

Ablation - the process by which ice and snow waste away owing to melting and evaporation.

Absolute Humidity - the actual weight of water vapor contained in a unit volume of the atmosphere.

Absorption - 1. The taking up of one substance into the body of another. 2. The entrance of water into the soil or rocks by all natural processes. It includes the infiltration of precipitation or snowmelt, gravity flow of streams into the valley alluvium (See Bank Storage) into sinkholes or other large openings, and the movement of atmospheric moisture.

Abyssal Zone - all of a sea, or a very deep lake below the bathyal zone. The primary energy source for this region lies far above in the euphotic zone; density of life depends on the amount of organic material that settles from the euphotic zone. (See Hadal Zone)

Acclimation - physiological and behavioral adjustments of an organism in response to a change in environment. (See Adaptation)

Acid - most commonly refers to a large class of chemicals having a sour taste in water, ability to dissolve certain metals, bases or alkalies to form salts and to turn certain acid-base indicators to their acid form. Characterized by the hydrated hydrogen ion.

Acidophilic - acid loving.

Acre-Foot - a unit for measuring the volume of water -- is equal to the quantity of water required to cover one acre to a depth of one foot and is equal to 43,560 cubic feet or 325,851 gallons.

Actinomycetes - filamentous microorganisms intermediate between the fungi and bacteria, although more closely related to the bacteria. These organisms are widely distributed in soils and are often conspicuous in lake and river mud. They are often associated with taste and odor problems in water supplies.

Activated Sludge - a process used for purification and stabilization of waste waters by mixing of the solids concentrate from previous contact with raw or settled wastewaters under turbulent oxygenating conditions for sufficient time to permit transfer of nutrients to the solids phase, partial biodegradation and clarification of the water before discharge.

Activity - here used as measure of rate of decay of a radioactive element. Each departure of proton, neutron, etc., from an atom of an element is a disintegration, an event that can be recorded instrumentally. So activity is an expression of the rate of radioactive disintegration, registered by counts,

as on a Geiger counter.

**Acute Toxicity** - any toxic effect that is produced within a short period of time, usually twenty-four to ninety-six hours. Although the effect most frequently considered is mortality, the end result of acute toxicity is not necessarily death. Any harmful biological effect may be the result. (See Chronic Toxicity, Direct Toxicity)

**Adaptation** - change in the structure, form or habits of an organism to better fit changed or existing environmental conditions. (See Acclimation)

**Adsorption** - 1. The taking up of one substance upon the surface of or interface zone of another substance. 2. The concentration of gases, dissolved materials, or ions on the surface of solid particles.

**Advanced Waste Treatment** - renovation of used water by biological, chemical or physical methods that are applied to upgrade water quality for specific reuse requirements. May include more efficient cleanup of a general nature or the removal of components that are inefficiently removed by conventional treatment processes.

**Advection** - the hydraulic mechanism by which water quality constituents are transported in the direction of the water flow.

**Aeration Period** - a theoretical time usually expressed in hours equal to the volume of the tank divided by the volumetric rate of flow.

**Aeration** - the process of adding air or other gases to, removing volatile constituents from, or mixing a liquid by intimate contact with air or other gases.

**Aeration Zone** - that portion of the lithosphere in which the functional interstices of permeable rock or earth are not (except temporarily) filled with water under hydrostatic pressure: that is, the interstices either are not filled with water or are filled with water that is held by capillarity.

**Aerobe** - organisms that can prosper only when oxygen is present more or less abundantly.

**Aerobic** - refers to life or processes occurring only in the presence of free oxygen; a condition characterized by an excess of free oxygen in the aquatic environment. (See Anaerobic)

**Aerobic Respiration** - a biochemical reaction in which materials combine with oxygen to produce energy. Synonymous with biological oxidation.

Afterbay - the tail race of a hydroelectric power plant at the outlet of the turbines. The term may be applied to a short stretch of stream or conduit, or to a pond or reservoir.

Agglomeration - an action by which small particles gather into larger particles that are more readily separated from the liquid by sedimentation or other means. May be the result of biological, chemical or physical factors.

Aggradation - raising of the stream bed due to settlement of moving sediment. This term is used for a "long term" (e.g. several years) process. Contrast with the term "deposition".

Aggressive Carbon Dioxide - the quantity of free carbon dioxide exceeding the equilibrium relationship of a bicarbonate solution, which is capable of "attacking" (i.e., dissolving) calcium carbonate and other substances.

Air Lift - a pump consisting of a vertical pipe immersed in a liquid into which air is mixed to reduce specific gravity of the air-liquid mixture. The net effect is to raise the liquid level in the discharge pipe.

Albedo - the portion of incoming radiation which is reflected by a surface.

Alga (pl. algae) - the simplest of all plant forms, having neither roots, stems, nor leaves. Algae range in size from microscopic single cells to branching forms one hundred feet or more in length. Usually aquatic, containing chlorophyll and capable of growth on mineral materials via energy from the sun. Algae forms the base of the food chain in aquatic environments. Some species may create a nuisance when environmental conditions are suitable for prolific growth. An algal bloom is a high concentration of a particular algal species; half of a million to one million cells per liter of water or more.

Algicide - a chemical highly toxic to algae. Algicides are often applied to water to control nuisance algal blooms.

Algology - the study of algae.

Algorithm - a rule or procedure for solving a logical or mathematical problem, frequently as incorporated into computer programs.

Alkali - certain soluble salts, principally of sodium, potassium, magnesium, and calcium that occur in water or soils.

Alkaline - water or soils which contain a sufficient amount of alkali substances present to raise the pH value above 7.0, or to be harmful to the growth of crops.

Alkalinity - 1. A term used to represent the content of carbonates, bicarbonates, hydroxides, and occasionally borates, silicates, and phosphates in water. It is expressed in mg/l of calcium carbonate. 2. The acid combining capacity of a (carbonate) solution, expressed in milliequivalents (the number of cc. of tenth normal HCl required to bring. 100 cc of the solution being investigated to the methyl orange endpoint).

Alkaliphobic - avoiding an alkaline reaction.

Allochthonous - pertaining to those substances, materials or organisms in a waterway which originate outside and are brought into the waterway. (See Autochthonous)

Alluvial Stream - a stream which flows within bed and banks that are composed of material which it transports. Such streams are sometimes referred to as "authors of their own geometry" because of the interaction between the stream's flow characteristics (hydraulic and hydrologic) and it's shape; both plan form and cross sectional (contrast with "geologic control").

Alluvial Fan - (See Delta)

Alum - a chemical substance (usually potassium aluminum sulfate) that is gelatinous when wet; used in water-treatment plants for settling out small particles of foreign matter.

Ambient - surrounding. In this handbook, a representative volume of surrounding receiving waters.

Amino Acid - an organic compound containing both amino and carboxyl groups.

Amperometric Chlorine Residual - a means of determining residual available chlorine with phenyl arsene oxide (PAO) titration using current response as an indicator of equivalence. For wastewater, the PAO preferably is used in excess with iodine backtitration.

Amphibious Organism - an organism adapted for life on land or in water.

Anabolism - synthesis or manufacture of organic compounds within an organism. (See Metabolism)

Anabranh - a diverging branch of a river which reenters the main stream.

Anadromous - pertaining to fishes that spend most of their life in salt water but enter freshwater to spawn; e.g., salmon, shad, striped bass, etc. (See Catadromous)

Anaerobe - an organism that grows in the absence of molecular oxygen.

Anaerobic - a condition in which dissolved oxygen is not detectable in the aquatic environment. Commonly characterized by the formation of reduced compounds from the use of bound oxygen from sulfates, carbonates, or other oxygen-containing compounds as an hydrogen acceptor. (See Aerobic)

Anchor Ice - ice in the bed of a stream or upon a submerged body or structure.

Anemometers - instruments used in measuring wind velocity.

Anion - a negatively charged ion in water solution. May be a single element or a combination of elements, such as the chloride ion in a water solution of common table salt or sulfate ion in a sulfuric acid solution.

Anisotropy - directional variation of a physical property at a point in the porous medium.

Annelids - segmented worms, as distinguished from the nonsegmented roundworms and flatworms. Most are marine; however, many live in soil or fresh water. Aquatic forms may establish dense populations in the presence of rich organic deposits. Common examples of segmented worms are earthworms, sludgeworms, sandworms, and leeches.

Annual Crop - the total weight or number of living organisms produced in a community over the course of a year. The annual crop is used as a measure of the community's productivity. (See Standing Crop)

Annual Flood - the highest peak discharge in a water year. An annual flood series is a list of annual floods.

Antagonism - reduction of the effect of one substance because of the introduction or presence of another substance; e.g., one substance may hinder, or counteract, the toxic influence of another. (See Synergism)

Antecedent Precipitation Index (API) - this is an index that is based upon preceding precipitation. It may be the total amount during a period or some factor of the total during the period. The API is often used as an index of basin wetness.

Anthropogenic – indicative of, made, or caused by human activity or actions.

Anticyclones - an area of relatively high pressure in which the winds tend to blow spirally outward in a clockwise direction in the Northern Hemisphere.

Aphotic Zone - that portion of a body of water to which light does not penetrate with sufficient intensity to have any biological significance. (See Euphotic Zone)

API - (See Antecedent Precipitation Index)

Aquatic - living in water.

Aquiclude - a body of earth material of low permeability, which can absorb water but cannot transmit it at a rate sufficient for economic extraction by wells. Appreciably greater transmissivity than an aquifuge but less transmissivity than an aquitard.

Aquifer - a subsurface water bearing unit that transmits water rapidly enough to supply useful quantities to springs and wells. Sand and gravel aquifers are characterized by innumerable spaces around and among the grains. Water is stored in and moves through those spaces. Limestone may have intergranular spaces but commonly stores and transmits water in small to cavernously large openings formed by solution. Lavas, especially basalt, store and transmit water in cracks and in boundary zones of rubble between successive flows of lava.

Aquifuge - a body of earth material which is impervious i.e., virtually no transmissivity, and nonabsorptive.

Aquitard - a body of earth material which has appreciably greater transmissivity than an aquiclude but considerably less transmissivity than an aquifer.

Area-Capacity Curve - a graph showing the relation between the surface area of the water in a reservoir, the corresponding volume, and 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 precipitation is so deficient in quantity, or occurs at such times, that agriculture is impracticable without irrigation.

Armoring - the process of progressive coarsening of the bed layer by removal of fine particles until it becomes resistant to scour. The coarse layer that remains on the surface is termed the "armor layer". Armoring is a temporary condition; higher flows may destroy an armor layer and it may re-form as flows decrease.

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

Artesian Aquifer - an aquifer in which the water is under sufficient head to cause it to rise above the zone of saturation at that place if opportunity were afforded to do so.

Artesian Groundwater - groundwater confined under an aquiclude or an aquifuge, so that water rises in a nonpumping well which penetrates it.

Artificial Control - a weir or other man-made structure which serves as the control for a stream-gaging station.

Artificial Substrate - a device placed in the water (for a specified period of time) that provides living spaces for a multiplicity of organisms; e.g., glass slides, concrete blocks, multiplate samplers, rock baskets, etc. The primary purpose of artificial substrates is to allow the investigator to collect organisms in areas where the physical habitat is limiting or cannot be adequately sampled using conventional methods.

Aspect - the direction toward which a sloping land area faces.

Assessment - a legal financial obligation of the property owner in an irrigation, water, drainage or sanitary district, created for the purpose of financing the construction and operation of facilities required to protect and enhance public benefit within the district.

Assimilation - 1. Removal of dissolved or suspended materials from a water mass by biological, chemical and physical processes. 2. Conversion or incorporation of absorbed nutrients into body substances. (See Synthesis)

Association - all organisms occupying a given habitat.

Atmometers - instruments used for studies of evaporation from plants, and having special surfaces which are kept moist and from which the water loss is recorded.

Atoll - large, thick, coral mass encircling a lagoon in tropical oceans; sometimes portions of the reef become built up with sand, silt, soil and vegetation to become an island. (See Barrier Reef, Fringing Reef)

Atom - an extremely small unit or particle of an element consisting of a positively charged nucleus and one or more negatively charged electrons. Atoms of different elements are different in mass and the number of electrons.

Electrons may be located in the nucleus or externally. The external electrons determine chemical combining power.

Atomic Weight - a relative mass of an atom of an element compared to carbon-12. May be expressed in grams, pounds or other consistent weight units when used for process control.

Attached Growth - plant or animal growth that tends to seek a solid surface for a point of attachment from which to grow, in contrast with freeswimming or suspended organisms.

Aufwuchs - (See Periphyton)

Augmentation of Flow - the release of water from dam-controlled reservoirs when stream level is low.

Autochthonous - pertaining to those substances, materials, or organisms originating within a particular waterway and remaining in that waterway. (See Allochthonous)

Autotroph - a microorganism that uses only inorganic materials as a source of nutrients; CO<sub>2</sub> is the sole source of carbon.

Autotrophic (Holophytic) - self nourishing; denoting those organisms that do not require an external source of organic material but can utilize light energy and manufacture their own food from inorganic materials; e.g., green plants, pigmented flagellates. (See Heterotrophic)

Autumn Overturn - the mixing of the entire water mass of a lake in the autumn.

Available Residual Chlorine - generally refers to that part of the chlorine that will react with ortho-toluidine or amperometric tests and exhibits significant germicidal activity.

Average Discharge - the arithmetic average of all complete water years of record whether or not they are consecutive. The term "average" is generally reserved for average of record and "mean" is used for averages of shorter periods, namely, daily mean discharge.

Avulsion - a rapid change in channel direction and form that occurs during catastrophic, rare floods.

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

Backwater Curve - the longitudinal profile of the water surface in an open channel, when the water surface is not parallel to the invert owing to the



depth of water having been increased by the interposition of an obstruction such as a dam or weir. The term is sometimes used in a generic sense to denote all water surface profiles; or for profiles where the water is flowing at depths greater than the critical.

Bacteria - primitive organisms having some of the features of plants and animals. Generally included among the fungi. Usually do not contain chlorophyll, hence commonly require preformed organic nutrients among their foods. May exist as single cells, groups, filaments, or colonies. Simple, colorless one-celled plants, most of which are unable to manufacture their own food using sunlight. Although some bacteria cause diseases, others fill an indispensable ecological role as decomposers. Aerobic bacteria require free (elementary) oxygen for their growth. Anaerobic bacteria grow in the absence of free oxygen and derive oxygen from breaking down complex substances.

Bactericide - any component that will kill or destroy bacteria.

Bacteriology - (See Microbiology)

Bacteriostatic - a condition during which the normal metabolic functions of bacteria are arrested until favorable conditions are restored.

Baffle - a deflector or check such as a vane, guide boards, plates, grids, grating, or similar devices used to control the flow distribution or velocity of liquid in a channel or basin.

Baghouse – A fabric device used to remove particulate air pollutants from industrial process air streams.

Bank Storage - water absorbed and stored in the voids in the soil cover in the bed and banks of a stream, lake, or reservoir, and returned in whole or in part as the level of the surface of the water body falls.

Bank - the margins of a channel. Banks are called right or left as viewed facing in the direction of the flow.

Bankfull Stage - stage at which a stream first overflows its natural banks. Bankfull stage is a hydraulic term, whereas flood stage implies damage. (See Flood Stage)

Bar Racks (Screens) - a coarse screen usually consisting of bars spaced with one to five inch openings to trap roots, branches, rocks, rags, and other large materials that may be encountered in the flow of a channel or conduit.

Barometric Efficiency - ratio of the atmospheric pressure induced change in water level in a well to the corresponding change in atmospheric pressure,

both expressed in the same units.

Barothermograph - an instrument which records simultaneous barometric pressure and temperature on the same chart.

Barrier Beach - a ridge of deposits separated from the mainland by an interval of water.

Barrier Boundary - surface across which there is little or no flow. Folds, faults, groundwater divides, aquicludes and aquifuges often form barrier boundaries.

Barrier Reef - large, thick, coral mass more or less surrounding an island or paralleling the mainland shore in tropical areas; separated from the land mass by a lagoon. (See Atoll, Fringing Reef)

Base Flow - the sustained flow, contributed largely from groundwater, which apparently does not change materially during the duration of a flood. Usually arbitrarily estimated by connecting the low flow portion of the hydrograph before a flood to the slowly receding portion of the hydrograph after the flood when surface runoff has largely ceased. (See Groundwater Runoff, Direct Runoff)

Base-Load Plant - a hydroelectric plant which is designed to supply power to meet the base load and operates essentially at a constant load, thus having a high plant factor.

Basin (Watershed) - the region drained by one stream. Also a basin area separated from adjacent areas by ridges or mountain ranges.

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.

Bathyal Zone - region of the sea that extends from the euphotic zone to the bottom of the continental slope. Density of life in this zone depends on organic material settling from the euphotic zone and is generally inversely proportional to the depth.

Beach - the zone of demarcation between land and water of lakes, seas, etc.; covered by sand, gravel or larger rock fragments.

Bed Forms - irregularities found on the bottom (bed) of a stream that are related to flow characteristics. They are given names such as "dunes", "ripples", and "antidunes". They are related to the transport of sediment and interact with the flow because they change the roughness of the streambed. An

analog to streambed forms are desert sand dunes (although the physical mechanisms for their creation and movement may be different).

Bed Layer - an arbitrary term used in various procedures for computation of sediment transport. From observation of slow motion movies of laboratory flume experiments, H. Einstein defined the "bed layer" as: "A flow layer, 2 grain diameters thick, immediately above the bed. The thickness of the bed layer varies with the particle size."

Bed Load - 1. "Bed particles moving in the bed layer. Sand, silt, gravel, or soil and rock detritus carried by a stream on or immediately above its bed. The particles of this material have a density or grain size such as to preclude movement far above or for a long distance out of contact with the streambed under natural conditions of flow. This motion occurs by rolling, sliding, and, sometimes by jumping." (H. Einstein). The term "saltation" is sometimes used in place of Einstein's "jumping". Bed load is bed material that moves in continuous contact with the bed; contrast with "suspended load".  
2. Generally refers to the oxygen demand requirements of benthic deposits, sludge, muck, attached growths, moving materials, living or dead that are exerted upon waters as a result of bottom or boundary dynamics.

Bed Load Discharge - the rate at which bed load passes a particular point (cross section). Usually presented in units of tons per day. May be measured or computed.

Bed Material Load - the total rate (tons/day) at which bed material is transported by a given flow at a given location on a stream. It consists of bed material moving both as bed load and suspended load. Contrast with "wash load".

Bench - a name applied to ledges that are shaped like steps or terraces cut into the side of hills in the removal of coal.

Beneficial Use - the use of water for some purpose from which benefits are derived. Such use includes domestic, irrigation, development of hydroelectric power, industrial, etc. The term benefits is variable with locality and custom, and what constitutes beneficial use is often defined by statute or in decisions of the courts.

Benthos - refers to the accumulated deposition of cell mass living or dead that collects at the bottom of a body of water. Bottom-dwelling organisms include: (1) sessile animals such as sponges, barnacles, mussels, oysters, worms, and attached algae; (2) creeping forms such as snails, worms and insects; (3) burrowing forms, which include clams, worms, and some insects; and (4) fish whose habits are more closely associated with the benthic region than other zones e.g., flounders.

Benthic Region (Benthal) - the bottom of all waters; the substratum that supports the benthos.

Bioaccumulation (also Bioconcentration) – The buildup of materials within the food chain that bind themselves to biomass and cannot be flushed by normal biological processes. Typical bioaccumulating materials are heavy metals such as mercury and lead or organic chemicals such as DDT.

Bioassay - a test using a species of fish adaptable to laboratory conditions which consists essentially of preparing various concentrations of a waste with selected dilution and observing the reaction of the test fish over a definite time period. The fish which are used are normally fathead minnows or bluegill sunfish. The dilution water is normally water from the receiving stream into which the waste will be discharged.

Bio-Filter - (See Trickling Filter)

Biofilm – (See Attached Growth)

Biochemical - resulting from the combined activities of biological and chemical transformations. Usually measured in terms of the ensuing chemical changes.

Biochemical Oxygen Demand (BOD) - the quantity of oxygen utilized in the biochemical oxidation of non living organic matter by microorganisms, such as bacteria, in a specified time and at a specified temperature. It is not related to the oxygen requirements in chemical combustion, being determined entirely by the availability of the material as a biological food and by the amount of oxygen utilized by the microorganisms during oxidation. A high BOD may temporarily, or permanently, so deplete oxygen in water as to kill aquatic life. The determination of BOD is perhaps most useful in evaluating impact of wastewater on the receiving water bodies.

Biocoenosis - a community of organisms whose composition and aspect is determined by the properties of the environment and by the relations of the organisms to each other.

Biodegradable - a substance that is capable of being readily decomposed by biological means, especially by bacterial action.

Biodegradation - the stabilization of wastewater contaminants by biological conversion of pollutants into separatable materials at a higher oxidation state.

Biological Control - 1. Use of natural predators, parasites or viruses to

reduce or eliminate pest organisms; e.g., use of gambusia to feed on mosquito larvae; 2. Control of organisms by interference with their physiological processes; e.g., sterilization of male flies.

Biological Processes - activities of living organisms to sustain life, growth, and reproduction. Commonly the processes by which organisms degrade complex organic material into simpler substances at a higher oxidation state to obtain energy for life processes and growth of new cell mass.

Biology - the science and study of living organisms, characteristics and behavior.

Biomass - the weight of all life in a specified unit of environment or an expression of the total mass or weight of a given population, both plant and animal.

Biomonitoring - 1. Continuous surveillance of an effluent (or dilution thereof) by using living organisms to test its suitability for discharge into a receiving water. 2. Use of living organisms to test the quality of a receiving water downstream from a waste discharge. (See Bioassay)

Biota - living things; the plant and animal life of a region.

Biotic Factors (Biological Factors) - in ecology, those environmental factors which are the result of living organisms and their activities; distinct from physical and chemical factors; e.g., competition, predation, etc. (See Ecological Factor)

Biotic Potential - the inherent capability of an animal to multiply in an unrestricted environment. (See Environmental Resistance)

Biotope - the totality of the environmental conditions under which a biocoenosis exists. (See Habitat)

Biosynthesis (See Anabolism)

Bit - a basic unit of computer storage, symbolically capable of representing only a "one" or a "zero".

Bivalve - an animal with a hinged two-valve shell; examples are the clam and oyster.

Blood Gills - fleshy protuberances permeated by blood vessels and found on the bodies of many aquatic animals. They function as gills by allowing gases to pass into and out of the blood as they move across the thin walls of the protuberances.

Bloodworms - midge fly larvae. Many of the species have hemoglobin in the blood causing a red color and are often associated with rich organic deposits. Also, the common name for certain of the marine segmented worms (class polychaeta). (See Sludgeworms)

Bloom - a readily visible concentrated growth or aggregation of minute organisms, usually algae, in bodies of water.

Blue-Green Algae - a group of algae with a blue pigment, in addition to the green chlorophyll. A stench is often associated with the decomposition of dense blooms of blue-green algae in fertile lakes.

BOD - abbreviation for Biochemical Oxygen Demand.

Boundary Conditions - the conditions around the spatial boundary of a problem area, which govern its solution. Here, the forces applied at the receiving waters' boundaries, and the flows crossing them.

Boundary Roughness - the roughness of the bed and banks of a stream or river. The greater the roughness, the greater the frictional resistance to flow; and, hence, the greater the water surface elevation for any given discharge.

Brackish Waters - those areas where there is a mixture of fresh and saltwater; or the salt content is greater than freshwater but less than seawater; or the salt content is greater than in seawater.

Braiding Stream - successive division and rejoining of riverflow with accompanying islands is the important characteristic denoted by the synonymous terms, braided or anastomosing stream. A braided stream is composed of anabranches.

Bridging - a condition in which particulates or solids concentrates that would normally seek the lowest level of a restricted channel or basin, tend to hang up on sidewalls. The bridged material commonly may settle again with vibration, agitation, a change in flow direction, or increased flow velocity.

British Thermal Unit (BTU) - that amount of heat that will raise the temperature of one pound of water one degree Fahrenheit.

Buffer - a mixture of weak acids and their salts which (in solution) are extensively able to equalize changes in the chemical reaction. In surface water, the primary buffer action is related to carbon dioxide, bicarbonate and carbonate equilibria.

Bulking - a condition, usually related to activated sludge processing, in

which the sludge solids separation from the liquids is inhibited. Rapid growth, filamentous organisms, and certain other factors that are but vaguely understood, tend to produce a low density thin sludge that settles very slowly and has limited compactability.

Buoyancy - the loss in weight of a body when immersed in a fluid, due to the resultant upward pressure exerted by the fluid on a body wholly or partly immersed in it.

Burner, Waste Gas - a device for burning the excess gas from sludge digestion.

Byte - a few bits (typically 6 or 8, depending upon the computer) of computer storage, required to store one character. (See Bit)

Calibration - the procedure of assigning values to the uncertain or unknown parameters in simulation model so predictions will correspond acceptably close to observed prototype behavior.

Calorie - that amount of heat required to raise one gram of water one degree Centigrade, or Celsius.

Capillarity - 1. The degree to which a material containing minute openings or passages, when immersed in a liquid, will draw the surface of the liquid above the hydrostatic level. Unless otherwise defined, the liquid is generally assumed to be water. 2. The phenomenon by which water is 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 water and the attraction of the molecules of water for one another.

Capillary Fringe - the belt of subsurface water held above the zone of saturation by capillary action. Materials having only subcapillary interstices are impermeable and are not regarded as having a capillary fringe. In materials whose interstices are supercapillary, the capillary fringe is practically absent. Its thickness is usually determined as the upper limit of the capillary rise of water.

Capillary Potential - it is the work required to move a unit mass of water from the reference plane to any point in the soil column.

Capillary Water - portion of soil water held by surface tension as a continuous film around particles and in capillary voids. Water in the capillary zone.

Carbohydrates - naturally occurring compounds consisting of carbon, hydrogen and oxygen, that are considered as energy foods and precursors of proteins and fats in the natural food chain.

Carbonaceous BOD (CBOD) – That portion of BOD due to organic materials in a water sample.

Carbonic Acid of Equilibrium - that quantity of free carbon dioxide necessary to prevent the precipitation of calcium carbonate from a solution of calcium bicarbonate.

Carnivore - an animal that lives by eating the flesh of other animals. (See Herbivore)

Carrying Capacity - the upper limit on the number of individuals of a particular kind of animal that can be supported within a given unit of habitat, such as an area of a stream.

Catabolism - the breakdown of organic compounds within an organism. (See Metabolism)

Catadromous - pertaining to fish that feed and grow in fresh water, but return to the sea to spawn. The best known example is the american eel.

Catalyst - a substance that influences the rate of chemical change but either remains unchanged during the reaction or is regenerated thereafter. Generally applies to acceleration of reaction rates.

Catastrophic Drift - massive drift of bottom organisms under conditions of stress such as floods or toxicity. (See Drift Organisms, Incidental Drift, Periodic Drift)

Catch Basin - a chamber, well or other enlargement of a channel, designed to retain grit and detritus below the point of liquid overflow.

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 Drainage Basin, Basin, Watershed)

Cation - a positively charged ion in water solution. May be a single element or a combination of elements, such as sodium ion in a water solution of common table salt.

Celsius, Degrees (°C) - a temperature scale based on one hundred equal division (degrees) between the freezing temperature of water (taken as 0°C) and the sea-level boiling temperature (taken as 100°C). Named for Anders Celsius, an 18th century Swedish astronomer who devised the scale.

Centi - an expression used to indicate 1/100 of a given standard unit centimeter (cm). 1/100 meter.



Centigrade - a temperature measurement scale in which the freezing point of pure water at sea level is designated as 0°C and the temperature of boiling water is designated as 100°C. This is more properly termed the Celsius scale.

Centrifugal Pump - a pump consisting of a rotating impeller within a casing having an inlet near the center and an outlet at the tip of the impeller where centrifugal force is greatest.

Centrifuge - a device for separation of solids or liquids of different densities by rotational energy; heavy materials move outward, less dense materials move toward a central takeoff port.

Cercariae - the tailed, immature stage of a parasitic flatworm.

Cfs - abbreviation of cubic feet per second.

Cfs-day - the volume of water represented by a flow of one cubic foot per second for 24 hours. It equals 86,400 cubic feet, 1.983471 acre feet, or 646,317 gallons. May be abbreviated sfd.

Cfsm (cu. ft./sec./sq. mi.) - 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 csm.

Channel (Watercourse) - an open conduit either naturally or artificially created 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. Natural channels may be single or braided (See Braiding of River Channels). Canal and floodway are some of the terms used to describe artificial channels.

Channel Control - when the stage-discharge relation is governed by the slope, size, and roughness of the channel over a considerable distance the station is then under channel control.

Channel Inflow - water, which at any instant, is flowing into the channel system from surface flow, subsurface flow, base flow, and rainfall direct on the channel.

Channel Storage - the volume of water at a given time in the channel or over the flood plain of the streams in a drainage basin or river reach. Channel storage is great during the progress of a flood event.

Channeling - a condition in which certain portions of the flow within a channel or basin tend to seek a more limited distribution than that resulting

from the confining bed or sidewalls, i.e., the flow may channel along the top, bottom or midchannel depth due to density, temperature, or some form of obstruction to uniform cross sectional flow.

Chara - a family of algae possessing cylindrical whorled branches. The plants grow only in hard water, from the bottom, and usually have a coating of lime that can be felt between the fingers. Chara should not be confused with submerged higher aquatic plants.

Check Valve (Flap Gate) - a device to control flow in a pipe or channel limiting it to one direction. Commonly a gate hinged at the top that is limited in movement by a seat in a near vertical position so that it can open for flow in one direction but closed by reverse flow.

Chemical Oxygen Demand (COD) - the amount of oxygen required for the chemical oxidation of organics in a liquid. A quick (and only approximate) measure of loads of oxidizable matter in water. Results cannot be used interchangeably with BOD values. However, COD can quickly identify water with very low or very high BOD potential.

Chemical Stratification - a layering of water in a lake because of density differences owing to the varying or differential concentrations of dissolved substances with depth. (See Stratification)

Chemistry - a science that deals with the composition and characteristics of substances and their behavior, i.e., the transformations that they undergo.

Chemoautotroph – an organism utilizing inorganic carbon (carbon dioxide or carbonate ions) for synthesis and inorganic chemical reactions for energy.

Chemosynthesis - the synthesis of organic matter from mineral substances with the aid of chemical energy (in contrast to photosynthesis).

Chinook - a downslope wind in which the air is warmed by adiabatic heating.

Chloramines - products of the combination of chlorine and ammonia. Commonly classified as combined available chlorine.

Chlorination Chamber - a basin or tank where chlorine is applied to the liquid.

Chlorination - the application of chlorine to water or wastewater for the purposes of disinfection, oxidation, odor control, or other effects.

Pre-chlorination - before treatment; post-chlorination - after treatment; in-process chlorination - during treatment.

Chlorine - a greenish yellow gaseous element having strong disinfecting and oxidizing properties in water solution. It is commercially available as compressed gas, liquid, or in combined form as a powder. It is highly toxic and irritating to skin, eyes, and lungs in significant concentrations.

Chlorine Demand - the difference between applied chlorine and residual available chlorine in aqueous media under specified conditions and contact time. Chlorine demand varies with dosage, time, temperature, nature and amount of the water impurities

Chlorine Residual - chlorine concentration in excess of the chlorine demand.

Chlorine Test - commonly refers to one of two methods separately listed: (1) ortho-toluidine test; and (2) amperometric test.

Chloro Organic Compounds - a broad group of compounds containing chlorine, carbon, hydrogen and sometimes other elements. Generally originating from or associated with living or dead organic materials. This group shows a wide range of toxicities but usually have relatively little oxidizing energy compared to chlorine.

Chlorophyll - green photosynthetic pigment present in many plant and some bacterial cells. There are seven known types of chlorophyll; the green coloring material or pigment in plants that promotes the photo synthetic reactions forming organic materials from inorganic nutrients and light energy within the living cells.

Chronic Toxicity - toxicity, marked by a long duration, that produces an adverse effect on organisms. The end result of chronic toxicity can be death although the usual effects are sublethal; e.g., inhibits reproduction, reduces growth, etc. These effects are reflected by changes in the productivity and population structure of the community. (See Acute Toxicity)

Clarifier - a basin or chamber serving as an enlargement of a channel to reduce flow velocity sufficiently to permit separation of settleable or floatable materials from the carrier water (a sedimentation basin).

Clark Method - a unit hydrograph method that routes the runoff from incremental portions of the basin to the discharge site. The routing is based upon McCarthy's Muskingum routing equation with the routing constants being developed from the recession of actual hydrographs.

Classification - the placing of organisms into groups (or categories) according to established scientific requirements. (See Taxonomy)

Clean Water Association - an association of organisms found in natural,

unpolluted environment. These associations are characterized by the presence of species that are sensitive to environmental changes caused by introduction of pollutants. In many cases the presence of a wide variety of species with relatively few individuals representing any one of them is also a characteristic. (See Sensitive Organisms, Tolerant Association)

Climate - the sum of the meteorological phenomena that characterizes average and extreme conditions 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.

Climatic Year - a continuous twelve-month period during which a complete annual cycle occurs, arbitrarily selected for the presentation of data relative to hydrologic or meteorologic phenomena. The climatic year is usually designated by the calendar year during which most of the twelve months occur. (See Water Year)

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.

Cloudburst - a torrential downpour of rain, which by its spottiness and relatively high intensity suggests the bursting and discharge of a whole cloud at once.

Coagulant - a material, which, when added to sewage or water, will combine with certain substances ordinarily present and form a precipitate comprising floc particles more or less gelatinous in character having the capacity to remove colloids from sewage or water. Coagulation is the process of modifying chemical, physical, or biological conditions to cause flocculation or agglomeration of particulates.

Coarse or Rough Fish - species of fish considered to be of poor fighting quality when taken on tackle, and of poor food quality. These fish may be undesirable in a given situation, but at times may be classified differently, depending upon their usefulness. Examples include carp, goldfish, gar, sucker, bowfin, gizzard shad, goldeneye, mooneye, and certain kinds of catfish.

Coastal Waters - those waters surrounding the continent which exert a measurable influence on uses of the land and on its ecology. The great lakes and the waters to the edge of the continental shelf.

Coastal Zone - coastal waters and adjacent lands which exert a measurable influence on the uses of the sea and its ecology. The zone extends onshore to

the upper reaches of the tidal zone and adjacent shore areas. (See Estuary)

COD - abbreviation for Chemical Oxygen Demand.

Coefficient of Roughness (N) - a coefficient, usually varying from .010 to .200, used in the Manning or Kutter formula to express the comparative roughness of the streambed and effect of internal turbulence.

Coefficient of Vertical Permeability - rate of vertical flow of water in gallons per day through a horizontal cross-sectional area of one square foot of confining bed under hydraulic gradient of one foot per foot at prevailing water temperature.

Coelenterate - a group of aquatic animals that have gelatinous bodies, tentacles, and stinging cells. These animals occur in great variety and abundance in the sea and are represented in fresh water by a few types. Examples are hydra, corals, sea-anemones, and jellyfish.

Cold-Blooded Animals (Poikilothermic Animals) - animals that lack a temperature regulating mechanism that offsets external temperature changes. Their temperature fluctuates to a large degree with that of their environment. Examples are fish, shellfish, and aquatic insects.

Coliform Bacteria - a large and varied group of bacteria. The fecal coliform bacteria flourish in the intestinal tract of warm blooded animals, including man. *Escherichia coli* (*E. coli*) is largely of fecal origin and has been the indicator organism most commonly cited as indicating sewage or feedlot pollution. The coliforms apparently do not themselves cause disease, but their presence in water suggest that disease causing organisms (pathogens) may also be present. Coliform bacteria are used as indicators of pollution because they are abundant and their presence is fairly easy to detect. The *coli-aerogenes* group is also among indicator organisms and is not usually distinguished from other fecal coliforms. Fecal streptococci and enteric viruses are pathogens found in animal waters. Methods for their identification in water remain provisional. The presence of fecal coliform bacteria suggests that streptococci and viruses may be present -- hence the concern over danger of infection whenever large numbers of fecal coliform bacteria are detected in water. (See Most Probable Number)

Collection System - the sewerage collection system is comprised of the conduits controlled by public agencies to intercept house, commercial or industrial discharges and transport them to a treatment facility or discharge point.

Colloid - a state of suspension in which the particulate or insoluble material is in a finely divided form that remains dispersed in the liquid for extended

time periods. Usually cloudy or turbid suspensions requiring flocculation before clarification.

Colony - a distinguishable localized population within a species.

Combined Available Chlorine - generally refers to chlorine-ammonia compounds exhibiting a slower reaction with ortho toluidine, determinable with phenyl arsene oxide after addition of potassium iodide under acid conditions and usually requires higher concentration and longer time to kill in comparison with free available chlorine.

Combined Sewage - consists of household, commercial or industrial wastes in combination with roof and surface storm drainage.

Combined Sewer - a sewer designed to carry wastewaters and storm waters in the same channel.

Comminution - 1. The act of cutting and screening materials contained in wastewaters. 2. To reduce the size of fibrous or amorphous materials.

Comminutor - a device for cutting sewage solids until they pass through an acceptable screen opening to improve pumping and wastewater processing.

Community - all the plants and animals in a particular habitat that are bound together by food chains and other interrelations.

Compensation Depth - the depth of water at which oxygen production by photosynthesis balances oxygen uptake by respiration of plants and animals. The depth is usually where light intensity is reduced to about one percent of the surface light.

Competition Exclusion Principle (Gause's Rule) - no two species can occupy the same niche (environmental resources) at the same time.

Compiler - a programmed component of a computer, which converts sophisticated programming language into elementary instructions and binary code.

Composite Hydrograph - a stream discharge hydrograph which includes base flow, or one which corresponds to a net rainstorm of duration longer than one unit period.

Composting – the controlled aerobic degradation of organic wastes in a material that can be used as a soil amendment.

Compound - 1. A combination of two or more atoms having definite physical and chemical characteristics and mutually attracted to each other. 2. Atoms in

the elemental state are electrically neutral but the number of external electrons may be increased or decreased in response to conditions and nature of the atom. An atom that becomes electrically charged may combine with another atom of opposite charge to form an electrically neutral compound.

Concentration - 1. The act of increasing the mass per unit volume of one substance with respect to another, such as concentrating the solids in a sludge from three percent to six percent. 2. A means of designating the ratio of one substance with respect to another, such as 15 mg of suspended solids per liter of water. 3. Sediment concentration is usually presented as the ratio of dry weight of sediment to the total weight of the water sediment mixture.

Concentration Time - 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. It is not a constant, but varies with depth of flow and condition of channel. The time when the rate of runoff equals the rate of rainfall of a storm of uniform intensity. (See Time of Concentration)

Concordant Flows - flows at different points in a river system that have the same recurrence interval, or the same frequency of occurrence. It is most often applied to floodflows.

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

Conditioning - an action of improving possibilities for subsequent processing such as chemical treatment to improve sludge dewatering or filtering.

Cone of Influence - the depression, roughly conical in shape, produced in a water table, or other piezometric 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 - aquifer which contains water under sufficient pressure that water levels in wells tapping it rise above the bottom of the confining bed.

Confined Groundwater - groundwater held under an aquiclude or an aquifuge called artesian if the pressure is positive.

Confluence - the point at which one stream flows into another or where two streams converge and unite.

Coning - a condition in a clarifier sludge hopper where the solids concentrate or sludge is partially withdrawn to form a cone or channel through which clarified liquid is pumped out while most of the solids remain behind around the cone. Infrequent sludge pumping tends to encourage this condition where

the sludge tends to solidify and is resistant to fluid flow.

Conjunctive Use - planned management of surface and groundwater resources as a single, interlocking system.

Connate Water - 1. Water that has been out of contact with the atmosphere for a relatively long period of time. 2. Water present in rock at its formation and is frequently saline.

Conservation Storage - storage of water for later release for useful purposes such as municipal water supply, power, or irrigation in contrast with storage capacity used for flood control.

Conservative - a conservative constituent is one for which the concentration is directly related to the extent of dilution, i.e., the substance is not decomposed, altered chemically, or removed physically as a result of natural processes.

Constituent - a physical, chemical or biological quantity whose presence in water is a factor in, or indicator of, water quality.

Consumers - organisms which feed upon other organisms; often divided into primary consumers (herbivores), secondary consumers (carnivores which eat primary consumers), etc. (See Heterotrophic, Trophic Level, Decomposers, Food Chain, Herbivore, Omnivore, Primary Producers)

Consumptive Use - 1. water absorbed by the crop and transpired or used directly in the building of plant tissue together with that evaporated from the cropped area. 2. water transpired and evaporated from a cropped area or the normal loss of water from the soil by evaporation and plant transpiration. 3. water discharged to the atmosphere or incorporated in the products of the process in connection with vegetative growth, food processing, or an industrial process.

Contamination - a general term referring to the introduction of materials into water that makes the water less desirable for its intended use. Also introduction of undesired substances into air, solutions, or other defined media (chemical or biological).

Contents - 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.

Continental Shelf - the shallow, gently sloping portion of the seabottom bordering a continent, down to a depth of about 200 m.



Continental Slope - the steeply sloping portion of the seabottom extending seaward from the continental shelf.

Continuous Model - a model which simulates continuously varying processes over a long period of time, typically many years.

Control - a natural constriction of the channel, a long reach of the channel, a stretch of rapids, or an artificial structure downstream from a gaging station that determines the stage discharge relation at the gage. A control may be complete or partial. A complete control exists where the stage discharge relation at a gaging station is entirely independent of fluctuations in stage downstream from the control. A partial control exists where downstream fluctuations have some effect upon the stage discharge relation at a gaging station. A control, either partial or complete, may also be shifting. Most natural controls are shifting to a degree, but a shifting control exists where the stage discharge relation experiences frequent changes owing to impermanent bed or banks.

Controlled and Uncontrolled Spillways - many types and plans of spillways are used to conform with advantages and requirements of various dam and reservoir sites. A spillway is designated as an "uncontrolled" type when there are no gates, stoplogs, or other means of preventing free overflow when the reservoir exceeds the crest elevation; the terms "ungated" or "free overflow" are commonly used in the same sense. A "controlled" spillway type is equipped with crest gates, stoplogs, or other movable structures to permit various degrees of variation in outflow rates when reservoir levels exceed the spillway crest elevation; the term "gated" is usually supplemented with information to identify the structural or mechanical type of gate involved.

Convection - 1. 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.  
2. Movements of particles in a liquid as a result of changes in density.

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.

Coral - a marine member of the phylum coelenterata which secretes a hard exoskeleton, chiefly of calcium carbonate. A coral reef is a large coral mass associated with coastal areas in the tropics. (See Barrier Reef, Fringing Reef, Atoll)

Correlation - the process of establishing a relation between a dependent

variable and one or more related independent variables. Correlation is simple if there is only one independent variable; multiple, if there is more than one independent variable.

Cosmopolitan - (See Ubiquitous)

Coupled Constituent - a constituent whose nonconservative behavior is affected by the presence of a second constituent. (See Nonconservative Constituent)

Creek - a small stream of water which serves as the natural drainage course for a drainage basin of nominal or small size. The term is a relative one as to size, some creeks in the humid section would be called rivers if they occurred in the arid portion.

Crest - 1. The top of a dam, dike, spillway, or weir, to which water must rise before passing over the structure. 2. The summit or highest point of a wave. 3. The highest elevation reached by flood waters flowing in a channel. A crest gage can be used to obtain a record of flood crests at sites where recording gages are not installed.

Criterion (pl. Criteria) - something which can be measured. Commonly used as a basis for standards. (See Water Quality Criteria)

Critical Depth - the depth of water flowing in an open channel or conduit, partially filled, corresponding to one of the recognized critical velocities.

Critical Flow - a condition of flow where the mean velocity is at one of the critical values; ordinarily at Belanger's critical depth and velocity. Another important usage is in reference to Reynolds' critical velocities which define the point at which the flow changes from streamline or nonturbulent to turbulent flow.

Critical Level - (See Threshold)

Critical Period - the actual period in a sequential record, either historical or simulated, which requires the largest volume from storage to provide a specified yield. The critical period is often taken as time from beginning of storage utilization to the time that the conservation pool refills during the period when the reservoir is drawn down to its lowest level. The period from beginning of storage utilization to minimum pool level is referred to as the critical drawdown period.

Critical Range - in bioassays, the range of magnitude of any factor between the maximum level or concentration at which no organisms die to the minimum level or concentration at which all organisms die under a given set of conditions in a given period of time.

Cross Connection - in plumbing, a physical connection between two different water systems, such as between potable and polluted water lines.

Cross Section - depicts the shape of the channel in which a streamflows. Measured by surveying the stream bed elevation across the stream on a line perpendicular to the flow. Necessary data for the computation of hydraulic and sediment transport information.

Crustacea - mostly aquatic animals with rigid outer coverings, jointed appendages, and gills. Examples are crayfish, crabs, barnacles, water fleas, and sow bugs.

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

Csm - abbreviation for cubic feet per second per square mile.

Cubic Feet Per Second (cfs) - a unit expressing rates of discharge. One cubic foot per second is equal to the discharge through a rectangular cross section, one foot wide and one foot deep, flowing at an average velocity of one foot per second. A flow rate that equals 28.32 liters per second, or 448.831 gallons per minute. Same as second-feet or British cusec.

Cultural Eutrophication - acceleration by man of the natural process of enrichment (aging) of bodies of water.

Culture - cultivation of organisms in a medium containing necessary nutrients.

Curie - (See Activity)

Current Meter - a device for measuring water velocity 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. 1. The constant downstream flow of water in a river or stream, resulting from water's tendency to move downslope toward sea level. 2. 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.

Curve - 1. A graphic plotted to represent changes in value of one quantity in reference to another. 2. A deviation from a straight line without a sharp break or angularity.

Curve, Oxygen Sag - a curve that represents the profile of dissolved oxygen content along the course of a stream, resulting from deoxygenation associated with biochemical oxidation of organic matter, and reoxygenation through the

absorption of atmospheric oxygen and through biological photosynthesis.

CUSEC - an abbreviation for cubic foot per second, common in the British Commonwealth countries. (See Cubic Foot Per Second)

Cuticular Plate - a hard chitinous or calcareous plate on the epidermis or outer horny layer of the skin.

Cutoff Storage - the remaining active conservation storage volume at which it is desirable to discontinue releases from a reservoir for one purpose in order to assure future releases for a higher priority purpose.

Cycle - a regularly recurring succession of events such as the cycle of the seasons. Use of cycle to describe a group of wet years followed or preceded by a group of dry years is to be avoided.

Cyclomorphosis - periodically repeated changes in the body form of successive generations of plankton animals.

Cyclone - a more or less circular area of low atmospheric pressure in which the winds blow counterclockwise in the Northern Hemisphere.

Cyclonic Precipitation - precipitation resulting 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 (or Diurnal) Temperature Range - the difference between the highest and lowest temperatures recorded on a particular day.

Data - records of observations or measurements of facts, occurrences and conditions in written, graphical or tabular form.

Dead Storage - the volume in a reservoir below the lowest controllable level. Dead storage elevation is the lowest level at which it is practicable to release water from the reservoir, as governed by design of outlet facilities.

Debris - 1. The remains of something broken down or destroyed. 2. An accumulation of fragments of rocks.

Decay - 1. To undergo decomposition. 2. Implies a slow change from a state of soundness or perfection. 3. To decay.

Decomposition - the breakdown of dead plant and animal tissue by bacteria to the elemental state. Decomposers are living plants and animals, but chiefly fungi and bacteria, that live by extracting energy from the decaying tissues

of dead plants and animals. In the process, they release simple chemical compounds stored in the dead bodies and make them available for use by green plants. (See Reducers)

Deep Percolation Loss - water that percolates downward through the soil beyond the reach of plant roots.

Deep Seepage - infiltration which reaches the water table.

Deep Well - a well whose pumping head is too great to permit use of a suction pump.

Deficiency Curve - similar to a duration curve but indicating durations that flows were equal to or less than a series of given values.

Deficit, Saturation - 1. The difference between the quantity of a substance in solution and the quantity of such substance required to create a saturated condition, at a given temperature, usually expressed in terms of percentage of the difference to that required for saturation. 2. The difference, expressed in percentage, between the quantity of dissolved oxygen in a stream and the quantity of oxygen required to create a condition of saturation therein, under given conditions.

Degradation - 1. The geologic process by means of which various parts of the surface of the earth are worn down and carried away and their general level lowered, by the action of wind and water. 2. Lowering of the streambed due the removal of bed material by the stream. This term is used for "long term" (e.g., several years) processes. Contrast with "scour".

Degrade - to reduce the complexity of a chemical compound.

Degree Day - the departure of one degree for one day in the mean daily temperature from a specified base temperature.

Deionized Water - water that has been treated by ion exchange resins or compounds to remove cations and anions present in the form of dissolved salts.

Delta (Alluvial Fan) - a fan-shaped deposition of silt, sand, gravel or other fine materials from a stream. These occur when the hydraulic gradient lessens abruptly, as in the discharge of a stream into a lake, or a river into an ocean.

Demand, Benthic - the demand upon dissolved oxygen of water overlying benthic deposits under natural stream conditions resulting from the upward diffusion of decomposition products of the deposits into the overlying water.

Dendritic - the form of the drainage pattern of a stream and its tributaries when it follows a treelike shape, with the main trunk, branches, and twigs corresponding to the main stream, tributaries, and subtributaries, respectively, of the stream.

Denitrification - 1. The conversion of oxidized nitrogen (nitrate and nitrite-N) to nitrogen gas by contact with septic wastewater solids or other reducing chemicals. 2. A reduction process with respect to oxidized nitrogen.

Density - 1. The quantity or mass of a substance per unit volume. Computed as grams per cubic centimeter, in the case of water. 2. For species population, the number of individuals in relation to the space in which they occur; refers to the closeness of individuals to one another. 3. For snow, the ratio, expressed as a percentage, of the volume which a given quantity of snow would occupy if it were reduced to water, to the volume of the snow. When a snow sampler is used, it is the ratio expressed as percentage of the scale reading on the sampler to the length of the snow core or sample.

Density Current - a flow of water maintained by gravity through a large body of water, such as a reservoir or lake, and retaining its unmixed identity because of a difference in density.

Density Stratification - (See Stratification)

Dependable Yield - the minimum supply of a given water development that is available on demand, with the understanding that lower yields will occur once in n years, on the average.

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.

Depletion - the progressive withdrawal of water from surface water or groundwater reservoirs at a rate greater than that of replenishment. (See Recession Curve, Streamflow Depletion)

Deposition - raising of the streambed that may be due to local changes in the flow, or during a single flood event. Contrast with "aggradation".

Depositing substrates are bottom areas where solids are being actively deposited. These often occur in the vicinity of effluent discharges. (See Sludge Deposits)

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, the term is usually expressed in inches of depth during a given period of time over the drainage area or acre-feet per square mile.

Depth-Duration Curve - a curve which shows the maximum depth (precipitation) or volume (runoff) observed or expected during any given consecutive duration of time such as from one hour to ten years.

Dermatitis - any inflammation of the skin. One type may be caused by the penetration beneath the skin of a cercaria found in water; this form of dermatitis is called "swimmers' itch."

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. The detention period is the time required for a given unit of liquid to flow through the tank or process unit. Usually determined by tracer method and depends upon inlet and outlet geometry, temperature, specific gravity, stratification, and other factors.

Detergent - something used for cleaning. Commonly consists of soap or surfactant plus various additives or associated materials.

Detritus - 1. Fragmented material of inorganic or organic origin. 2. The heavier mineral debris moved by natural watercourses, usually in bed-load form. 3. The sand, grit, and other coarse material removed by differential sedimentation in a relatively short period of detention.

Dew - drops of water deposited by direct condensation of water vapor from adjacent clear air, and mainly on horizontal surfaces cooled by natural radiation. The dew point is the temperature to which air with a given quantity of water vapor must be cooled to cause condensation of the vapor therein.

Dewatering - process of lowering the water table.

Diaphragm Pump - a pump consisting of a rubber diaphragm (generally) fastened to a cylindrical casing having inlet and outlet valves. When the diaphragm is raised, liquid enters to be forced out the discharge valve on the reverse stroke.

Diatom - a single-celled alga encased in an intricately etched silica shell formed of two halves that fit together like the lid on a box. Diatoms are important primary producers in rivers, streams, and other bodies of water.

Diffusion - a process by which water quality constituents are transported, primarily depending upon the concentration gradients. Therefore can occur in

directions different from the flow direction. Diffused aeration is aeration produced by introducing air through a dispersing mechanism into a liquid. Sufficient air pressure must be applied to overcome hydrostatic head and diffuser or pipe back pressure. The diffuser is a porous plate, tube, bag, or other device, through which air is forced into a liquid in the form of small bubbles.

Digested Sludge - solids concentrates stabilized under aerobic or anaerobic conditions to preferentially decompose the more unstable fractions and produce a residue of satisfactory disposal characteristics. To reduce the volatile fraction of the sludge.

Dilution - 1. To make thinner or more liquid. 2. A ratio, volume or weight of a more concentrated sample or effluent flow compared to that into which it is discharged. 3. The reduction of a constituent concentration by mixing in water containing a lower concentration.

Dimensionless - these unit hydrographs are designed by correlating basin characteristics, such as stream length and slope, to the peak. All other coordinates of the unit hydrograph are defined in terms of the peak.

Dinoflagellate - a typically yellow-brown unicellular alga that swims by means of two laterally attached appendages called flagella.

Direct Flood Damage - the damage done to property, structures, goods, etc., by a flood as measured by the cost of replacement and repairs.

Direct Runoff - the runoff entering stream channels promptly after rainfall or snowmelt. Superposed on base runoff, it forms the bulk of the hydrograph of a flood (See Surface Runoff). The terms base runoff and direct runoff are time classifications of runoff. The terms groundwater runoff and surface runoff are classifications according to source.

Direct Toxicity - toxicity that has an effect on organisms themselves instead of having an effect by actual alteration of their habitat or interference with their food supply. (See Acute Toxicity, Chronic Toxicity, Indirect Toxicity)

Discharge - 1. The volume of water that passes through a given cross-section of a channel or sewer during a unit of time; commonly measured in cubic feet per second. 2. In its simplest concept discharge means outflow; therefore, the use of this term is not restricted as to course or location, and it can be applied to describe the flow of water from a pipe or 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, a stream, or an ocean (See Streamflow, Runoff). 3. The data in the reports of the Geological Survey on



surface water represent the total fluids measured. Thus, the terms discharge, streamflow, and runoff represent water with the solids dissolved in it and the sediment mixed with it. Of these terms, discharge is the most comprehensive. The discharge of drainage basins is distinguished as follows: (a) Yield - Total water runoff or crop; includes runoff plus underflow. (b) Runoff - That part of water yield that appears in streams. (c) Streamflow - The actual flow in streams, whether or not subject to regulation, or underflow. 4. Each of these terms can be reported in total volumes (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 Area - area in which groundwater flow lines converge and are directed toward water table.

Discharge Rating - a curve or table 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 Stage-Discharge Rating.

Disinfection - 1. To make free of infectious organisms. 2. The killing of the larger portion (but not necessarily all) of the harmful and objectional microorganisms in, or on, a medium by means of chemicals, heat, ultraviolet light, etc.

Dispersion, Longitudinal - the process by which prototype concentrations are changed as a result of the non-uniform velocity distribution at a channel cross-section.

Disposal - 1. The discarding or throwing away. 2. For wastewaters, this may represent any method of disposing, but usually involves some degree of degradation and discarding in a non-pollutional manner.

Dissimilation - metabolic processes by means of which simpler substances (down to the inorganic end products of decomposition) arise from complex organic compounds (physiological combustion).

Dissociation - the splitting of a molecule of a substance (a salt, acid, or base) existing in solution into electrically charged particles (ions). The positively charged hydrogen ion and metallic ions are called cations, the negatively charged hydroxyl ion and acid ions are called anions.

Dissolved - 1. Those materials dispersed in water in ionic, atomic, or molecular form; an homogenous mixture or solution. 2. Generally clear but may be colored. 3. Present in true solution form.

Dissolved Oxygen (DO) - 1. The amount of free (not chemically combined) oxygen

in water. Usually expressed in mg/l or percent of saturation. 2. DO concentration of unpolluted water depends pretty much on atmospheric pressure and temperature. Therefore it is greater at sea level and when water is cool than at high altitudes or when water is warm. Nonliving organic matter (especially its content of carbon in any form) and various chemicals react with oxygen in water, depleting the oxygen and causing stress from lack of oxygen on fish and other aquatic life. In unpolluted water, oxygen is usually present in amounts of 10 ppm or more. Adequate dissolved oxygen is necessary for the life of fish and other aquatic organisms. About three to five ppm is the lowest limit for support of fish life over a long period of time. In extreme depletion, water may become anaerobic (literally without air), stagnate, and stink.

Dissolved Solids (DS) - the total amount of dissolved material, organic and inorganic, contained in water or wastes. Excessive dissolved solids can make water unsuitable for industrial uses, unpalatable for drinking, and even cathartic. Potable water supplies may have dissolved solids content from twenty to one thousand mg/l, but sources which have more than five hundred mg/l are not recommended by the U.S. Public Health Service. Also called Total Dissolved Solids and Total Solids.

Distilled Water - a purified water resulting from heat vaporization followed later by vapor condensation to separate the water from non-volatile impurities.

Distributed Load - a constituent load which enters the receiving water over a considerable distance, as in the case of groundwater seepage, rather than at a point as with a sewer outfall.

Distribution Hydrograph - a unit hydrograph of direct runoff modified to show the proportions of the volume of runoff that occur during successive equal units of time.

Distributor - 1. A device to control flow into some desired direction or place. 2. A device used to spread the flow evenly across a trickling filter surface or other process unit.

Diurnal - 1. Refers to an event, process, or specific change that occurs every day; usually associated with changes from day to night. 2. Pertaining to those organisms that are active during daytime. (See Nocturnal)

Diversion Chamber - a basin or tank that may be used to divert part of the flow from a channel. May or may not contain treatment capabilities or a means of returning the diverted flow to the treatment plant when a shock load has passed.

Diversion - the taking of water from a stream or other body of water into a canal, pipe, or other conduit.

Diversity - pertaining to the variety of species within a given association of organisms. Areas of high diversity are characterized by a great variety of species; usually relatively few individuals represent any one species. Areas with low diversity are characterized by a few species; often relatively large numbers of individuals represent each species.

DO Deficit - the extent by which the DO concentration falls below its saturation level. (See Dissolved Oxygen)

Domestic Consumption - the quantity, or quantity per capita, of water consumed in a municipality or district for domestic uses or purposes during a given period, generally one day. It is usually taken to include all uses included within the term Municipal Use of Water and quantity wasted, lost, or otherwise unaccounted for. The use of water primarily for household purposes including use for laundry, lawn watering, washing cars, cooling, and swimming pools., the watering of livestock; the irrigation of gardens, lawns, shrubbery, etc., surrounding a house or domicile.

Dominant Discharge - a particular magnitude of flow which is sometimes referred to as the "channel forming" discharge. Empirical relations have been developed between "equilibrium" stream width, depth, and slope and dominant discharge. It has been variously defined as the bank full flow, mean annual discharge, etc.

Dominant - species which by their activity, behavior, or number, have considerable influence or control upon the conditions of existence of associated species; species which "controls" its habitat and food web. (See Predominant)

Dosing Siphon - a device to permit intermittent dosing, such as for a trickling filter. Consists of a chamber that will fill gradually to a fixed level before starting a siphon that permits rapid drainage to the filter or other treatment unit.

Double-Mass Curve - a plot on arithmetic cross-section paper of the cumulated values of one variable against the cumulated values of another or against the computed values of the same variable for a concurrent period of time.

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. The drainage area is the measured area within a drainage divide which contributes surface runoff to a given point on a stream.

It is expressed in acres, square miles, or other units of area. The drainage divide is the boundary line, along a topographic ridge separating two adjacent drainage basins. (See Watershed)

Drainage Density - the relative density of natural drainage channels in a given area. It is usually expressed in terms of miles of natural drainage or stream channel per square mile of area, and obtained by dividing the total length of stream channels in the area in miles by the area in square miles.

Drainage Pattern - the courses that water follows over a land mass as it flows to the ocean.

Drainage Tile - a vitrified tile under-drainage system laid on the bottom to support trickling filter stone, sand, or other filter media, including sludge drying beds. These are specially prepared blocks or half-tiles containing slots for passage of water or air but restricting bed media penetration.

Draw - a tributary valley or coulee that usually discharges water only after a rainstorm.

Drawdown - the lowering of the surface elevation of a body of water, the water surface of a well, the water table, or the piezometric surface adjacent to the well, resulting from the withdrawal of water therefrom, i.e., the difference between the nonpumping water level at some time and the pumping level at that time. Drawdown storage capacity refers to storage space reserved for impoundment of runoff during some periods for the express purpose of retaining the water for later release when needed for industrial and municipal water supplies, irrigation, hydroelectric power generation, water quality improvement downstream, enhancement of downstream navigation, and other water uses. The same drawdown storage space may serve several of the water use objectives, provided the total space is large enough to regulate flows within acceptable provisions of scheduling; in such cases, the drawdown storage space is referred to as a "joint use" pool, and designated by design purposes involved.

Drift - any or all of the material, living and nonliving, that is carried passively by the current in a river or stream. (See Plankton, Incidental Drift, Periodic Drift, Catastrophic Drift)

Drinking Water Standards - a list of standards prescribed for potable water acceptable for use on interstate carriers. Deal with sources, protection, and bacteriological, biological, chemical and physical criteria some mandatory, some desired. Official for municipal use only upon acceptance by State and local authorities.

Driving Forces - the forces promoting movement in the receiving water,

primarily gravity and tides.

Drizzle - rather uniform precipitation consisting exclusively of minute and very numerous drops of water, of less than 0.02 inches in diameter, which seem to float in the air, and thereby visibly follow even the slightest motion of the air. It is distinguished from light rain by the fact that visibility is poor during a drizzle. It frequently occurs simultaneously with fog.

Drought - 1. A period of deficient precipitation or runoff extending over an indefinite number of days, but with no set standard by which to determine the amount of deficiency needed to constitute a drought. There is no universally accepted quantitative definition of drought; each investigator establishes his own definition. 2. When in an area that is ordinarily classed as humid, natural vegetation becomes desiccated or defoliates unseasonably and crops fail to mature owing to lack of precipitation, or when precipitation is insufficient to meet the needs of established human activities, drought conditions may be said to prevail. Although water for irrigation or other uses in arid areas is always limited, special shortages in such areas are also regarded as droughts. Unsatisfactory distribution of precipitation throughout the year may be as effective a factor in causing a drought as a shortage in the total amount. Temperature and wind may also play an important part, especially in relation to the damage done.

Dry-Adiabatic Lapse Rate - the decrease in temperature per 1,000 feet of rise in elevation in the unsaturated lower layers of the atmosphere. Usually used as 5.4°F per 1,000 feet (or 1°C per 100 meters).

Drying - the removal of water by natural or engineered means.

Duration Curve - a cumulative frequency curve that shows the percent of time during which specified units of measure (e.g., discharge, head, power, etc.) were equaled or exceeded in a given period. It is the integral of the frequency diagram. The period of time represented by the curve should always be stated for instance, "Duration Curve of Flows (1900-40)". (See Flow-Duration Curve)

Dynamic - a process which may vary freely with time. This includes both the inputs and the solution in a computer model.

Dynamic Equilibrium - a process which may vary with time, but only over a limited period (e.g., one day) which repeats itself in cycles. Also known as dynamic steady state.

Dynamic Head, Total - the difference in pressure at the elevation of the pump discharge and the elevation at the pump suction flange, plus the velocity head at the discharge minus the velocity head at the suction flange, all corrected

to the same units and datum points.

Dystrophic - pertaining to shallow lakes with brown water, low lime content, high humic material and organic matter content, low nutrient availability, poor bottom fauna, and high oxygen demand; oxygen is continually depleted and ph is usually low. In lake aging, the "age" between a eutrophic lake and a swamp.

Ebb Tide - that period of tide between a high water and the succeeding low water; falling tide. (See Flood Tide)

Ecological Factor - any part or condition of the environment that influences the life of one or more organisms. (See Biotic Factor)

Ecological Niche - the role of an organism in the environment, its activities and relationships to the living and nonliving environment; food and nutrition relationships are of primary importance. (See Habitat Niche)

Ecology - the study of the interrelationship of organisms among themselves and their environment.

Ecosystem - a community, including all the component organisms, together with the environment, forming an interacting system.

Ecotype - the growth form or appearance of an organism which is characteristic of a specific habitat. (Individuals of the same species may appear different in various habitats.)

Effective Porosity - the ratio, usually expressed as a percentage, of the volume of water or other liquid which a given saturated volume of rock or soil will yield under any specified hydraulic condition, to the given volume of soil or rock.

Effective Precipitation (Rainfall) - 1. That part of the precipitation that produces runoff. Also called Precipitation Excess. 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.

Efficiency - the ratio of materials out of a process to those into that process usually expressed as a percentage.

Effluent - 1. Liquid which flows from a containing space. 2. Sewage, water, or other liquid, partially or completely treated, or in its natural state, as the case may be, flowing from a reservoir, basin, or treatment plant, or part thereof. 3. Effluent seepage is diffuse discharge of groundwater to the

ground surface. 4. Effluent streams intersect the water table and receive flow from groundwater.

Electrical Log - a record of electrical resistivity tests made at various depths in a well.

Electrical Conductivity - a measure of the ability to pass electricity, expressed in "reciprocal ohms" (i.e., mhos). A column of liquid one cm<sup>2</sup> in cross section and one cm high possessing a resistance of one ohm. In dilute solutions the conductivity is approximately proportional to the concentration. (See Specific Conductance)

Electrostatic precipitator – an air pollution device that uses an electric field to trap particulate air pollution.

Element - 1. Elementary substance. 2. A kind of matter in which all atoms are alike in that they will have the same average relative weight and the same number of external electrons.

Elevation Head - elevation above some selected datum plane.

Elutriation - a washing operation. Sludge elutriation is an action where digested or process sludge is washed with sewage or effluent to remove fine particulates or certain soluble components. The elutriate is recycled to process waters, the elutriated solids are more readily filtered.

Emersed (Emergent) Aquatic Plants - plants that are rooted at the bottom of a body of water, but project above the surface; e.g., cattails, bulrushes, etc. (See Floating Aquatic Plants, Submersed Aquatic Plants)

Endogenous Metabolism - a diminished level of metabolism in which various materials previously stored by the cells are oxidized.

Energy Gradient (Grade Line) - slope of an imaginary line located above the water surface profile which is computed by adding the velocity head to the water surface elevation.

Enrichment - an increase in the quantity of nutrients available to aquatic organisms for their growth. (See Eutrophication)

Enteric Organisms - those organisms commonly associated with the intestinal tract. (See Coliform Bacteria)

Entrainment - a condition or action that will cause an immiscible substance to be mixed with another. Usually the result of turbulence or entrapment; i.e., air bubbles in aqueous media.

Entomologist - a specialist in the study of insects.

Environment - the sum of all external influences and conditions affecting the life and the development of an organism.

Environmental Resistance - restriction imposed on the numerical increase of a population by environmental factors. (See Biotic Potential)

Enzyme - a soluble or colloidal organic catalyst produced by a living organism. Usually they are simple or conjugated proteins that catalyze specific reactions.

Ephemeral Stream - a natural channel that carries water after a storm but is otherwise dry.

Epilimnion - the upper, relatively warm, circulating zone of water above the thermocline or metalimnion in a thermally stratified lake. (See Thermal Stratification, Thermocline, and Metalimnion)

Epiphytes - plants that are not rooted in the bottom but rather use other plants as a substrate without penetrating into them and without withdrawing nutrient substances from them (pseudoparasites).

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 long continued, steady rate of net rainfall, with discharge rate equal to net rainfall rate.

Equilibrium - the condition in which a population or community is maintained with only minor fluctuations in composition over an extended period of time.

Equilibrium Time - the 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, and therefore the direction of flow is perpendicular to the line at all points.

Equivalent - 1. Equal in force, amount, or value. 2. Chemical: The atomic or molecular weight of one substance that will react with one unit of weight of another substance; i.e., that weight of an alkali necessary to precisely equalize one gram atomic weight of H<sup>+</sup> ion. If the weight of the compound is expressed in milligrams, then the term milliequivalents is used.



Equivalent Conductivity - the electrical conductivity of a solution divided by the number of gram equivalents of the dissolved substance contained in one cubic centimeter of the solution.

Erosion - the general process or group of processes whereby the materials of the Earth's crust are loosened, dissolved, or worn away, and removed from one place to another by solution and transport due to water, wind, ice, and other natural forces. Weathering, although sometimes included here, is a distinct process which does not imply removal of any material.

Estuary - that portion of a coastal stream influenced by the tide of the body of water into which it flows; a bay, at the mouth of a river, where the tide meets the river current; an area where fresh and marine waters mix. (See Positive Estuary, Inverse Estuary, Neutral Estuary, Coastal Zone)

Eucaryotic organism – an organism having a nuclear membrane. This includes all known organisms except viruses and bacteria.

Eulittoral Zone - the shore zone of a body of water between the limits of water-level fluctuation. (See Tidal Zone)

Euphotic Zone - the lighted region of a body of water that extends vertically from the water surface to the depth at which photosynthesis fails to occur because of insufficient light penetration. Refers to the combined littoral and limnetic zones of lakes.

Eurytopic - an organism that has a wide range of tolerance to a particular environmental factor, e.g., euryhaline refers to a wide range of salinity tolerance; eurythermal refers to a wide range of temperature tolerance. (See Steno-)

Eutrophic - lakes which are rich in nutrients and organic materials, therefore, highly productive, these lakes are often shallow and seasonally deficient of oxygen in the hypolimnion. (See Oligotrophic Lakes)

Eutrophication - a natural process of the aging of lakes characterized by nutrient enrichment and increasing growth of plant and animal organisms. The net effect is to decrease depth until the lake becomes a bog and eventually dry land. Man-made pollution tends to hasten the proliferation of plant life due primarily to an excess of nutrients particularly nitrogen and phosphorus. Plant life grows in abundance as a result of incomplete treatment particularly from municipal wastes. (See Dystrophic, Mesotrophic, Oligotrophic)

Evaporation Opportunity - 1. The ratio of actual to potential rate of evaporation, generally stated as a percentage. 2. The opportunity for a given

rate of evaporation to continue is determined by the available moisture supply.

Evaporation Pan - an open tank used to contain water for measuring the amount of evaporation. The U.S. Weather Bureau class A pan is 4 feet in diameter, 10 inches deep, set on a timber grillage so that the top rim is about 16 inches from the ground. The water level in the pan during the course of observation is maintained between 2-3 inches below the rim.

Evaporation Rate - the quantity of water, expressed in terms of depth of liquid water, which is evaporated from a given surface per unit of time. It is usually expressed in inches depth per day, month, or year.

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

Evaporation Total - the sum of water lost from a given land area during any specific time by transpiration from vegetation and building of plant tissue; by evaporation from water surfaces, moist soil, and snow; and by interception. It has been variously termed "evaporation", "evaporation from land areas", "evapo-transpiration", "total loss", "water losses", and "fly off".

Evaporativity (Potential Rate of Evaporation) - the rate of evaporation under the existing atmospheric conditions from a surface of water that is chemically pure and has the temperature of the atmosphere.

Evapotranspiration - water withdrawn from water surfaces and soil by evaporation and from plants by transpiration. This water is transmitted to the atmosphere as vapor. (Essentially the same as "consumptive use" except for the water retained within the plant tissue.) (See Potential Evapotranspiration)

Event Model - a model which simulates the processes occurring in a single event, typically for a near-steady-state condition or for one incident during a relatively short period of time.

Exceedance Frequency - the percentage or proportion of values that exceed a specified magnitude.

Exceedance Interval - the average interval of time between values that exceed a specified magnitude; reciprocal of the exceedance frequency.

Exceedance Probability - probability that an event selected at random will exceed a specified magnitude.

Excess Rain - effective rainfall or rainfall in excess of infiltration capacity and other losses. (See Effective Precipitation)

Exchange Coefficient - the fraction of material leaving an embayment during ebb tide, which returns on the following flood tide.

Extinction Depth - the depth below a lake surface at which the light intensity is only one percent of its intensity at the surface.

Fahrenheit, Degree (°F) - a temperature scale in which freezing temperature of pure water at sea level is 32°F and boiling is 212°F. Named for Gabriel D. Fahrenheit, an 18th century German physicist.

Facultative - refers to the capability of an organism to live under varying conditions; e.g., a facultative anaerobe is an organism that although usually living in the presence of free oxygen can live in the absence of free oxygen. (See Obligate)

Fall Overturn - a physical phenomenon that may take place in a body of water during the early autumn. The sequence of events leading to fall overturn include: (1) cooling of surface waters, (2) density change in surface waters producing convection currents from top to bottom, (3) circulation of the total water volume by wind action, and (4) vertical temperature equality, 4°C. The overturn results in a uniformity of the physical and chemical properties of the entire water mass. (See Spring Overturn)

Fathom - a unit of measurement equal to six feet (1.83 meters).

Fats - naturally occurring compounds functioning as storage products in the living organisms. Consist of carbon, hydrogen and oxygen in the form of fatty acid esters. Generally semi-solid or oily at normal temperatures.

Fauna - the animals peculiar to a specific environment or region.

Fecal Coliform - a group of organisms belonging to the coliform group and whose presence denotes recent fecal pollution from warm blooded animals. Standard tests are available to differentiate the fecal coliform group from the other members of the group which have a lesser sanitary significance. (See Coliform Bacteria)

Fecal Streptococci - (See Coliform Bacteria)

Fermentation - a form of respiration by organisms which requires little or no free oxygen, yielding alcohol and carbon dioxide as end products and releasing only part of the food energy available; i.e., the conversion of sugars into alcohol by enzymes from yeasts.

Fetch - 1. The distance which waves have traveled in open water, from their point of origin to the point where they break. 2. The distance of the water or the homogeneous type surface over which the wind blows without appreciable change in direction.

Field Moisture Deficiency - the quantity of water, which would be required to restore the soil moisture to field moisture capacity.

Field Moisture Capacity - the quantity of water which can be permanently retained in the soil by capillary forces in opposition to the downward pull of gravity.

Field Permeability - permeability corresponding to the temperature which occurs under field conditions.

Filter - a porous media through which a liquid may be passed to effect removal of suspended materials. Filter media may include paper, cloth, sand, prepared membranes gravel, asbestos fiber, or other granular or fibrous material.

Filter Cloth - fabric, wire or other material stretched over the drum of a vacuum filter and accessories to support the solids during cake formation and discharge the solids when and where desired.

Filter Flooding - the filling of a trickling filter with liquid to a level above the media by closing all outlet parts. Generally to control nuisance organisms such as flies.

Filter Fly - small black flies commonly found in or near the trickling filter. Commonly the *Psychoda* group.

Filter Loading - the mass (or volume) of applied oxygen demand or solids per unit of filter area or volume. (See Load Ratio)

Filter Medium - any material over which water sewage or other liquid is passed for purification purposes by chemical, biological or physical processes.

Filter Ponding or Clogging - the effect of fine particles on sand filters or organic growth on trickling filters that restricts normal passage of liquid through the filter as a result of filling void spaces.

Filter Residue - that material which is retained on or in a filter.

Filter Unloading - a phenomenon in which normally attached growth or slime on trickling filter media becomes detached and either partially or completely sloughs off.

Filtrate - that liquid which has passed through a filter.

Filtration Rate - a rate of application of water or wastewater to a filter. Commonly expressed in million gallons per acre per day or gallons per square foot per minute.

Final Settler, Clarifier - a settling basin or chamber for the mixed liquor following secondary treatment.

Firn Snow - old snow on the top of glaciers, granular and compact but not yet converted into ice. It is a transitional stage between snow and ice. Also called Neve. The firn line is 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.

Firth - a narrow arm of the sea; also the opening of a river into the sea. (See Estuary)

Fjord (Fiord) - a narrow arm of the sea between highlands. (See Firth, Estuary)

Flame Arrestor - a safety device in the handling of flammable gases. Usually consists of an enlargement in a pipe line containing a metallic grid that allows passage of gas but acts as a barrier to the passage of flame.

Flash Flood - a sudden destructive rush of water across the desert floor after a rainstorm, resulting from the inability of hard-packed desert soil to absorb rain water as quickly as it falls. Besides occurring suddenly, flash floods usually subside quickly.

Flashboard - a temporary barrier, of relatively low 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 to increase the storage capacity. It is constructed so as to be readily removed or lowered, or carried away by high flow or floods.

Flights - a cross member of a conveyor system used for collection and transport of the collected material; i.e., the boards fastened to a chain loop on either side of a primary clarifier that pushes scum along the surface to a collector trough and sludge along the bottom to the sludge collector.

Float Control - commonly a device to control a pump or pumps according to the water level in a chamber or well as indicated by the float. Usually operates a relay to control pump power, number, or speed of pumps in operation.

Floatation - a process for separation of solids from clarified liquid that causes particulates to be floated to the surface by means of attached air globules.

Floating Aquatic Plants - rooted plants that wholly or in part float on the surface of the water; e.g., water lilies, water hyacinth and duckweed. (See Emerged Aquatic Plants, Submersed Aquatic Plants)

Floating Cover - a gas tight cover with a water seal supported by digester gas pressure and capable of moving upward or downward with liquid and gas content of the digester.

Floc - gelatinous or amorphous solids formed by chemical, biological or physical agglomeration of fine materials into larger masses that are more readily separated from the liquid.

Flocculation - the gathering together of fine particulate materials in a suspension to form loosely associated larger masses of solids agglomerates.

Floe Ice - ice formed on the surface of a body of water, usually of a thickness of several feet, which has been broken up into pieces and floats about in this form.

Flood - 1. An overflow or inundation that comes from a river or other body of water and causes or threatens damage. 2. Any relatively high streamflow overtopping the natural or artificial banks in any reach of a stream. 3. A relatively high flow as measured by either gage height or discharge quantity.

Flood Control Storage - the quantity of space which must be kept available at a given date to control anticipated flows after that date. Any encroachment into this space during the passage of a flood must be reduced as rapidly as release criteria will permit.

Flood Frequency Curve - 1. A graph showing the number of times per year on the average, plotted as abscissa, that floods of magnitude, indicated by the ordinate, are equaled or exceeded. 2. A similar graph but with recurrence intervals of floods plotted as abscissa.

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 - a strip of relatively smooth land bordering a stream, built of sediment carried by the stream and dropped in the slack water beyond the influence of the swiftest current. It is called a water flood plain if it is

overflowed in times of highwater; but a fossil flood plain if it is beyond the reach of the highest flood. The lowland that borders a river, usually dry but subject to flooding. That land outside of a stream channel described by the perimeter of the maximum probable flood.

Flood Profile - a graph of elevation of the water surface of a river in flood plotted as ordinate, against distance, measured in the downstream direction, plotted as abscissa. A flood profile may be drawn to show elevation at a given time, crests during a particular flood, or to show stages of concordant flows.

Flood Routing - the process of determining progressively the timing and shape of a flood wave at successive points along a river.

Flood Stage - 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 throughout which the water inundates an unimportant and small area. 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. (See Bankfull Stage)

Flood Tide - that period of tide between low water and the succeeding high water; a rising tide. (See Ebb Tide)

Flood Volume - the total volume of runoff that passes a point of measurement during the flood period. Flood Volume Frequency Curves usually have a log, skewed relationship.

Flood Wave - a distinct rise in stage culminating in a crest and followed by recession to lower stages.

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.

Flood Control Storage - storage of water in reservoirs to abate flood damage. (See Retarding Reservoir)

Floodway - a part of the flood plain, otherwise leveed, reserved for emergency diversion of water during floods. A part of the flood plain which, to facilitate the passage of floodwater, is kept clear of encumbrances. 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.

Flora - the plants peculiar to a specific environment or region.

**Flow Duration** - a measure of the range and variability of stream flows. Usually presented as a graph of flow rate (discharge) vs. percent of time that flows are greater than, or equal to, that flow.

**Flow Line** - a line which represents the path a fluid particle would follow through a porous medium. The flow net is a graphical representation comprising a family of flow lines and equipotential lines within a flow region.

**Flow System** - a set of flow lines in which any two flow lines adjacent at one point in the flow region remain adjacent throughout the entire flow region, and that can be intersected anywhere by an uninterrupted surface across which flow occurs only in one direction.

**Flow** - the rate at which water passes a given point in a channel. Usually stated in cubic feet per second (cfs).

**Flow Storage Curve** - an empirical or computed relation between storage in a reservoir or river reach and the corresponding outflow from the reach.

**Fluid Pressure** - pressure at a specific point determined by height a static liquid would rise above that point plus atmospheric pressure.

**Fluidization** – the suspension of solid particles by an upward velocity of a fluid. Buoyancy and fluid friction overcome gravity operating on particles.

**Flume** - a long narrow channel for gravity flow of liquid from one point to another.

**Fly Away BOD** - wastewater stabilization operations such as trickling filters encourage the development of insect larvae that serve as scavengers during their development. If the adult form of the larvae have functionable wings, the equivalent of oxygen demand consumed during development becomes fly-away BOD.

**Food Chain** - a series of plants and animals linked by their food relationships; the passage of energy and materials from primary producers (green plants) through a succession of consumers ending with the largest carnivores; e.g., phytoplankton, zooplankton, forage fish, game fish. The food web is a system of interlocking food chains. Since few animals rely on a single food source and since a given food source rarely is consumed exclusively by a single kind of animal, the separate food chains in any natural community interlock and form a web.

**Forage Fish** - fish, usually smaller species, that are important as food for



other species.

Force Potential - the approximate amount of mechanical energy contained at a point in a system; equal to hydraulic head at that point multiplied by acceleration due to gravity.

Forest Influences - effects resulting from the presence of forest or brush upon climate, soil water, runoff, streamflow, floods, erosion and soil productivity.

FORTTRAN - a scientific language commonly used by programmers to direct computer activities.

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

Frazil Ice - a French-Canadian term for the fine spicular ice, derived from the French for cinders which this variety of ice most resembles. When formed in saltwater, it is known as lolly ice. It is composed of fine particles which, when first formed, are colloidal and not seen in the water in which they are floating.

Free Available Chlorine - generally includes that chlorine existing in water as the hypochlorous acid. Characterized by rapid color formation with ortho toluidine. Can be titrated in neutral solution with phenyl arsene oxide and produces a rapid organism kill in low concentrations.

Free Groundwater - unconfined groundwater whose upper boundary is a free water table.

Free-Swimming - actively moving about in water or capable of moving about in water. (See Sessile)

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.

French Drain - an underground passageway for water through the interstices among stones placed loosely in a trench.

Frequency Array - a tabulation of basic data in descending (or ascending) order of magnitude.

Frequency Curve - a curve that expresses the relation between the frequency

distribution plotted, usually, with the magnitude of the variables as abscissas and the number of occurrences of each magnitude in a given period as ordinates. Theoretical frequency curve is a derivative of the probability curve.

Fresh Sludge - recently deposited sludge from sedimentation tanks that has not been conditioned, processed, or progressed materially into the anaerobic action stage.

Friction Head - the decrease in total head caused by friction.

Fringing Reef - large coral mass at the edge of any land mass in tropical seas; it begins at the water's edge and may extend out to a quarter mile. (See Barrier Reef, Atoll)

Frost - thin ice crystals in the shape of scales, needles, feathers, or fans, deposited by sublimation under conditions similar to dew formation, except that temperatures at or below 32°F must prevail when frost is deposited.

Fungi - simple or complex organisms without chlorophyll. The simpler forms are one-celled; higher forms have branched filaments and complicated life cycles. Examples are molds, yeasts and mushrooms.

Fungicide - substances or a mixture of substances intended to prevent, destroy, or mitigate any fungi.

Gage - 1. A device for indicating the magnitude or position of a thing in specific units, when such magnitude or position undergoes change, for example: the elevation of a water surface, the velocity of flowing water, the pressure of water, the amount or intensity of precipitation, the depth of snowfall, etc. 2. The act or operation of registering or measuring the magnitude or position of a thing when these characteristics are undergoing change. 3. The operation, including both field and office work, of measuring the discharge of a stream of water in a waterway.

Gage Height - the water surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term stage although gage height is more appropriate when used with a reading on a gage.

Gaging Station - a particular site on a stream, canal, lake, or reservoir where systematic observations of gage height or discharge are obtained. (See Stream-Gaging Station)

Game Fish (Sport Fish) - those species of fish considered to possess sporting qualities on fishing tackle; e.g., salmon, trout, black bass, striped bass,

etc. Game fish are usually considered to be more sensitive to environmental changes than rough fish.

Gas Dome - a chamber usually mounted on top of the digester cover for separation of gas from scum, foam or liquid.

Gas Holder - a tank used for storage of gas from sludge digestion units for the purpose of meeting the gas demand for burners, engines, or other use during non-steady production.

Gas stripping – transfer of an undesired gas from a water stream to the atmosphere.

Gate Chamber or Gate House - a chamber installed for housing devices for controlling flow to various parts of a collection, treatment or distribution system, including valves, gates, and automatic or manual controls.

Gause's Rule - (See Competition-Exclusion Principle)

Geohydrologic Unit - an aquifer, an aquiclude, or a combination of aquifers and aquicludes that compose a framework for a reasonably distinct hydraulic system.

Geohydrology - that branch of hydrology relating to subsurface or subterranean waters.

Geologic Control - a local rock formation or clay layer that limits (within the engineering time frame) the vertical and/or lateral movement of a stream at a particular point. Note that man-made controls such as drop structures also exist.

Geomorphology - the study of landform development under processes associated with running water.

Geophysics - the study of the physical characteristics and properties of the earth; including geodesy, seismology, meteorology, oceanography, atmospheric electricity, terrestrial magnetism, and tidal phenomena.

Germicide - an agent that kills microorganisms.

Gill - an organ for breathing underwater. (See Blood Gill, Tracheal Gill)

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. It may occur in a heterogeneous mass or be reasonably well sorted, depending upon its manner of deposition.

Glacier - bodies of land ice that consist of recrystallized snow accumulated on the surface of the ground, and that move 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 upon which it forms are at temperatures 32°F or lower. It often forms a matrix for sleet pellets that fall at the same time.

Grab - an instrument designed to "bite" into the bottom sediment of a lake or stream to sample the bottom materials and the benthos.

Gradation - a measure of the variation in grain (particle) sizes within a mixture. Usually presented as a graph of grain diameter vs. percent of the mixture that is finer than that diameter.

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.

Gravity Drainage - free water in earth materials which flows downward under the influence of gravity.

Gravity System - a system of open or closed conduits in which the liquid flows by gravity (without pumping).

Green Algae - algae that have pigments similar in color to those of higher green plants. Some form produce algal mats or floating "moss" in lakes.

Grit Chamber - an enlargement of a channel designed to reduce flow velocity adequately to permit differential separation of sand or grit from organic suspended material. Usually approaches a linear flow velocity of one to three feet per seconds.

Grit Collector - a device placed in a grit chamber to collect and to convey the more coarse and dense grit particles out of the chamber and permit return of most of the organic or liquid materials.

Grit - the heavy material in water or sewage such as sand, gravel, cinders, etc.

Groundwater Basin - a groundwater storage area more or less separate from neighboring groundwater storage areas, so that it can be considered a hydrologic unit. The groundwater divide is 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.

Groundwater Hydrology - the branch of hydrology that treats groundwater; its occurrence and movements; its replenishment and depletion; the properties of rocks that control groundwater movement and storage; and the methods of investigation and utilization of groundwater.

Groundwater Mining - pumping groundwater from a basin where the safe yield is very small, thereby extracting groundwater which had accumulated over a long period of time.

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

Groundwater Overdraft - pumpage of groundwater in excess of safe yield.

Groundwater Runoff - that part of the runoff which has passed into the ground, has become groundwater, and has been discharged into a stream channel as spring or seepage water. (See Base Runoff, Direct Runoff)

Groundwater - subsurface water that completely fills (saturates) all available space within an aquifer and below the top of the zone of saturation. Contrast with water in unsaturated zone. Groundwater does not occur in subsurface "lakes" nor move in subsurface "rivers" except those in a few caves in limestone.

Guttation - the loss of water in liquid form from the uninjured leaf or stem of the plant, principally through water stomata.

Habitat Form - (See Ecotype)

Habitat Niche - the specific part or smallest unit of a habitat occupied by an organism. (See Ecological Niche)

Habitat - the immediate surroundings (living place) of a plant or animal; everything necessary to life in a particular location except the life itself.

Hadal Zone - pertaining to that part of the ocean at depths exceeding 6000 meters, including both water and floor or bottom. (See Abyssal Zone)

Hail - precipitation in the form of balls or lumps of ice over 0.2 inches in diameter formed by alternate freezing and melting as they are carried up and down in highly turbulent air currents.

Hair Hygrometer - makes use of the fact that length of hair varies with relative humidity.

Half-Life - (See Radioactivity)

Hardness - a measure of magnesium and calcium compounds in water which will normally cause scaling problems in heating units and pipelines.

Hardpan - a shallow layer of earth material which is relatively hard and impermeable, usually through deposition of minerals.

Head Loss - the difference in pressure between the inlet and outlet pressure of a given process unit arising as a result of flow resistance within the process unit, such as the head loss due to friction of a filter media and filter residue.

Head Race - a channel which conducts 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 such direction.

Headwater - the most upstream portion of a river, stream, or creek.

Heat Budget - the accounting of the various factors governing water temperature.

Heat Exchanger Coils - a piping layout designed to circulate a liquid media within the contents of the process unit but without mixing with the process media for the purpose of adding or removing heat; i.e., hot liquids may be circulated within a digester to raise digester temperature.

Heavy Rain - rain which is falling at the time of observation with an intensity in excess of 0.30 inches per hour (over 0.03 inches in 6 minutes).

Herbicide - chemical or a mixture of chemicals intended to control or destroy any vegetation.

Herbivore - an organism that feeds on vegetation; an animal that eats plants, thus making the energy stored in plants available to carnivores. (See Omnivore, Carnivore)

Heterocyst - a specialized vegetative cell in certain filamentous blue-green algae; larger, clearer, and thicker-walled than the regular vegetative cells.

Heterogeneous - consisting of dissimilar elements or constituents. (See Homogeneous)

Heterotrophic (Holozoic) - pertaining to organisms that are dependent on

organic material for food; includes all animals and most bacteria. (See Autotrophic)

Higher Aquatic Plants (Pond Weeds) - those plants whose seeds germinate in the waterphase or substrate of a body of water and which must spend part of their life cycle in water. This grouping includes plants which grow completely submersed as well as a variety of emersed and floating leaf types.

Highwall - the unexcavated face of exposed overburden and coal or ore in an area mine or the face or bank on the uphill side of a contour strip mine excavation.

Histogram - a graph of relative frequency distribution of a specific variable.

Holomictic - lakes that are completely circulated to the bottom at the time of winter cooling.

Holophytic - (See Autotrophic)

Holozoic - (See Heterotrophic)

Homogeneous - of uniform composition throughout.

Homothermous - having the same temperature throughout.

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 condition of the atmosphere in respect to its content of water vapor.

Humus - a brown or black organic matter in or on a soil; composed of partly or fully decomposed bits of plant tissue derived from plants on or in the soil, or from animal manure.

Hydraulic Conductivity - ratio of flow velocity to driving force (hydraulic gradient) for viscous flow under saturated conditions of a specified liquid in a porous medium.

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 along a pipeline or a groundwater streamline.

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. A. The sum of the pressure and elevation heads.

Hydraulic Model - the hydraulic data needed to operate a numerical model. These data consist of cross sections and their locations, and energy loss coefficients. This term is also frequently used to mean a physical scale model of a river used for engineering studies.

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 cross-sectional area of a stream of water divided by the length of that part of its periphery in contact with its containing material; the ratio of area to wetted perimeter. Also called Hydraulic Mean Depth.

Hydraulics - the study and computation of the characteristics, e.g., depth (water surface elevation), velocity and slope, of water flowing in a stream or river.

Hydric - attributable to water.

Hydrobiology - the study of life in water.

Hydrograph - a plot of discharge as a function of time for a given location.

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, etc.

Hydrologic Boundary - an abrupt change in hydraulic properties in or at the margin of a groundwater basin. Recharge and barrier boundaries are types of hydrologic boundaries.

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 through which water passes, commencing as atmospheric water vapor, passing into liquid form as precipitation, then 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 ( $\text{Inflow} = \text{Outflow} + \text{Storage}$ ) 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. The equation balancing the hydrologic budget.

Hydrology - the applied science concerned with the waters of the earth, their occurrences, distribution, and circulation through the unending hydrologic cycle of: precipitation, consequent runoff, infiltration, and storage; eventual evaporation; and reprecipitation. It is concerned with the physical and chemical reaction of water with the rest of the earth, and its relation to the life of the earth. In practice the study of the water of the oceans and the atmosphere is considered part of the sciences of oceanography and meteorology.

Hydrolysis - the partial splitting caused by water of a neutral salt into its component free acid and base; according to the strength of these products the solution reacts acidic or alkaline.

Hydrostatic Head - the pressure exerted by a given height of liquid above a given datum point. May be listed in feet of head, pounds per square inch, or other criteria.

Hydrostatic Pressure - pressure exerted by water at any given point in a body of water at rest.

Hydrostratigraphic Unit - earth materials with considerable lateral extent that compose a geologic framework for a reasonably distinct hydrologic system.

Hyetograph - graphical representation of rainfall intensity against time.

Hygroscopic Water - water so tightly attached to soil particles that it will not evaporate except at temperatures above the boiling point.

Hygrothermograph - combines the features of both the hair hygograph and the thermograph, recording both relative humidity and temperature on one chart.

Hypolimnion - the cooler lower level of a thermally stratified body of water which extends from the metalimnion to the bottom and which is essentially removed from surface influence. (See Metalimnion, Thermal Stratification)

Ichthyologist - a specialist in the study of fishes.

Identification - the use of a taxonomic key or the equivalent to determine the

scientific name of an organism.

Imhoff Cone - a conical glass container commonly one liter capacity, having the upper larger diameter end open and the closed apex downward with graduations to assist estimation of the volume of settleable solids after an arbitrary time interval for setting (usually one hour).

Imhoff Tank - a deep two-story tank originally patented by Karl Imhoff. The floor of the upper chamber is slotted for transfer of settleable solids from the settling chamber. The lower chamber serves for anaerobic digestion and storage of solids.

Immediate Oxygen Demand (IOD) - the presence of reducing agents such as sulfites, sulfides, or ferrous iron, which cause an immediate demand on the dissolved oxygen in a stream.

Impeller - a rotating set of vanes to impart motion to a fluid, commonly within a casing where dynamic energy of fluid increases from the center to the tip of the vanes. May be closed or open depending on a tube or paddle configuration.

Impervious - a term applied to a material through which water cannot pass. It is also applied to material through which water passes with great difficulty.

Import - water piped or channeled into an area.

Impoundments - a water reservoir or lake formed by its confinement and storage.

Inactive Storage - the gross capacity below the "Inactive Storage Elevation." The inactive pool elevation is the lowest elevation to which a reservoir would be drawn to attain primary project design objectives. Any releases made when the pool is below this level normally would be the minimum required to meet legal requirements or emergency provisions.

Inch-Degrees - the product of inches of rainfall times temperature in degrees above freezing (Fahrenheit scale), used as a measure of the snowmelting capacity of rainfall.

Incidental Drift - the casual, random drift of organisms. (See Drift Organisms, Catastrophic Drift, Periodic Drift)

Incipient Motion - the flow condition at which a given size bed particle just begins to move. Usually related to a "threshold" shear stress.

Inclined Staff Gage - located on the slope of a stream bank and graduated so

that the scale reads directly in vertical depth.

Incomplete Metamorphosis - the type of life history, characteristic of certain insects such as dragonflies and true bugs, in which there is no inactive pupal stage. The immature insect, or nymph, undergoes a series of molts as it grows, and finally emerges as a mature adult. (See Larva, Metamorphosis)

Independent Events - statistically, independent events are events which do not affect the probability of occurrence of one another in a given series. An example refers to successive flow volumes for a given duration. A degree of independence is assured by selecting volume events so that no flow data is used in more than one volume event.

Index of Wetness - the precipitation for a given year expressed as 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, velocity, stage, discharge, or the movements or positions of water controlling devices.

Indicator - may include the color change of a dye, electronic sensor response, or other means of estimating the equivalence point of a reaction between two different materials.

Indicator Organisms - a species, whose presence or absence may be characteristic of environmental conditions in a particular area or habitat; however, species composition and relative abundance of individual components of the population or community are usually considered to be a more reliable index of water quality.

Indirect Flood Damage - expenditures made as a result of the flood (other than repair) such as relief and rescue work, removing silt and debris, etc.

Indirect Toxicity - toxicity that affects organisms by interfering with their food supply or modifying their habitat instead of directly acting on the organisms themselves. (See Direct Toxicity)

Induced Surcharge Elevation - the accumulation of surcharge storage above the normal full pool level during a particular flood may be "induced", entirely or in part, by operating the regulating outlets and/or spillway gates at partial openings. Such operations can serve to reduce peak reservoir outflow rates and/or permit a more gradual increase in downstream river stages, while higher surcharge elevations are caused in the reservoir. Although induced surcharge may be used to obtain additional flood control effectiveness, the storage space used is not identified as primary flood control capacity and does not affect the designation of the "Normal Full Pool Elevation".

**Industrial Consumption** - the quantity of water consumed in a municipality or district for mechanical, trade, and manufacturing purposes, in a given period, generally one day. The per capita use is generally based on the total population of the locality, municipality, or district.

**Infiltration** - 1. The entrance of groundwater into a sewer through breaks, defective joints, or porous walls. 2. The penetration of water through the soil from surface precipitation, stream or impoundment boundaries.

**Infiltration Capacity** - the maximum rate at which the soil, when in a given condition, can absorb falling rain or melting snow. The infiltration capacity curve is a graph of 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 Index** - an average rate of infiltration, in inches per hour, equal to the average rate of rainfall such that the volume of rainfall at greater rates equals the total direct runoff.

**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.

**Infiltrometer** - a device by which the rate and amount of water percolating into the soil is determined 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 surface runoff is measured either as to rate or total flow. 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 zone of aeration from the ground surface toward the water table.

**Influent** - sewage, water, or other liquid, raw or partly treated, flowing into a reservoir, basin, or treatment plant.

**Influent Streams** - streams which contribute flow to the groundwater.

**Infra-Red** - the region of long wave-length radiation beyond the visible red.

**Initial Detention** - the volume of water on the ground, either in depressions or in transit, at the time active runoff begins.

**Initial Loss** - in hydrology, rainfall preceding 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 upon a unit area, by which the actual water content of a given soil zone (usually the root zone) in such area is less than the field capacity of such zone at the beginning of the rainy season. Also called Initial Moisture Deficiency.

**Inlet** - a short, narrow waterway connecting a bay, lagoon, or similar body of water with a large parent body of water; an arm of the sea, or other body of water, that is long compared to its width, and that may extend a considerable distance inland.

**Inorganic** - being composed of material other than plant or animal materials. Forming or belonging to the inanimate world.

**Insecticide** - substances or a mixture of substances intended to prevent, destroy, or repel insects.

**Instar** - a stage in the life cycle of an insect or other arthropod between two successive molts.

**Intangible Flood Damage** - estimates of the damage done by disruption of business, danger to health, shock, and loss of life and in general all costs not directly measurable which require a large element of judgment for estimating.

**Interaction** - mutual or reciprocal action or influence between organisms, between organisms and environment, or between environmental factors.

**Intercepting Drain** - a drain constructed at the upper end of the area to be drained, to intercept surface or groundwater flowing toward the protected area from higher ground, and carry it away from the area. 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.

Interceptor - an intercepting sewer designed to carry the dry weather flow from a community to a treatment plant, but not large enough to carry storm water above some preset ratio to dry weather flow. May be used to collect lateral sewer flows.

Interflow - 1. That movement of water of a given density in a reservoir or lake between layers of water of different density, and usually caused by the inflow of water either at different temperature, or of 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 streams.

Intermediate Zone - the subsurface water zone below the root zone and above the capillary fringe.

Interpretative - a type of sampling program or study designed to collect information useful in describing a system, and cause-and-effect relationships without the system.

Interspecific - refers to relations or conditions between species. (See Intraspecific)

Intertidal Zone - (See Tidal Zone)

Intolerant Organisms - (See Sensitive Organisms)

Intraspecific - refers to relations or conditions between individuals within a species. (See Interspecific)

Intrinsic Permeability - ability of a porous medium to transmit fluid. It is a function of the properties of the porous medium only.

Inverse Estuary - type of estuary in which evaporation exceeds the supply of freshwater; evaporation is greater than the freshwater inflow plus the precipitation. (See Positive Estuary, Neutral Estuary)

Invertebrates - animals without an internal skeletal structure; e.g., insects, mollusks, crayfish. (See Vertebrate)

Ion - an electrically charged particle of matter dissolved in water. For instance, common table salt has no chemical charge. In water, salt "dissociates;" each molecule of salt forms one ion of sodium with a positive charge, and one ion of chloride with a negative charge. (Chlorine is a gas; each molecule consists of two atoms of the element chlorine. In water, the atoms travel alone, are electrically charged, and are called chloride ions.) (See Dissociation)

Ionization - the process of the formation of ions by the splitting of molecules of electrolytes in solution.

Irrigation Efficiency - the percentage of water applied that can be accounted for in soil moisture increase.

Irrigation Requirement - the quantity of water, exclusive of precipitation, that is required for crop production. It includes surface evaporation and other economically unavoidable wastes.

Irrigation - the controlled application of water to arable lands to supply water requirements not satisfied by rainfall. The irrigated area is 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.

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 earth's surface as represented on a map connecting all points of equal precipitation.

Isotonic - solutions of the same osmotic pressure.

Joint Use Flood Control Storage Capacity - refers to storage capacity that is made available for flood control use on a flood runoff forecast basis, and/or with certain limitations on use in conjunction with some other storage function, such as hydroelectric power or irrigation. The term does not apply to "incidental" flood control use of storage that is not governed by specific rules to assure availability of the storage space according to conditions established prior to the flood occurrence.

Junction - in rivers, the point of connection of two upstream stretches or segments. In some estuary models a junction is a segment of the estuary.

Juvenile Water - water formed chemically within the earth and brought to the surface in intrusive rock.

Kilogram (kg) - a unit of weight that equals 1,000 grams, or the weight of one liter of pure water.

Kinetics - the dynamics of physical, chemical and biological reaction processes.

Lag - variously defined as time from beginning (or center of mass) of rainfall

to peak (or center of mass) of runoff.

Lag-Type (Flow-Storage) Curve - a curve showing the relation between values of storage and the outflow that would occur a selected number of hours later. Used in routing flows through a long river reach. Also called "Meyer Lag Curve".

Lagoon - 1. A shallow sound, pond, or channel near or communicating with a larger body of water. 2. A natural or artificial basin used for storage and/or stabilization of wastewater or sludge. Sometimes used for indefinite storage for disposal purposes. Commonly the lagoon depth is greater than a wadable depth but not greater than twenty feet.

Laminar Flow - streamline flow in which successive flow particles follow similar pathlines and head loss varies with velocity to the first power.

Land Evaporation - evaporation from land surfaces, in contrast to evaporation from free water surfaces.

Land Pan - an evaporation pan located on land.

Lapse Rate - a vertical temperature gradient (i.e., the rate of change of temperature with elevation in the free atmosphere).

Larva (plural Larvae) - an active immature stage in an animal's life history, during which its form differs from that of the adult. Larva are usually self-feeding but must pass through some sort of metamorphosis before assuming the characteristics of the adult; in insects, the wormlike stage between the egg and the pupa. The caterpillar, for example, is the larval stage in the life history of a butterfly; the tadpole is the larva of a frog. (See Incomplete Metamorphosis, Metamorphosis, Nymph, Pupa)

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.

Lateral Sewer - a sewer that discharges into a branch or main sewer and has no other tributaries other than individual house connections.

Law of Tolerance, Shelford's - "when one environmental factor or condition is near the limits of toleration, either minimum or maximum, that one factor or condition will be the controlling one and will determine whether or not a



species will be able to maintain itself." (See Limiting Factor)

Law of the Minimum, Liebig's - "the growth and reproduction of an organism is dependent on the nutrient substance, such as oxygen, carbon dioxide, calcium, etc., that is available in minimum quantity." (See Limiting Factor)

LD50 - (See Median Lethal Dose)

Leaching - 1. The removal of soluble constituents from soils or other material by percolating water. 2. The removal of salts and alkali from soils by abundant irrigation combined with drainage. 3. The disposal of a liquid through a nonwater-tight artificial structure, conduit, or porous material by downward or lateral drainage, or both, into the surrounding permeable soil.

Leachate – contaminated liquid created by the leaching process.

Lentic - pertaining to standing (nonflowing) waters such as lakes, ponds, and swamps. (See Lotic)

Life Cycle - the various phases, changes, or stages through which an individual passes from the fertilized egg to death of the mature organism. (See Metamorphosis)

Light Rain - rain which is falling at the time of observation with an intensity of between a trace and 0.10 inches per hour (0.01 inches in 6 minutes).

Limiting Factor - a factor whose absence, or excessive concentration, exerts some restraining influence upon a population through incompatibility with species requirements or tolerance. (See Law of the Minimum, Law of Tolerance)

Limnetic Zone - the open-water region of a lake, especially in areas too deep to support rooted aquatic plants. This region supports plankton and fish as the principal plants and animals. (See Littoral Zone)

Limnokrene - a pool spring.

Limnology - the study of the physical, chemical, and biological aspects of lakes.

Linked Constituent - a constituent whose nonconservative behavior is affected by the presence of one or more other constituents.

Liquid Sludge - an organic solid concentrate usually formed by deposition from wastewaters. The water content varies with the origin and nature of the sludge; usually has enough water to permit pumping but does not contain

significant separatable free water.

Liter - metric unit of volume containing 1,000 milliliters.

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 in this rocky crust.

Littoral Zone - 1. The shallow zone of a body of water where light penetrates to the bottom; 2. The shallow area that extends from shore to the lakeward limit of rooted aquatic plants; 3. The shoreward region of a body of water; 4. In marine ecology, the tidal zone. (See Limnetic Zone)

Load Ratio - an index of loading, including mass input per unit of capacity per unit of time. Mass may be expressed in pounds. BOD, COD, Suspended, or volatile solids, capacity in volume, weight of solids or volatile solids in process, and time, usually in days.

Load - the load to a process is that which is contained in the inflow to that process. It may be expressed as hydraulic, oxygen demand, solids, or other criteria.

Local Scour - erosion caused by an abrupt change in flow direction or velocity. Examples include erosion around bridge piers, downstream of stilling basins, at the ends of dikes, and near snags.

Long-Period Variations - secular when a cycle or a change in trend is completed within a century; climatic when the period of change runs through centuries or a few millennia; geologic when the period runs into geological time. (See Trend)

Lotic - pertaining to flowing waters such as streams and rivers. (See Lentic)

Low Flow Augmentation - increasing of an existing flow. The ability to assimilate waste can generally be improved by storage of flood flows and their subsequent release when natural flows are low and water quality conditions are poor.

Low Flow Frequency Curve - a graph showing the magnitude and frequency of minimum flows for a period of given length. Frequency is usually expressed as the average interval, in years, between recurrences of an annual minimum flow equal to or less than that shown.

Lysimeter - a device 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 as to quality.

Lysis - to decompose, loosen, or separate into component parts.

Macroorganisms - those organisms retained on a U.S. Standard Sieve No. 30 (opening of 0.589 mm); those organisms visible to the unaided eye.

Macrophytes are plants that can be seen with the naked, unaided eye; e.g., aquatic mosses, ferns, liverworts, rooted plants, etc. (See Microorganisms)

Manhole - an opening by which access may be achieved for inspection, maintenance, or repair of a sewer, conduit, or other buried structure or appurtenance.

Manning's n - a coefficient used to describe boundary (i.e., stream bed) roughness in hydrodynamics.

Manometer - an instrument for measuring pressure; usually it 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 upon the liquid in the other end. The term is also applied to a tube type of differential pressure gage.

Marsh - a meadow-like area overgrown with aquatic plants.

Mass Curve - a graph of the cumulative values of a hydrologic quantity (such as precipitation or runoff), generally as ordinate, plotted against time or date as abscissa. (See Double-Mass Curve, Residual-Mass Curve)

Mathematical Model - the set of equations, usually based upon fundamental physical principles, that describe a physical process.

Maximum Flood Control Release - the maximum permissible controlled release from a dam under a given operating criterion.

Maximum Permissible Concentration (MPC) - a standard intended to govern the concentration of a radioactive substance allowable in drinking water.

Standards - and only a few have been suggested - differ from place to place. The MPC for any element is set on the basis of variables such as sources other than water from which the element may be absorbed, degree to which element accumulates in the body, estimated daily intake of water, and half-life of the element.

Maximum Probable Flood - the largest flood for which there is any reasonable expectancy in the specific climatic area. (See Flood)

Maximum Thermometer - has a constriction near the bulb which prevents the mercury from returning to the bulb as the temperature falls and thus registers the highest temperature since its last setting.

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

Mean Annual Flow - the average of all the days of record of discharge, in cubic feet per second. It is the uniform flow, which, if multiplied by the number of seconds in a year, gives the volume of water that passed a location in an average year.

Mean Annual - 1. For floods, the arithmetic mean, over a period of years, of the highest peak discharge during each year of record. 2. For precipitation, the average over a period of years of the annual amounts of precipitation. 3. For temperature, is the average of the monthly mean temperatures for the year.

Mean Daily - 1. For flow, the mean flow for one day. Usually stated in second-foot-days (sfd). 2. For temperature, is 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.

Mean Monthly Temperature - is the average of the mean monthly maximum and minimum temperatures.

Meandering Stream - an alluvial stream characterized by a series of pronounced alternating bends. The shape and existence of the bends in a meandering stream are a result of alluvial processes and not determined by the nature of the terrain (geology) through which the stream flows. The meander amplitude is the distance between points of maximum curvature of successive meanders of opposite phase in a direction normal to the general course of the meander belt, measured between centerlines of channels. A meander belt is the area between lines drawn tangential to the extreme limits of fully developed meanders. The meander breadth is the distance between the lines used to define the meander belt. The meander length is the distance in the general course of the meanders between corresponding points of successive meanders of the same phase. Twice the distance between successive points of inflection of meander wave.

Mechanical Aeration - aeration produced by mechanical energy of the turbine, pump, paddle, or other device that imparts an intimate mixture of liquid and air.

Median - the magnitude of item such that half of the total number of items are larger and half are smaller.

Median Lethal Dose (LD50) - the dose that is lethal to fifty percent of a

group of test organisms for a specified period. The dose material may be ingested or injected.

Median Tolerance Limit (TLM) - the concentration of the tested material in a suitable diluent (experimental water) at which just fifty percent of the test organisms are able to survive for a specified period of exposure.

Membrane Filter - a flat, highly porous flexible plastic disc, commonly about 0.15 millimeter in thickness and 47-50 millimeter in diameter. Membrane filters are used in water microbiology to trap organisms, and, by use of standard media and conditions, direct enumeration by colony count of selected organisms.

Meniscus - the curved upper surface of a liquid in a tube that is concave upward when the containing walls are wetted by the confined liquid, and convex upward when they are not.

Meromictic Lake - a lake in which some water remains partly or wholly unmixed with the main water mass at circulation periods is said to be meromictic. The process leading to a meromictic state is termed meromixis. The perennially stagnant deep layer of a meromictic lake is called the monimolimnion. The part of the meromictic lake in which free circulation can occur is called the mixolimnion. The boundary between the monimolimnion and the mixolimnion is called the chemocline. (See Chemical Stratification)

Meromixis - a condition of permanent stratification of water masses in lakes.

Mesolimnion - (See Thermocline)

Mesophilic - medium temperature loving. Organisms capable of optimum metabolic activities at temperatures from about 80°- 110°F, 26°- 42°C.

Mesotrophic - intermediate stage in lake classification between the oligotrophic and eutrophic stages, in which primary production occurs at a greater rate than in oligotrophic lakes, but at a lesser rate than in eutrophic lakes. This is due to a moderate supply of nutrients. (See Eutrophic, Oligotrophic)

Metabolism - the chemical and physical processes continuously taking place in living organisms and cells, comprising those processes by which assimilated nutrient is built up into protoplasm (anabolism), and those by which protoplasm is used and broken down into simpler substances, with the release of energy (catabolism).

Metalimnion - the layer, in a thermally stratified body of water, for which the temperature difference is largest per unit of depth. This layer separates

the epilimnion from the hypolimnion. (See Epilimnion, Hypolimnion)

Metamorphosis - abrupt transformation of an animal from one distinctive life history stage to another in its postembryonic development; e.g., larva of an insect to a pupa. (See Life Cycle)

Meteoric Water - water derived from precipitation.

Meteorology - the science of the atmosphere; the study of atmospheric phenomena.

Meter - the length of a reference platinum bar used as a standard unit of measurement of length in the metric system; 1 meter = 39.37 inches.

Micro - 1/1,000,000 of a unit of measurement ( $1 \times 10^{-6}$ ) such as microgram (ug), microliter(ul). A microgram per liter (ug/l) is one-millionth of a gram of substance in one liter of water. Equals part per billion (ppb) because one liter of pure water weighs 1,000 grams, so we have one-millionth of one gram in 1,000 grams, or one ppb by weight. Used in identifying and reporting trace concentrations of heavy metals or of pesticides.

Microbiology - the science and study of microbiological organisms and their behavior. Commonly related to the study of pathogenic organisms.

Microorganisms - those organisms retained on a u.S. standard sieve no. 100 (openings of 0.149 mm); those minute organisms invisible or only barely visible to the unaided eye. Microphytes are small plants. (See Macroorganisms)

Milli - 1/1,000 of a unit of measure, such as milliliter (ml), milligram (mg), millimeter (mm). A milligram per liter (mg/l) is one part by weight of dissolved chemical, or suspended sediment, in one million by volume (one liter) of water. Numerically equivalent to parts per million (ppm) between zero and about 7,000 mg/l or when the specific gravity of liquid is 1.0.

Milli Equivalent Weight - 1/1,000 of the equivalent weight; usually expressed in milligrams.

Miners' Inch - 1. It is the rate of discharge through an orifice one inch square under a specific head. 2. Obsolete unit of measure in Western States; variously, 38.4, 40, and 50 miner's inches equal one cubic foot per second, as set by law in different states. Still the basis for some old water rights.

Minimum Thermometer - of the alcohol-in-glass type, has an index which remains at the lowest temperature occurring since its last setting.

Minnows (Cyprinidae) - the family of fishes including such forms as shiners, dace, and carp.

Miracidium - the ciliated free-swimming larva of a trematode worm.

Mixed Liquor - a mixture of return sludge and wastewater in the aerator of an activated sludge plant. Also may be used in reference to mixed aerobic or anaerobic digesters.

Mixing Zone - an area where two or more substances of different characteristics blend to form a uniform mixture; i.e., chlorine application, heated water, or other discharged materials entering a water mass will show significant differences of chlorine residual, temperature or other criteria, depending upon the sampling location throughout the mixing zone and approach uniform results with respect to lateral, longitudinal, and vertical sampling positions when mixing has been completed.

Mixotrophic - applied to algae that have the ability to assimilate carbon dioxide but in addition depend in part on organic substances for their nutrition.

Mixed liquor suspended solids (MLSS)– total suspended solids in an activated sludge process.

Mixed liquor volatile suspended solids (MLVSS)– suspended solids in an activated sludge process which can be volatilized by heating at 550 °C.

Model - a physical, analog, or mathematical representation of a process which can be used to predict some aspect of the process's behavior. (See Prototype)

Moderate Rain - rain which is falling at the time of observation with an intensity of between 0.11 and 0.30 inches per hour.

Moisture - water diffused in the atmosphere, soil, sludge or screenings. The moisture equivalent is the ratio of the weight of water which the soil, after saturation, will retain against a centrifugal force 1,000 times the force of gravity, to the weight of the soil when dry. The ratio is stated as a percentage.

Mollusk (Mollusca) - a large animal group including those forms popularly called shellfish (but not including crustaceans). All have a soft unsegmented body protected in most instances by a calcareous shell. Examples are snails, mussels, clams, and oysters.

Molt - to cast or shed periodically the outer body covering which permits an increase in size. This is especially characteristic of invertebrates. (See Instar)

Monitoring - a type of sampling program designed to determine time trend changes.

Monomictic - lakes having only one circulation period per year.

Morphology - study of configuration or form.

Moss - any bryophytic plant characterized by small, leafy, often tufted stems bearing sex organs at the tips.

Most Probable Number (MPN) - a statistical evaluation of degree of water pollution based on presence of coliform bacteria. It is not feasible to identify the exact concentration of coliform bacteria in a water sample. The MPN interprets test results in terms of results observed. A statistical method of determining microbial populations. A multiple dilution tube technique is utilized with a standard medium and observations are made for specific individual tube effects. Resultant coding is translated by mathematical probability tables into population numbers. (See Coliform Bacteria)

Motile - exhibiting or capable of spontaneous movement. (See Free-Swimming)

Movable Bed - a streambed made up of materials readily transportable by the streamflow.

Mudflow - a well-mixed mass of water and alluvium which, because of its high viscosity and low fluidity as compared with water, moves at a much slower rate, usually piling up and spreading over the fan like a sheet of wet mortar or concrete.

Municipal Use of Water - the various uses to which water is put in developed urban areas, including domestic use, industrial use, street sprinkling, fire protection, etc. The term is an inclusive one, applied where the uses are varied.

Mycology - the study of fungi.

Nanogram Per Liter (ng/l) - one-billionth of a gram of substance in one liter of water. Equals part per trillion (ppt) because one liter of pure water weighs 1,000 grams, so we have one-billionth of one gram in 1,000 grams, or one ppt by weight. Trace concentrations of heavy metals or of pesticides are reported in nanograms per liter. "Parts per trillion" has pretty much dropped out of use.

Nanoplankton - very minute plankton not retained in a plankton net equipped



with no. 25 silk bolting cloth (mesh, 0.03 to 0.04 mm).

Natural Control - a stream-gaging control which is natural to the stream channel, in contrast to an artificial control constructed by man.

Natural Flow - the flow resulting from natural hydrologic conditions. (Unaffected by man-made structures which would alter the natural regime.)

Natural Selection - processes occurring in nature which result in survival of the fittest and elimination of individuals less well adapted to their environment.

Nauplius - free-swimming microscopic larval stage characteristic of many crustaceans, barnacles, etc.

Neap Tides - exceptionally low tides which occur twice each month when the earth, sun and moon are at right angles to each other; these usually occur during the moon's first and third quarters. (See Spring Tides)

Nekton - macroscopic organisms swimming actively in water; e.g., fish. (See Plankton)

Nematoda - unsegmented roundworms or threadworms. Some are free living in soil, freshwater, and saltwater; some are found living in plant tissue; others live in animal tissue as parasites.

Neritic Zone - relatively shallow water zone which extends from the high-tide mark to the edge of the continental shelf.

Net Plankton - plankton retained in a plankton net equipped with no. 25 silk bolting cloth (mesh, 0.03 to 0.04 mm).

Net Rain - the portion of rainfall which reaches a stream channel or the concentration point as direct surface flow. (See Rainfall Excess, Effective Rainfall)

Neuston - organism associated with, or dependent upon, the surface film (air-water interface) of bodies of water.

Neutral Estuary - type of estuary in which neither the freshwater inflow nor the evaporation predominates; freshwater inflow + precipitation = evaporation. (See Positive Estuary, Inverse Estuary)

Niche - (See Ecological Niche, Habitat Niche)

Nitrate Reduction - the reduction of nitrates to nitrites or ammonia.

Nitrification - the biochemical conversion of unoxidized nitrogen (ammonia and organic) to oxidized nitrogen (usually nitrate).

Nitrogen Fixation - the formation of nitrogen compounds from free atmospheric nitrogen.

Nitrogenous oxygen demand (NOD) – biochemical oxygen demand due to oxidation of ammonia.

Nocturnal - pertaining to those organisms that are active at night. (See Diurnal)

Non-Project Conditions - the conditions that would be expected to exist in the future if a project were not built, also called pre-project conditions.

Non-Sequential Mass Curve - a curve showing the relationship between various durations and minimum recorded flow volumes or minimum flow volumes with specified probabilities. The curve is developed without regard to sequential occurrences of flows and therefore the critical duration can be obtained from the curve, but the critical period cannot.

Nonconservative - a constituent that may be subject to chemical, biological, or physical processes that tend to alter it or remove it from solution or suspension.

Nonconsumptive - uses of water in which only a small part of the water is lost to the atmosphere by evapotranspiration or by combination with a manufactured product. Nonconsumptive uses return to the stream or the ground approximately the same amount as diverted or used.

Normal - 1. A central value (such as arithmetic average or median) of annual quantities for a thirty-year period ending with an even ten-year, thus 1921-50; 1931-60, and so forth. 2. For daily temperature, the average daily mean temperature for a given date computed for a specific thirty-year period.

Normal Distribution - ideal frequency distribution approached by many observed distributions which are symmetrical and in which the small deviations greatly outnumber the large ones, the possible deviations being virtually unlimited in magnitude by physical conditions.

Normal Full Pool Elevation - this term corresponds to the top reservoir level that would be attained for routine storage of water for flood control, hydroelectric power, low-flow augmentation, recreation, sediment control, or other authorized storage uses; this level corresponds to the "total design capacity" of the reservoir selected initially on the basis of planning and design studies, excluding surcharge storage that is provided primarily to

reduce costs of constructing and maintaining the dam and appurtenances or to improve safety of operation during emergencies.

Normal Solution - a solution containing one gram equivalent of a substance per liter.

Normal Year - a year during which the precipitation or streamflow approximates the average for a long period of record.

Normality - 1. A means of expressing the concentration of a standard solution in terms of the gram equivalents of reacting substances per liter. 2.

Generally expressed as a decimal fraction, such as 0.1 or 0.02 N.

Nuisance Organisms (Pests) - those organisms capable of interfering with the use or treatment of water.

Numerical Dispersion - error in models using numerical approximations, caused by the use of grids of discrete size. Also called discretization error.

Numerical Model - a numerical model is the representation of a mathematical model as a sequence of instructions (program) for a computer. Given appropriate data, the execution of this sequence of instructions yields an approximate solution to the set of equations that comprise the mathematical model.

Nutrient - 1. Any chemical element, ion, or compound that is required by an organism for the continuation of growth, reproduction, and other life processes. 2. Includes many combinations elements and combinations of them. The major nutrients include carbon, hydrogen, nitrogen, sulfur, and phosphorus. 3. Nitrogen and phosphorus are of major concern because they tend to recycle and are hard to control.

Nymph - the immature, preadult form of an insect whose life history is characterized by incomplete metamorphosis, i.e., do not have a pupal stage; e.g., mayflies and stoneflies. Nymphs, after hatching, live and feed in water until they molt and become adults. (See Larva, Metamorphosis)

Obligate - limited to one mode of life or action. (See Facultative)

Observation Well - a nonpumping well used for observing the elevation of the water table or the piezometric surface.

Oceanic Zone - the region of open ocean beyond the continental shelf.

Ocular Micrometer - a scaled glass disc that, fitted on the diaphragm of a microscope ocular, is used in making microscopic measurements.

Odor Control - in wastewater treatment this generally refers to good house-keeping in the plant and aeration, chlorination or other operations to prevent onset of malodorous septicity in the wastewater flow.

Ogee - a reverse curve, shaped like an elongated letter S. The downstream faces of overflow dams are often made to this shape.

Ohm - the unit of electrical resistance: one ohm is the resistance offered by a column of mercury one mm<sup>2</sup> in cross section and 106.3 cm long at 0° (after the physicist G. Simon Ohm).

Oils - 1. Liquid fats of animal or vegetable origin. 2. Oily or waxy mineral oils.

Oligo aerobic - organisms that thrive only at low dissolved oxygen levels.

Oligothermal - confined to a range of low temperatures.

Oligotrophic - lakes which have a low supply of nutrients, thus they support very little organic production. Dissolved oxygen is present at or near saturation throughout the lake during all seasons of the year. (See Eutrophic Lakes)

Omnivore - an animal that habitually eats both plants and animals. (See Carnivore, Herbivore)

Operating Diagram (Flood Control) - a graphical presentation of the flood control operating criteria which shows the amounts of reservation which must be provided at various times during the year. Usually is accompanied by a brief statement of the methods of operation to be used.

Optimum Level - the most suitable degree of an environmental factor for the full development of the organism concerned. (See Tolerance Range)

Organic - 1. Pertaining or relating to a compound containing carbon. Organic chlorine compounds contain chlorine in combination with carbon, hydrogen and certain other elements.

2. Pertaining to anything that is or ever was alive or produced by a living plant or animal. Organic detritus is the particulate remains of disintegrated plants and animals. (See Inorganic)

Organic nitrogen – that portion of nitrogen in a water sample tied up in organic dissolved chemicals or solid.

Organism - any living individual.

Orifice - 1. An opening with closed perimeter, usually sharp edged, and of regular form in a plate, wall, or partition through which water may flow, generally used for the purpose of measurement or control of such water. 2. The end of a small tube, such as a Pitot tube, piezometer, etc.

Orifice Meter - a device consisting of a flange set in a pipe section containing an opening smaller than the pipe. Pressure readings above and below the orifice may be related to flow.

Orographic Precipitation - precipitation which is caused by hills or mountain ranges deflecting the moisture-laden air masses upward, causing them to cool and precipitate their moisture.

Ortho-Toluidine Chlorine Test - the dye, ortho-toluidine, under highly acid conditions, produces a yellow color proportional in intensity to the concentration available residual chlorine and certain other oxidants or interfering materials.

Osmoregulation - the adjustment in the osmotic concentration of solutes in body fluids in organisms to environmental conditions; e.g., when salmon migrate from salt to freshwater.

Osmosis - the passing of liquids through membranes. Osmotic pressure is the tendency of a solution to reduce its concentration by attracting more of the solvent to it.

Outcrop - that part of the mineral formation that appears at the surface of the ground. It does not necessarily imply visible presentation of the mineral on the surface of the earth, but includes those deposits that are near to the surface.

Outfall Sewer - the outlet or channel through which sewage effluent is discharged.

Outslope - the outer (away from the highwall) edge or face of a bench.

Overbank - the shallow portion of the waterway area outside the deeper main channel.

Overburden - any material, consolidated or unconsolidated, that overlies a deposit of useful materials, ores, or coal.

Overland Flow - the flow of rainwater or snowmelt over the land surface toward stream channels. After it enters a stream, it becomes runoff.

Overtum (Turnover) - the period of mixing, by top to bottom circulation, of previously stratified water masses. This phenomenon may occur in spring and/or fall; the result is a uniformity of physical and chemical properties of the water at all depths. (See Thermal Stratification, Chemical Stratification, Spring Overtum, Fall Overtum)

Oxidation - a chemical process that can occur: (1) in the uptake of oxygen (combustion); (2) in the removal of hydrogen; and (3) in the increase of the valence (for example, from ferrous to ferric compounds). Reduction is the reverse process.

Oxidation Pond - a large shallow body of water in which waste is discharged. Reaeration is accomplished through surface agitation by wind action and as a result of activity of the algae utilizing the carbon dioxide and adding oxygen back to the system. This system requires a substantially high dilution so that the time involved normally is in days rather than hours. This system sometimes is referred to as aerated lagoon when surface aerators are installed.

Oxygen Available - that part of the oxygen available for aerobic stabilization of organic matter. Includes dissolved oxygen and that available in nitrite or nitrates, peroxides, ozone, and certain other forms of oxygen.

Oxygen Balance - refers to the dynamic relationship among the available oxygen assets and the oxygen requirements for stabilization of oxygen demanding materials in a treatment plant or receiving water.

Oxygen Deficit - 1. The difference between observed oxygen concentration and the amount that would theoretically be present at one hundred percent saturation for existing conditions of temperature and pressure. 2. A temporary phenomenon that occurs in an organism when available oxygen is inadequate to supply the respiratory demand. During such a period the metabolic processes result in the accumulation of breakdown products that are not oxidized until sufficient oxygen becomes available.

Oxygen Demand, Biochemical (Oxygen-Depleting Effect; BOD) - the amount of oxygen required for aerobic bacteria to oxidize completely the organic decomposable matter in water within a specified time and at a given temperature - an index to the degree of organic pollution in the water. When discharged to a watercourse, waste containing BOD constituents will consume dissolved oxygen in the water; the BOD indicates the amount of oxygen used up. Waters that receive high BOD waste undergo reduction of oxygen and consequent damage to aquatic life.

Oxygen Depletion - the loss of oxygen from water or sewage due to biological, chemical or physical action.

Oxygen Sag Curve - a curve that represents the profile of dissolved oxygen content along the course of a stream, resulting from deoxygenation associated with biochemical oxidation of organic matter, and reoxygenation through the absorption of atmospheric oxygen and through biological photosynthesis.

Oxygen Saturation Capacity - the maximum quantity of dissolved oxygen that a liquid exposed to the atmosphere can contain at a given temperature and pressure.

Parasite - an organism that lives on or in a host organism from which it obtains nourishment at the expense of the latter during all or part of its existence. Does not necessarily cause disease.

Parshall Flume - a device for estimation of the flow in an open conduit. Consists of a constricting section, a throat, and an expanding section. The throat contains a sill over which the liquid passes. The pressure change over the sill can be related to quantity of flow.

Parts Per Trillion (ppt) - (See Nanogram Per Liter)

Parts Per Billion (ppb) - (See Micro)

Partial Pressure - in any mixture of gases, each gas exerts a pressure independent of the other gases.

Partial-Duration Flood Series - a list of all flood peaks that exceed a chosen base stage or discharge, regardless of the number of peaks occurring in a year (Also called basic-stage flood series, or floods above a base).

Particulate - refers to detectable suspended solid material dispersed in a gas or liquid. Small sized particulates may produce a smoky or hazy appearance in a gas; milky or turbid appearance in a liquid. Larger particulates are more readily detected and separated by sedimentation or filtration.

Parts Per Million (ppm) - (See Milli)

Pathogens - bacterial, fungal, viral, or other organisms directly involved with diseases of plants, animals, or man. (See Coliform Bacteria)

Peak Flow - the instantaneous maximum flow.

Peaking Plant - a hydroelectric plant which is designed to supply power during maximum load periods. Peaking plants ordinarily have low plant factors.

Pelagic Zone - the open sea, away from the shore. Comparable with the

limnetic zone of lakes.

Percentage Treatment - the ratio expressed as a percentage of the material removed from process water in terms of the material entering. Sometimes referred to as reduction.

Perched Groundwater - a lense of groundwater separated from an underlying body of groundwater by unsaturated earth material.

Percolation - the movement, under hydrostatic pressure, of water through the interstices of a rock or soil, except the movement through large openings such as caves. Deep percolation is the amount of water that passes below the root zone of the crop or vegetation, in irrigation or farming practice.

Periodic Drift - drift of bottom organisms at regular or predictable intervals such as diurnal, seasonal, etc. (See Drift Organisms, Catastrophic Drift, Incidental Drift)

Periphyton - microscopic aquatic organisms such as algae, attached or clinging to stems and leaves of rooted plants or other surfaces projecting above the bottom. (See Phytoplankton)

Permanent Control - a stream-gaging control which is substantially unchanging and is not appreciably affected by scour, fill, or backwater.

Permeability Coefficient - the rate of flow of a fluid through a cross section of a porous mass under a unit hydraulic gradient, at a temperature of 60°F. The standard coefficient of permeability used in hydrologic work in Meinzer's Units is defined as the rate of flow of water at 60°F, in gallons per day, through a cross section of one square foot, under a hydraulic gradient of one hundred percent. A related coefficient, which may be called the field coefficient of permeability, is defined as the rate of flow of water, in gallons a day, under prevailing conditions, through each foot of thickness of a given aquifer in a width of one mile, for each foot per mile of hydraulic gradient.

Permeability - the property of soil or rock that allows passage of water through it when subjected to a difference in head.. This depends not only on the volume of the openings and pores but also on how these openings are connected to each other.

Permeameter - a laboratory instrument for determining permeability by measuring the discharge through a sample of the material when a known hydraulic head is applied.

Pesticide - any chemical preparation used to kill pests. Includes



insecticides, herbicides, fungicides, etc.

Pests - (See Nuisance Organisms)

pH - an index of hydrogen ion activity. Defined as the negative logarithm (base 10) of the hydrogen ion concentration at a given instant. On a scale of zero to fourteen, Ph of 7.0 is neutral, pH less than 7.0 indicates a predominance of hydrogen ions (acid); pH greater than 7.0 indicates a lack of hydrogen ions (alkaline). The pH of most natural water falls within the range of four to nine. Slight decrease in pH may greatly increase the toxicity of pollutants such as ammonia. Alkaline water will tend to form a scale; acid water is corrosive.

Photic Zone - (See Euphotic Zone)

Photoelement - an element consisting of a metallic plate (iron, copper) a thin layer of crystalline semiconductor (silver selenide, cuprous oxide), and a transparent metallic film. On illumination a photoelectric current arises from the surface of the metallic film and passes through the conductor enclosed between this and the metallic plate.

Photosynthesis - the metabolic process whereby green plants utilize light as an energy source and convert chemical compounds to carbohydrates. In the process, carbon dioxide is consumed and oxygen is released. (See Chlorophyll)

Phototrophs – organisms obtaining energy from light.

Phototropism - movement in response to the stimulus of a light gradient.

Phreatophyte - a plant that habitually obtains its water supply from the zone of saturation, either directly or through the capillary fringe.

Phytoplankton - the plants of the plankton. Unattached microscopic plants subject to movement by wave or current action. (See Zooplankton, Periphyton)

Piezometer - an instrument for measuring pressure head in a conduit, tank, soil, etc. It usually consists of a small pipe or tube tapped into the side of the container, the inside end being flush with, and normal to, the water face of the container, connected with a manometer pressure gage, mercury or water column, or other device for indicating pressure head. The piezometric surface is an imaginary surface that everywhere coincides with the static level of water in an aquifer or artesian basin. It is the surface to which the water in such aquifer or basin would rise if afforded an opportunity to do so.

Piscicide - substances or a mixture of substances intended to destroy or

control fish populations.

Pitot Tube - a device for measuring the velocity of flowing water using the velocity head of the stream as 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.

Plankton - suspended microorganisms that have relatively low powers of locomotion, or that drift in the water subject to the action of waves and currents. (See Benthos, Phytoplankton, Periphyton, Nekton)

Plant Factor - the ratio of the average hydroelectric load on the plant for a stated period, to the aggregate rating of all the generating equipment installed in the plant.

Pleuston - the community of organisms floating on the upper surface of a lake.

Plotting Position - various plotting positions have been developed to permit graphical presentation and interpretation of basic data for frequency analysis. Several of the commonly used formulas are given below:

$$P = \frac{M}{N} \quad (\text{California Method}) \quad P = \frac{M}{N+1} \quad (\text{Powell Method})$$

$$P = \frac{2M-1}{2N} \quad (\text{Hazen Method}) \quad P = \frac{M-.3}{N+.4} \quad (\text{Median Method})$$

where:

P = plotting position (generally equal to probability)

N = period of record (number of events or values in sample)

M = rank number (largest event = 1, smallest = N)

Pneumatic Ejector - a device for pumping sludge, sewage, or other liquid by admitting the fluid into a chamber through one check valve and forcing it out of another by air pressure in the chamber above the liquid.

Point Discharge - 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 - contamination or other alteration of the physical, chemical or biological properties of water that renders it unacceptable in terms of established water quality standards or beneficial uses of the water, including changes in temperature, taste, color, or odor of the water, or the discharge into the water of any liquid, gaseous, radioactive, solid, or other substance that may create a nuisance or render such water detrimental or injurious to public health, safety or welfare. Broadly, pollution means any change in water quality that impairs it for the subsequent user.

Polythermal - confined to a range of high temperature.

Pond - a basin or catchment used for retention of water for equalization, stabilization, or other purposes. Commonly less than five feet in depth.

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 for 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. (See Reregulating Reservoir)

Ponding - with reference to trickling filtration, ponding refers to a plugging of the filter media by slimes or solids to restrict downward movement of wastewater sufficiently to cause surface accumulation of liquid either partially or completely.

Pools - the deepwater areas of a stream, where the velocity of current is reduced. The reduced velocity provides a favorable habitat for plankton. Silt and other loose materials that settle to the bottom of this zone are favorable for burrowing forms of benthos. (See Riffle)

Population - a group of interacting individuals of the same species, area, or community.

Porosity - 1. An index of the void characteristics of a soil or stratum as pertaining to percolation; degree of perviousness. 2. The ratio, usually expressed as a percentage, of the volume of the interstices (voids) in a given quantity of material, to the total volume of the material.

Positive Estuary - coastal indentures in which there is a measurable dilution of seawater by land drainage; freshwater inflow + precipitation > evaporation. (See Inverse Estuary, Neutral Estuary)

Potable - water which is safe for human consumption.

Potamology - the study of the physical, chemical, geological, and biological aspects of rivers. (See Limnology)

Potamon Zone - stream reach at lower elevations characterized by reduced flow, higher temperature, and lower dissolved oxygen levels. (See Rithron Zone)

Potential Evapotranspiration - water loss that will occur if at no time there is a deficiency of water in the soil for use of vegetation.

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 to water loss under the type and density of vegetation native to a basin, actual conditions of moisture supply, and other basin characteristics, whereas potential evapotranspiration represents the hypothetical condition of no deficiency of water in the soil at any time for use of the type and density of vegetation that would develop.

Potential Rate of Evaporation - (See Evaporativity)

Potentiometric Surface - general term which refers either to the water table or the piezometric surface.

Precipitable Water - total water vapor contained in an atmospheric column of unit cross-sectional area expressed in terms of water of the same cross-sectional area.

Precipitate - 1. The formation of solid particles in a solution. 2. The solids that settle as a result of chemical or physical action that caused solids suspension from solution.

Predator - an animal that kills and consumes other animals. (See Prey)

Predominant - those organisms that are of outstanding abundance in a particular community for a given period of time. (See Dominant)

Pressure Gage - a device for registering the pressure of solids, liquids, or gases. It may be graduated to register pressure in any units desired.

Pressure Head - energy contained by fluid because of its pressure, usually expressed in feet of fluid (foot pounds per pound). Fluid pressure divided by unit weight of water.

Pressure - the total load or force acting upon a surface. In hydraulics, the term commonly means pounds per square inch of surface, or kilograms per square

centimeter above atmospheric pressure on site. (Atmospheric pressure at sea level is about 14.7 pounds per square inch.)

Prey - an animal that is killed and consumed by another animal. (See Predator)

Price Current Meter - a current meter with a series of conical cups fastened to a flat framework through which a pin extends. The pin sets in the framework of the meter, and the cups are rotated around it in a horizontal plane by the flowing water, registering the number of revolutions by acoustical or electrical devices, from which the velocity of the water may be computed.

Primary Flood Control Storage Capacity - refers to any storage space above the "Normal Full Pool Elevation" in which storage runoff and subsequent releases therefrom are made, with control of downstream floods as a primary objective. The primary flood control storage capacity reserved in a reservoir may be varied on a fixed rule curve basis to provide the largest capacity during seasons when flood control needs are greatest.

Primary Producers - green plants, the basic link in any food chain. By means of photosynthesis, green plants manufacture the food on which all other living things ultimately depend. Primary production is the synthesis of organic compounds by green plants in the presence of elements and light energy. (See Consumer)

Primary Sludge - sludge obtained from a primary sedimentation tank.

Primary Treatment - commonly the separation of settleable or floatable materials from carrier water. Usually preceded by pretreatment such as coarse screens, grit separation, or comminution.

Probability of Shortage - the likelihood or chance that a shortage will occur in any given year based on sample data. (Sometimes expressed as a percentage, i.e., ten percent probability of shortage indicates that there is one chance in ten that a shortage will occur in any given year.)

Probable Maximum Flood (PMF) - this term identifies estimates of hypothetical flood characteristics (peak discharge, volume and hydrograph shape) that are considered to be the most severe "reasonably possible" conceivable probability of occurring at a particular location, based on relatively comprehensive hydrometeorological analyses of critical runoff-producing precipitation (and snowmelt, if pertinent) and hydrologic factors favorable for maximum flood runoff.

Prokaryotic organism – organisms that do not have a cellular membrane.

Process - a series of operations or actions that lead to a particular result. A combination of unit operations that may be assembled and used for a given treatment objective.

Producers - organisms that synthesize organic material from inorganic substances; e.g., all green plants and some bacteria. (See Consumers, Reducers)

Production - the total amount of organic matter produced from raw materials in an area per unit time, regardless of the fate of the material. (See Primary Production, Secondary Production)

Production Pyramid - a representation of the diminishing amount of organic material produced at each successive level along a food chain. The decline in productivity results from the constant loss of energy through living processes along the food chain. (See Pyramid of Numbers)

Profundal - the deep region of a body of water below the light-controlled limit of plant growth.

Project Conditions - the conditions that would be expected to exist in the future if a project were built.

Prolific - pertaining to organisms that have a high reproduction rate and normally produce large numbers of young.

Proteins - naturally occurring compounds containing carbon, hydrogen, nitrogen, and oxygen, with smaller amounts of sulfur and phosphorus, and trace components essential to the living cells. An essential food associated with meat and eggs.

Protoplasm - the living material in cells of plants and animals.

Prototype - the process or thing being modeled. (See Model)

Protozoa - organisms consisting either of a single cell or of aggregates of cells, such as amoeba, ciliates, and flagellates, each of which performs all the essential functions in life. They are mostly microscopic in size and largely aquatic.

Protozoologist - a specialist in the study of protozoa.

Psammon - the community within sand deposits of lakes and river bars and shores.

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 being 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 is determined.

Psychrophilic Organisms - low temperature loving organisms, or having a competitive advantage over other organisms at lower temperatures; i.e., from about 10°C downward to the freezing point.

Publicly owned treatment works (POTW) – a municipally owned wastewater treatment plant.

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 of them, which has been compacted through the addition of water and rolling and tamping, and made more or less impervious. 3. A small pool of water, usually a few inches in depth and from several inches to several feet in its greatest dimension.

Pumping Head - energy given to a fluid by a pump, usually expressed in feet of fluid (foot pounds per pound).

Pupa (pl. Pupae) - the inactive stage in the life of certain insects, during which the larva undergoes a gradual reorganization of its tissues in the process of transforming into an adult. (See Metamorphosis)

Putrefaction - biological decomposition of organic matter by microorganisms with the formation of smelly products, such as hydrogen sulfide, amines, mercaptans. Associated with anaerobic conditions.

Pyramid of Numbers - a representation of the normally declining number of individuals at each successive level on a food chain. (See Production Pyramid)

Quality - 1. For water, the composite chemical, physical, and biological characteristics of a water with respect to its suitability for a particular use. 2. For snow, the fraction of the total weight of a snow sample which is in the form of ice, the remaining portion consisting of entrained liquid water.

Quiescent - characterized by a lack of or negligible movement of the suspending media, such as liquid or gas. Still or absence of turbulence.

Radiation Absorbed Dose (RAD) - a measure of the radiation dose absorbed by matter (as human tissue, for example). The RAD is about equivalent to the

absorption of one roentgen (r) of X-rays.

Radioactivity - the property of some elements of giving off particles or rays or both. The rays are gamma or x-rays. The particles are alpha particles (like the nucleus of a helium atom), neutrons, or protons. The process is called radioactive decay. Decay rate is measured by the half-life - that is, by the time it takes for one-half the available particles to be given off. Uranium decays slowly and has a half-life of about 4.5 billion years. Strontium-90 has a half-life of twenty-eight years. Tritium (radioactive hydrogen) has a half-life of about 12.5 years. Some man-made radioactive elements have half-lives of tiny fractions of a second.

Radionuclide - a radioactive atom having (1) a specified number of protons and neutrons (therefore a specified mass), and (2) the property of giving off protons, neutrons, or rays at a specified time rate.

Rain - drops of liquid water in the air, generally larger than 0.02 inches in diameter, which fall to the earth at velocities usually greater than ten feet per second in still air. Liquid precipitation. A rain flood is a flood caused primarily by rainfall, viz., rainfall with only incidental contribution from snowmelt. Rainfall rate is the amount of precipitation occurring in a unit of time, generally expressed in inches per hour.

Rain Gage - a device for catching and measuring the depth of rainfall. There are various kinds and sizes of rain gages, most of them employing the principle of catching the rainfall in a collector or larger cross-sectional area than that of the measuring compartment, so that a given depth of water in the latter represents a considerably smaller depth of rainfall catch.

Rainfall Excess - the volume of rainfall available for direct runoff. It is equal to the total rainfall minus interception, depression storage, infiltration, and absorption.

Rainfall, Excessive - rainfall in which the rate of fall is greater than certain adopted limits, chosen with regard to the normal precipitation (excluding snow) of a given place or area. In the U.S. Weather Bureau, it is defined, for States along the southern Atlantic coast and the Gulf coast, as rainfall in which the depth of precipitation is 0.90 inch at the end of thirty minutes and 1.50 inches at the end of an hour, and for the rest of the country as rainfall in which the depth of precipitation at the end of each of the same periods is 0.50 and 0.80 inches, respectively.

Rainfall Intensity Curve - a curve which expresses the relation of rates of rainfall and their duration. Each curve is generally for a period of years during which time the intensities shown will not, on the average, be exceeded more than once.



Rapids - the shallow water area of a stream where velocity of current is great enough to keep the bottom clear of all loose materials, thus providing a firm substrate. The surface of the water is disrupted by turbulent currents. This area is occupied largely by specialized benthic or periphytic organisms that can firmly attach or cling to a firm substrate. (See Pools, Riffles)

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 gate, meter, or other hydraulic structure or instrument and the pertinent hydraulic conditions affecting the discharge such as pressure, hydrostatic head, velocity of approach, etc. If more than one condition affects discharge, a family of curves will be required to represent the rating. (See Discharge Curve)

Raw Wastewater (Sewage) - used wastewater prior to treatment.

Reach - 1. The length of channel uniform with respect to discharge, depth, area, and slope. 2. The length of a channel for which a single gage affords a satisfactory measure of the stage and discharge. 3. The length of a river between two gaging station. 4. More generally, any length of a river.

Reaeration - the absorption of oxygen by a liquid, the dissolved oxygen content of which has been depleted. (See Aeration)

Recession Curve - the descending portion of a hydrograph (following the cessation of inflow) which results from the draining out of the storage in a reach or basin. Since most natural storage is complex and consists of surface, subsurface, and groundwater portions, this recession curve is usually complex and cannot be represented by a single mathematical equation.

Recession Time - in hydrograph analysis, the duration of direct surface discharge after the end of rainfall excess.

Recharge - addition of water to an aquifer. Occurs naturally from infiltration of rainfall and of water flowing over the land surface. Artificial recharge through injection wells, or by spreading surface water where it will infiltrate, both to store water where it won't evaporate and to protect groundwater bodies from intrusion of seawater into aquifers. The recharge area is that where groundwater flow lines diverge and are directed away from the water table. The recharge boundary is the surface across which there is nearly constant hydraulic head. Rivers, lakes, and other bodies of surface water often form recharge boundaries.

Reciprocating Pump - a pump device using a piston within a casing fitted with

suction and discharge valves. Movement of the piston in one direction fills the casing, the reverse movement forces liquid into the discharge line. May be vertical or horizontal.

Recirculation - the return of effluent to the influent of a process unit to reduce influent concentration, stabilize the system, maintain hydraulic flow, to reprocess or for other beneficial reasons.

Reconnaissance - a type of sampling program or study designed to determine the present status of something; a preliminary survey.

Recorder - 1. A device to keep a continuous or intermittent record of some measured item such as flow, velocity, applied power, etc. 2. An individual who tabulates or maintains records of events, actions or measurements.

Recurrence Frequency - the frequency per year with which an event of a given magnitude can be expected to be surpassed. For example, an event with a recurrence frequency of .01 will be surpassed, on the average, once in a hundred years.

Recurrence Interval - the average interval of time between values more extreme than a specified magnitude. Reciprocal of the recurrence frequency (may also be called the return period or exceedance interval).

Red Tide - a visible red-to-orange coloration of an area of the sea caused by the presence of a bloom of certain plankton "armored" flagellates. These blooms are often the cause of major fish kills.

Redd - a type of fish-spawning area associated with running water and clean gravel. Fish moving upstream sequentially dig a pocket, deposit and fertilize eggs, and then cover the spawn with gravel from the next upstream pocket. Fishes that utilize this type of spawning area include some trouts, salmons, and minnows.

Reducers - organisms that digest food outside the cell wall by means of enzymes secreted for this purpose. Soluble food is then absorbed into the cell and reduced to a mineral condition. Examples are fungi, bacteria, protozoa, and nonpigmented algae. (See Producers, Consumers)

Reduction - 1. To make smaller or to remove from a given amount of material 2. Chemistry; the removal of oxygen, addition of hydrogen, or the addition of electrons to an element or compound. (See Oxidation)

Reef - a ridge of rocks, sand, soil or coral projecting from the bottom to or near the surface of the water.

Regime - "regime theory" is a theory of the forming of channels in material carried by the stream. As used in this sense, the word "regime" applies only to streams that make 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, of the order of a decade. In unspecialized use "regime" and "regimen" are synonyms.

Regulating Outlets - in design studies it is usually desirable to distinguish between "regulating outlets" provided primarily for routine operation of a reservoir and "spillway" facilities intended primarily for use in discharging excess waters, inasmuch as many different design considerations are involved. However, regulating outlets and spillways usually are complementary structures. A variety of combinations have been adopted to conform with various functional needs and design advantages. Under some circumstances, regulating outlets are inoperable during severe floods because of lack of access to operating towers, or because heads exceed those for which the outlets were designed. On the other hand, some regulating outlets that are provided primarily to serve routine operating functions, before the design storage capacity of the reservoir is exceeded, are also designed to discharge "excess" waters when required, usually with the objective of reducing the frequency of emergency or limited-service spillway operations; such a structure may be designated as a "service spillway", if the capacity to discharge excess waters is a major portion of its total capacity. In contrast, some spillways are used regularly or occasionally to make routine reservoir releases associated with flood control operations or to augment downstream flows for navigation, pollution control, or other purposes.

Regulation - the artificial manipulation of the flow of a stream.

Relative Biological Effectiveness (RBE) - a measure of the relative effect on man of various types of radiation. One RAD of alpha particles or of neutrons or protons has ten times the RBE of one RAD of beta particles or gamma or X-rays. Heavy recoil nuclei are estimated to be twenty times as damaging as X-rays on the same scale.

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.

Relief Sewer - a sewer built to carry the flow in excess of the capacity of an

existing sewer.

Reoxygenation - the replenishment of oxygen in a stream from: (1) dilution water entering the stream, (2) biological reoxygenation through the activities of certain oxygen-producing plants, and (3) atmospheric reaeration.

Reregulating Reservoir - a reservoir for reducing diurnal fluctuations resulting from the operation of an upstream reservoir.

Reservoir - a pond, lake, tank, basin, or other space, either natural in its origin, or created in whole or in part by the building of engineering structures, which is used for storage, regulation, and management of water.

Reservoir Pool Elevation - water surface elevations in the reservoir near the dam site, exclusive of wave action and wind-tide effects.

Reservoir Storage Space - reservoir capacity available between two flat pool elevations as indicated by appropriate elevation-capacity curves.

Reservoir-Type (Flow-Storage) Curve - a curve showing the relation between simultaneous values of storage and outflow. Used in routing flows through a reservoir or short river reach.

Residual Chlorine - (See Available Residual Chlorine)

Residual Depression Storage - depression storage existing at the end of the period of excess rain.

Residual Detention Storage - detention storage existing at the end of the period of excess rain.

Residual Discharge - direct surface discharge after the end of excess rain.

Residual Mass Diagram - a graph plotted with rectangular coordinates, each ordinate being equal to the summation of all preceding quantities up to a given point, minus the arithmetic mean of the series times the number of quantities in the series up to the given point, with the corresponding abscissa representing time, number of the item in the series, etc. When the general slope of a section of such graph is upward, it indicates that the terms in the series within such section are, in general, in excess of the average for the series; and when such slope is downward, the reverse is indicated. The diagram is used in determining cyclic variation of quantities such as precipitation, etc. (See Mass Curve)

Resistance Thermometer - an arrangement for measuring temperature on the basis of thermally induced changes in the electrical resistance of thin wires.

Respiration - the complex series of chemical and physical reactions in all living organisms by which the energy and nutrients in foods is made available for use. Oxygen is used and carbon dioxide released during this process. (See Metabolism)

Retarding Reservoir - 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 irrigation water that is not consumed by evapotranspiration and that returns to its source or another body of water. The term is also applied to the water that is discharged from industrial plants. Also called Return Water.

Return Period - in statistical analysis of hydrologic data, assuming that observations are equally spaced in time, and, choosing the interval between two successive observations as unit of time, return period is the reciprocal of one minus the probability of a value equal to or less than a certain value; or it is the mean number of such time units necessary in order once to obtain a value equal to or greater than a certain value. Where the interval between observations is a year, a return period of one hundred years, for example, means that on the long term average, not more often than once in one hundred years is an event of this magnitude, or greater, expected to occur.

Return Seepage - water which percolates from canals and irrigated areas to underlying strata, raising the groundwater level, and which eventually returns to natural channels.

Return Sludge - sludge returned from process to the influent flow. Commonly return activated sludge from a secondary clarifier. Also may include sludge from a clarifier after trickling filtration.

Reynolds Number - a dimensionless ratio of inertial to viscous (or resistive) forces, an index of fluid flow characteristics, equal to velocity times diameter or depth times mass density divided by dynamic viscosity.

Rheokrene - a flowing spring.

Rheotropism - movement in response to the stimulus of a current gradient in water.

Riffle - a section of a stream in which the water is shallower and the current

of greater velocity than in the connecting pools; the water surface is broken into waves by obstructions wholly or partly submerged; a riffle is smaller than a rapid and shallower than a chute. Riffles usually support a wider variety of bottom organisms than other stream sections. (See Pools, Rapids)

Riparian - pertaining to the banks of a stream, lake or body of water.

Ripples - small bed forms that are approximately triangular in cross section (parallel to the flow).

Rithron Zone - stream reach at higher elevations characterized by rapid flow, low temperature, and high dissolved oxygen levels. (See Potamon Zone)

River Basin - the total area (also called a watershed) drained by a river system. The river basin is regarded as a social and economic unit for community development and conservation of water, soil, forests and related resources. This concept recognizes the interrelationships of resource elements in a single basin, and assumes that multiple-purpose development can take these interrelationships into account. It extends the principle of ecological balance to the whole of the area and its occupants.

River Stage - is the elevation of the water surface at a specified station above some arbitrary zero datum.

Roentgen (r) - a measure of radiation (as X-rays equal gamma rays). One r produces in one cubic centimeter of air, ions that carry one electrostatic charge.

Roentgen Equivalent Man (REM) - the quantity of radiation of any kind that has the same effect on man as does absorbing one roentgen of X-rays. The various kinds of radiation considered are gamma and X-rays, beta particles, alpha particles, neutrons and protons, and heavy recoil nuclei.

Root Zone - the subsurface zone from the land surface to the depth penetrated by roots.

Rotary Distributor - a device mounted on a center post with horizontal arms extending to the edge of a circular trickling filter for distribution of flow over the entire bed surface.

Rotifer - a group of many-celled, microscopic zooplankton.

Rough Fish - those species of fish considered to be of poor fighting quality when taken on tackle; e.g., carp, gar, suckers, etc. These fish are considered undesirable in most situations. Most species in the group are more tolerant of widely changing environmental conditions than game fish.

Routing - a process of computing an unknown flow hydrograph at the lower end of a storage reach from a known hydrograph at the upper end of the reach. The routing interval is the basic time interval involved in a sequential routing (i.e., a weekly routing interval indicates that the routing will be composed of sequential periods one week in length).

Runoff Factor - the percentage of the basin precipitation that appears as runoff during a specific period of time such as one day or one year.

Runoff - that part of the precipitation that appears in surface streams. It is the same as streamflow unaffected by artificial diversions, storage or other works of man in or on the stream channels. Runoff may be classified as follows: (1) Classification as to speed of appearance after rainfall or snow melting: Direct Runoff, Base Runoff; (2) Classification as to source: Surface Runoff, Storm Seepage, Groundwater Runoff. The runoff rate is volume of water running off in a unit of time from a surface, expressed in inches in depth of rainfall per hour over a specific drainage area, cubic feet per second, or other units.  
(See Overland Flow)

Runout - (See Water Yield)

S-Curve - in unit hydrograph terminology, an S-Curve is the flow hydrograph resulting from a very long storm when the excess precipitation intensity is constant. The excess precipitation is the amount of water that is available for runoff after all losses have been subtracted from the precipitation. Also called S-Hydrograph.

Safe Yield - with reference to either a surface water or groundwater 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.

Salinity - the relative concentration of salts, usually sodium chloride, in a given water. It is usually expressed in terms of the number of mg/l of chloride.

Salt - a chemical compound formed from the interaction of an acid and an alkali (base). Common salt is sodium chloride formed from hydrochloric acid and sodium hydroxide. This ionizes in water solution to form sodium ions and chloride ions; sodium chloride is but one of many such compounds that are found in water.

Salt Marsh - low area adjacent to the sea that is covered with salt tolerant vegetation and regularly flooded by the high tide; similar inland areas near

saline springs or lakes, though not regularly flooded.

Saltwater Intrusion - the phenomenon occurring when a body of saltwater, because of its greater density, invades a body of freshwater. It can occur in surface or groundwater bodies.

Sanitary Sewer - a sewer designed to receive and to convey household, commercial or industrial wastewater mixtures.

Saprobic - organisms living upon dead or decaying organic matter. Saprobicity is the sum of all metabolic processes which are the direct opposite of primary production; can be measured either by the dynamics of metabolism or analysis of community structure.  
(See Scavenger)

Saprobien System - european system of classifying organisms according to their response to organic pollution in slow moving streams. 1. Alpha-Mesosaprobic Zone - area of active decomposition, partly aerobic, partly anaerobic, in a stream heavily polluted with organic wastes. 2. Beta-Mesosaprobic Zone - that reach of a stream that is moderately polluted with organic wastes. 3. Oligosaprobic Zone - that reach of a stream that is slightly polluted with organic wastes and contains the mineralized products of self-purification from organic pollution, but with none of the organic pollution remaining. 4. Polysaprobic Zone - that area of a grossly polluted stream which contains the complex organic wastes that are decomposing primarily by anaerobic processes.

Sapropel - foul-smelling ooze.

Saturated Adiabatic Lapse Rate - the decrease in temperature per 1,000 feet of rise in elevation in the saturated lower layers of the atmosphere. Usually used as 3°F per 1,000 feet (.5°C per 100 meters).

Saturated Air - air containing all the water vapor that it is capable of holding at a given temperature and pressure.

Saturation - refers to the maximum amount of any material that can be dissolved in medium of a given temperature and pressure. For oxygen, this commonly refers to a percentage saturation in terms of an equilibrium value, such as about 9 mg/l at 20°C.

Saturation Vapor Pressure - the pressure exerted by the vapor in a saturated space.

Scavenger - an organism that eats the dead remains and wastes of other animals and plants. In water pollution, this commonly refers to worms, insect larvae, bloodworms, sow bugs, and crustaceans. Or, more properly, oligochaetes,



chironomids and isopods. (See Saprobic)

Scour - the erosive action of running water in streams, in excavating and carrying away material from the bed and banks. Scour may occur in both earth and solid rock material. Lowering of the stream bed which may take place due to disturbances in the flow (See Local Scour), or during a single flood event. Contrast with "degradation".

Screen - a device with openings, generally having a relatively uniform size, that permit liquid to pass but retain larger particles. The screen may consist of bars, coarse to fine wire, rods, gratings, paper, membranes, etc., depending upon particle size to be retained. Screenings are the material removed by the screens.

Scum Board - a vertical baffle, above and below the liquid surface of a basin or tank, designed to prevent the passage of or to contain floating material within designated limits.

Scum Breaker - a device installed in a sludge digestion tank to disperse surface accumulations. Generally accomplished by means of mechanical agitation, gas or liquid recirculation, to promote mixing and destratification.

Scum Collector - a mechanical device for skimming and removing scum or floatable material from the surface of a tank.

Secchi Disc - a circular metal plate, twenty cm in diameter, the upper surface of which is divided into four equal quadrants and so painted that two quadrants directly opposite each other are black and the intervening ones white.

Second Foot Day - the discharge during a twenty-four hour period when the rate of flow is one cubic foot per second. It is equal to 86,400 cubic feet., or 1.9835 acre-feet. Abbreviated sfd.

Second Foot - abbreviation for cubic foot per second, cfs. A rate term.

Second Foot Per Square Mile - the number of cubic feet per second flow in a stream at a given time, divided by the area of its drainage basin in square miles. The term is usually used with reference to magnitude of flood peaks. Abbreviated csm.

Secondary Porosity - results from fractures and solution channels.

Secondary Productivity - total quantity of animal (and other heterotrophic) protoplasm produced per unit of time in a specified habitat. (See Primary

Productivity, Productivity)

Secondary Treatment - processes used to convert dissolved and colloidal materials in wastewater to a form that may be separated from the water. Commonly consists of biodegradation and conversion to cell mass in a separable form with partial oxidation, such as in activated sludge, trickling filtration, or oxidation ponds.

Sedgwick-Rafter Concentration Method - a procedure for the quantitative determination of plankton in water by use of a special funnel, a certain grade of sand, and bolting-cloth discs. The Sedgwick-Rafter counting cell is a plankton-counting cell consisting of a brass or glass receptacle 50x20x1 millimeter sealed to a 1x3 inch glass microscope slide. A rectangular cover glass large enough to cover the whole cell is required. The cell has a capacity of exactly one milliliter.

Sediment - fragmental material, both mineral and organic, that is in suspension or is being transported by the water mass or has been deposited on the bottom of the aquatic environment. Sedimentation is the process of subsidence and deposition of suspended matter carried by water, sewage, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point where it can transport the suspended material. Also called clarification, settling.

Sediment Load - the rate at which sediment passes a particular point on a stream for a given flow measured in dry weight as volume transported in a given time. Usually given in tons per day. This term may refer to a particular type of load; e.g. total, suspended, wash, bed, or bed material.

Sediment Rating Curve - a plot of sediment load vs. water discharge.

Sediment Storage Capacity Allowance - refers to storage space allowance provided for deposition of sediment within reservoir limits during the assumed life of the project. If the sediment accumulation expected is so small as to have a relatively small effect in depleting storage required for primary reservoir functions, allowances for sediment are usually included as a part of the "Inactive Storage Capacity"; otherwise, special studies are required to establish acceptable estimates of amounts that various storage use allocations will be affected by sediment depositions.

Sediment Transport Routing - the computation of sediment movement for a selected length of stream (reach) for a period of time with varying flows. Most sediment transport functions compute the bed material load capacity. The actual transport may be less than the computed capacity due to armoring, geologic controls, etc.

Application of sediment continuity relations allow the computation of

aggradation and deposition as functions of time.

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 from a canal, reservoir, or other body of water, or from a field. It is generally expressed as flow volume per unit time. During the process of priming, such loss is termed absorption loss.

Segment - a discrete portion of a water body of somewhat homogeneous character, as represented in mathematical models. (See Reach, Junction)

Seiche - an oscillation (standing wave) of the water surface of a lake or other large body of water due to unequal atmospheric pressure, wind, or other cause, which sets the surface in vibration. The amplitude of the oscillation may amount to a foot or more and the period may reach several hours.

Self-Purification - the natural processes of purification of pollution in a moving or still body of water whereby the bacterial content is reduced, the BOD is largely satisfied, the organic content is stabilized, and the dissolved oxygen returned to the equilibrium.

Self-Supplied Industrial Use - water supply developed by an individual industry or factory for its own use.

Semiconfined Aquifer - aquifer bounded by rock units or aquitards (aquicludes) of low permeability.

Sensitive Organisms (Intolerant Organisms) - organisms that exhibit a rapid response to environmental changes and are killed, driven out of the area, or are substantially reduced in numbers when their environment is fouled. (See Tolerant Association)

Septic Sewage - wastewater in which available oxygen has been depleted and the reduction of sulfates has begun. A result of anaerobic putrefaction.

Septic Sludge - that sludge which has reached a stage of anaerobic putrefaction (sulfate reduction). Includes that from Imhoff, septic, or sludge digestion tanks.

Sequential Mass Curve - a curve showing the relationship between accumulated sequential flow volumes and time. The curve is developed by accumulating sequential flows and plotting the accumulated flow volume versus the actual time when that accumulation occurred. A sequential mass curve may be used in analysis of both historical and synthesized flow records.

Sequential Routing Study - a study which simulates the operation of a reservoir or system of reservoirs using historical or synthesized flow data in sequence.

Serial Correlation - the correlation of an event with a preceding event.

Sessile - organisms that sit directly on a base without support; attached or merely resting unattached on a substrate; e.g., periphyton. (See Free-Swimming)

Seston - the living and nonliving bodies of plants or animals and inorganic material that float or swim in the water; all the particulate matter suspended in water.

Settleable Solids - 1. Includes materials that will settle by gravity under low flow velocities. 2. Commonly expressed in terms of the volume of solids accumulating in an Imhoff cone after one hour on a volume basis.

Settling Basin - a natural or engineered enlargement of a channel that reduces velocity sufficiently to permit sedimentation of settleable particulates.

Sewage Gas, Digester Gas - the gas produced from anaerobic (septic) sewage solids. Generally contains marsh gas (methane) and carbon dioxide with hydrogen sulfide and other components in minor proportions.

Sewer - a pipe or conduit, generally covered, for the purposes of conveying wastewaters from the point of origin to a point of treatment or discharge. Sewage is the liquid or solid refuse (domestic and industrial wastes) carried off in sewers. (See Wastewater)

Shallow Well - a well of pumping head about twenty feet or less, permitting use of a suction pump.

Shear Stress - frictional force per unit of bed area exerted on the bed by the flowing water. An important factor in the movement of bed material.

Sheet Erosion - the type of erosion which occurs when water flows in a sheet down a sloping surface and removes material from the surface in a sheet of relatively uniform thickness.

Shifting Control - a stream gaging control which is affected by scour, fill, or backwater. (See Control)

Short Circuiting - 1. Hydraulic; a condition in which one part or unit of flow into the basin reaches the outlet in much less time than that required for a uniform mixed flow. 2. Electrical; a situation in which an electric

current is out of place in relation to its controlled pathway.

Shortage - a deficit in supply, often expressed as a ratio to or percentage of a specified demand or target yield for a given period such as one year, (i.e., a twenty percent shortage indicates that there is a deficit in supply equivalent to twenty percent of the demand or target yield).

Shortage Index - the sum of the squares of the annual shortages over a 100-year period, each shortage expressed as a ratio to the annual target yield.

Simulated Flows - flow values which have been sequentially synthesized using the statistical characteristics of actual flow records.

Simulation - the representation of a system by a device that imitates the behavior of the system. The simulation period is a characteristic time for which a mathematic model simulates a system, using data obtained during that time period.

Sink - refers to the discharge of water from a flow system.

Sinuosity - a measure of meander "intensity". Computed as the ratio of the length of a stream measured along its thalweg (or centerline) to the length of the valley through which the stream flows.

Skimming - the diversion of water from a stream or conduit by a shallow overflow used to avoid diversion of sand, silt, or other debris carried as bottom load.

Sleet - is frozen raindrops cooled to the ice stage while falling through air at subfreezing temperatures.

Slime, Sewage Slimes - consisting of organisms growing on wastewater nutrients with the formation of mucilaginous covering, streamers or clumps. May consist of bacteria, molds, protozoa or algae.

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 showing the discharge at a given gaging station and taking into account the slope of the water surface as well as the gage height. This curve may be plotted by using (1) the difference between elevations of water surface at two fixed gages on the stream instead of the slope; or (2) the three variables: the discharge, the elevation of water surface at the lower gage, and the 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, and graduated to such a scale that the graduations represent vertical elevation. Such a gage is usually installed on a flat sloping bank where it is desired to increase the accuracy of reading the gage; and 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  $\cos A$ .

**Sloughing** - a phenomenon associated with trickling filters and contact aeration units where slimes build up to a varying degree, then slip off into the effluent.

**Sludge** - accumulated or concentrated solids from sedimentation or clarification of wastewater. Contains varying proportions of solids in wastewater depending upon source, process, and nature. Sludge banks are an accumulation of solids including silt, mineral, organic, and cell mass particulate material, that is produced in the aquatic system characterized by low current velocity, generally refers to gross deposits of appreciable depth. Sludge cake is the solid material remaining after dewatering sludge by vacuum, filtration, or sludge drying beds. Usually forkable or spadable, with a water content of thirty percent to eighty percent. May also occur on the surface waters.

**Sludge Collector** - a mechanical device, including rake, drag, or suction, for collecting settled sludge from the bottom of a clarifier into a sump or other withdrawal system.

**Sludge Deposits** - accumulations of settled, usually rapidly decomposing, organic material in the aquatic system.

**Sludge Digestion** - a process by which organic matter in sludge is converted into more stable or separatable form through the action of living organisms. May be the result of aerobic or anaerobic digestion.

**Sludge Drying Bed** - a covered or uncovered area used to discharge wet sludge for drainage and drying. Generally prepared of porous bed material surrounded by sidewalls to contain the sludge while the liquid percolates into an underdrain system.

**Sludge Filter** - a device to effect partial water removal from wet sludge, usually with the aid of vacuum or pressure of preconditioned sludge.

**Sludge Synthesis** - the net gain in sludge mass in a process over a period of time as a result of simultaneous growth of cell mass and endogenous oxidation within it.

Sludgeworms - aquatic segmented worms (class - oligochaeta) that exhibit marked population increases in waters polluted with decomposable organic wastes. (See Bloodworms)

Sluice Gate - a gate constructed for adjustment to control the flow in a channel by gate position.

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. These crystals may fall either separately or in coherent clusters forming snowflakes. It may be expressed in inches depth as it falls, or in terms of inches depth of the equivalent amount of water.

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

Snow Density - ratio between the volume of melt water 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 Field - an area, usually at high elevation or in polar latitudes, where snow accumulates and remains on the ground throughout the entire year.

Snow, Quality of - the ratio of heat of melting of snow, in calories per gram to the eighty calories per gram for melting pure ice at 0°C.

Snow Sampler - a device used in securing snow samples, consisting essentially 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 snow sample.

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 thereon in the form of snow for the purpose of forecasting subsequent runoff.

Snowflake - composed of a number of ice crystals fused together.

Snowline - 1. The 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 temperature of the summer. 2. A line sometimes drawn on a map during the winter showing the lower elevation of the snow cover at a particular time.

Snowmelt Flood - a flood caused primarily by snowmelt or snowmelt with only incidental contribution from rainfall.

Snowmelt Rate - the rate of conversion of ice into water within a snow pack.

Snyder Method - this method utilizes the basin area and main channel slope and lengths to define the unit hydrograph. These factors establish the unit hydrograph peak and the widths at seventy-five percent and fifty percent of the peak. The unit hydrograph is drawn using these five points.

Soil Moisture - water diffused in the soil, the upper part of the zone of aeration from which water is discharged by the transpiration of plants or by soil evaporation. (See Field-Moisture Capacity, Field-Moisture Deficiency).

Solids, Dissolved - solids which are present in solution.

Solids, Settleable - suspended solids which will subside in quiescent water, sewage, or other liquid in a reasonable period. Such period is commonly, though arbitrarily, taken as two hours. Also called Settling Solids.

Solids, Suspended - solids which are suspended in water which are either settleable or colloid and differentiated between dissolved solids.

Solids, Total - the solids in water, sewage, or other liquids; includes the suspended solids (largely removable by filter paper), and the dissolved solids (those which pass filter paper).

Solids, Volatile - organic fraction of the total solids.

Solution - 1. An homogenous mixture, commonly gas, liquid, or solid in a liquid that remains clear indefinitely. 2. Generally an atomic, ionic, or molecular dispersion in a liquid (may be colored). 3. A water solution of dissolved material.

Sorption - to take up and hold by either adhesion or incorporation. A collective term for absorption and adsorption.

Sounding - measuring the depth of water, as in a well, river, or lake.

Source - refers to the addition of water to the flow system.

Spawn - to produce or deposit eggs or sperm.

Species (both singular and plural) - 1. All organism or organisms forming a natural population or group of populations that transmit specific



characteristics from parent to offspring. They are reproductively isolated from other populations with which they might breed. Populations usually exhibit a loss of fertility when hybridizing. 2. The basic or final unit for the classification of organisms.

Specific Capacity - the rate at which water may be drawn from a formation through a well, to cause a drawdown of a stipulated depth. The usual units of measurement are gallons per minute per foot of drawdown.

Specific Conductance - literally specific electrical conductance (or electrical conductivity); a measure of the capacity of water to conduct an electrical current under standard test conditions. Increases as concentrations of dissolved and ionized constituents increase. Actually measured as resistance (in millionths of an ohm) but reported usually as micromhos (reciprocal of millionths of an ohm). As a rule of thumb, dissolved-solids concentration (in mg/l) is sixty to seventy percent of specific conductance (in micromhos).

Specific Gravity - the weight of a material per unit volume in reference to the weight of water maximum density; water at 4°C has weight of one gram per milliliter. The weight ratio of any substance divided by the weight of water is the specific gravity.

Specific Heat - 1. The ratio of the amount of heat required to raise the temperature of a given weight of a given substance 1°F, to that required to raise the temperature of the same weight of water from 62°F to 63°F. 2. The quantity of heat in calories that must be added to a unit weight of a substance in order to raise its temperature 1°C.

Specific Humidity - the mass of water vapor per unit mass of moist air.

Specific Retention - the fraction of the saturated bulk volume consisting of water which will not drain by gravity when the water table drops.

Specific Storage - quantity of water in storage that is released from (or taken into) a unit volume of aquifer per unit change in hydraulic head.

Specific Yield - the quantity of water that a unit volume of permeable rock or soil, after being saturated, will yield when drained by gravity. It may be expressed as a ratio or as a percentage by volume.

Spectroscopic Hydrometer - measures the selective absorption of light in certain bands of the spectrum by water vapor.

Sphaerotilus - a slime-producing, nonmotile, sheathed, filamentous, attached bacterium. Great masses are often broken from their "holdfasts" by currents

and are carried floating downstream in gelatinous flocks.

Spillway Design Flood (SDF) - this term refers to the reservoir inflow-discharge hydrograph used in estimating the maximum spillway discharge capacity and maximum surcharge elevation finally adopted as a basis for project design assuming the initial reservoir pool elevation and general plan of water releases (through the spillway, regulating outlets, hydropower turbines and other outflow facilities) specified in the reservoir regulation plan established for use under critically severe flood conditions. The spillway design flood estimate for a particular project may conform with the PMF, the SPF, or some other magnitude of flood, depending upon the degree of hazard that might result from overtopping of the dam.

Spillway - any passageway, channel, or structure designed expressly or primarily to discharge "excess" water from a reservoir after the design storage capacity and design discharge capacities of regulating outlets, turbines, and other project facilities have been used to perform normal operating functions.

Spiracle - an opening for breathing, such as the external openings to an insect's tracheal system or the opening through which a tadpole expels water as it breathes.

Spoil - the overburden or non-ore material removed in gaining access to the ore or mineral material in surface mining.

Spore - the reproductive cell of a protozoan, fungus, alga, or bryophyte. In bacteria, spores are specialized resting cells.

Sport Fish - (See Game Fish)

Spring - underground water issuing naturally out of the earth.

Spring Overturn - a physical phenomenon that may take place in a body of water during the early spring. The sequence of events leading to spring overturn include: (1) melting of ice cover, (2) warming of surface waters, (3) density changes in surface waters producing convection currents from top to bottom, (4) circulation of the total water volume by wind action, and (5) vertical temperature equality. The overturn results in a uniformity of the physical and chemical properties of the entire water mass. (See Fall Overturn, Overturn)

Spring Tide - exceptionally high tide which occurs twice per lunar month when there is a new or full moon, and the earth, sun, and moon are in a straight line. (See Neap Tides)

Squeegee - 1. A device, generally rubber, used for dislodging and removing solids, scum or other materials from a surface. 2. Metal or wood blades to move sludge along the bottom of a clarifier.

Stability - 1. The ability of any substance to resist putrefaction. 2. A characteristic of numerical models. Unstable models develop large numerical errors as computations proceed. Numerical errors reduce in stable models as computations proceed. 3. Pertaining to the work that must be done to destroy or equalize the density stratification existing in a lake.

Stabilization - 1. The activity proceeding along the pathway to stability. 2. In organic wastes, generally refers to oxidation via biochemical pathways and conversion to gaseous or insoluble materials relatively inert to further change.

Stable Channel - a stream channel that does not change in plan form or bed profile during a particular period of time. For purposes of this glossary the time period is years to tens of years.

Staff Gage - a scale set so that a portion of it is immersed in the water at all times to measure river stage.

Stage - the height of a water surface above an established datum plane; also gage height.

Stage Capacity Curve - a graph showing the relation between the surface elevation of the water in a reservoir, usually plotted as ordinate, against the volume below that elevation, plotted as abscissa.

Stage Discharge Curve - A graph showing the relation between the gage height, usually plotted as ordinate, and the amount of water flowing in a channel, expressed as volume per unit of time, plotted as abscissa. Also called Rating Curve.

Stage Micrometer - a standardized, accurately ruled scale, mounted on a glass slide. It is used to calibrate a microscope.

Stagnation Period - the period when warming or cooling of the surface water in lakes forms a thermal density stratification, preventing the mixing of the entire water mass.

Standard Methods - methods of analysis of water, sewage, and sludge approved by a Joint Committee of the American Public Health Association, American Water Works Association, and Water Pollution Control Federation.

Standard Permeability - permeability corresponding to temperature 60°F.

Standard Project Flood (SPF) - the largest flood that can be reasonably expected to occur at the location of a flood control structure during its lifetime. This is often considered as the flood that would occur if the largest storm observed in the region should occur over the basin at a time when ground conditions were conducive to high runoff. The SPF has a frequency rarer than once in one hundred years and in extreme cases may exceed the once in 1,000 year frequency. The SPF peak discharge and volume is usually equal to about forty percent to sixty percent of the PMF estimate for the same drainage basin, when the comparison is related to rainfall concentrated in approximately four days or less. In studies involving reservoirs in which storage effects are important, the SPF derived from relatively short period rainfall (four days or less) is usually assumed to follow a period of substantial flood runoff, the combination being referred to as the "SPF Series."

Standard - 1. Something set by authority. Having qualities or attributes required by law and defined by minimum or maximum limits of acceptability in terms of established criteria or measurable indices. 2. Standards prescribed by the U.S. Public Health Service for the quality of drinking water supplied to interstate carriers. The principal provisions deal with sources and protection, bacteriological quality, physical and chemical characteristics. (See Water Quality Standard)

Standing Crop - the biota present in an environment on a selected date; the total weight or number of living organisms (or of a particular kind of organism) present in a given area at any one time. (See Annual Crop)

Static Water Level - level at which water stands in a nonpumping well.

Steady-State - quantities (e.g., inputs and solution) do not vary with time (but may vary over space).

Stemflow - rainfall or snowmelt led to the ground down the trunks or stems of plants.

Steno- - prefix denoting a narrow range of tolerance of an organism to a specific environmental factor; e.g., stenothermal refers to temperature; stenohaline refers to salinity; etc. (See Eury-)

Step Aeration - a procedure for adding increments of wastewater at various points along the line of flow in an activated sludge aerator.

Sterilization - the process of making a medium free of living organisms such as by killing them, filtering through a porous medium fine enough to be a barrier to the passage of organisms, etc.

Stimulus - an influence that causes a response in an organism. (See Taxis)

Stoichiometric - the relative quantities of elements in a chemical compound according to their combining weights.

Storage - 1. Water artificially impounded in surface or underground reservoirs, for future use. Regulation refers to the action of this storage in modifying streamflow. 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. (See Bank Storage, Conservation Storage, Dead Storage, Depression Storage, Total Storage, Usable Storage)

Storage Coefficient - 1. For surface waters, a coefficient devised by Allen Hazen to express 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 waters, quantity of water released from (or taken into) storage in a column of aquifer with unit cross section and length equal to thickness of aquifer per unit change in hydraulic head, e.g., the cubic feet of water discharged from each vertical column one foot square as the water level drops one foot.

Storage Ratio - the net available storage divided by the mean flow for one year.

Storage Rule Curve Elevations - in multiple-purpose reservoirs, it is common practice to establish elevation guidelines to govern the accumulation and drawdown of storage for various uses, with appropriate variations by seasons to conform with functional needs and runoff probabilities. For example, a "rule curve" or "guideline" may permit a relatively high reservoir level to be maintained for the benefit of hydroelectric power development during seasons of the year when flood problems are a minimum, and require drawdown to lower levels to provide greater storage space for flood control as the most severe flood season approaches. When it is necessary to store water above the "power pool rule curve" in order to control floods, such storage would normally be evacuated as promptly as possible without adding to downstream flood conditions, making releases not only through the power turbines but also through flood control outlets if necessary; in some cases, evacuation of storage above the power rule curve may be delayed to avoid or reduce wasting of water, if flood forecasts or probability analyses warrant such action. Elevation rule curves are also used to govern seasonal changes in recreation pool levels, storage accumulations and drawdown for water supply, low-flow augmentation, and other multiple-purpose reservoir storage uses. These rule curves, established on the basis of economic studies and hypothetical reservoir operation and analyses usually have an important bearing on project

design requirements.

**Storage-Required Frequency Curve** - a graph showing the frequency with which storage equal to or greater than selected amounts will be required to maintain selected rates of regulated flow.

**Storm** - a disturbance of the ordinary average conditions 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; also includes the interception loss in some cases.

**Storm Overflow** - a device such as a well, dam, or orifice, in a combined sewer that will intercept design flow but permit excess storm flow to discharge directly. The overflow contains a mixed discharge of storm and other sewer components.

**Storm Seepage** - that part of precipitation which infiltrates the surface soil, and moves laterally toward the streams as ephemeral, shallow, perched groundwater above the main groundwater level. Storm seepage is usually part of the direct runoff. Also called Interflow.

**Storm Sewer** - a sewer which carries storm water from roofs, surface wash and street drainage.

**Stormflow** - (See Direct Runoff)

**Stratification** - arrangement of water masses into separate, distinct, horizontal layers as a result of differences in density; may be caused by differences in temperature, dissolved or suspended solids. (See Thermal Stratification, Chemical Stratification)

**Stream** - a term for a body of flowing water. In hydrology, the term is generally applied to the water flowing in a natural channel as distinct from a canal, but is sometimes applied to a body of water flowing in a well-defined, open or closed conduit, a jet of water issuing from any opening, such as a nozzle, a fissure in rock, etc. More generally as in the term stream gaging, it is applied to the water flowing in any channel, natural or artificial. Streams in natural channels may be classified as follows: (1) Relation to time (a) Perennial - one which flows continuously, (b) Intermittent or Seasonal - One which flows only a certain times of the year when it receives water from springs or from some surface source such as melting snow,(c) Ephemeral - one that flows only in direct response to precipitation, and whose channel is at all times above the water table. (2) Relation to space (a) Continuous - one that does not have interruptions in space, (b) Interrupted -

one which contains alternating reaches, that are either perennial, intermittent, or ephemeral. (3) Relation to groundwater (a) Gaining - A stream or reach of a stream that receives water from the zone of saturation, (b) Losing - A stream or reach of a stream that contributes water to the zone of saturation, (c) Insulated - A stream or reach of a stream that neither contributes water to the zone of saturation nor receives water from it. It is separated from the zones of saturation by an impermeable bed. (d) Perched - A perched stream is either a losing stream or an insulated stream that is separated from the underlying ground water by a zone of aeration.

Stream Gage - a gaging station where a record of depth of a stream is obtained. Stream gaging is the operation of measuring the velocity of a stream of water in a channel, or an open conduit, and the average cross section of the water, for the purpose of determining the discharge.

Stream Gradient - a 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 called first order, the stream receiving the tributary is called second order, and so on. It is usually necessary to specify the scale of the map used. A first order stream on a 1:62,500 map, may be a third-order stream on a 1:12,000 map. Tributaries which have no branches are designated as of the first order, streams which receive only first-order tributaries are of the second order, larger branches which receive only first- order and second-order tributaries are designated third order, and so on, the main stream being always of the highest order.

Stream Power - the product of bed shear stress and mean cross sectional velocity at a cross section for a given flow.

Stream Profile - a plot of the elevation of a streambed vs. distance along the stream.

Stream Underflow - percolating water flowing parallel to the surface stream, in the permeable bed of a stream.

Streamflow - the discharge that occurs in a natural channel. Although the term discharge can be applied to the flow of a canal, the word streamflow uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than runoff, as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

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 from the particular land area.

Streamflow Routing - the technique used in hydrology to compute the effect of channel storage on the shape and movement of a flood wave.

Streamlined - having a form or body shape that offers a minimum of resistance to air or water.

Stuck Digester - any of a series of events that results in serious malfunction of the digester. Commonly refers to anaerobic digestion where overloading, temperature control, toxicity, or other factors, result in an excessive acid production with serious limitations of gasification, stabilization, and solids concentration.

Sublittoral - the part of the shore from the lowest water level to the lower boundary of plant growth; transition zone from the littoral to profundal bottom.

Submeander - small meander contained within banks of main channel, associated with relatively low discharges.

Submersed Plant - an aquatic plant that lives entirely below the surface of the water, e.g., pondweed, coontail, etc. (sometimes called submerged or submergent).

Substrate - 1. The bottom material of a waterway. 2. The base or substance upon which an organism is growing. 3. A substance undergoing oxidation. 4. The liquid in an activated sludge aeration tank.

Subsurface Flow - water which infiltrates the soil surface and moves laterally through the upper soil layers until it enters a channel. Sometimes called Subsurface Runoff, Storm Seepage.

Subsurface Water - all water that exists in the interstices of porous earth materials, including soil moisture, intermediate zone water, capillary fringe water, and groundwater.

Sulphate Reduction - formation of hydrogen sulfide from sulphates.

Summer Kill - complete or partial kill of a fish population in ponds or lakes during the warm months; variously produced by excessively warm water, by a depletion of dissolved oxygen, and by the release of toxic substances from a decaying algal bloom, or by a combination of these factors. (See Winter Kill)

Supernatant Liquor - the liquid overlying deposited sludge. Commonly that fraction of liquid in an anaerobic digester located over the deposited material and beneath possible surface floating material.



Supplemental Irrigation - commonly, irrigation as carried on in humid areas. The term means that the irrigation water is supplementary to the natural rainfall rather than being the primary source of moisture as in the arid and semiarid West. Supplementary irrigation is used generally to prevent retardation of growth during periods of drought.

Supralittoral (Supratidal) - the portion of the seashore adjacent to the tidal or spray zone.

Surcharge - any accumulation of storage above the "Normal Full Pool" is referred to as "surcharge". The highest surcharge pool level attained during the passage of a particular flood is referred to as the "Maximum Surcharge Elevation" for that flood. Inasmuch as the accumulation of surcharge storage during a particular flood is dependent upon the plan of reservoir operation adhered to, and the initial pool level, these should be identified with any designation of maximum surcharge elevation.

Surface Aquatic Plants - (See Floating Aquatic Plants)

Surface Detention - that part of the rain which remains on the ground surface during rain and either runs off, or infiltrates after the rain in ends; surface detention does not include depression storage.

Surface Runoff - that part of the runoff which travels over the soil surface to the nearest stream channel. It is also defined as that part of the runoff of a drainage basin that has not passed beneath the surface since precipitation. The term is misused when applied in the sense of direct runoff. (See Runoff, Overland Flow, Direct Runoff, Groundwater Runoff, Surface Water).

Surface Tension - a property of liquids that causes the surface of a standing body of a liquid to act like an elastic film. Surface tension results because molecules of the liquid at the surface have a stronger attraction for each other than they do for the air above.

Surface Water - the water we see on the land surface, as in lakes, ponds, and streams.

Surfactant - 1. A chemical that, when added to water, will greatly reduce the surface tension of the solution. 2. The surface active component in a detergent mixture.

Suspended Bed Material Load - that portion of the suspended load that is composed of particle sizes found in the bed material.

Suspended Load - the rate at which sediment in suspension passes a given point on the stream. Includes both suspended bed material load and wash load. Sediment that moves in suspension is continuously supported in the water column by fluid turbulence. Contrast with "bed load".

Suspended Sediment - the very fine soil particles which remain in suspension in water for a very considerable period of time without contact with the bottom.

Suspended Solids - the concentration of insoluble materials suspended or dispersed in waste or used water. Generally expressed in mg/liter on a dry weight basis. Usually determined by filtration methods.

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

Swamp - a flat wet area usually covered by standing water and having a heavy growth of aquatic plants.

Swimmers' Itch - a rash produced on bathers by a parasitic flatworm in the cercarial stage of its life cycle. The organism is killed by the human body as soon as it penetrates the skin; however, the rash may persist for a period of about two weeks.

Symbiosis - two organisms of different species living together, one or both of which may benefit and neither is harmed.

Synergism - refers to the action produced when two or more substances in combination have a greater effect than that produced by the additive effects of each one separately; e.g., action of certain combinations of toxicants. (See Antagonism)

Synthesis - the production of a substance by the union of elements or simpler chemical compounds.

Systematics - the science of organism classification. (See Taxonomy)

Tail Race - a channel which conducts water from a water wheel.

Tank - an artificial reservoir for stock water.

Tapered Aeration - a procedure for adjusting air input along the line of flow of an activated sludge aerator according to need. Usually requires addition of more air per unit of volume at the inlet end of the aerator.

Taxis - directed movement by an organism in response to a stimulus; e.g., phototaxis is directed movement in response to a light stimulus; thermotaxis is directed movement in response to heat or cold as a stimulus; etc.

Taxon (taxa) - a "kind" of organism. Any taxonomic unit or category of organisms; e.g., species, genus, family, order, etc.

Taxonomy - the division of biology concerned with the classification and naming of organisms.

Temperature Inversion - the surface cooling, at the earth's surface, which sometimes leads to an increase of temperature with altitude.

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

Territory - the area which an animal defends against intruders.

Tertiary Pollution - refers to heated discharges to surface waterways. The largest contributor of heated discharges is associated with power production.

Tertiary Waste Treatment - an advanced step in waste treatment, in which excess nutrients, suspended matter, color, odor, and most of the organic matter is removed. (See Advanced Water Treatment)

Test Hole - a well drilled for exploratory purposes.

Thalweg - 1. The lowest deepest thread along the axial part of a valley. 2. A subsurface groundwater 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 Gradient - the temperature difference within a layer one meter thick.

Thermal Stratification (of a lake) - vertical temperature stratification that shows the following: the upper layer of the lake, known as the epilimnion, in which the water temperature is virtually uniform; a stratum next below, known as the metalimnion, in which there is a marked drop in temperature per unit of depth; and the lowermost region or stratum, known as the hypolimnion, in which the temperature from its upper limit to the bottom is nearly uniform. (See Overturn)

Thermocline - that layer, in a body of water, having thermal stratification for which the temperature difference is greatest per unit of depth (usually equal to or greater than 1°C per meter). This layer separates the epilimnion

from the hypolimnion. (See Epilimnion, Hypolimnion, Thermal Stratification)

Thermocouple - a pair of wires of different metals soldered together at their ends, which yields an electrical current (thermoelectric current) when the temperatures of the junctions are different (for example, as a result of radiation). Thermopile, several thermocouples connected in series.

Thermograph - instrument used to record temperature, with either a bimetallic strip or a metal tube filled with alcohol or mercury for its thermometric element, makes an autographic record on a ruled chart wrapped around a clock driven cylinder.

Thermophilic - high temperature loving organisms. Generally considered to include organisms having a favorable competitive advantage at temperatures above 110°F or 42°C.

Thief - a term applied to a sampling tube used to remove a core of sample from a bag or bulk material.

Threshold (Critical Level) - the maximum or minimum duration or intensity of a stimulus that is required to produce a response in an organism.

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

Tidal Averaging - averaging of processes such as water currents and pollutant transport over an entire tidal cycle. This averaging may reduce or eliminate the need to solve for time variations in tidally influenced waters.

Tidal Efficiency - ratio of the load-induced change in water level in a well to the corresponding change in the stage of the tide both expressed in the same units.

Tidal Flat - the sea bottom, usually wide, flat, muddy and nonproductive, which is exposed at low tide.

Tidal Marsh - a low, flat marshland that is intersected by channels and tidal sloughs; usually covered by high tides; vegetation consists of rushes, grasses, and other salt tolerant plants.

Tidal Zone (Eulittoral Zone, Intertidal Zone) - the area of a shore between the limits of water level fluctuation; the area between the levels of high and low tides.

Tide - the alternate rising and falling of water levels, twice in each lunar day, due to gravitational attraction of the moon and sun in conjunction with

the earth's rotational force.

Time of Concentration - the time required for water to flow from the farthest point on the watershed to the gaging station.

Titration - the careful addition of a standard solution of known concentration of reacting substance to an equivalence point to estimate the concentration of a desired material in a sample.

Tlm - (See Median Tolerance Limit)

TOC - Total Organic Carbon. A test expressing wastewater contaminant concentration in terms of the carbon content.

Tolerance - relative capability of an organism to endure or adapt to an unfavorable environmental factor.

Tolerance Limit (t10...100) - the concentration of a substance which some specified portion of an experimental population can endure for a specified period of time with reference to a specified type of response; e.g., T1100 means that all test organisms endured the stress for the specified time; t10 means only ten percent of the test organisms could tolerate the imposed stress for the specified time. (See Median Tolerance Limit)

Tolerance Range - the range of one or more environmental conditions within which an organism can function; range between the highest and lowest value of a particular environmental factor in which an organism can live.

Tolerant Association - an association of organisms capable of withstanding adverse conditions within the habitat. This association is often characterized by a reduction in the number of species (from a clean water association) and, in the case of organic pollution, an increase in individuals representing certain species.

Total Head - energy contained by fluid because of its pressure, velocity, and elevation, usually expressed in feet of fluid (foot pounds per pound).

Total Organic Carbon (TOC) - a newly developing test for the one constituent, carbon, in wastewater that perhaps, most influences BOD. Relations between TOC and BOD must still be determined by trial and error in specific studies before TOC alone can be used as an index of organic pollution of a waterbody.

Total Sediment Load - the total rate at which sediment passes a given point on a stream (tons/day). Includes bed load, suspended bed material load, and wash load. In general, total sediment load cannot be calculated or directly measured.

Total Solids - refers to the solids contained in dissolved and suspended form in water. Commonly determined on a weight basis by evaporation to dryness.

Total Storage - the volume of a reservoir below the maximum controllable level including dead storage.

Toxic - chemical compounds or ions that are harmful to aquatic life.

Toxicant - a substance that through its chemical or physical action kills, injures, or impairs an organism; any environmental factor which, when altered, produces a harmful biological effect. (See Pesticide)

Toxicity - quality, state or degree of the harmful effect resulting from alteration of an environmental factor.

Toxin - a poisonous substance.

Trace - the amount of rainfall or other form of precipitation which occurs when the quantity is so small that it cannot be measured in the rain gage. The occurrence is usually noted on the daily record sheet by the word "Trace" or the letter "T".

Trachea (pl. Tracheae) - a minute branching air tube that distributes air through an insect's body. Tracheae are the basic elements in the breathing system of insects and certain of their relatives.

Tracheal Gills - thin-walled fingerlike or platelike gills permeated by tracheae and found on the bodies of certain aquatic insects. Gases pass between the water and the air tubes by moving across thin membranes that form the walls of the gills.

Transient - a temporary and brief time-varying solution during readjustment to equilibrium, resulting from a sudden change in input(s).

Transmissibility - the flow capacity of an aquifer in gallons per day per foot width, equal to the product of permeability times the saturated thickness of the aquifer.

Transmissibility Coefficient - the number of gallons of water a day that percolates under prevailing conditions through each square mile of water bearing bed for each foot thickness of bed. It is the product of the field coefficient of permeability in units of gallons per day and per square mile multiplied by the thickness of the bed, in feet.

Transmissivity - rate of horizontal water flow in gallons per day through a

vertical strip of aquifer one foot wide and extending full saturated thickness under hydraulic gradient of one foot per foot at prevailing water temperature.

Transpiration - the quantity of water absorbed and transpired and used directly in the building of plant tissue, in a specified time. It does not include soil evaporation. The process by which water vapor escapes from the living plant, principally the leaves, and enters the atmosphere. As considered practically, transpiration also includes guttation.

Transpiration Ratio - the number of pounds of water required for transpiration per pound of dry plant tissue produced.

Transport Capacity - ability of a stream to transport a suspended load; it is expressed in terms of the total weight of the particles.

Trap Efficiency - proportion of sediment inflow to a stream reach (or reservoir) that is retained within that reach (or reservoir). Computed as inflowing sediment volume minus outflowing sediment volume divided by inflowing sediment volume. Positive values indicate aggradation; negative values, degradation.

Treatment Factor - percentage by which pollutants in effluents are reduced in wastewater treatment.

Trematode - the common name for a parasitic worm of the class trematoda, a fluke.

Trend - a statistical term referring to the direction or rate of increase or decrease in magnitude of the individual members of a time series of data when random fluctuations of individual members are disregarded.

Tributary - a stream or other body of water, surface or underground, which contributes its water, even though intermittently and in small quantities, to another and larger stream or body of water.

Trickling Filter - a treatment process employing downward flow of wastewater over the surfaces of a rock or grid system with a large void space for upward movement of air. Slime organisms accumulate to effect biological stabilization.

Tripton - the dead suspended particulate matter in aquatic habitats; the nonliving portion of the seston.

Trophic Level - one of the parts in a nutritive series in an ecosystem in which a group of organisms in a certain stage in the food chain secures food in the same general manner. The first or lowest trophic level consists of

producers (green plants); the second level of herbivores; the third level of secondary carnivores. Most bacteria and fungi are organisms in the reducer (decomposer) trophic level.

Trophogenic Region - the area of a body of water where organic production from mineral substances takes place on the basis of light energy and photosynthetic activity.

Tropholytic Region - the deep area of a body of water where organic breakdown predominates because of light deficiency.

Tubificidae - aquatic segmented worms that exhibit marked population increases in aquatic environments containing organic decomposable wastes.

Turbidity - defined as capacity of materials suspended in water to scatter light. Measured in arbitrary Jackson Turbidity Units (JTU). Highly turbid water is often called "muddy," although all manner of suspended particles contribute to turbidity.

Turbulence - unorganized movement in liquids and gases resulting from eddy formation.

Turbulent Flow - the type of fluid flow in which successive flow particles follow independent path lines, and head loss varies approximately with velocity raised to the second power.

Turnover - (See Overturn)

Tychoplankton - forms of the littoral community occurring in the plankton "accidentally".

Ubiquitous Organisms - organisms that can tolerate a wide range of environmental conditions; organisms that are so active or numerous as to seem to be present or existent in all types of environments. (See Tolerant Association, Sensitive Organisms)

Ultimate Infiltration Capacity - the relatively low and steady infiltration capacity which exists after a sufficiently long period of infiltration at capacity rate.

Ultimate Wilting Point - the moisture content of the soil at which all the leaves of plants growing in that soil are completely wilted and will not recover to an approximately saturated atmosphere without addition of water to the soil. The lower end of the wilting range.

Ultraviolet - the region of short-wave radiation beyond the visible violet.



Unconfined Aquifer - aquifer within which the water table is located.

Underflow - the downstream flow of water through the permeable deposits that underlie a stream and that are more or less limited by rocks of low permeability.

Unicellular - refers to an organism that consists of only one cell; e.g., blue green algae, protozoa, bacteria. These organisms may, however, be filamentous or colonial in form.

Unit Hydrograph - 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 of one inch from the drainage basin.

Unit Operation - a particular kind of a physical change that is repeatedly and frequently encountered as a step in a process such as filtration, aeration, evaporation, mixing, or pumping.

Unit Period - the time duration of a unit storm.

Unit Storm - a net rainfall of depth one inch, which occurs over all parts of a drainage area at a uniform rate during a specified unit period of time.

Unmeasured Load - equipment used to measure sediment transport by sampling the concentration of suspended sediment cannot operate close to the stream bed. The material moving below the lowest point which the sampler can reach is termed "unmeasured load".

Unsteady-State Flow - fluid movement that is time dependent.

Ultimate Oxygen Demand (UOD). Usually about 1.5 x five-day BOD.

Usable Storage - the volume normally available for release from a reservoir below the elevation of the maximum controllable level.

Vadose Water - water in the unsaturated zone.

Vapor Blanket - the layer of air which overlays a body of water, and has, due to its proximity to the water, a higher content of water vapor than the surrounding atmosphere.

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

Velocity (Flow) - a rate term expressed in terms of linear movement per unit of time. Commonly expressed in feet per second or meters per second.

Velocity Head - energy contained by fluid because of its velocity, usually expressed in feet of fluid (foot pounds per pound).

Venturi Meter - a device for estimating flow of fluid in closed conduits or pipes. Generally based upon constricting and enlarging pipe sections with pressure at the full size and the point of maximum constriction. Differences in pressure can be related to flow.

Verification - the act of testing a model's accuracy using a different simulation period, i.e., an independent set of input and output data, from that used in calibration.

Vertebrates - animals that have an internal skeletal system. (See Invertebrate)

Vertical Velocity Curve - a curve showing how the down gradient velocity varies with depth along a vertical depth observation line in a surface stream.

Virus - a term generally used to designate organisms that pass filtration media capable of removing bacteria. Technically described as a collective term covering disease stimuli held by some to be living organisms and by others to be nucleic acids capable of reproduction and growth.

Viscosity - resistance to flow in a liquid.

Volatile Acids - a group of low molecular weight acids such as acetic and propionic, that are distillable from acidified solutions.

Volatile Material - 1. Refers to those chemicals having a vapor pressure low enough to evaporate from water readily at normal temperatures. 2. With reference to dry solids, the term includes loss in weight upon ignition at 600°C.

Volt - the unit of electromotive force: one volt is the force that produces an electrical current of one ampere in a conductor with a resistance of one ohm (after the physicist A. Volta).

Wash Load - that part of the suspended load that is finer than the bed material and in near permanent suspension. Wash load is limited by supply rather than hydraulics. What grain sizes constitute wash load varies with flow and location in a stream. Sampling procedures that measure suspended load will include both wash load and suspended bed material load.

Waste Sludge - 1. Commonly refers to activated sludge produced in excess of that required for return process. 2. Any solids concentrate to be routed for disposal.

Wastewater - refers to the used water of a community. Generally contaminated by the waste products from household, commercial or industrial activities. Often contains surface wash, storm water and infiltrations water

Water Analysis - the determination of the physical, chemical, and biological characteristics of water. Such analyses involve usually four different kinds of examination: bacteria, chemical, microscopic and physical.

Water Balance - (See Hydrologic Budget)

Water Content of Snow - (See Water Equivalent of Snow)

Water Crop - (See Water Yield)

Water Discharge - the volumetric rate at which water flows past a point on a stream or river. Usually given in units of cubic feet per second.

Water Equivalent of Snow - amount of water that would be obtained if the snow should be completely melted. Water content may be merely the amount of liquid water in the snow at the time of observation.

Water in Unsaturated Zone - water, including soil moisture, below land surface but above the zone of saturation where all available space is filled by water. This water may percolate down to the zone of saturation to become groundwater, or may, as soil moisture does, return to the surface by capillary attraction or in roots of plants.

Water Level - water surface elevation or stage.

Water Level Gage - a gage, recording or otherwise, which indicates the water level in a reservoir, still well, or other receptacle.

Water Loss - the difference between the average precipitation over a drainage basin and the water yield from the basin for a given period. The basic concept is that water loss is equal to evapotranspiration, that is, water that returns to the atmosphere and thus is no longer available for use. However, the term is also applied to differences between measured inflow and outflow even where part of the difference may be seepage.

Water Pollution - any impairment of the suitability of water for any of its beneficial uses, actual or potential, by man-caused changes in the quality of the water.

Water Quality - 1. That phase of hydrology that deals with the kinds and amounts of matter dissolved and suspended in natural water, the physical characteristics of the water, and the ecological relationships between aquatic organisms and their environment. 2. A term used to describe the chemical, physical, and biological characteristics of water in respect to its suitability for a particular purpose. The same water may be of good quality for one purpose or use, and bad for another, depending upon its characteristics and the requirements for the particular use.

Water Quality Criteria - "a scientific requirement on which a decision or judgement may be based concerning the suitability of water quality to support a designated use." (See Water Quality Standard)

Water Quality Standard - "a plan that is established by governmental authority as a program for water pollution prevention and abatement." (See Water Quality Criteria)

Water Requirement - the quantity of water, regardless of its source, required by a crop in a given period of time, for its normal growth under field conditions. It includes surface evaporation and other economically unavoidable wastes.

Water Spreading - controlled application of water to the land for the purpose of recharging groundwater aquifers.

Water Table - the upper surface of a zone of saturation, where the body of groundwater is not confined by an overlying impermeable formation. Where an overlying confining formation exists, the aquifer in question has no water table.

Water Year - the twelve-month period, October 1 through September 30. The water year is designated by the calendar year, in which it ends and which includes nine of the twelve months. Thus, the year ending September 1959, is called the "1959 water year."

Water Yield (Water Crop or Runout) - the runoff from the drainage basin including groundwater outflow that appears in the stream plus groundwater outflow that bypasses the gaging station and leaves the basin underground. Water yield is the precipitation minus the evapotranspiration.

Watercourse Bed - that portion of the watercourse which carries water at ordinary stages.

Watershed - the area drained by, or contributing to, a stream, lake, or other body of water. The divide separating one drainage basin from another and in

the past has been generally used to convey this meaning. However, over the years, use of the term to signify drainage basin or catchment area has come to predominate, although drainage basin is preferred. Drainage divide, or just divide, is used to denote the boundary between one drainage area and another. (See River Basin, Drainage Basin)

Weather - one phase of the succession of phenomena whose complete cycle, recurring with greater or less uniformity every year, constitutes the climate of any locality.

Weir - a device used for surface overflow from a tank, basin or chamber. Generally designed to smooth out discharge flow to minimize turbulence within the detention basin. May be used to measure discharged flow

Weir Box - an enlargement of the channel upstream of a weir to reduce the velocity and turbulence before reaching the weir.

Well - 1. An artificial excavation or shaft that collects water from interstices of the soil or rock. 2. Also an engineered structure for the housing of pumps or other equipment below ground level.

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. It may be expressed in terms of gallons per minute, cubic feet per second, or other similar units.

Well Development - application of a surging or brushing process to a well for the purpose of drawing fine material from the aquifer next to the well and increasing its discharge capacity.

Well Efficiency - ratio of the actual specific capacity after twenty-four hours of pumping to the theoretical specific capacity at that time.

Well Field - a tract of land containing a number of wells, for supplying a large municipality or irrigation district.

Well Hydrograph - a graphical representation of the fluctuations of the water surface in a well, plotted as ordinates, against time 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.

Wet Oxidation - oxidation of substances such as organic contaminants in water media. Includes biological oxidation and physical chemical oxidation, such as

that obtained at elevated temperature, pressure catalyst or other promoters.

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.

White Water - swiftly flowing, frothy water in a rapid.

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

Winter Kill - the death of fishes in a body of water during a prolonged period of ice and snow cover; caused by oxygen exhaustion due to respiration and lack of photosynthesis. (See Summer Kill)

Withdrawal Use of Water - the water removed from the ground or diverted from a stream or lake for use (MacKichan, 1957, p. 2).

Word (of Computer Storage) - a few bytes (typically four or six, depending upon the computer) of computer storage, required to store one variable. (See Byte, Bit)

Year - (See Climatic Year, Water Year)

Yield - 1. The quantity of water expressed either as a continuous rate of flow (cubic feet per second, etc.) or as a volume per unit of time (acre-feet per year, etc.) which can be collected for a given use, or uses, from surface or groundwater sources on a watershed. The yield may vary with the use proposed, with the plan of development, and also with economic considerations. The term 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 usually expressed in cubic feet per second per square mile, determined by dividing the observed streamflow at a given location by the drainage area above that location.

Yield Factor - a decimal fraction or percentage of product per unit of input.

Zone - an area characterized by similar flora or fauna; a belt or area to which certain species are limited.

Zone of Aeration - the zone above the water table. Water in the zone of aeration does not flow into a well.

Zone of Saturation - the zone in which the functional permeable rocks are

saturated with water under hydrostatic pressure. Water in the zone of saturation will flow into a well, and is called groundwater.

Zoogloea - a jelly-like matrix developed by certain microorganisms at some stage in their life cycle. Commonly associated with sludge flocculation in biochemical treatment operations.

Zooplankton - the animals of the plankton. Unattached microscopic animals having minimal capability for locomotion.

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