

COMMON TERMINOLOGY OF WATER RECYCLING

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ACRE-FOOT: A volume of water equal to one foot in depth covering an area of one acre, or 43,560 cubic feet; approximately 325,851 gallons.

ADVANCED OXIDATION: Oxidation processes relying on hydroxyl radical oxidation to destroy recalcitrant contaminants.

ADVANCED TREATMENT: Additional treatment provided to remove suspended and dissolved substances that persist through conventional secondary treatment. Often this term is used to mean additional treatment after tertiary treatment for the purpose of further removing contaminants of concern to public health. In many cases, this includes membrane filtration, reverse osmosis (RO), and advanced oxidation/disinfection with ultraviolet light (UV) and hydrogen peroxide (H₂O₂).

AGRICULTURE: The science, art, and business of cultivating the soil, producing crops, and raising livestock (farming).

AQUIFER: An underground layer of sand, gravel, or rock through which water can pass and is stored. Aquifers supply the water for wells and springs.

AUGMENTATION: The process of adding recycled water to an existing raw water supply (such as a reservoir, lake, river, wetland, and/or groundwater basin) after receiving advanced treatment. This water could eventually be used for drinking water after further treatment.

BACKFLOW PREVENTION: Prevention of the flow of any foreign liquids, gases, or substances into the distribution pipelines of a potable water supply; accomplished by an air gap or mechanical backflow obstacle.

BIOCHEMICAL OXYGEN DEMAND (BOD): A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. Used as an indicator of the amount of organic material in the waste stream. The greater the BOD, the greater the degree of pollution. Usually expressed in milligrams per liter.

BIOFOULING: The formation of bacterial film (biofilm) on fragile reverse osmosis membrane surfaces.

BRACKISH WATER: Water containing dissolved minerals in amounts that exceed normally acceptable standards for municipal, domestic, and irrigation uses. Considerably less saline than seawater.

CLEAN WATER ACT: The federal law that establishes how the United States will restore and maintain the chemical, physical, and biological integrity of the country's waters (oceans, lakes, streams and rivers, groundwater, and wetlands).

CLIMATE: Meteorological conditions, including temperature, precipitation, condensation, and wind.

CENTRAL ARIZONA PROJECT (CAP) CANAL: A canal structure that delivers water to various municipalities (or jurisdictions) from the Colorado River to Southern Arizona.

CONSERVATION: Obtaining the benefits of water more efficiently, resulting in reduced demand for water. Sometimes called "end-use efficiency" or "demand management."

DAM: A structure built to hold back water.

DIRECT INJECTION: Injecting recycled water through an injection well directly into a groundwater basin. If the water will later be used for drinking, the recycled water will receive advanced treatment prior to injection.

DIRECT POTABLE REUSE (DPR): The immediate use of recycled water as a potable water supply. DPR differs from IPR since the environmental buffer characteristic of IPR applications is eliminated.

DISINFECTION: Water treatment which destroys or inactivates potentially harmful bacteria.

DROUGHT: A long period of below-average precipitation.

ECOSYSTEM: A community of plants and animals and the physical environment in which they live.

EFFLUENT: The water leaving a wastewater treatment plant. If the effluent has been treated to a sufficiently high standard, it may be used for recycled water applications.

ENDANGERED SPECIES ACT: The federal law that sets forth how the United States will protect and recover animal and plant species whose populations are in dangerous decline or close to extinction. The law protects not only threatened and endangered species but also the habitat upon which those species depend.

ENDOCRINE DISRUPTING COMPOUNDS (EDCs): Chemicals that can interfere with the normal hormone function in humans and animals.

ENVIRONMENTAL IMPACT STATEMENT (EIS): Detailed analysis of the impacts of a project on all aspects of the natural environment required by federal National Environmental Policy Act for federal permitting or use of federal funds.

ESTUARY: The shallow water areas of bays or the mouths of rivers and creeks that discharge to the ocean or sea. This is the place where ocean tides meet and mix with fresh water.

EUTROPHICATION: The deterioration of an aquatic ecosystem due to high nutrient loads that lead to algal blooms, oxygen depletion, noxious odors, and a loss of biodiversity.

FILTRATION: A process that separates small particles from water by using a porous barrier to trap the particles while allowing the water to pass.

FINISHED WATER: Treated drinking water that is considered safe and suitable for delivery to consumers.

GRAY WATER: Water that has been used for showering, clothes washing, and faucet uses. Kitchen sink and toilet water are excluded.

GROUNDWATER: Water found below the surface of the Earth.

HYDROLOGIC CYCLE: The movement of water as it evaporates from rivers, lakes or oceans, returns to the earth as precipitation and, either flows into rivers and evaporates again or percolates through the soil to join the groundwater or surface water. Also known as the water cycle.

IMPORTED WATER: Water that has originated from one hydrologic region and is transferred to another hydrologic region.

INDIRECT POTABLE REUSE (IPR): The blending of advanced treated recycled water into a natural water source (i.e., environmental buffer: groundwater basin or reservoir) that could be used for drinking (potable) water after further treatment.

INTEGRATED RESOURCE PLANNING (IRP): A method for looking ahead using environmental, engineering, social, financial, and economic considerations; includes using the same criteria to evaluate both supply and demand options while involving customers and other stakeholders in the process.

IRRIGATION: Diverting or moving water from its natural course in order to use it for crops or landscapes.

MAXIMUM CONTAMINANT LEVEL (MCL): The highest allowable amount of a constituent in water. MCLs are established by the U.S. Environmental Protection Agency as regulatory standards under the Safe Drinking Water Act.

MICROGRAMS PER LITER ($\mu\text{g/L}$): A measurement describing the amount of a substance (such as a mineral, chemical or contaminant) in a liter of water. It is expressed in terms of weight per volume. One $\mu\text{g/L}$ is equal to one part per billion.

MILLIGRAMS PER LITER (mg/L): A measurement describing the amount of a substance (such as a mineral, chemical, or contaminant) in a liter of water. One milligram per liter is equal to one part per million.

NANOGRAMS PER LITER (ng/L): A measurement describing the amount of a substance (such as a mineral, chemical, or

contaminant) in a liter of water. One nanogram per liter is equal to one part per trillion.

MILLION GALLONS PER DAY (MGD): A measure of flow. This term is used to describe the volumes of water treated and discharged from a treatment plant in a day.

MICROFILTRATION: A physical separation process where tiny, hollow, straw-like membranes separate particles from water. It is used as a pretreatment for reverse osmosis.

NANOFILTRATION: A filtration process that utilizes membranes that is used most often with low total dissolved solids water such as surface water and fresh groundwater, with the purpose of softening (polyvalent cation removal) and removal of disinfection by-product precursors such as natural organic matter and synthetic organic matter. It is commonly used in conjunction with desalination.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES): A federal permit authorized by the Clean Water Act, Title IV, which is required for discharge of pollutants to navigable waters of the United States, which includes any discharge to surface waters-lakes, streams, rivers, bays, the ocean, wetlands, storm sewer, or tributary to any surface water body.

NEPHELOMETRIC TURBIDITY UNIT (NTU): A unit of measure related to the individual particles suspended in water.

NON-POTABLE: Water not suitable for drinking.

NON-POTABLE REUSE: Includes all recycled water applications except those related to drinking water.

PARTS PER BILLION (ppb): A unit of measure for contamination concentration (parts of contamination per billion parts of water). One thousand parts per billion is equal to one part per million.

PARTS PER MILLION (ppm): A unit of measure for contamination concentration (parts of contamination per million parts of water). One part per million is equal to one milligram per liter. (This term is becoming obsolete as instruments measure smaller particles.)

PATHOGENS: Disease-causing organisms (generally viruses, bacteria, protozoa, or fungi).

PERCOLATION POND: A pond that allows water to percolate (or seep) through layers of rock, gravel, and soil. The water is cleaned as it slowly travels downward and eventually reaches an underground aquifer. The purpose of man-made percolation ponds is both to clean the water and to keep the ground from sinking.

PHARMACEUTICALLY-ACTIVE COMPOUNDS (PhACs): A group of compounds that include hormones, antibiotics and painkillers that can pass into the environment.

POTABLE: Water that does not contain pollution, contamination, objectionable minerals or infective agents and is considered safe for domestic consumption; drinkable.

POTABLE REUSE: The use of advanced treated recycled water (purified water) to augment a potable water distribution system.

PHARMACEUTICALS AND PERSONAL CARE PRODUCTS (PPCPs):

Products include pharmaceuticals; personal care products like shampoo, dish soap, perfume, and baby wipes; plastic products; and a whole host of other household products. As a result of human use, these compounds make their way into wastewater at generally minute concentrations.

PRETREATMENT: A process in wastewater treatment where metal screens are used to remove large objects and chunks of debris.

PRIMARY TREATMENT: The first process in wastewater treatment where suspended solids are removed.

RAW WATER: Untreated water.

RECLAIMED WATER: Water that is used more than one time before it passes back into the natural water cycle. Wastewater that has been treated to a level that allows for its reuse for a beneficial purpose. Also known as recycled water.

RECYCLED WATER: Water that is used more than one time before it passes back into the natural water cycle. Wastewater that has been treated to a level that allows for its reuse for a beneficial purpose. Also known as reclaimed water.

RESERVOIR: A body of water used to collect and store water, or a tank or cistern used to store potable water.

RETROFIT: The process for constructing and separating new potable and recycled/reclaimed pipelines that allows recycled water to be used for nondrinking purposes. A retrofit system separates recycled water from drinking water pipelines.

REUSE: To use again; recycle; to intercept, either directly or by exchange, water that would otherwise return to the natural hydrologic (water) system, for subsequent beneficial use. Water reuse often refers to potable reuse applications.

REVERSE OSMOSIS (RO): A method of removing salts or other impurities from water by forcing water through a semi-permeable membrane.

SAFE DRINKING WATER ACT (SDWA): Federal legislation passed in 1974 that regulates the treatment of water for human consumption and requires testing for and reduction and/or elimination of contaminants that might be present in the water.

SALINITY: Generally, the concentration of mineral salts dissolved in water. Salinity may be measured by weight (total dissolved solids - TDS), electrical conductivity, or osmotic pressure. Where seawater is known to be the major source of salt, salinity is often used to refer to the concentration of chlorides in the water.

SEAWATER INTRUSION: The movement of salt water into a body of fresh water. It can occur in either surface water or groundwater basins.

SECONDARY TREATMENT: Treatment of wastewater to a non-potable level so that it may be discharged into the natural hydrologic system. Generally used to remove biochemical oxygen demand, further remove solids, and reduce, eliminate, or render pathogens inactive.

SOIL AQUIFER TREATMENT (SAT): The process of water being purified by percolating through soil and into an underground aquifer.

STORAGE: Water held in a reservoir for later use.

SURFACE WATER: Water located on the Earth's surface.

TOTAL DISSOLVED SOLIDS (TDS): A measure of the residual minerals dissolved in water that remain after evaporation of a solution. Usually expressed in milligrams per liter.

TOTAL SUSPENDED SOLIDS (TSS): A measure of the suspended solids in wastewater, effluent, or water bodies, determined by tests for "total suspended non-filterable solids." Usually expressed in milligrams per liter.

TERTIARY TREATMENT: Treatment of wastewater to a level beyond Secondary Treatment but below Potable. Generally to remove specific pollutants such as nitrogen, phosphorus, color, and odor.

TURBIDITY: A measure of suspended solids in water; cloudiness. Usually expressed as NTUs.

ULTRAFILTRATION (UF): A membrane filtration process that falls between reverse osmosis (RO) and microfiltration (MF) in terms of the size of particles removed.

ULTRAVIOLET TREATMENT (UV): The use of ultraviolet light for disinfection or as part of an advanced oxidation process. This usually renders the pathogens inactive (changes the DNA so that the pathogens cannot replicate).

URBAN RUNOFF: Water from an urban area that neither infiltrates the soil nor is consumed, but flows into a storm sewer or open waterway

WASTEWATER: Water that has been previously used by a municipality, industry, or agriculture and has suffered a loss of quality as a result of use.

WATER CYCLE: The movement of water as it evaporates from rivers, lakes, or oceans, returns to the earth as precipitation, and either flows into rivers and evaporates again or percolated through the soil to join with groundwater or surface water. Also known as the hydrologic cycle.

WATERSHED: An area from which water drains to a given point on a stream or river.

WETLANDS: Areas with standing water or a high water table that under normal circumstances support vegetation typically adapted to saturated soil conditions; generally includes swamps, marshes, bogs, and areas with vegetation that grows in or around water.

XERISCAPE: Landscaping concept where vegetation is suited to soils and climate and requires less water than traditional landscaping.

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