

Water Purification Demonstration Project

Glossary and Key Information

Advanced Oxidation: A process of chemical treatment designed to remove organic and inorganic materials with the use of ultraviolet light and hydrogen peroxide.

Acre-foot: A unit used to measure large volumes of water. It equals the volume of water required to cover one acre to a depth of one foot. An acre-foot is 325,851 gallons and is considered enough water to meet the needs of two families of four with a house and yard for one year.

Augmentation of water: The process of adding highly purified recycled water that has gone through an advanced purification process to an existing raw or untreated water supply (such as a reservoir, lake, river, wetland, and/or groundwater basin) where it will blend with raw water supplies.

Beneficial reuse: The use of recycled water for purposes that contribute to the economy or environment of a community.

Blending: Mixing or combining one water source with another such as highly purified recycled water with raw water sources.

Brackish water: Water that has a higher salt content than fresh water, but not as high as sea water. Usually, the salts must be removed or greatly reduced before the water is usable.

Clean Water Act (CWA): The federal law passed in 1977 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).

Conservation: Any beneficial deduction in water use or waste, which results in reduced demand or reduced need for imported water sources.

Desalination: The process of removing salts and other minerals from non-potable water usually referred to as sea water or brackish groundwater desalination.

Direct potable reuse: When highly purified recycled water is added directly to the potable or drinking water supply. The recycled water does not get added to an existing raw water supply of either surface water or groundwater before it reaches the reuse location.

Disinfection: The removal, deactivation or killing of microorganisms present in a water supply that may be harmful to humans. Microorganisms are destroyed, deactivated, or removed through various combinations of oxidation, coagulation, settling, disinfection and filtration.

Drought: A defined period of time when rainfall and runoff in a geographic area are much less than average.

Endocrine Disrupting Compounds (EDC's): Chemicals that can interfere with the normal hormone function in humans and animals. These substances include detergent, plasticizers and synthetic hormones. EDCs are contained in natural agricultural products such as soybeans, alfalfa, and natural hormones in animals.

Effluent: The water leaving a water or wastewater treatment plant. If effluent has been treated to a high enough standard, it may be considered reclaimed or recycled water and can be used for beneficial purposes.

Environmental Impact Statement: Detailed analysis of the impacts of a project on all aspects of the natural environment required by the 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; an area where ocean tides meet and mix with fresh water.

Filtration: A process that separates small particles from water by using a porous barrier to trap the particles and allow the water to pass through.

Graywater: Wastewater from a household generated from domestic activities such as laundry, dishwashing, and bathing which can be recycled on-site for uses such as landscape irrigation. Greywater does not include wastewater from a toilet, kitchen sink or dishwasher which is designated as sewage or blackwater to indicate it contains human waste.

Groundwater: Water beneath the earth's surface that supplies wells and natural springs. A groundwater basin is any underground area that contains water.

Groundwater recharge: Naturally or artificially adding water back into a groundwater basin.

Hydrologic Cycle: The movement of water as it evaporates from rivers, lakes or oceans, and returns to the earth as precipitation to evaporate again.

Imported Water: A water source that originates in one hydrologic region and is transferred to another hydrologic region. In San Diego's case, water is imported from Northern California or the Colorado River and travels to this region in large underground pipelines and above ground aqueducts.

Indirect potable reuse: The process of blending highly purified recycled water into a natural water source (groundwater basin or reservoir) that can be used for drinking (potable) water.

Maximum Contaminant Level: The highest allowable amount of a constituent in water, established by the U.S. Environmental Protection Agency as a regulatory standard.

mg/L: Milligrams per liter; 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.

MGD: Abbreviation for million gallons per day. This term is used to describe the flow of water treated and distributed from a treatment plant.

Microfiltration (MF): A low-pressure membrane filtration process where tiny, hollow straw-like membranes separate small suspended particles, bacteria and other materials out of the water. MF provides the most efficient preparation of water for reverse osmosis. MF is used in commercial industries to process food, fruit juices and soda beverages; in computer chip manufacturing; and to sterilize medicines that cannot be heated.

Non-potable water: Water that is not suitable for drinking because it has not been treated to drinking water standards.

NPDES: National Pollutant Discharge Elimination System. 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, and includes any discharge to surface waters: lakes, streams, rivers, bays, the ocean, wetlands, storm sewer, or tributary to any surface water body.

Oxidation: A treatment step used in disinfection, where oxygen or ozone is added to water to produce a chemical reaction that removes harmful substances.

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

Personal care products (PCP's): Products that can be found in wastewater such as shampoos, fragrances, over-the-counter medications, and herbal remedies.

Pharmaceutically-active compounds (PhAC's): Hormone-based compounds found within EDC's. Examples of these compounds include antibiotics, anti-epileptic medications, heart medications, pain medications, and cancer medications, along with veterinarian drugs and feed additives used for livestock.

Potable water (Drinking water): Water that is naturally drinkable or has been treated to a level sufficient to meet federal drinking water standards as well as state and local water quality standards and is safe for human consumption.

Pretreatment: The treatment of wastewater to remove harmful pollutants before being discharged to a sewer system under the control of a publicly owned treatment works.

Primary, secondary and tertiary treatment: The stages in a wastewater treatment facility that clean wastewater to a level where it can be safely discharged back into the environment.

Purified recycled water: Recycled water that has been treated to an advanced level beyond tertiary treatment, so that it can be added to water supplies ultimately used for drinking water. This includes ultra-filtration, reverse osmosis (RO), and advanced oxidation which consists of disinfection with ultraviolet light (UV) and hydrogen peroxide (H₂O₂). Purified water may be discharged into a surface water reservoir or groundwater basin that supplies water directly to a water treatment facility.

Raw water: Water that has not been treated for use. Examples of raw water are water in the Colorado River aqueduct, the State Water Project aqueduct, open reservoirs (whether filled with imported water or runoff), rivers, naturally occurring lakes and some well water.

Recycled water or reclaimed water: Water that originated as municipal wastewater and has undergone a high level of treatment at a reclamation facility so that it can be beneficially reused for a variety of purposes.

Reservoir: An artificial lake, tank, or underground aquifer used to collect and store water.

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.

Reservoir augmentation (also known as surface water augmentation): The process of adding highly purified recycled water to a surface water reservoir. The recycled water undergoes advanced treatment (ultra-filtration, reverse osmosis and UV light plus peroxide). The purified water is then blended with untreated water in a reservoir. The blended water is then treated and disinfected at a conventional drinking water treatment plant and is distributed into the drinking water delivery system.

Reverse Osmosis (RO): A high-pressure membrane filtration process that forces water through the molecular structure of several sheets of thin plastic membranes to filter out minerals and contaminants, including salts, viruses, pesticides, and other materials. The RO membranes are like microscopic strainers - bacteria and viruses, as well as inorganic and most organic molecules cannot pass through the membranes.

Safe Drinking Water Act (SDWA): Federal legislation passed in 1974 that regulates the treatment of water for human consumption and requires testing for, and 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 or TDS), electrical conductivity, or osmotic pressure.

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 that meets Clean Water Act standards, so that it may be discharged into the natural hydrologic system.

Storage: Water held in a reservoir for later use.

Surface Water: Water located on the Earth's surface, in a lake, pond or surface water reservoir.

Sustainability: The withdrawal of fresh water from an ecosystem that doesn't exceed its natural replacement rate in order to ensure availability of water for future generations.

TDS: Total dissolved solids. A quantitative measure of the residual minerals dissolved in water that remain after evaporation of a solution. TDS is usually expressed in milligrams per liter.

Tertiary Treatment: Treatment of wastewater to a level beyond Secondary Treatment but below highly purified recycled water. Water treated to this level is considered to be recycled or reclaimed water, which is suitable for many beneficial uses including for irrigation or industrial processes. Tertiary water meets treatment and reliability criteria established by Title 22, Chapter 4, of the California Code of Regulations

Turbidity: A measure of suspended solids in water; cloudiness.

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

Ultraviolet (UV) Light and Hydrogen Peroxide Treatment: During ultraviolet disinfection, water is exposed to ultraviolet (UV) light, just like instruments in medical and dental offices, to provide disinfection. Additionally, ultraviolet light combined with hydrogen peroxide creates an advanced oxidation reaction that eliminates any remaining compounds in water by breaking them down in harmless

compounds like carbon dioxide and water. This multiple barrier process creates an ultra-pure quality water.

Urban Runoff: Water from an urban area that neither infiltrates the soil nor is consumed, but flows into a storm water collection system 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, flows into rivers and evaporates again. This cycle is aided in urban areas by modern technology which includes wastewater and drinking water treatment facilities, which help nature in removing harmful contaminants.

Water reuse: The planned use of recycled water for a specific beneficial purpose.

Watershed: An area from which water drains and contributes to a given point on a stream, river, or reservoir.

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.

Water Purification Process: The process of using advanced technology and highly treated recycled water to produce a supply of water that can be used for reservoir augmentation and ultimately for drinking water purposes. The process of water purification starts with wastewater which is treated on multiple occasions with various state-of-the-art technologies to produce a recycled supply of water that can be used to augment local reservoir supplies where it is treated once more to produce drinking water.

Water Measurement Terms

Milligrams per liter (mg/l) also known as parts per million (PPM): A unit used to measure water concentrations (parts of something 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.) This is equivalent to one drop of water diluted into 50 liters (roughly the fuel tank capacity of a compact car), or about thirty seconds out of a year.

Micrograms per liter (ug/l) also known as parts per billion (PPB): A frequently used measurement for water concentration (parts of something per billion parts of water). One thousand parts per billion is equal to one part per million. This is equivalent to one drop of water diluted into 50 liters (roughly the fuel tank capacity of a compact car), or about thirty seconds out of a year.

Nanograms per liter (ng/l) also known as parts per trillion (PPT): A very high level of measurement for water concentration (parts of something per trillion parts of water). This is equivalent to one drop of water diluted into 250 chemical drums (50 m³), or about three seconds out of a century.