WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

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COMMONLY USED ACRONYMS & CONVERSION FACTORS

FYI - Many industries use acronyms to shorten frequently used terms. Acronyms not only make speaking and writing easier, but they also enhance communications and assist in memory retention and learning. The groundwater business is no exception. We use acronyms to represent all sorts of technical terms. But, many of the terms may not be commonly known or used. The purpose of this Technical Bulletin is to define the commonly used acronyms related to groundwater that we hear and use at the WRD.

Many of these acronyms also represent measurement units used in water such as length or flow, and can be presented in either metric units (Standard International - SI) or United States customary units. Conversion factors are commonly needed to change one unit into another. The table on the back of this bulletin lists some of the common conversion factors we use. If you have any comments on this bulletin, please ***RSVP*** to the author, Ted Johnson, Chief Hydrogeologist, at tjohnson@wrd.org.

AF, AFD, AFY: Acre-feet, acre-feet per day, or acre-feet per year. One acre-foot is generally the amount of water utilized by two households in a year (equivalent to 325,851 gallons). The term AF is used instead of gallons because water agencies deal with billions to trillions of gallons every year and the AF unit is smaller and more convenient to use than gallons. For example, the adjudicated pumping rights in the Central and West Coast Basins are 281,835 AFY, which is easier to say and write than its equivalent of 91,836,337,000 gallons per year.

ASR: Aquifer Storage and Recovery. The act of injecting water underground for temporary storage until it is needed. The water can be injected and extracted from the same well or injected in one well and pumped out from another well.

CFS: Cubic Feet per Second. A common unit of measurement for the flow rate in a river, stream, or pipe; releases from a dam; pumping or injection rate in a well; or percolation rate of water in the spreading grounds.

GPM: Gallons per Minute. Like CFS, it is a common unit of measurement for the pumping rate of a well or the flow rate in a river, stream, or pipe.

MCL: Maximum Contaminant Level. The highest concentration of a contaminant allowed in drinking water. There are primary MCL standards that are established to protect public health and secondary MCL standards established for water aesthetics such as taste, odor, and appearance. A listing of the California MCLs for drinking water can be found at the following web site link: **www.dhs.ca.gov/ps/ddwem/chemicals/MCL/regextract.pdf**

MF: Microfiltration. A treatment process that removes contaminants from water by passage through a microporous membrane. MF is often used as a pre-treatment and filtration process before the water passes through Reverse Osmosis (RO) membranes.

MGD: Million Gallons per Day. A common unit for the amount of water produced by a water or wastewater treatment plant. For example, the WRD's Leo J. Vander Lans Water Treatment Facility is a 3 MGD plant.

NL: Notification Levels are health-based advisory levels established by the California Department of Health Services for chemicals in drinking water that lack MCLs.

PPM: Parts per Million. Used in describing the concentration of a contaminant in water. Equivalent to 1 milligram per liter (mg/L) since a liter of water weighs 1,000 grams and a milligram is 1 one-thousandth of a gram. For example, the MCL for nitrate (as NO_3) is 45 ppm or mg/L. A ppm can be visualized as a few drops in bathtub full of water.

PPB: Parts per Billion. Equivalent to 1 microgram per liter (μg/L), or a thousand ppm. Also used to describe concentrations of a contaminant in drinking water. For example, the MCL for benzene is 1.0 ppb or μg/L. A ppb can be visualized as a few drops in an Olympic-size swimming pool.

PPT: Parts per Trillion. Equivalent to 1 nanogram per liter (ng/L), or a thousand ppb. Used to describe very small concentrations of a contaminant in water. For example, the MCL for dioxin is an amazingly low 0.03 ppt or ng/L. A ppt can be visualized as a few drops in the Rose Bowl if it were completely filled with water.

RA: Replenishment Assessment. WRD under State law by the Water Code is authorized to levy a RA on all groundwater pumping in its service area. The monies collected from this RA are used to purchase replenishment water (imported and recycled) to maintain basin groundwater balances, to keep out seawater intrusion, and to finance projects and programs related to groundwater replenishment and to protect and preserve the groundwater quality. The current RA in Fiscal Year 2006/2007 is $138 for every AF pumped.

RO: Reverse Osmosis. A water treatment process to produce pure water by forcing the water through a semi-permeable membrane under high pressure across which salts and other impurities cannot pass. This process has been used for ocean or brackish water desalination, as well as for advanced treatment of reclaimed (recycled) wastewater before injection into the seawater barrier wells.

TDS: Total Dissolved Solids. The concentration of all dissolved substances in water (the solids remaining after evaporation). Sometimes referred to as salts, a TDS concentration over 1,000 ppm is often objectionable as drinking water and may be harmful to plants. The secondary MCL for TDS is a range between 500 ppm (recommended MCL) and 1,000 ppm (upper limit MCL).

VOC: Volatile Organic Compounds are organic chemicals often containing carbon, oxygen, hydrogen, chlorine, and other atoms. VOCs rapidly vaporize under normal temperatures. They include compounds such as gasoline and industrial solvents including PCE (perchloroethylene), which is a principal solvent used at dry cleaners. Many VOCs are toxic and have primary MCLs.

Conversion Factors:

The table below provides conversion factors for some of the common measurement units used in the local groundwater industry. Some are easier to remember than others, such as 1 CFS is about 2 AFD, or 1 MGD is about 1,100 AFY. Many web sites exist that can also quickly do conversions. One of the easiest is **Google.com**, where you just type the conversion you want in the search window and the answer will be provided very quickly. For example, if you type *50 cubic feet per second to acre feet per day* in the search window, the answer of "50 (cubic feet per second) = 99.1735537 (acre feet) per day" will quickly appear.

Conversion Factors for Common Groundwater Units

Type	Column "A"	Column "B"	"A" x factor below = "B"	"B" x factor below = "A"
Length	centimeters (cm)	inches (in)	0.3937	2.54
	meters (m)	feet (ft)	3.2808	0.3048
	kilometers (km)	miles (mi)	0.6214	1.6093
Area	square centimeters (cm^2)	square inches (in^2)	0.1550	6.4516
	square meters (m^2)	square feet (ft^2)	10.7639	0.0929
	square kilometers (km^2)	square miles (mi^2)	0.3861	2.5899
	acre	square feet (ft^2)	43,560	2.2957×10^{-5}
Volume	liters (L)	US gallons (gal)	0.2642	3.7854
	cubic meters (m^3)	cubic feet (ft^3)	35.3146	0.0283
	cubic feet (ft^3)	US gallons (gal)	7.4805	0.1337
	acre feet (af)	cubic feet (ft^3)	43,560	2.2957×10^{-5}
	acre feet (af)	US gallons (gal)	325,851	3.0689×10^{-6}
	acre feet (af)	US million gallons	0.3258	3.0689
Flow (Discharge)	cubic meters per second (m^3/s)	cubic feet per second (ft^3/s)	35.3147	0.0283
	cubic feet per second (ft^3/s)	US gallons per minute (gpm)	448.8312	2.2280×10^{-3}
	cubic feet per second (ft^3/s)	US million gallons per day (mgd)	0.6463	1.547
	acre feet per day (afd)	cubic feet per second (ft^3/s)	0.5042	1.9835
	acre feet per day (afd)	US gallons per minute (gpm)	226.2857	4.4192×10^{-3}
	acre feet per year (afy)	US million gallons per day (mgd)	8.9274×10^{-4}	1,120
Mass	kilograms (kg)	pounds (lbs)	2.2046	0.4536
Velocity	centimeters per second (cm/s)	feet per day (ft/d)	2,834.6457	3.5278×10^{-4}
Pressure	Pounds per square inch (psi)	feet (head) of water column	0.4335	2.3067

Other Useful Conversions:

1 cubic foot of water weighs 62.38 pounds
1 gallon of water weighs 8.34 pounds

Degrees Celsius = 5/9x(^{o}F-32)
Degrees Fahrenheit = 9/5x(^{o}C+32)

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