

❄️ DICTIONARY ❄️

TECHNICAL WATER, WATER QUALITY, ENVIRONMENTAL, AND WATER-RELATED TERMS

[Note: Words and definitions included in this dictionary which explain or summarize elements of existing water law are not intended to change that law in any way.]

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A–Horizon — The uppermost zone in the *Soil Profile*, from which soluble *Salts* and *Colloids* are leached, and in which organic matter has accumulated. Generally this represents the most fertile soil layer and constitutes part of the *Zone of Eluviation*.

Abandoned Water Right — A water right which has not been put to *Beneficial Use* for generally five or more years, in which the owner of the water right states that the water right will not be used, or takes such actions that would prevent the water from being beneficially used. Compare to *Forfeited Water Right*.

Abandoned Well — A well which is no longer used or a well removed from service; a well whose use has been permanently discontinued or which is in a state of such disrepair that it cannot be used for its intended purpose. Generally, abandoned wells will be filled with concrete or cement grout to protect underground water from waste and contamination.

Abandonment (Water Right) — (1) Generally refers to the intentional surrender of a water right by virtue of nonuse. (2) Failure to put a water right to *Beneficial Use* for generally five or more years, in which the owner of the water right states that the water right will not be used, or takes such actions that would prevent the water from being beneficially used. Also see *Abandoned Water Right*. Compare to *Forfeiture (Water Right)*.

Abatement — Reducing the degree or intensity of, or eliminating, pollution, as a water pollution abatement program.

Abiota — Those non-living factors which are present in and affect the characteristics of a given ecosystem.

Ablation — (1) The process by which ice and snow waste away as a result of melting and/or evaporation. (2) The erosive processes by which a glacier is reduced.

Abrasion — Removal of stream-bank soil as a result of sediment-laden water, ice, or debris rubbing against the bank.

Abscissa (Symbol X) — (Mathematics) The coordinate representing the position of a point along a line perpendicular to the *y*-axis (*Ordinate*) in a *Plane Cartesian Coordinate System*.

Abscission — The dropping of leaves from a plant. Premature abscission in certain plant species frequently results from excessive exposure to certain air contaminants.

Absolute Humidity — The actual weight of water vapor contained in a unit volume of the atmosphere, usually expressed in grams of water per kilogram of air. Compare to *Relative Humidity*.

Absolute Temperature (T) — A temperature expressed on the thermodynamic scale, measured from *Absolute Zero*, or 0° Kelvin (K), also equivalent to –273.15°C or –459.67°F.

Absolute Zero — The zero value of thermodynamic temperature, or 0° Kelvin (°K), also equivalent to –273.15°Celsius (°C) on the *Centigrade Temperature Scale* or –459.67°Fahrenheit (°F) on the *Fahrenheit Temperature Scale*.

Absorber — A material capable of taking in a substance, such as oil, as a sponge takes up water.

Absorption — (1) The entrance of water into the soil or rocks by all natural processes, including the infiltration of precipitation or snowmelt, gravity flow of streams into the valley alluvium into sinkholes or other large openings, and the movement of atmospheric moisture. (2) The uptake of water or dissolved chemicals by a cell or an

- organism (as tree roots absorb dissolved nutrients in soil). (3) More generally, the process by which substances in gaseous, liquid, or solid form dissolve or mix with other substances. Not to be confused with *Adsorption*.
- Absorption Loss** — The loss of water by *Infiltration* or *Seepage* into the soil during the process of priming, i.e., during the initial irrigation of a field; generally expressed as flow volume per unit of time.
- Absorption Tower** — (Air Quality) An air pollution control device in which contaminated air is passed through a tower containing substances (packing) possessing large surface area. Water is passed over the packing material in a countercurrent fashion, i.e., in a direction opposite to the passage of the air, and the air contaminants are then absorbed into the liquid. Also referred to as *Packed Tower*, *Spray Tower*, or *Tray Tower*.
- Abutment (of a Dam)** — The part of a valley side wall against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section to take the thrust of an *Arch Dam* where there is no suitable natural abutment. Right and left abutments are designated as one looks downstream.
- Abutment Seepage** — Reservoir water that moves through seams or pores in the dam's natural *Abutment* material and exists as seepage.
- Abyssal** — Of or relating to the bottom waters of the ocean depth.
- Abyssal Zone** — The bottom of a deep ocean. Also see *Bathyal Zone* and *Euphotic Zone*.
- Acclimatization** — The physiological adjustment or adaptation by an organism to new physical and/or environmental conditions. With respect to water, it is frequently used in reference to the ability of a species to tolerate changes in water temperature, degradation of water quality, or increased levels of salinity.
- Accretion** — The slow addition to land by deposition of water-borne sediment. An increase in land along the shores of a body of water, as by *Alluvial* deposit.
- Acequia** — (Southwestern U.S.) (1) An irrigation canal; an irrigation ditch or channel, a term commonly used in northern New Mexico. (2) A Spanish word used in the Southwestern United States in referring to a community irrigation ditch or canal. (3) Community-run irrigation ditches and/or the community-run organizations that manage them. These systems of water management are rooted in ancient Spanish custom and many still operate in northern New Mexico.
- Acid** — (1) Chemicals that release hydrogen ions (H^+) in solution and produce hydronium ions (H_3O^+). Such solutions have a sour taste, neutralize bases, and conduct electricity. (2) Term applied to water with a pH of less than 7.0 on a pH scale of 0 to 14.
- Acid Aerosol** — Airborne particles composed of sulfates (SO_x), sulfuric acid (H_2SO_4), nitrates (NO_x), and/or nitric acid (HNO_3). Dry particle diameters are typically less than 1–2 microns. Also see *Acid Deposition* and *Acid Fog*.
- Acid Deposition** — The introduction of acidic material to the ground or to surface waters. Involves a complex chemical and atmospheric phenomenon that occurs when emissions of sulfur and nitrogen compounds and other substances are transformed by chemical processes in the atmosphere, often far from the original sources, and then become deposited on the land or surface waters in either wet or dry forms. *Wet Deposition* (commonly referred to as *Acid Rain* or *Acid Fog*) results from precipitation as rain, snow, or fog. *Dry Deposition* results from particle fallout or acidic gases.
- Acid Fog** — Airborne water droplets containing sulfuric acid and/or nitric acid. Typical diameters are 3–30 microns. Also see *Acid Deposition* and *Acid Aerosol*.
- Acid-Forming Material** — Material containing sulfide minerals or other materials, which if exposed to air, water, or weathering processes will form sulfuric acid that may create *Acid Mine Drainage*.
- Acid Mine Drainage (AMD)** — Acidic water that flows into streams from abandoned mines or piles of mining waste or tailings. The acid arises from the oxidation of iron sulfide compounds in the mines by air, dissolved oxygen in the water, and chemoautotrophs, which are bacteria that can use the iron sulfide as an energy source. Iron sulfide oxidation products include sulfuric acid, the presence of which has reduced or eliminated aquatic life in many streams in mining regions. Also see *Open-Pit Mining* and *Yellowboy*. Also referred to as *Acid Mine Waste*.
- Acid Neutralizing Capacity (ANC)** — (1) A measure of the ability of water or soil to resist changes in pH. (2) The equivalent sum of all bases or base-producing materials, solutes plus particulates, in an aqueous system that can be titrated with acid to an equivalence point. The term designates titration of an “unfiltered” sample (formerly reported as alkalinity).
- Acid Precipitation** — Atmospheric precipitation that is composed of the hydrolyzed by-products from oxidized halogen, nitrogen, and sulfur substances. Also see *Acid Rain*.
- Acid Rain** — Rainfall with a pH of less than 7.0. One of the principle sources is the combining of rain (H_2O) and sulfur dioxide (SO_2), nitrous oxides (NO_x), and carbon dioxide (CO_2) emissions which are byproducts of the combustion of fossil fuels. These oxides react with the water to form sulfuric (H_2SO_4), nitric (HNO_3), and carbonic acids (H_2CO_3). Long-term deposition of these acids is linked to adverse effects on aquatic organisms and plant life

in areas with poor neutralizing (buffering) capacity. Also see *Acid Deposition*.

Acid Soil (Alkaline Soil, Neutral Soil) — A description of one aspect of a soil's chemical composition. Many plants will grow best within a range of pH rating from slightly acid to slightly alkaline. A pH rating of 7 means that the soil is neutral; a pH below 7 indicates acidity; a pH above 7 indicates alkalinity.

Acidic — The condition of water or soil that contains a sufficient amount of acid substances to lower the pH below 7.0.

Acidification — Raising the acidity (lowering the pH) of a fluid by adding an acid.

Acidity — A measure of how acid a solution may be. A solution with a pH of less than 7.0 is considered acidic. Solutions with a pH of less than 4.5 contain mineral acidity (due to strong inorganic acids), while a solution having a pH greater than 8.3 contains no acidity.

Acre — A measure of area equal to 43,560 square feet (4,046.87 square meters). One square mile equals 640 acres, and is also referred to as a *Section*.

Acre-Feet (AF) — A unit commonly used for measuring the volume of water. See *Acre-Foot*.

Acre-Foot (AF) — A unit commonly used for measuring the volume of water; equal to the quantity of water required to cover one acre (43,560 square feet or 4,047 square meters) to a depth of 1 foot (0.30 meter) and equal to 43,560 cubic feet (1,234 cubic meters), or 325,851 gallons.

Acre-Inch — The volume of water or solids that will cover one acre to a depth of one inch, equivalent to 3,630 cubic feet or 102.7 cubic meters.

Activated Carbon — A material produced by heating coal or wood in such a manner as to yield a porous structure, creating a very large internal surface area. Activated carbon is available in both powdered and granular forms, and is widely used to adsorb organic compounds from water and wastewater. It provides a means of removing tastes and odors from drinking water. Also see *Granular Activated Carbon (GAC)*. Also referred to as *Activated Charcoal*.

Activated Carbon Adsorption — The process of pollutants moving out of water and attaching on to *Activated Carbon*.

Activated Sludge — The *Floc* produced in raw or settled wastewater due to the growth of bacteria and other organisms in the presence of *Dissolved Oxygen*. It is the product that results when primary effluent is mixed with bacteria-laden sludge and then agitated and aerated to promote biological treatment, speeding the breakdown of organic matter in raw sewage undergoing secondary waste treatment.

Activated Sludge Process — A method of *Secondary Wastewater Treatment* in which the waste is treated by microorganisms in a well-aerated tank to degrade the organic material. A sedimentation tank is then used to remove the resultant sludge.

Active Conservation Storage — Storage of water for later release for purposes, such as municipal and industrial (M&I) uses, hydropower, or irrigation.

Active Fault — A fault that has undergone movement in recent geologic time (the last 10,000 years) and may be subject to future movement. Also see *Fault*.

Active Solar Water Heater — A water heating system in which heat from the sun is absorbed by collectors and transferred by pumps to a storage unit. The heated fluid in the storage unit conveys its heat to the domestic hot water system of the house through a heat exchanger.

Active Storage Capacity — (1) The total amount of usable reservoir capacity available for seasonal or cyclic water storage. It is gross reservoir capacity minus inactive storage capacity. (2) More specifically, the volume of water in a reservoir below the maximum controllable level and above the minimum controllable level that can be released under gravity. In general, it is the volume of water between the outlet works and the spillway crest. In some instances, *Minimum Pool* operating constraints may prevent lowering the reservoir to the level of the outlet works, and the water below the minimum pool level is not considered to be in active storage.

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

Acute — Designates an exposure to a dangerous substance or chemical in sufficient dosage to precipitate a severe reaction. *Acute Exposure* refers to such dosage levels received over a period of 24 hours or less. Longer-term exposures are referred to as *Chronic Exposure*.

Adaptation — Changes in an organism's structure or habits that allow it to adjust to its surroundings.

Adaptive Management — A process for implementing policy decisions as an ongoing activity that requires monitoring and adjustment. Adaptive management applies scientific principles and methods to improve resource management incrementally as managers learn from experience and as new scientific findings and social changes demand.

- Adenosine Triphosphate (ATP)** — An organic, phosphate-rich compound important in the transfer of energy in organisms. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of *Biomass*. ATP is reported in micrograms per liter of the original water sample.
- Adequate-Size Farm** — A farm with resources and productivity sufficient to generate enough income to (a) provide an acceptable level of family living; (b) pay current operating expenses and interest on loans; and (c) allow for capital growth to keep pace with technological growth.
- Adfluvial** — Migrating between lakes and rivers or streams; typically used of fish species.
- Adhesion** — Molecular attraction that holds the surfaces of two substances in contact, such as water and rock particles. Also, the attraction of water molecules to other materials as a result of hydrogen bonding.
- Adiabatic** — Applies to a thermodynamic process during which no heat is added to or withdrawn from the body or system concerned. In the atmosphere, adiabatic changes of temperature occur only in consequence of compression or expansion accompanying an increase or decrease of atmospheric pressure. Thus, a descending body of air undergoes compression and adiabatic cooling.
- Adiabatic Lapse Rate** — The theoretical rate at which the temperature of the air changes with altitude. The temperature change is due to the pressure drop and gas expansion only, and no heat is considered to be exchanged with the surrounding air through convection or mixing. The *Dry Adiabatic Lapse Rate* for air not saturated with water vapor is 0.98°C per 100 meters (5.4°F per 1,000 feet). The *Wet Adiabatic Lapse Rate* for air saturated with water vapor is about 0.60°C per 100 meters (3.3°F per 1,000 feet).
- Adiabatic Process** — A change involving no gain or loss of heat.
- Adit** — A horizontal or nearly horizontal passage, driven from the surface, for the working or dewatering of a mine. Also referred to as *Drift*, *Shaft*, or *Portal*.
- Adjudicate** — To determine by judicial action.
- Adjudication** — (1) Refers to a judicial process whereby water rights are determined or decreed by a court of law. (2) A court proceeding to determine all rights to the use of water on a particular stream system or within a specific ground water basin.
- Administered Groundwater Basin** — A groundwater basin (watershed, area, or sub-area) which, in the interest of public welfare, is monitored by an appropriate agency to insure adequate water resources for prescribed uses. Quite often, such basins will have *Preferred Uses* designated for future development to insure that the basin's *Perennial Yield* is not exceeded. Also referred to as *Designated Groundwater Basin*. Also see *Designated Groundwater Basin [Nevada]*.
- Adsorbate** — Any material adsorbed onto the surface of another.
- Adsorbent** — Any material which adsorbs another on its surface.
- Adsorber** — A solid or liquid that can hold molecules of another substance on its surface.
- Adsorption** — (1) The adherence of ions or molecules in solution to the surface of solids. (2) The adherence of a gas, liquid, or dissolved material on the surface of a solid. (3) The attraction and adhesion of a layer of ions from an aqueous solution to the solid mineral surfaces with which it is in contact. An example is the adsorption of organic materials by activated carbon. Not to be confused with *Absorption*.
- Advanced Treatment** — A level of wastewater treatment more stringent than secondary treatment; requires an 85 percent reduction in conventional pollutant concentration or a significant reduction in nonconventional pollutants.
- Advanced Wastewater Treatment (AWT)** — Any process which reduces the level of impurities in a wastewater below that attainable through conventional secondary or biological treatment. Includes the removal of nutrients such as phosphorus and nitrogen and a high percentage of suspended solids. Also see *Tertiary Wastewater Treatment*.
- Advance Time** — The time it takes for water to travel the length of an irrigation furrow.
- Advection** — (1) The process by which solutes are transported by the bulk of flowing fluid such as the flowing ground water. (2) The horizontal transfer of heat energy by large-scale motions of the atmosphere.
- Aedile** — An elected official of ancient Rome who was responsible for public works and games and who supervised markets, the grain supply, and the water supply.
- Aeolian Soil** — Soil transported from one area to another by the wind.
- Aerate** — To supply or charge a liquid or body of water with a gas, as to expose a body of water to the circulation of air for purification. See *Aerated Lagoon*.
- Aerated Lagoon** — A holding and/or treatment pond that speeds up the natural process of biological decomposition of organic waste by stimulating the growth and activity of bacteria that degrade organic waste.
- Aeration** — (1) Any active or passive process by which intimate contact between air and liquid is assured, generally

by spraying liquid in the air, bubbling air through water, or mechanical agitation of the liquid to promote surface absorption of air. (2) The process of loosening or puncturing the soil by mechanical means in order to increase water and air permeability.

Aeration Tank — A chamber used to inject air into water.

Aeration (Unsaturated) Zone — The zone between the land surface and the water table which characteristically contains liquid water under less than atmospheric pressure and water vapor and air or other gases at atmospheric pressure. The term *Unsaturated Zone* is now generally applied.

Aerobe — An organism which requires oxygen for its life processes.

Aerobic — Characterizing organisms able to live only in the presence of air or free oxygen, and conditions that exist only in the presence of air or free oxygen. Contrast with *Anaerobic*.

Aerobic Bacteria — Single-celled, microscopic organisms that require oxygen to live and are partly responsible for the *Aerobic Decomposition* of organic wastes.

Aerobic Decomposition — The biodegradation of materials by aerobic microorganisms resulting in the production of carbon dioxide, water, and other mineral products. Generally a faster process than *Anaerobic Decomposition*. Also see *Aerobic Bacteria*.

Aerobic Treatment — The process by which microbes decompose complex organic compounds in the presence of oxygen and use the liberated energy for reproduction and growth. Such processes may include extended aeration, trickling filtration, and rotating biological contactors.

Aerobic Treatment Unit (ATU) — Also known as home aeration units, the aerobic treatment unit, or ATU, provides wastewater treatment and storage functions similar to a normal septic tank. By contrast, however, the ATU has a mechanism to inject air into the tank, thereby turning the anaerobic environment aerobic. This allows aerobic bacteria to treat the wastewater resulting in a cleaner effluent than that from a normal septic tank system. The basic ATU consists of an aeration chamber and a settling chamber, with some ATUs also having pretreatment chambers and/or screens to reduce the amount of larger solids entering the aeration chamber. The aeration chamber contains a mechanical stirrer or diffuser lines to add air to the wastewater. Aerated wastewater treatment is more effective and produces a better quality effluent than anaerobic or septic treatment. The improved effluent quality allows ATUs to be used on sites that are not suitable for conventional septic systems.

Aerodynamic — Refers to forces acting upon the soil or crop surface by moving air.

Aeroponics — A technique for growing plants without soil or hydroponic media. The plants are held above a system that constantly mists the roots with nutrient-laden water. Also called *Aeroculture*.

Aerosol — A suspension of liquid or solid particles in air or gas.

Affected Environment — (1) Existing biological, physical, social and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action. (2) The chapter in an Environmental Impact Statement (EIS) describing current environmental conditions.

Affected Public — The people who live and/or work near a hazardous waste site or other source of pollutant emissions.

Affluent (Stream) — A stream or river that flows into a larger one; a *Tributary*.

Afforestation — The artificial establishment of forest crops by planting or sowing on land that has not previously, or recently, grown trees.

Afterbay — The tail race or reservoir of a hydroelectric power plant or a pumping plant at the outlet of the turbines used to regulate the flow below the plant; may refer to a short stretch of stream or conduit, or to a pond or reservoir. Compare with *Forebay*.

Age (of Groundwater) — An approximation of the time between the water's penetration of the land surface at one location and its later presence at another location.

Agglomeration — (Water Quality) The grouping of small suspended particles into larger particles that are more easily removed through filtration, skimming, or settling. Also see *Coagulation*.

Aggradation — (1) The raising of stream beds or flood plains by deposition of sediment eroded and transported from upstream. (2) The build-up of sediments at the headwaters of a lake or reservoir or at a point where streamflow slows to the point that it will drop part or all of its sediment load. (3) The building of a floodplain by sediment deposition; the filling of a depression or drainageway with sediment; the building of a fan by deposition of an alluvial mantle. (4) Modification of the earth's surface in the direction of uniformity of grade or slope, by *Deposition*, as in a river bed. Opposite of *Degradation*.

Aggrade — The raising of a stream-channel bed with time due to the *Deposition* of sediment that was eroded and transported from the upstream watershed or the channel.

Aggrading — The building up of a stream channel which is flowing too slowly to carry its sediment load.

- Aggressive Water** — Water which is soft and acidic and can corrode plumbing, piping, and appliances.
- Agitated Pit** — A reservoir, pit, or pond that ordinarily is not stirred or aerated, but which is mixed just before emptying to suspend any settled solids.
- Agitator/Mixer** — (Water Quality) Blades or paddles that slowly rotate in a tank to facilitate the mixing of suspended material.
- Agribusiness** — The sum of all operations involved in the production, storage, processing, and wholesale marketing of agricultural products.
- Agricultural Drainage** — (1) The process of directing excess water away from the root zones of plants by natural or artificial means, such as by using a system of pipes and drains placed below ground surface level. Also referred to as *Subsurface Drainage*. (2) The water drained away from irrigated farmland.
- Agricultural Drought** — A general form of drought which occurs when soil moisture availability to agricultural crops is reduced to a level causing adverse effects on grain yield and consequently, the agricultural production of a region. Compare to *Hydrological Drought* and *Meteorological Drought*.
- Agricultural Economics** — The application of economic principles to the *Agribusiness* sector of the economy.
- Agricultural Land** — Land in farms regularly used for agricultural production; all land devoted to crop or livestock enterprises, for example, farmstead lands, drainage and irrigation ditches, water supply, cropland, and grazing land.
- Agricultural Levee** — A levee that protects agricultural areas where the degree of protection is usually less than that of a flood control levee.
- Agricultural Pollution** — Liquid and solid wastes from all types of farming, including runoff from pesticides, fertilizers, and feedlots; erosion and dust from plowing; animal manure and carcasses; and crop residues and debris. Agriculture is generally recognized as the leading nonpoint source of water pollutants, such as sediments, nutrients, and pesticides. Among other water pollution problems related to agriculture, nitrate pollution has been of growing concern. Nitrate contamination from agricultural activities has been reported in almost every state in the United States.
- Agricultural Restructuring Scenario (ARS)** — A term used to describe the sensitivity of agricultural water demand and farm marketing revenues to changes in certain cropping patterns.
- Agricultural Runoff** — The runoff into surface waters of herbicides, fungicides, insecticides, and the nitrate and phosphate components of fertilizers and animal wastes from agricultural land and operations. Considered a *Non-Point Source (NPS)* of water pollution.
- Agricultural Use** — The use of any tract of land for the production of animal or vegetable life; uses include, but are not limited to, the pasturing, grazing, and watering of livestock and the cropping, cultivation, and harvesting of plants.
- Agricultural Water Use (Withdrawals)** — Includes water used for irrigation and non-irrigation purposes. Irrigation water use includes the artificial application of water on lands to promote the growth of crops and pasture, or to maintain vegetative growth in recreational lands, parks, and golf courses. Nonirrigation water use includes water used for livestock, which includes water for stock watering, feedlots, and dairy operations, and fish farming and other farm needs.
- Agro-Ecosystem** — Land used for crops, pasture, and livestock; the adjacent uncultivated land that supports other vegetation and wildlife; and the associated atmosphere, the underlying soils, ground and surface waters, irrigation channels, and drainage networks.
- Agroindustrial** — Of or relating to production (as of power for industry and water for irrigation) for both industrial and agricultural purposes..
- Aground** — Onto or on a shore, reef, or the bottom of a body of water.
- Air** — The colorless, odorless, tasteless, gaseous mixture that makes up the earth's *Atmosphere*. Four gases comprise 99.997 percent (by volume) of clean, dry, air: *Nitrogen* (78.084 percent); *Oxygen* (20.946 percent); *Argon* (0.934 percent); and *Carbon Dioxide* (0.033 percent). The remaining components include neon, helium, methane, krypton, nitrous oxide, hydrogen, xenon, and various organic vapors. Under normal conditions, air contains up to about 3 percent water vapor (by volume) and many solid, liquid, or gaseous contaminants introduced by human activities and natural causes such as wind erosion and the burning of fossil fuels.
- Air Binding** — A situation where air enters the filter media and harms both the filtration and backwash processes.
- Air-Bound** — Condition in a pipeline wherein air trapped in a summit prevents the free flow of the material in the pipeline.
- Air Curtain** — A method for mechanical containment of oils spills in which air is bubbled through a perforated pipe, causing an upward water flow that retards the spreading of oil; also used as barriers to prevent fish from entering a polluted body of water.

Air Gap — An open vertical gap or empty space that separates a drinking water supply to be protected from another water system in a treatment plant or other location. The open gap protects the drinking water from contamination by *backflow* or *backsiphonage*.

Air Hole — An opening in the frozen surface of a body of water.

Air Injection — In groundwater management, the pumping of compressed air into the soil to move water in the *Unsaturated Zone (Vadose Zone)* down to the *Saturated Zone (Phreatic Zone)*, or *Water Table*.

Air Lock — A bubble or pocket of air or vapor, as in a pipe, that stops the normal flow of fluid through the conducting part.

Air Mass — A large body of air of considerable depth which is approximately homogeneous horizontally. At the same level, it has nearly uniform physical properties, especially as regards to temperature and moisture.

Air Padding — Pumping dry air into a container to assist with the withdrawal of liquid or to force a liquefied gas such as chlorine out of the container.

Air Stripping — (Water Quality) A process for the removal of organic contaminants from groundwater. The groundwater flows downward inside a tower filled with materials (the packing) over a large surface area. Air is introduced at the bottom of the tower and is forced upward past the falling water. Individual organic contaminants are transferred from the water to the air, according to the gas and water equilibrium concentration values of each contaminant. Also referred to as *Packed Tower Aeration*.

Air Vent (of a Dam) — A pipe designed to provide air to the outlet conduit to reduce turbulence and prevent negative pressures during the release of water. Extra air is usually necessary downstream of constrictions.

Alachlor — A herbicide, marketed under the trade name Lasso, listed by the *U.S. Environmental Protection Agency (EPA)* as a “probable human carcinogen” and found frequently in streams and rivers, particularly following floods and periods of heavy rain. Alachlor is used extensively for weed control in corn, cotton, and soybean fields.

Aldosterone — A steroid hormone secreted by the adrenal cortex that regulates the salt and water balance in the human body.

Alfalfa Valve — A screw-type valve placed on the end of a pipe to regulate the flow of water.

Algae — Simple single-celled, colonial, or multi-celled, mostly aquatic plants, containing chlorophyll and lacking roots, stems and leaves. Aquatic algae are microscopic plants that grow in sunlit water that contains phosphates, nitrates, and other nutrients. Algae, like all aquatic plants, add oxygen to the water and are important in the fish food chain.

Algal Bloom — (1) Rapid growth of algae on the surface of lakes, streams, or ponds; stimulated by nutrient enrichment. (2) A heavy growth of algae in and on a body of water as a result of high phosphate concentration such as from farm fertilizers and detergents. It is associated with *Eutrophication* and results in a deterioration in water quality. Also spelled *Algae Bloom*.

Algal Growth Potential (AGP) — The maximum algal dry weight biomass produced in a natural water sample under laboratory conditions. Expressed as milligrams (mg), dry weight per liter (l) of sample.

Algal Growth Rate — A measure of algal productivity in a body of water, the growth rate measures the mass of carbon used annually by algae per unit area of lake surface. The growth rate, typically referred to as *Primary Productivity*, is expressed as an index figure in grams of carbon per square meter per year, and indicates the state of *Eutrophication* of a body of water. Algal productivity is influenced by the quantities of nutrients that flow into, or fall onto, the lake each year and the number of days of sunshine. Another important factor is the mixing of the lake, which brings up to the surface where algae exist nutrients which have accumulated near the bottom of the lake.

Algicide — One of a group of plant poisons used to kill filamentous algae and phytoplankton.

Algorithm — A series of well-defined steps used in carrying out a specific process. May be in the form of a word description, an explanatory note, a diagram or labeled flow chart, or a series of mathematical equations.

Alkali — Any strongly basic (high pH) substance capable of neutralizing an acid, such as soda, potash, etc., that is soluble in water and increases the pH of a solution greater than 7.0. Also refers to soluble salts in soil, surface water, or groundwater.

Alkaline — Sometimes water or soils contain an amount of *Alkali* substances sufficient to raise the pH value above 7.0 and be harmful to the growth of crops. Generally, the term alkaline is applied to water with a pH greater than 7.4.

Alkalinity — (1) Refers to the extent to which water or soils contain soluble mineral salts. Waters with a pH greater than 7.4 are considered alkaline. (2) The capacity of water for neutralizing an acid solution. Alkalinity of natural waters is due primarily to the presence of hydroxides, bicarbonates, carbonates and occasionally borates, silicates and phosphates. It is expressed in units of milligrams per liter (mg/l) of CaCO₃ (calcium carbonate). A solution

having a pH below 4.5 contains no alkalinity.

Allochthonous Material — Organic material that falls into a stream from the surrounding land. Compare to *Autochthonous Material*.

Allogenic — Exogenous, caused by external factors, such as a change in a habitat or environment caused by flooding. Contrast with *Autogenic*.

Allogenic Succession — Predictable changes in plant and animal communities in which changes are caused by events external to the community, for example, fire, drought, floods, etc.

Allopathy — An interaction between plant species in which one species inhibits the establishment or growth on the second species through production of a selectively inhibitory chemical agent.

Alluvial — (1) Pertaining to processes or materials associated with transportation or deposition by running water. (2) Pertaining to or composed of *alluvium*, or deposited by a stream or running water. (3) An adjective referring to soil or earth material which has been deposited by running water, as in a riverbed, flood plain, or delta.

Alluvial Fan — (1) A fan-shaped deposit of generally coarse material created where a stream flows out onto a gentle plain; a geomorphologic feature characterized by a cone or fan-shaped deposit of clay, silt, sand, gravel, and boulders that have been eroded from mountain slopes, transported by flood flows, and deposited on the valley floor. (2) A geomorphologic feature characterized by a cone or fan-shaped deposit of boulders, gravel, and fine sediments that have been eroded from mountain slopes, transported by flood flows, and then deposited on the valley floors, and which is subject to flash flooding, high velocity flows, debris flows, erosion, sediment movement and deposition, and channel migration. (3) (Montane) A semiconical, or fan-shaped constructional, major landform that is built of more-or-less stratified alluvium with or without debris flow deposits, that occurs on the upper margin of a piedmont slope, and that has its apex at a point source of alluvium debauching from a mountain valley into an inter-montane basin. Also, a generic term for like forms in various other landscapes.

Alluvial Fan Flooding — Flooding occurring on the surface of an *Alluvial Fan* or similar landform which originates at the apex and is characterized by high-velocity flows, active processes of erosion, sediment transport, deposition, and unpredictable flow paths.

Alluvial Flat — A nearly level, graded, alluvial surface between the piedmont slope and playa of a *Bolson* or the axial-stream floodplain of a semi-bolson. This major landform may include both recent and relict components.

Alluvial Land — Areas of unconsolidated alluvium, generally stratified and varying widely in texture, recently deposited by streams, and subject to frequent flooding.

Alluvial Plain — (1) A level or gently sloping tract or a slightly undulating land surface produced by extensive deposition of *Alluvium*, usually adjacent to a river that periodically overflows its banks; it may be situated on a *Flood Plain*, a delta, or an *Alluvial Fan*. (2) A major landform of some basin floors, comprised of the floodplain of a major Pleistocene stream that crossed the floor, or of a low gradient fan-delta built by such a stream. It is distinguished from an alluvial flat by its relatively well sorted and stratified alluvium.

Alluvial Valley Floor — [Public Law 95–87, Section 701] (Legal) “The unconsolidated stream laid deposits where water availability is sufficient for subirrigation or flood irrigation. It does not include upland areas which are generally overlain by a thin veneer of colluvial deposits composed chiefly of debris from sheet erosion, deposits by unconcentrated runoff or slopewash, talus, or other mass movement accumulation and wind-blown deposits.”

Alluvion — (1) The flow of water against a shore or bank. Inundation by water; flood. (2) (Legal) The increasing of land area along a shore by deposited *Alluvium* or by the recession of water.

Alluvium — (1) A general term for deposits of clay, silt, sand, gravel, or other particulate material that has been deposited by a stream or other body of running water in a streambed, on a flood plain, on a delta, or at the base of a mountain. (2) A general term for such unconsolidated detrital material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or its flood plain or delta, or as a cone or fan at the base of a mountain slope; especially such a deposit of fine-grained texture (silt or silty clay) deposited during time of flood. Also see *Alluvion*.

Alpenglow — A rosy glow that suffuses snow-covered mountain peaks at dawn or dusk on a clear day.

Alpine — That portion of mountains above tree growth; or organisms living there.

Alpine Decree [California and Nevada] — The Federal Court adjudication of the relative water rights on the Carson River which is the primary regulatory control of Carson River operations today. The decree is administered in the field by a *Watermaster* appointed by the federal district court. The decree, initiated by the U.S. Department of the Interior on May 1, 1925 through *United States of America v. Alpine Land and Reservoir Company, et al.*, Civ. No. D-183 BRT, to adjudicate water rights along the Carson River. The decree was finally entered 55 years later on October 28, 1980, making it the longest lawsuit undertaken by the federal government against private parties over water rights. The decree established the respective water rights (to surface water only) of the parties to the original

lawsuit, both in California and Nevada to Carson River water. The decree did not make an interstate allocation of the Carson River between California and Nevada; it only quantified individual water rights. Neither state was a party to the decree. In addition to Carson River surface water rights, it also established the rights to reservoir storage in the high alpine reservoirs and confirmed the historical practice of operating the river on rotation, so that irrigators with more junior priorities could be served as long as possible. These upper alpine reservoirs were permitted to fill out of priority order, in accordance with historical practice. The decree also specifically recognized *Riparian Water Rights* in California (as distinguished from the quantified *Appropriative Water Rights* used in Nevada). For purposes of water distribution, the Carson River and its east and west forks, were divided into eight (8) segments and when the river went into regulation (i.e., there was not enough water in the Upper Carson River to serve the most junior priority) each segment of the river was to be administered autonomously. Duties of water were set forth for various locations according to *Bench Land* and *Bottom Land* designations. For lands in the *Newlands Irrigation Project* (i.e., below Lahontan Dam) in Churchill County near Fallon, the Alpine decree provided for an annual net consumptive use of surface water for irrigation of 2.99 acre-feet per acre and a maximum water duty of 4.5 acre-feet per acre for water-righted bench lands and 3.5 acre-feet per acre for water-righted bottom lands *delivered to the land*. For lands above the Newlands Project (i.e., above Lahontan Reservoir), the net consumptive water use was set at 2.5 acre-feet per acre with water duties of 4.5 acre-feet per acre *diverted to the canal* for bottom lands, 6.0 acre-feet per acre diverted to the canal for the alluvial fan lands and 9.0 acre-feet per acre diverted to the canal for the bench lands. This annual net consumptive use, or *Crop Water Requirement*, was based on the water duty of alfalfa as it is a dominant and the highest water-using crop grown in Nevada. While the Alpine Decree established water duties for bench and bottom lands throughout the Carson River Basin, it made no identification of those lands. The decree also granted landowners on the Newlands Project an *Appurtenant Water Right* for the patented lands, effectively transferring water rights to these land holders individually.

Alternate Concentration Limits (ACLs) — One of the three types of standards that may be applied when a leak is detected at a treatment, storage, or disposal facility and groundwater compliance monitoring is required. ACLs are set by the U.S. *Environmental Protection Agency (EPA)* for specific hazardous waste constituents at levels that are designed to prevent a substantial hazard to human health or the environment. Groundwater compliance monitoring can use the following standards: (1) background concentrations, or the levels found in the area naturally; (2) specific values set by federal regulations in Title 40, Part 264.94, of the *Code of Federal Regulations* for eight metals and six pesticides and herbicides; or (3) alternative concentration limits.

Alternatives — Courses of action which may meet the objectives of a proposal at varying levels of accomplishment, including the most likely future conditions without the project or action.

Altitheermal — (Climatology) A period of time when it was much warmer than now, approximately 7,000–4,500 years before the present time. Also see *Anathermal* and *Medithermal*.

Altitude — The vertical distance of a level, a point, or an object considered as a point, measured from *Mean Sea Level (MSL)*.

Alto cumulus Cloud — A fleecy cloud, usually a rounded mass, but which can change radically and unexpectedly, producing intermediate forms, at an average height of 2.5 miles (4 kilometers). Also see *Cloud*.

Altostratus Cloud — A somewhat high level, blue to grayish blue cloud that forms a sheet or layer at an average height of 3.5 miles (5.6 kilometers). Also see *Cloud*.

Altum Mare — (Old English Law) The high seas; the deep sea.

Alum — Common name for commercial-grade *Aluminum Sulfate*. Its chemical formula is generally denoted by $\text{Al}_2(\text{SO}_4)_3 \cdot 12\text{H}_2\text{O}$ (number of bound water molecules will vary from 12 to 18).

Aluminum Sulfate — A white crystalline compound, $\text{Al}_2(\text{SO}_4)_3$, used chiefly in paper making, water purification, sanitation, and tanning. See *Alum*.

Ambient Water Quality Standards — The allowable amount of materials, as a concentration of pollutants, in water. The standard is set to protect against anticipated adverse effects on human health or welfare, wildlife, or the environment, with a margin of safety in the case of human health. Also see *Primary* and *Secondary Standards* and *7Q10*.

Amebic Dysentery — A disorder of the gastrointestinal tract caused by a protozoan parasite belonging to the genus *Entamoeba histolytica*. The disorder is commonly found in communities with poor sanitary conditions, particularly related to water and food storage and preparation. Infected individuals experience abdominal cramps, diarrhea, and blood and mucus in the feces. The parasite invades the liver in some cases.

American Public Works Association (APWA) — A national organization founded in 1894 and based in Chicago, Illinois of individuals and organizations involved in the management of municipal solid waste and in the design and operation of wastewater treatment plants.

- American Society of Civil Engineers (ASCE)** — A professional organization in New York City founded in 1852 that supports the practice of, and research in, environmental engineering, hydrology, and water and wastewater treatment.
- American Water Works Association (AWWA)** — A national organization in Denver, Colorado, founded in 1881 of individuals involved in the design and operation of public water supplies and systems.
- Amictic Lake** — A lake that does not experience mixing or turnover on a seasonal basis. Also see *Dimictic Lake*.
- Ammonia Stripping** — A process for the removal of ammonia from wastewater. The waste is first made alkaline to favor the NH_3 form, and then aerated so that exchange between the water and the atmosphere is encouraged. Stripping towers are often used, with the waste trickling downward as air is forced upward through the tower.
- Ammonification** — The transformation of organic nitrogen to ammonia, generally by means of bacterial activity.
- Ammonium Sulfate** — A brownish-grey to white crystalline salt, $(\text{NH}_4)_2\text{SO}_4$, used in fertilizers and water purification.
- Amoeba, also Ameba** — A protozoan of the genus *Amoeba* or related genera, occurring in water and soil and as a parasite in other animals. An amoeba has no definite form and consists essentially of a mass of protoplasm containing one nucleus or more surrounded by a delicate, flexible outer membrane. It moves by means of pseudopods.
- Amphibian** — (1) A cold-blooded, smooth-skinned vertebrate of the class *Amphibia*, such as a frog or salamander, that characteristically hatches as an aquatic larva with gills. The larva then transforms into an adult having air-breathing lungs. (2) An animal capable of living both on land and in water.
- Amphibiotic** — Living in water during an early stage of development and on land during the adult stage.
- Amphibious** — (Biology) (1) Living or able to live both on land and in water. (2) Able to operate both on land and in water.
- Ampoules** — A sealed, liquid-filled tube which is broken to release or be filled with another fluid.
- Ampermometric Titration** — A means to measure concentrations of certain substances in water using an electric current that flows during a chemical reaction. Also see *Titration*.
- Anabaena** — Any of various freshwater algae of the genus *anabaena* that sometimes occur in drinking water and cause a bad taste and odor.
- Anabranh** — A diverging branch of a river which re-enters the main stream.
- Anadromous** — Pertaining to fish that spend a part of their life cycle in the sea and return to freshwater streams to spawn, for example, salmon, steelhead trout, and shad. Contrast with *Catadromous*.
- Anaerobe** — An organism that does not require oxygen to maintain its life processes.
- Anaerobic** — Characterizing organisms able to live and grow only where there is no air or free oxygen, and conditions that exist only in the absence of air or free oxygen.
- Anaerobic Decomposition** — The degradation of materials by *Anaerobic* microorganisms living beneath the ground or in oxygen-depleted water to form reduced compounds such as methane or hydrogen sulfide. Generally a slower process than *Aerobic Decomposition*.
- Anaerobic Digester** — An airtight tank in which *Anaerobic* microorganisms decompose organic material and produce *Biogas*, mainly *Methane*. Sewage treatment plants often use anaerobic digesters to reduce the volume of *Sludge* produced in *Primary* and *Secondary Treatment*, and they sometimes use the methane as a heating fuel.
- Anaerobic Digestion** — The degradation of organic matter by microorganisms in the absence of oxygen, particularly as related to the treatment of sewage sludge. Sewage treatment plants often use anaerobic digesters to reduce the volume of sludge produced in primary and secondary treatment, and they sometimes use the resultant methane gas as a heating fuel.
- Anaho Island National Wildlife Refuge (NWR) [Nevada]** — One of the nine National Wildlife Refuges (NWR) located in the State of Nevada, the Anaho Island NWR was established in 1913 by President Woodrow Wilson to protect the white pelican nesting colonies. The Anaho NWR consists of the 750-acre (1.2 square mile) Anaho Island located within Pyramid Lake, which is wholly contained within the Pyramid Lake Paiute Indian Reservation. Situated approximately 45 northeast of Reno, Nevada, the Anaho NWR contains one of the largest white pelican nesting colonies in North America, as well as cormorant, great blue heron, and gull nesting colonies. This refuge is closed to the public for the protection of the colony nesting birds. Also see *National Wildlife Refuge (NWR) System* and *National Wildlife Refuges (NWR) [Nevada]*.
- Analog** — A continuously variable electrical signal representing a measured quantity. For example, electrical signals such as current, voltage, frequency, or phase used to represent physical quantities such as water level, flow, and gate position.
- Analytical Model** — A model that provides approximate or exact solutions to simplified forms of the differential equations for water movement and solute transport. Such models generally require the use of complex calculations

and the use of computers.

Anastomosing — The branching and rejoining of channels to form a netlike pattern.

Anathermal — (Climatology) The period preceding the *Altithermal*; the early *Holocene* epoch from about 10,000–7,000 years before the present. Also see *Medithermal*.

Anchor — A series of methods used to secure a structure to its footings or foundation wall so that it will not be displaced by flood or wind forces.

Anchor Ice — Frazil ice that has collected on rocks on the stream bed.

Ancient Water Course — A water course is said to be “ancient” if the channel through which it naturally runs has existed from time immemorial independent of the amount of water which it discharges.

Aneroid — Not using liquid.

Angiosperms (Angiospermae) — (Botanical) The vast majority of seed plants characterized as having ovules and seeds in a closed ovary. Along with the *Gymnosperms (Gymnospermae)*, Angiosperms comprise a structurally superior class within the plant family *Spermatophyta*, or seed plants. Its two sub-classes consist of *Monocotyledones* and *Dicotyledones*. Also see *Gymnosperms*.

Angler-Day — The time spent fishing by one person for any part of a day.

Anhydride — A chemical compound formed from another, often an acid, by the removal of water.

Anhydrous — Without water, especially water of crystallization; not hydrated (*Dehydrated*).

Anion — In an electrolyzed solution, the negatively charged particle, or ion, which travels to the anode and is therefore discharged, evolved, or deposited. Also, by extension, any negative ion.

Anisotropy — (1) The condition of having different properties in different directions. (2) The condition under which one or more of the hydraulic properties of an aquifer vary according to the direction of the flow.

Annual Flood — The highest peak discharge of a stream in a *Water Year*.

Annual Flood Series — A list of annual floods for a given period of time.

Annual Low-Flow — The lowest flow occurring each year, usually the lowest average flow for periods of perhaps 3, 7, 15, 30, 60, 120, or 180 consecutive days.

Annual Runoff — The total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data: (1) acre-feet (AC-FT, acre-ft, af)– the quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet, 325,851 gallons, or 1,234 cubic meters; (2) cubic feet per second per square mile (CFSM, (ft³/s)/mi²) – the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area; (3) inch (In., in.) – the depth to which a drainage area would be covered with water if all the runoff for a given time period was uniformly distributed on it.

Annual 7-Day Minimum (USGS) — The lowest mean discharge for 7 consecutive days in a year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (i.e., April 1-March 31). The date shown in USGS statistical tables is the initial date of the 7-day period. This value should not be confused with the 7-day 10-year low-flow statistic.

Annular Space — The space between two cylindrical objects, one of which surrounds the other, such as the space between the wall of the drilled hole and the casing, or between a permanent casing and the borehole.

Annulus — For a well, the space between the pipe and the outer wall (casing) of the borehole, which may be a pipe also (the well casing).

Annulus Pressure — The positive pressure maintained by a fluid introduced between the well piping and the outer wall (casing) of the borehole of an underground *Injection Well* providing an indication of the integrity of the well.

Anoxia — (1) Absence of oxygen. (2) The total deprivation of oxygen, as in bodies of water, lake sediments, or sewage.

Anoxia, Functional — Although not well defined, generally refers to a body of water sufficiently deprived of oxygen to where *Zooplankton* and fish would not survive.

Anoxic — (1) Denotes the absence of oxygen, as in a body of water. (2) Of, relating to, or affected with anoxia; greatly deficient in oxygen; oxygenless as with water.

Antecedent Moisture — The degree of wetness of soil at the beginning of a runoff, determined by summation of weighted daily rainfall amounts for a period preceding the runoff.

Antecedent Moisture Condition (AMC) — (1) A description of the amount of water in storage at some point in time (usually the start of a hydrologic event) that is relevant to the event. (2) Soil moisture at the onset of a rainfall event. The U.S. Department of Agriculture, *Natural Resources Conservation Service (NRCS)*, formerly the *Soil Conservation Service (SCS)*, defines AMC in terms of total rainfall during the 5 days immediately preceding the rainfall event. Dry AMC conditions mean less than 1.4 inches, average is 1.4 to 2.1 inches, and wet is greater than

2.1 inches.

Antecedent Precipitation — Precipitation which occurred prior to a particular time over a specific area or *Drainage Basin*. Usually applied as a measure of moisture in the top layer of the soil which would affect runoff from additional rainfall. Also see *Antecedent Precipitation Index (API)*.

Antecedent Precipitation Index (API) — An index of moisture stored in a basin before a storm, calculated as a weighted summation of past daily precipitation amounts. Also see *Antecedent Precipitation*.

Antecedent Soil Water — Degree of wetness of a soil prior to irrigation or at the beginning of a runoff period, typically expressed as an index.

Antecedent Streams — Antecedent streams are those in place before the rising of mountain chains. As the mountains rise, the streams cut through at the same rate and so maintain their positions.

Antediluvian (Policy) — (1) Extremely old and antiquated. (2) Occurring or belonging to the era before the Flood written about in the Bible. (Ecology) Used sometimes today to denote a public growth and water policy based on an area's *natural* ability to support population growth only through existing, readily available natural resources, i.e., water.

Anthropogenic — Involving the impact of man on nature; induced, caused, or altered by the presence and activities of man, as in water and air pollution.

Anticyclone — An area of relatively high pressure in which, in the northern hemisphere, the winds tend to blow spirally outward in a clockwise direction.

Antidegradation Policy (or Clause) — Rules or guidelines that are required of each state by federal regulations implementing the *Clean Water Act (CWA)*, stating that existing water quality be maintained even if the current water quality in an area is higher than the minimum permitted as defined by federal ambient water quality standards. Some controlled degradation is permitted in support of economic development.

Antifreeze — A substance, often a liquid such as ethylene glycol or alcohol, mixed with another liquid, such as water, to lower its freezing point.

Antifluoridationist — One who is strongly opposed to the fluoridation of public water supplies.

Anti-Seepage Collar — A projecting collar, usually of concrete, built around the outside of a pipe, tunnel, or conduit, or conduit under or through an *Embankment Dam* to lengthen the seepage path along the outer surface of the conduit.

Apex — (1) The highest point on an *Alluvial Fan* or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and *Alluvial Fan Flooding* can occur. (2) The point of highest elevation on an alluvial fan, which on undisturbed fans is generally the point where the major stream that formed the fan emerges from the mountain front.

Aphotic — Defined as without light. Of or relating to the region of a body of water that is not reached by sunlight and in which *Photosynthesis* is unable to occur. The *Aphotic Zone* of the ocean is the water deeper than about 800 meters (2,625 feet), beyond which no light penetrates. Contrast with *Photic Zone*.

Apothecaries' Measure — A system of liquid volume measure used in pharmacy.

Applicable or Appropriate Requirements (ARARs) — Any state or federal statute that pertains to the protection of human life and the environment in addressing specific conditions or use of a particular cleanup technology at a *Superfund Site*.

Application Rate — For irrigation, the rate at which water is applied per unit of land area, usually expressed in terms of inches per hour.

Application, Water Right — An official request for permission to develop a source of water or to change an existing water right; includes a description of the proposed project, a map of the project, and a legal description of the property involved. The application for a water right will typically consists of the following information:

- [1] the total amount of water to be diverted or pumped;
- [2] the rate of flow (diversion);
- [3] the point of diversion or pumpage;
- [4] the point or place of use;
- [5] the manner of (beneficial) use; and
- [6] the period of use (continuous pumpage, seasonal diversion, etc.).

The application process is the first step in a process of obtaining a certificate of use or a *Perfected Water Right*. This process includes:

- [1] the filing of the application, which establishes the priority date for appropriation purposes;
- [2] the permit which is issued by the *State Engineer* or other approving authority;
- [3] the proof of completion which is filed by the applicant;

- [4] the proof of beneficial use which is also filed by the applicant; and
- [5] the certificate or perfected water right which is issued by the State Engineer or other approving authority.

Applied Water Demand — The quantity of water delivered to the intake of a city's water system or factory, the farm headgate or other point of measurement, or a marsh or other wetland, either directly or by incidental drainage. For instream use, it is the portion of the stream flow dedicated to instream use or reserved under federal or state legislation such as *Wild and Scenic River Acts*. Applied water includes the water that returns to groundwater, a stream, canal, or other supply source that can be reused or recycled and thus is not the same as *Net Water Demand*.

Appropriate — To authorize the use of a quantity of water to an individual requesting it.

Appropriated Water — (1) A quantity of water from a well, stream, river, reservoir, or other source reserved for a specific use and place of use under state water-right laws, statutes, or regulations. (2) Surface water in an irrigation district that has been assigned or allocated to owners of water rights.

Appropriate Technology — The application of current scientific knowledge and technology in such a way so as to conform with existing economic, infrastructure, social, and cultural conditions and practices. By extension, the concept implies the implementation of low-technology solutions incorporating simplicity of design, use, and maintenance.

Appropriation — A granting process whereby authority is granted by a state to divert, store, or use the public waters of the state. Often used interchangeably with the terms water right and water permit.

(Prior) Appropriation Doctrine — The system for allocating water to private individuals used in the western United States under which (1) the right to water was acquired by diverting water and applying it to a beneficial use and (2) a right to water acquired earlier in time is superior to a similar right acquired later in time. In most states water rights are not now acquired by diverting water and applying it to a beneficial use. Such a system is referred to as the constitutional method of appropriation. Water rights are acquired by application, permit, and license, which may not require diversion and application to a beneficial use. Superiority of right is based on earliest in time and has no reference to whether two rights are for a similar use. The doctrine of *Prior Appropriation* was in common use throughout the arid west as early settlers and miners began to develop the land. The prior appropriation doctrine is based on the concept of "*First in Time, First in Right*." The first person to take a quantity of water and put it to *Beneficial Use* has a higher priority of right than a subsequent user. Under drought conditions, higher priority users are satisfied before junior users receive water. Appropriative rights can be lost through nonuse; they can also be sold or transferred apart from the land. Contrast with *Riparian Water Rights*.

Appropriative Water Right [Nevada] — Nevada's water law is based on statutes enacted in 1903 and 1905 and are founded on the principal of *Prior Appropriation*. Unlike some other states, Nevada has a statewide system for the administration of both ground water and surface water. Appropriative water rights are based on the concept of applying water to *Beneficial Use* and "*First in Time, First in Right*." Appropriative water rights can be lost through nonuse and they may be sold or transferred apart from the land. Due in large part to the relative scarcity of water in Nevada and numerous competing uses, Nevada has had a thriving market for water transfers for a number of years. A person in Nevada who desires to place water to beneficial use must file an application with the State Engineer to initiate the process of acquiring an appropriative water right. Also see *Riparian Water Rights*, *Prescribed Water Rights*, and *Reserved Water Rights (Federal)*.

Appropriator — One taking water from a watercourse under the authority of the state and applying it to *Beneficial Use*.

Approximate Original Contour — The surface configuration achieved by backfilling and grading of mined areas so that the reclaimed area, including any terracing or access roads, closely resembles the general surface configuration of the land prior to strip mining and blends into and complements the drainage pattern of the surrounding terrain.

Appurtenant — (1) (Legal) A right, privilege, or property that is considered incident to the principal property for purposes such as passage of title, conveyance, or passage of title. (2) (Water-Related) A right to water that is incident to the ownership or possession of the land.

Appurtenant Land — The land base to which water rights legally pertain or belong.

Appurtenant Structures (of a Dam) — Auxiliary features of a dam such as an outlet, spillway, powerhouse, tunnel, etc.

Appurtenant to Place of Use — A water right has several characteristics, one of which is the location of where the water will be put to beneficial use. An *Appurtenant Water Right* is a water right that belongs to the legal owner of the land described as the place of use of the water right.

Appurtenant Water Right — A water right that is incident to the ownership or possession of land.

Apron — (1) A platform, as of planking, at the entrance to a dock. (2) A covering or structure along a shoreline for

- protection against erosion. A platform serving a similar purpose below a dam or in a sluiceway. (3) An area covered by sand and gravel deposited in the front of a glacial moraine.
- Aqua** — Water; an *Aqueous* solution. A prefix meaning water, e.g., *Aquaculture*.
- Aquacade** — (1) A water spectacle originated at Cleveland, Ohio, in 1937; (2) A water spectacle that consists usually of exhibitions of swimming and diving with musical accompaniment.
- Aquaculture, also Aquiculture** — The science, art, and business of cultivating marine or freshwater food fish or shellfish, such as oysters, clams, salmon, and trout, under controlled conditions for commercial purposes.
- Aquanaut** — A person trained to live in underwater installations and conduct, assist in, or be a subject of scientific research. Also called *Oceanaut*.
- Aquarium** — (1) A tank, bowl, or other water-filled enclosure in which living fish or other aquatic animals and plants are kept. (2) A place for the public exhibition of live aquatic animals and plants.
- Aquarius** — (1) A constellation in the equatorial region of the Southern Hemisphere near Pisces and Aquila also referred to as the *Water Bearer*. (2) The 11th sign of the zodiac in astrology.
- Aquatic** — (1) Consisting of, relating to, or being in water; living or growing in, on, or near the water. (2) Taking place in or on the water. (3) An organism that lives in, on, or near the water.
- Aquatic Algae** — Microscopic plants that grow in sunlit water containing phosphates, nitrates, and other nutrients. Algae, like all aquatic plants, add oxygen to the water and are important in the fish food chain.
- Aquatic Life** — All forms of living things found in water, ranging from bacteria to fish and rooted plants. Insect larva and zooplankton are also included.
- Aqueduct** — (1) A pipe, conduit, or channel designed to transport water from a remote source, usually by gravity. (2) A bridgelike structure supporting a conduit or canal passing over a river or low ground.
- Aqueous** — (1) Relating to, similar to, containing, or dissolved in water; watery. (2) (Geology) Formed from matter deposited by water, as certain sedimentary rocks.
- Aqui** — A prefix for water, e.g., *Aquifer*.
- Aquic** — A mostly reducing soil moisture regime nearly free of dissolved oxygen due to saturation by groundwater or its capillary fringe and occurring at periods when the soil temperature at 50 centimeters is above 5°C (41°F).
- Aquiclude (Confining Bed)** — A formation which, although porous and capable of absorbing water slowly, will not transmit water fast enough to furnish an appreciable supply for a well or spring. Aquicludes are characterized by very low values of “leakage” (the ratio of vertical *Hydraulic Conductivity* to thickness), so that they transmit only minor inter-aquifer flow and also have very low rates of yield from compressible storage. Therefore, they constitute boundaries of aquifer flow systems.
- Aquiculture** — See *Aquaculture*. Compare with *Mariculture*.
- Aquifer** — (1) A geologic formation, a group of formations, or a part of a formation that is water bearing. (2) A geological formation or structure that stores or transmits water, or both, such as to wells and springs. (3) An underground layer of porous rock, sand, or gravel containing large amounts of water. Use of the term is usually restricted to those water-bearing structures capable of yielding water in sufficient quantity to constitute a usable supply. (4) A sand, gravel, or rock formation capable of storing or conveying water below the surface of the land. (5) A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.
- Aquifer, Basin-Fill** — An aquifer located in a basin surrounded by mountains and composed of sediments and debris shed from those mountains. Sediments are typically sand and gravel with some clay.
- Aquifer Compaction** — Term used to describe the effects of emptying or overdrawing an aquifer; overdrafts tend to collapse the structure of the aquifer such that the original volume cannot be restored. May also be associated with a general *Land Subsidence* in the surrounding ground level as the result of such compaction.
- Aquifer, Confined** — An aquifer which is bounded above and below by formations of impermeable or relatively impermeable material. An aquifer in which ground water is under pressure significantly greater than atmospheric and its upper limit is the bottom of a bed of distinctly lower hydraulic conductivity than that of the aquifer itself. See *Artesian Aquifer*.
- Aquifer, Fractured Bedrock** — An aquifer composed of solid rock, but where most water flows through cracks and fractures in the rock instead of through pore spaces. Flow through fractured rock is typically relatively fast.
- Aquifer, Leaky (Semi-Confined)** — An aquifer overlaid and/or underlaid by a thin semipervious layer through which flow into or out of the aquifer can take place.
- Aquifer, Perched** — A groundwater unit, generally of moderate dimensions, that occurs whenever a groundwater body is separated from the main groundwater supply by a relatively impermeable stratum and by the *Zone of Aeration* above the main water body.

- Aquifer, Saline/Poor Quality** — An aquifer containing water that is high in total dissolved solids, and is unacceptable for use as drinking water.
- Aquifer, Sandstone** — The type of aquifer supplying groundwater to large parts of the United States upper Middle West, Appalachia, and Texas. The water-bearing formation is often contained by shale strata, and the water has high levels of iron and magnesium.
- Aquifer System** — A body of permeable and relatively impermeable materials that functions regionally as a water-yielding unit. It comprises two or more permeable units separated at least locally by confining units (*Aquitards*) that impede ground-water movement but do not greatly affect the regional hydraulic continuity of the system. The permeable materials can include both saturated and unsaturated sections.
- Aquifer Test** — A test to determine hydrologic properties of an aquifer, involving the withdrawal of measured quantities of water from, or the addition of water to, a well and the measurement of resulting changes in head in the aquifer both during and after the period of discharge or addition (recharge).
- Aquifer, Unconfined** — An *Aquifer* made up of loose material, such as sand or gravel, that has not undergone lithification (settling). In an unconfined aquifer the upper boundary is the top of the *Zone of Saturation* (water table).
- Aquifer, Volcanic Rock** — An aquifer composed of rock that originated from a volcano, such as basalt. This type of rock may or may not be very permeable.
- Aquifuse** — A formation that has no interconnected openings and hence cannot absorb or transmit water.
- Aquitard** — A saturated, but poorly permeable bed that impedes ground-water movement and does not yield water freely to wells, but which may transmit appreciable water to or from adjacent aquifers and, where sufficiently thick, may constitute an important ground-water storage unit. Aquitards are characterized by values of leakance that may range from relatively low to relatively high. Areally extensive aquitards of relatively low leakance may function regionally as boundaries of aquifer flow systems.
- Arable Land** — Land capable of being cultivated and suitable for the production of crops. The (U.S. Department of the Interior) *Bureau of Reclamation (USBR)* defines arable land as: “Land which, in adequate units and when properly provided with the essential improvements of leveling, drainage, buildings, irrigation facilities and the like, will have a productive capacity, under sustained irrigation agriculture, sufficient to: meet all production expenses, including a reasonable return on investment; repay reasonable irrigation and improvement costs; and provide a satisfactory level of living for the farm family.”
- Arboretum** — A collection of plants, trees, and shrubs grown for public exhibition, public enjoyment, recreation, education, or research.
- Arboriculture** — The planting, care, and tending of trees and shrubs, individually or in small groups, for utilitarian purposes.
- Arch Dam** — Curved masonry or concrete dam, convex in shape upstream, that depends on arch action for its stability; the load or water pressure is transferred by the arch to the *Abutments*. Also see *Dam*.
- Arch-Gravity Structure** — A structure which derives its resistance to the pressure of water from both an arching effect and its own weight.
- Archimedean Screw** — An ancient apparatus for raising water, consisting of either a spiral tube around an inclined axis or an inclined tube containing a tight-fitting, broad-threaded screw. Also referred to as *Archimedes’ Screw*.
- Arctic Tundra** — The grassland *Biome* characterized by permafrost (subsurface soil that remains frozen throughout the year).
- Are** — A metric unit of land measure equal to 100 square meters or 1/100 *Hectare* (119.6 square yards). Also see *Metric System*.
- Area-Capacity Curve** — A graph showing the relation between the surface area of the water in a reservoir and the corresponding volume.
- Area Flooded** — Area of a floodplain that is flooded in a specific stream reach, watershed, or river basin; may be for a single flood event, but is usually expressed as an average, annual value based on the sum of areas from all individual flood events over a long period of time, such as 50 to 100 years, and adjusted to an average value.
- Area (Sub-Area), Hydrographic** — Primarily these are sub-drainage systems, typically valleys, within a more comprehensive drainage basin. *Hydrographic Areas* (Valleys) may be further subdivided into *Hydrographic Sub-Areas* based on unique hydrologic characteristics (e.g., differences in surface flows) within a given valley or area.
- Area (Sub-Area), Hydrographic [Nevada]** — Nevada’s 14 major drainage *Basins* or *Hydrographic Regions* are divided further into 232 *Hydrographic Areas* (valleys) and 256 *Hydrographic Areas* and *Hydrographic Sub-Areas* as defined by the *U.S. Geological Survey (USGS)* and the Nevada Division of Water Resources, Department of Conservation and Natural Resources. See *Basins [Nevada]*. [A listing of Nevada’s Hydrographic Regions, Areas

and Sub-Areas is presented in Appendix A-1 (hydrographic regions, areas and sub-areas), Appendix A-2 (listed sequentially by area number) Appendix A-3 (listed alphabetically by area name), and Appendix A-4 (listed alphabetically by principal Nevada county(ies) in which located).]

Area of Critical Environmental Concern (ACEC) — An area on *Public Lands* where special management attention is required to protect and prevent irreparable damage to historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect people from natural hazards.

Area of Critical Environmental Concern (ACEC) [Nevada] — Any area in the State of Nevada where there is our could develop irreversible degradation of more than local significance, but does not include an area of depleting water supply which is caused by the beneficial use or storage of water in other areas pursuant of legally owned and fully appropriated water rights. (Nevada Revised Statutes 321.655)

Area of Influence — The area surrounding a pumping or recharging well within which the water table or potentiometric surface has been changed due to the well's pumping or recharge.

Area of Origins Protection — (1) Generally, laws, regulations, or policies that provide some form of protection to states, counties, or regions from which an interbasin transfer of water is made. (2) State and federal laws, dating back to 1931, enacted to guarantee that the counties that contribute water to state and federal water projects will get priority for water when it is needed to match future growth. As yet, these statutes have not received close legal scrutiny by the courts.

Area of Review — The area around an underground injection well that may be influenced adversely by fluid injection. Typically, the extent of this area may be calculated by using the specific gravity and rate of introduction of the injected fluids, the size, storage capacity, and hydraulic conductivity of the injection zone, and certain underground formation pressures.

Area of Shallow Flooding — Designated *Flood Zones* AO and AH on a community's *Flood Insurance Rate Map (FIRM)* with a one percent or greater annual chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow. Also referred to as *Sheet Flow Area*.

Area of Special Flood Hazard — See *Special Flood Hazard Area*.

Area of Special Flood-Related Erosion Hazard — The land within a community which is most likely to be subject to experience flood-related erosion losses. The area may be designated as Zone E on the *Flood Insurance Rate Map (FIRM)*. See *Flood Zones*.

Area of Special Mudslide (i.e., Mudflow) Hazard — The area subject to severe mudslides (i.e., mudflows). The area is designated as Zone M on the *Flood Insurance Rate Map (FIRM)*.

Argillic Alteration (Argillization) — A form of *Hydrothermal* alteration in which certain minerals of rock are converted to clay minerals.

Arid — A term applied to a climate or region where precipitation is so deficient in quantity, or occurs so infrequently, that crop production is impractical or impossible without irrigation.

Arid Climate — Generally any extremely dry climate.

Aridic — A soil moisture regime that has no moisture available for plants for more than half the cumulative time that the soil temperature at 19.7 inches (50 centimeters) is above 5°C (41°F) and has no period as long as 90 consecutive days when there is moisture for plants while the soil temperature at 50 centimeters is continuously above 8°C (46.4°F).

Aridity — The quality or state of being arid, dry, or barren.

Arithmetic Growth — (Statistics) A rate of increase (or decrease) by a constant amount per time period, for example a population increase of X persons per year, year after year. Compare to *Exponential Growth* and *Sigmoid Growth*.

Arithmetic Mean — (Statistics) The sum of a set of observations divided by the number of observations. Also referred to as simply the *Mean*, or the *Sample Mean*. Compare to *Mode* and *Median*.

Arm — An inlet of water (as from the sea).

Arm of the Sea — A portion of the sea projecting inland, in which the tide ebbs and flows. It is considered as extending inland into the interior of a country to the extent to which fresh river waters are propelled backwards by the inflow of the tide.

Armor — To protect fill slopes, such as the sides of a levee, by covering them with erosion-resistant materials such as rock or concrete.

Armoring — (1) Formation of a layer of rocks on the surface of a streambed that resists erosion by water flows. The rocks can be naturally occurring, caused by the scour of smaller particles from high discharges, or placed by humans to stop channel erosion. (2) A facing layer (protective cover), or *Rip Rap*, consisting of very large stones placed to prevent erosion or the sloughing off of a structure or embankment. Also, a layer of large stones, broken

rocks or boulders, or precast blocks placed in random fashion on the upstream slope of an *Embankment Dam*, on a reservoir shore, or on the sides of a channel as a protection against waves, ice action, and flowing water. The term armoring generally refers only to very large rip rap.

(United States) Army Corps of Engineers (Corps or COE) — Originally formed in 1775 during the Revolutionary War by General George Washington as the engineering and construction arm of the Continental Army. Initially, the Corps of Engineers built fortifications and coastal batteries to strengthen the country's defenses and went on to found the Military Academy at West Point, help open the West, and to develop the nation's water resources. In its military role, the COE plans, designs, and supervises the construction of facilities to insure the combat readiness of the U.S. Army and Air Forces. In its civilian role, the COE has planned and executed national programs for navigation and commerce, flood control, water supply, hydroelectric power generation, recreation, conservation, and preservation of the environment. In a very general sense, the U.S. Army Corps of Engineers has a primary responsibility for water projects which protect property from potential flood damage, whereas the (U.S. Department of the Interior) *Bureau of Reclamation (USBR)* is responsible for primarily western water projects with respect to developing water sources for agriculture and commerce. In reality, however, quite often these federal agencies' project goals overlap with USBR's dams and reservoirs providing important flood protection and the COE's water projects — dams, locks, and canals — providing important water transportation linkages and benefits to commerce. [See Appendix E-2 for the U.S. Army Corps of Engineers' organizational structure and primary missions and objectives.]

Arranged Delivery — Operation of a water delivery system to meet predetermined needs, generally based on user water orders. Also referred to as *Scheduled Delivery*.

Arrastra — A crude drag-stone mill for pulverizing ores, especially those containing free gold or silver; frequently powered by falling water.

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

Arroyo Valley — A small valley tributary to a major desert stream valley.

Artesian — A commonly used expression, generally synonymous with *Confined* and referring to subsurface (ground) bodies of water which, due to underground drainage from higher elevations and confining layers of soil material above and below the water body (referred to as an *Artesian Aquifer*), result in underground water at pressures greater than atmospheric.

Artesian Aquifer — A commonly used expression, generally synonymous with (but a generally less favored term than) *Confined Aquifer*. An artesian aquifer is an aquifer which is bounded above and below by formations of impermeable or relatively impermeable material. An aquifer in which ground water is under pressure significantly greater than atmospheric and its upper limit is the bottom of a bed of distinctly lower hydraulic conductivity than that of the aquifer itself.

Artesian Basin — A body of groundwater more or less compact, moving through soils with more or less resistance.

Artesian Pressure — The pressure under which *Artesian Water* in an *Artesian Aquifer* is subjected, generally significantly greater than atmospheric.

Artesian Water — Ground water that is under pressure when tapped by a well and is able to rise above the level at which it is first encountered. It may or may not flow out at ground level. The pressure in such an aquifer commonly is called *Artesian Pressure*, and the formation containing artesian water is an *Artesian Aquifer* or *Confined Aquifer*.

Artesian Well — (1) A well bored down to the point, usually at great depth, at which the water pressure is so great that the water is forced out at the surface. The name is derived from the French region of Artois, where the oldest well in Europe was bored in 1126. (2) A well tapping a *Confined* or *Artesian Aquifer* in which the static water level stands above the top of the aquifer. The term is sometimes used to include all wells tapping confined water. Wells with water levels above the unconfined water table are said to have positive artesian head (pressure) and those with water level below the unconfined water table, negative artesian head. If the water level in an artesian well stands above the land surface, the well is a *Flowing Artesian Well*. If the water level in the well stands above the water table, it indicates that the artesian water can and probably does discharge to the unconfined water body.

Artesian Zone — A zone where water is confined in an aquifer under pressure so that the water will rise in the well casing or drilled hole above the bottom of the confining layer overlying the aquifer.

Artificial Recharge — (1) The addition of surface water to a groundwater reservoir by human activity, such as putting surface water into a *Spreading Basin*. (2) The designed (as per man's activities as opposed to the natural or incidental) replenishment of ground water storage from surface water supplies such as irrigation or induced

infiltration from streams or wells. There exist five (5) common techniques to effect artificial recharge of a groundwater basin:

- [1] **Water Spreading** consisting of the basin method, stream-channel method, ditch method, and flooding method, all of which tend to divert surface water supplies to effect underground infiltration;
- [2] **Recharge Pits** designed to take advantage of permeable soil or rock formations;
- [3] **Recharge Wells** which work directly opposite of pumping wells, although they generally have limited scope and are better used for deep, confined aquifers;
- [4] **Induced Recharge** which results from pumping wells near surface supplies, thereby inducing higher discharge towards the well; and
- [5] **Wastewater Disposal** which includes the use of secondary treatment wastewater in combination with spreading techniques, recharge pits, and recharge wells to reintroduce the water into deep aquifers thereby both increasing the available groundwater supply and also further improving the quality of the wastewater.

Also referred to as *Induced Recharge*. Also see *Natural Recharge*, *Incidental Recharge*, *Injection*, and *Perennial Yield*.

Artificial Substrate — (1) A device placed in the water for a specified period of time that provides living spaces for a multiplicity of organisms; for example, glass slides, concrete blocks, multi-plate samplers, or rock baskets; used primarily to collect organisms in areas where the physical habitat is limiting or cannot be adequately sampled using conventional methods. (2) A device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multiplate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Artificially Developed Water — Water which would not have reached a stream if left to flow in accordance with natural laws. If developed by an individual, that person may acquire rights to such waters superior to adjudicated rights of earlier appropriators of natural waters of the stream into which such waters are diverted.

Asbestos — A mineral fiber that can pollute air or water and cause cancer or *Asbestosis* when inhaled. The *U.S. Environmental Protection Agency (EPA)* has banned or severely restricted its use in manufacturing and construction.

Asbestosis — A disease associated with inhalation of *Asbestos* fibers. The disease makes breathing progressively more difficult and can be fatal.

Ash Mass — The mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500 degrees centigrade for 1 hour. Ash mass of zooplankton and phytoplankton is expressed in grams per cubic meter, and periphyton and benthic organisms in grams per square meter.

Ash Meadows National Wildlife Refuge (NWR) [Nevada] — One of the nine National Wildlife Refuges (NWR) located in the State of Nevada, the Ash Meadows NWR is located approximately 90 miles northwest of Las Vegas in Nye County, Nevada, and was established in 1984, encompasses some 14,000 acres (approximately 22 square miles) and provides critical habitat for 25 plant and animal species found nowhere else in the world. This distinguishes the Ash Meadows NWR as having the greatest concentration of endemic species of any other local area in the United States. Of the 25 unique species, 12 have been listed as either *Threatened* or *Endangered*. Water is the key natural resource which makes the Ash Meadows NWR a unique *Ecosystem* in the dry Mojave Desert. In this area, water-bearing strata come to the surface in approximately 30 seeps and springs, providing a rich and complex variety of habitat. The earliest efforts to protect this area were undertaken by *The Nature Conservancy*, which purchased 12,613 acres of land in 1984 and subsequently sold it to the USFWS specifically to establish a wildlife refuge. Also see *National Wildlife Refuge (NWR) System* and *National Wildlife Refuges (NWR) [Nevada]*.

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

Asperse — To sprinkle, especially with holy water.

Assessment Report — A comprehensive record of historical, existing and projected water quality conditions of a particular watershed.

Assignment of Water — The transfer of a water right application or permit from one person to another. This can be done in conjunction with the sale of land.

Assimilation — The ability of a body of water to purify itself of pollutants.

Assimilative Capacity — The ability of air, a natural body of water, or soil to effectively degrade and/or disperse

chemical substances. If the rate of introduction of pollutants into the environment exceeds its assimilative capacity for these substances, then adverse effects may result to habitat and wildlife.

Association of Boards of Certification — An international organization representing boards which certify the operators of waterworks and wastewater facilities.

Asthenosphere — The zone inside the earth beneath the *Lithosphere* constituting the source of *Igneous* rock (*Magma*).

Athalassohaline Lake — A term used to describe a saline lake which is not of marine origin. In this respect athalassohaline lakes differ from lakes formed by the isolation of part of the ocean in as much as those lakes originating from evaporation of fresh water is the importance of bivalent ions such as calcium, magnesium, and sulfate relative to the dominance of two monovalent ions (sodium and chloride) in sea water. The different ionic ratios are important biologically because the osmotic strength of a solution at a given level of *Total Dissolved Solids (TDS)* changes with the valence of the dominant ions. The individual ion concentrations are also important in that some ions are more toxic to fish than others.

Atmometer — An instrument used to measure the rate of evaporation.

Atmosphere — The gaseous layer covering the earth. The regions of the atmosphere are the *Troposphere*, *Stratosphere*, *Mesosphere*, *Chemosphere*, and the *Thermosphere* (which overlaps the *Ionosphere* and the *Exosphere*). The atmosphere is one of the four components, together with the *Lithosphere*, *Hydrosphere*, and *Biosphere*, that comprise the earth's ecosystem. Also see *Air*.

Atrazine — A herbicide listed by the *U.S. Environmental Protection Agency (EPA)* as a "possible human carcinogen" and found frequently in streams and rivers, particularly following floods and periods of heavy rain and runoff from agricultural lands. Atrazine is used extensively for weed control for corn, sorghum, and sugarcane. Along with another common farm herbicide, *Cyanazine*, atrazine concentrations can soar to levels much higher than federal standards during the peak growing season.

Attached Ground Water — The portion or amount of alkali substances in the ground sufficient to raise the pH value above 7.0 or to be harmful to the growth of crops, a condition called alkaline.

Attenuation — (1) Generally, a term used to describe the slowing, modification, or diversion of the flow of water as with *Detention* and *Retention*. (2) (Water Quality) The process of diminishing contaminant concentrations in ground water, due to filtration, biodegradation, dilution, sorption, volatilization, and other processes. Also see *Natural Attenuation*.

Atterberg Limits — The transition points between various states of soil consistency. The Atterberg Limits consist of: (1) the liquid limit (water content at which the soil passes from the liquid to the plastic state); (2) the plastic limit (water content at which the soil passes from the plastic to the semi-solid state); and (3) the shrinkage limit (water content at which the soil passes from the semi-solid to the solid state).

(National) Audubon Society — A national environmental organization founded in 1905 and dedicated to the conservation and restoration of natural ecosystems with a focus on birds and other wildlife species for the benefit of humanity and the earth's biological diversity. Named after John James Audubon (1785–1851) who was one of the first American conservationists and who gained widespread recognition for his paintings of birds.

Aureole — (Astronomy) A faintly colored luminous ring appearing to surround a celestial body visible through a haze or thin cloud of water vapor, especially such a ring around the moon or sun, caused by the diffraction of light from suspended matter in the intervening medium. Also referred to as *Corona*.

Autochthonous Material — (1) Pertaining to substances, materials, or organisms originating within a particular waterway and remaining in that waterway. (2) Organic material produced in the stream usually through primary production. Compare to *Allochthonous Material*.

Autoregression, or Autoregressive Process — (Statistics) A condition which exists whenever a lagged (i.e., prior period) value of the *Dependent Variable*, or the variable to be explained, appears as a regressor, that is, as an *Explanatory Variable*. The fundamental assumption is that future data values may be expressed as linear combinations of past observations. It is not uncommon in economics and other areas of scientific study for a variable to be influenced by its own behavior in prior periods. The problem with this equation (model) format is to insure that the lagged variable, represented below as Y_{t-1} , is independent of the disturbance term, \hat{a}_t . An example of a (first-order) autoregressive process, commonly termed AR(1), would be represented by:

$$Y_t = \delta_1 Y_{t-1} + \bar{a} + \hat{a}_t$$

where the parameter $\delta_1 < 1$, and \bar{a} is the (constant, time insensitive) trend component, and \hat{a}_t is the residual or disturbance term associated with each observation of Y_t .

Autotrophic Index — See *Biomass Picment Ratio*.

Auxiliary Spillway — A dam spillway built to carry runoff in excess of that carried by the principal spillway; a

secondary spillway designed to operate only during exceptionally large floods. Also referred to as *Emergency Spillway*. Also see *Spillway*.

Available Nutrients — Nutrient ions or compounds in forms that plants can absorb and utilize in growth.

Available Water — The portion of water in a soil that can be absorbed by plant roots, usually considered to be that water held in the soil against a tension of up to approximately 15 atmospheres.

Available Water Content (AWC) — A measure of the relative amount of water available in the upper levels of the soil strata which is available for use by plants.

Available Water Holding Capacity — The capacity of a soil to hold water in a form available to plants. Also, the amount of moisture held in the soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Avalanche — A fall or slide of a large mass, as of snow or rock, down a mountainside.

Average Annual Flood Damages — The weighted average of all flood damages that would be expected to occur yearly under specified economic conditions and development. Such damages are computed on the basis of the expectancy in any one year of the amounts of damage that would result from floods throughout the full range of potential magnitude.

Average Annual Recharge — The amount of water entering an aquifer on an average annual basis. In many, if not most, hydrologic conditions, “average” has little significance for planning purposes as there may exist so few “average” years in fact.

Average Annual Runoff (Yield) — The average of water-year (October 1–September 30) runoff or the supply of water produced by a given stream or water development project for a total period of record; measured in cubic feet per second or acre-feet.

Average Conditions — The conditions under which a numerical value for a hydrologic variable, such as precipitation or streamflow, is equal to the arithmetic mean for a selected time period. Also see *Natural Conditions*.

Average Discharge — In the annual series of the *U.S. Geological Survey’s (USGS)* reports on surface-water supply, the arithmetic average of all complete water years of record whether or not they are consecutive. Average discharge is not published for less than 5 years of record. The term “average” is generally reserved for average of record and “mean” is used for averages of shorter periods, namely daily mean discharge.

Average Water Year — A term denoting the average annual hydrologic conditions based upon an extended or existing period of record. Because precipitation, runoff, and other hydrologic variables vary from year to year, planners typically project future scenarios based on hydrologic conditions that generally include average, wet (high-water), and drought (low-water) years.

Average Year Water Demand — The demand for water under average hydrologic conditions for a defined level of development.

Average Year Water Supply — The average annual supply of a water development system over a long period. For a dedicated natural flow, it is the long-term average natural flow for wild and scenic rivers or it is *Environmental Flows* as required for an average year under specific agreements, water rights, court decisions, and congressional directives.

Avoirdupois Weight — The system in common use in English-speaking countries for weighing all commodities except precious stones, precious metals, and drugs. In it 16 drams (dr.) make 1 ounce (oz.), 16 ounces make 1 pound (lb.). The pound contains 7,000 grains (453.59 grams) and is equal to 1.2153 pounds troy (or, 1 lb.=14.5833 troy oz.). There are two avoirdupois tons, the *long ton* (2,240 pounds) and the *short ton* (2,000 pounds), of which the long ton is the customary one in Great Britain and the short ton is used in the United States. Also see *Metric System*.

Avulsion — (1) The sudden movement of soil from one property to another as a result of a flood or a shift in the course of a boundary stream. (2) A forcible separation or detachment; a sudden cutting off of land by flood, currents, or change in course of a body of water; especially one separating land from one person’s property and joining it to another’s. (3) A sudden cutting off or separation of land by a flood or by an abrupt change in the course of a stream, as by a stream breaking through a meander or by a sudden change in current, whereby the stream deserts its old path for a new one. (4) A sudden loss or gain of land as the result of action of water or a shift in a bed of a river which has been used as a boundary by property owners. If land is lost as a result of avulsion the riparian owner does not lose title to the land that has been lost; the boundary lines remain the same. This is not true when land is lost by erosion.

Awash — Washed by the sea as level with or washed by waves. In such a position or way as to be covered with or as if with water.

Axial Flow — Fluid flow in the same direction as the axis of symmetry of the duct, vessel, or tank.

Axis (of a Dam) — The horizontal centerline of a dam in the longitudinal direction.

Azotobacter — Any of various rod-shaped, nonpathogenic, nitrogen-fixing bacteria of the genus *azotobacter*, found in soil and water.