Institute for Community Involvement

A GLOSSARY of WASTEWATER TERMS

ABSORPTION (ab-SORP-sun)

The taking in or soaking up of one substance into the body of another by molecular or chemical action (as tree roots absorb dissolved nutrients in the soil).

ACID

- ✓ A substance that tends to lose a proton.
- ✓ A substance that dissolves in water with the formation of hydrogen ions.
- ✓ A substance containing hydrogen which may be replaced by metals to form salts.
- ✓ A substance that is corrosive.

ACRE FEET

Measurement term. One acre foot of water refers to a volume of water one foot deep extending for *one* acre.

ACTIVATED SLUDGE (ACK-ta-VATE-ed sluj)

Sludge particles produced in raw or settled wastewater (primary effluent) by the growth of organisms (including zoogleal bacteria) in aeration tanks in the presence of dissolved oxygen. The term "activated" comes from the fact that the particles are teeming with bacteria, fungi, and protozoa.

Activated sludge is different from primary sludge in that the sludge particles contain many living organisms which can feed on the incoming wastewater.

ACTIVATED SLUDGE PROCESS (ACK-ta-VATE-ed sluj)

A biological wastewater treatment process which speeds up the decomposition of wastes in the wastewater being treated. Activated sludge is added to wastewater and the mixture (mixed liquor) is aerated and agitated. After some time in the aeration tank, the activated sludge is allowed to settle out by sedimentation and is disposed of (wasted) or re-used (returned to the aeration tank) as needed. The remaining wastewater then undergoes more treatment.

ADEQ

Initials standing for Arizona Department of Environmental Quality. This state agency oversees water quality issues in conjunction with the federal Environmental Protection Agency.

ADVANCED WATER TREATMENT

Any process of water renovation that upgrades treated *wastewater to meet* specific reuse requirements. May include general cleanup *of water or* removal of specific parts of wastes insufficiently removed by conventional treatment processes. Typical processes include chemical treatment and pressure filtration. Also called TERTIARY TREATMENT.

ADWR

Initial standing for Arizona Department of Water Resources. This agency *oversees water* quantity issues in the state.

AERATION (air-A-shun)

The process of adding air to water. In wastewater treatment, air is added to freshen wastewater and to keep solids in *suspension.* With mixtures of wastewater and activated sludge, adding air provides mixing and oxygen for the microorganisms treating the wastewater.

AERATION LIQUOR (air-A-shun)

Mixed liquor. The contents of the aeration tank including living organisms and material carried into the tank by either untreated wastewater or primary effluent.

AERATION TANK (air-A-shun)

The tank *where raw or* settled wastewater is mixed with return sludge and aerated. The same as aeration by, aerator, or reactor.

AEROBIC (AIR-O-}wick)

A condition in which "free" (atmospheric) or dissolved (molecular) oxygen is present in the aquatic (water) environment.

AEROBIC BACTERIA (AIR-O-bick back-TEAR-e-ah)

Bacteria which will live and reproduce only in an environment containing oxygen which is available for their respiration (breathing), namely atmospheric oxygen or oxygen dissolved in water. Oxygen combined chemically, such as in water molecules, be used for respiration by aerobic bacteria.

AEROBIC DECOMPOSITION (AIR-O-bick)

The decay or breaking down of organic material in the presence of "free" or dissolved oxygen.

AEROBIC DIGESTION (AIR-O-bick)

The breakdown of wastes by microorganisms in the presence of dissolved oxygen. This digestion process may be used to treat only waste activated sludge or trickling filter sludge and primary (raw) sludge, or waste sludge from activated sludge treatment plants designed without primary settling. The sludge to be treated is placed in a large aerated tank where aerobic microorganisms decompose the organic matter in the sludge. This is an extension of the activated sludge process.

AEROBIC PROCESS (AIR-O-bick)

A waste treatment process conducted under aerobic (in the presence of "free" or dissolved oxygen) conditions.

ALGAE (AL-gee)

Microscopic plants which contain chlorophyll and live floating or are suspended in water. They also may be attached to structures, rocks, or other similar substances. Algae produce oxygen during sunlight hours and use oxygen during the night hours. Their biological activities appreciably affect the pH and dissolved oxygen of the water.

ALKALI (AL-ka-lie)

Any of certain soluble salts, principally of sodium, potassium, magnesium, and calcium, that have the property of combining with acids to form neutral salts and may be used in chemical processes such as water or wastewater
treatment.

ALKALINITY (AL-ka-LIN-it-tee)

The capacity of water or wastewater to neutralize acids. This capacity is caused by the water's content of carbonate, bicarbonate, hydroxide, and occasionally borate, silicate, and phosphate. Alkalinity is expressed in milligrams per liter of equivalent calcium carbonate. Alkalinity is not the same as pH because water does not have to be strongly basic (high pH) to have a high alkalinity. Alkalinity is a measure of how much acid must be added to a liquid to lower the pH to 4.5.

ANAEROBIC (AN-air-O-bick)

A condition in which "free" (atmospheric) or molecular (dissolved) oxygen is NOT present in the aquatic (water) environment.

ANAEROBIC BACTERIA (AN-air-O-bick back-TEAR-e-ah)

Bacteria that live and reproduce in an environment containing no "free" or dissolved oxygen. Anaerobic bacteria obtain their oxygen supply by breaking down chemical compounds which contain oxygen, such as sulfate.

ANION (AN-EYE-on)

A negatively charged ion in an electrolyte solution, attracted to the anode under the influence of a difference in electrical potential. Chloride ion is an anion.

ARROWHEAD RECLAMATION

This facility treats wastewater generated from the north area of the City. The facility currently can treat 2.6 million gallons of wastewater a day. The water is reclaimed meaning it is cleaned to a set standard and used for irrigation of the surrounding golf courses.

ARTIFICIAL GROUNDWATER TABLE

A groundwater table that is changed by artificial means. Examples of activities that artificially raise the level of a groundwater table include agricultural irrigation, dams and excessive sewer line ex-filtration. A groundwater table can be artificially lowered by sewer line infiltration, water wells, and similar drainage methods.

ASEPTIC (a-SEP-tick)

Free from the living germs of disease, fermentation or putrefaction. Sterile.

AQUIFER (ACK-wi-fer)

A porous, water-bearing geologic formation. Usually refers only to materials capable of yielding a substantial amount of water.

BACTERIA (back-TEAR-e-ah)

Bacteria are living organisms, microscopic in size, which consist of a single cell. Most bacteria use organic matter for their food and produce waste products as the result of their life processes.

BASE

(1) A substance which takes up or accepts protons.
(2) A substance which dissociates (separates) in aqueous solution to yield hydroxyl ions (OH-).
(3) A substance containing hydroxyl ions which reacts with an acid to form a salt or which may react with metals to form precipitates.

BATCH PROCESS

A treatment process in which a tank or reactor is filled, the wastewater (or solution) *is treated or a* chemical solution is prepared, and the tank is emptied. The tank may then be filled and the process repeated. Batch processes are also used to cleanse, stabilize or condition chemical solutions for use in industrial manufacturing and treatment processes.

BIOCHEMICAL OXYGEN DEMAND (BOD)

The rate at which organisms use the oxygen in water or wastewater while stabilizing decomposable organic matter under aerobic conditions. In decomposition, organic matter serves as food for the bacteria and energy results from its oxidation. BOD measurements are used as a measure of the organic strength of wastes in water.

BIOCHEMICAL OXYGEN DEMAND (BOD) TEST

A procedure that measures the rate of oxygen use under controlled conditions of time and temperature. Standard test conditions include dark incubation at 20 degrees C for a specified time (usually five days).

BIODEGRADATION (BUY-o-deh-grah-DAY-shun)

The breakdown of organic matter by bacteria to more stable forms which will not create a nuisance or give off foul odors.

BIOFLOCCULATION (BUY-o-flock-u--LAY-shun)

The clumping together of fine, dispersed organic particles by the action of certain bacteria and algae. This results in faster and *more* complete settling of *the organic* solids *in* wastewater.

BIOMONITORING

A term used to describe methods of *evaluating or* measuring the effects of toxic substances in effluents on aquatic organisms in receiving waters. There are two types of biomonitoring, the biosurvey and the bioassay.

BREAKOUT OF CHLORINE

A point at which chlorine leaves solution as a gas because the chlorine feed rate is too high. The solution is saturated and cannot dissolve any more chlorine. The maximum strength a chlorine solution can attain is approximately 3,500 mg/L.

BUFFER

A solution or liquid whose chemical makeup neutralizes acids or bases without a great change in pH.

BUFFER CAPACITY
A measure of the capacity of a solution or liquid to neutralize acids or bases. This is a measure of the capacity of water or wastewater for offering a resistance to changes in pH.

SULKING (BULK-ing)

Clouds of billowing sludge that occur throughout secondary clarifiers and sludge thickeners when the sludge becomes too light and will not settle properly. In the activated sludge *process* bulking is usually caused by filamentous bacteria or bound water.

CAP (pronounced as separate letters)

Central Arizona Project water is Colorado River water being delivered to Arizona through an extensive canal system. Approximately 25-30% of the City's water is CAP water.

CAPACITY REQUIREMENTS CATION (CAT-EYE-en)

A positively charged ion in an electrolyte solution, attracted to the cathode under the influence of a difference in electrical potential. Sodium ion is a cation.

CENTRIFUGE

A mechanical device that uses centrifugal or rotational forces to separate solids from liquids.

CFS

Initials stand for "Cubic Feet per Second", a measure of flow rate.

CHEMICAL OXYGEN DEMAND (COD)

A measure of the oxygen-consuming capacity of organic matter present in wastewater. COD is expressed as the amount of oxygen consumed from a chemical oxidant in mg/L during a specific test. Results are not necessarily related to the biochemical oxygen demand because the chemical oxidant may react with substances that bacteria do not stabilize.

CHLORINATION (KLOR-uh-NAY-shun)

The application of chlorine to water or wastewater, generally for the purpose of disinfection, but frequently for accomplishing other biological or chemical results.

CHLORINE CONTACT UNIT

A baffled basin that provides sufficient detention time for disinfection to occur.

CHLORINE DEMAND

Chlorine demand is the difference between the amount of chlorine added to wastewater and *the amount of* residual chlorine remaining after a given contact time. Chlorine demand may change with dosage, time, temperature, pH, and nature and amount of the impurities in the water.

Chlorine Demand, mg/L - Chlorine Applied, mg/L - Chlorine Residual, mg/L

CHLORINE REQUIREMENT

The amount of chlorine which is needed for a particular purpose. Some reasons for adding chlorine are reducing the number of coliform bacteria (Most Probable Number), obtaining a particular chlorine residual, or oxidizing some substance in the water. In each case a definite dosage of chlorine will be necessary. This dosage is the chlorine requirement.

CHOLLA WATER TREATMENT FACILITY

This facility treats Salt River Project water for use by Glendale residents. The facility can treat 30 million gallons of water per day.

CLARIFICATION (KLAIR-uh-fuh-KAY-shun)

Any process or combination of processed the main purpose of which is to reduce the concentration of suspended matter in a liquid.

CLARIFIER (KLAIR-uh-fire)

Settling Tank, Sedimentation Basin. A tank or basin in which wastewater is held for a *period of time, during* which the heavier solids settle to the bottom and the lighter material will float to the water surface.

COAGULANT AID

Any chemical or substance used to assist or modify coagulation.

COAGULANTS (co-AGG-you-lents)

Chemicals that cause very fine particles to clump (floc) together into larger *particles. This makes* it easier to separate the solids from the water by settling, skimming, draining or filtering.

COAGULATION (co-AGG-you-LAY-shun)

The clumping together of very fine particles (floc) caused by the use of chemical (coagulants). The chemicals neutralize the electrical charges of the fine particles and cause destabilization of the particles. This clumping together makes it easier to separate the solids from the water by settling, skimming, draining, or filtering.

COLIFORM (COAL-i-form)

One type of bacteria. The presence of coliform-group bacteria is an indication of possible pathogenic bacterial contamination. The human intestinal tract is one of the main habitats of coliform bacteria. They may also be found in the intestinal tracts of warm-blooded animals, and in plants, oil, air, and the aquatic environment. Fecal coliforms are those coliforms found in the feces of various warm-blooded animals; whereas the term "coliform" also includes other environmental sources.

COLLECTION SYSTEM

A network of pipes, manholes, cleanouts, traps, siphons, lift stations and other structures used to collect all wastewater and wastewater-carried wastes of an area and transport them to a treatment plant or disposal system. The collection system includes land, *wastewater* lines and appurtenances, pumping stations and general property.

COMBINED AVAILABLE CHLORINE

The concentration of chlorine which is combined with ammonia as chloramine or as other chloro derivatives, yet is still available to oxidize organic matter.

COMBINED AVAILABLE RESIDUAL CHLORINE

The concentration of residual chlorine which is combined with ammonia and/or organic nitrogen in water as a chloramine (or other chloro derivative) yet is still available to oxidize *organic matter and* utilize its bactericidal properties.

COMBINED RESIDUAL CHLORINATION

The application of chlorine to water or wastewater to produce a combined available residual chlorine. The residual may consist of chlorine compounds formed by the reaction of chlorine with natural or added ammonia or with certain organic nitrogen compounds.

COMBINED SEWER

A sewer designed to carry both sanitary wastewater and storm- or surface-water runoff.

COMPOSITE (com-PAH-zit) (PROPORTIONAL) SAMPLE

A composite sample is a collection of individual samples obtained at regular intervals, usually every one or two hours during a 24-hour time span. Each individual sample is combined with the others in proportion to the rate of flow when the sample was collected. The resulting mixture (composite sample) forms a representative sample and is analyzed to determine the average conditions during the sampling period.

COMPOUND

A pure substance composed of two or more elements whose composition is constant. For example, table salt (sodium chloride-NaCI) is a compound.

CONTINUOUS PROCESS

A treatment process in which water is treated continuously in a tank or reactor. The water being treated continuously flows into the tank at one end, is treated as it flows through the tank, and flows out the opposite end as treated water.

CONVENTIONAL TREATMENT

The preliminary treatment, sedimentation, flotation, trickling filter, rotating biological contactor, activated sludge and chlorination wastewater treatment processes.

DO

Abbreviation of Dissolved Oxygen. DO is the molecular (atmospheric) oxygen dissolved in water or wastewater.

DECHLORINATION (dee-KLOR-uh-NAY-shun)

The removal of chlorine from the effluent of a treatment plant. DECOMPOSITION, DECAY Processes that convert unstable materials into more stable forms by chemical or biological action. Waste treatment *encourages decay in* a controlled situation so that material may be disposed of in a stable form. When organic matter decays under anaerobic conditions (putrefaction), undesirable odors are produced. The aerobic processes in common use for wastewater treatment produce much less objectionable odors.

DEGRADATION (deh-gruh-DAY-shun)

The conversion or breakdown of a substance to simpler compounds. For example, the degradation or organic matter to carbon dioxide and water.

DENITRIFICATION

An anaerobic process that occurs when nitrite or nitrate ions are reduced to nitrogen gas and bubbles are formed as a result of this process. The bubbles attach to the biological flocs and float the flocs to the surface of the secondary clarifiers. This condition is often the cause of rising sludge observed in secondary clarifiers or gravity thickeners.

DETENTION

The delay or holding of the flow of water and water-carried wastes in a pip *system. This* can be caused by a restriction in the pipe, a stoppage or a dip. Detention also means the time water is held or stored in a basin or a *wet* well. *Sometimes* called RETENTION.

DETENTION TIME

The time required to fill a tank at a given flow or the theoretical time required for a given flow of wastewater to pass through a tank.

DETRITUS (dee-TRY-tus)

The heavy, coarse mixture of grit and organic material carried by wastewater. Also called GRIT.

DEWATER

(1) To remove or separate a portion of the water present in a sludge or slurry. To dry sludge so it can be handled and disposed of.
(2) To remove or drain the water from a tank or a trench.

DEWATERABLE

This is a property of a sludge related to the ability to separate the liquid portion from the solid, with or without chemical conditioning. A material is considered dewaterable if water will redily drain from it.

DIFFUSED-AIR AERATION

A diffused air activated sludge plant takes air, compresses it, and then discharges the air below the water surface of the aerator through some type of air diffusion device.

DIFFUSER

A device (porous plate, tube, bag) used to break the air stream from the flower system into find bubbles in a aeration tank or reactor.

DIGESTER (die-JEST-er)

A tank in which sludge is placed to allow decomposition by microorganisms. *Digestion may* occur under anaerobic (more common) or aerobic conditions.

DISINFECTION (dis-in-FECT-shun)

The process designed to kill most microorganisms in wastewater, including essentially all pathogenic (disease-causing) bacteria. There are several *ways to disinfect, with* chlorine being most frequently used in water and wastewater treatment plants. Compare with STERILIZATION.

DISSOLVED OXYGEN

Molecular (atmospheric) oxygen dissolved in water or wastewater, usually abbreviated DO.

DOMESTIC CONTRIBUTION

Wastes originating in a residential facility or dwelling. In this use, it means the type of quantity of wastes are different from commercial and industrial or agricultural wastes.

DOMESTIC SERVICE

A connection to a sewer system for hookup of a residential-type building.

EFFLUENT (EF-lu-ent)

Wastewater or other liquid - raw (untreated), partially or completely treated - flowing FROM a reservoir, basin, treatment process, or treatment plant.

ELECTROLYSIS (ee-leck-TRAWL-uh-sis)

The decomposition of material by an outside electric current.

ELECTROLYTE (ee-LECK-tro-lite)

A substance which dissociates *(separates) into two or* more ions when it is dissolved in water.

ELECTRO-MAGNETIC FORCES

Forces resulting from electrical charges that either attract or repel particles. Particles *with* opposite charges are attracted to each other. Particles with similar charges repel each other. A particle with positive charges repelled by a particle with positive charges and a particle with negative charges is repelled by another particle with negative charges.

ELECTRON

(1) A very small, negatively charged particle which is practically weightless. According to the electron theory, all electrical and electronic effects are caused either by the movement of electrons from place to place or because there is a excess or lack of electrons at a particular place.
(2) The part of an atom that determines its chemical properties.

ELEMENT

A substance which cannot be separated into its constituent parts and still retain its chemical identity. For example, sodium is an element.

EMULSION (e-MULL-shun)

A liquid mixture of two or more liquid substances not normally dissolved in one another, one liquid is held in suspension in the other.

ENTERIC

Of intestinal origin, especially applied to wastes or bacteria.

ENTERPRISE BASED

Refers to city utilities such as the water and wastewater fund which is funded independently such that revenue generated equals expenditure.

ENZYMES (EN-zimes)

Organic substances (produced by living organisms) which cause *or* speed *up* chemical reactions. Organic catalysts and/or biochemical catalysts.

EPA

Initials stand for Environmental Protection Agency. This is the federal agency charged with overseeing all environmental issues.

ESTIMATED FLOW

A rough guess of the amount of flow in a collection system. When greater accuracy is needed, flow could be computed using average or typical flow quantities. Even greater accuracy would result from metering or otherwise measuring the actual flow.

EQUALIZING BASIN

A holding basin in which variation in flow and composition of liquid are averaged. Such basins are used to provide a flow of reasonably uniform volume and composition to a treatment unit. Also called a balancing reservoir.

FACULTATIVE (FACK-ul-TAY-tive)

Facultative bacteria can use either molecular (dissolved) oxygen or oxygen obtained from food materials such as sulfate or nitrate ions. In other words, facultative bacteria can live under aerobic or anaerobic conditions.

FACULTATIVE POND

The most common type of pond in current use. The upper portion (supernatant) is aerobic, while the bottom layer is anaerobic. Algae supply most of the oxygen to the supernatant.

FILTER AID

A chemical (usually a polymer) added to water to help remove fine colloidal suspended solids.

FLOC

Groups or clumps of bacteria and particles that have come together and formed a cluster. Found in aerator tanks, secondary clarifiers and chemical precipitation processes.

FLOCCULATION (FLOCK-you-LAY-shun)

The gathering together of fine particles after coagulation to form larger particles by a process if gentle merge.

FORCE MAIN

A pipe that conveys wastewater under pressure from the discharge side of a pump to a point of gravity flow downstream.

FREE AVAILABLE CHLORINE

The amount of chlorine available in water. This chlorine may be in the form of dissolved gas, hypochlorous acid, or hypochlorite ion, but does no include chlorine combined with *an amine (ammonia or* nitrogen) or other organic compound.

FREE AVAILABLE RESIDULE CHLORINE

That portion of the total available residual chlorine remaining in water or wastewater at the end of a specific contact period. Residual chlorine will react chemically and biologically as hypochlorous acid or hypochlorite ion. This does not include chlorine that have combined with ammonia, *nitrogen, or* other compounds.

FREE OXYGEN

Molecular oxygen available for respiration by organisms. Molecular oxygen is the oxygen molecule that is not combined with another element to form a compound.

FREE RESIDUAL CHLORINATION

The application of chlorine or chlorine compounds to water or wastewater to produce a free available chlorine residual directly or through the destruction of ammonia or certain organic nitrogenous compounds.

GPCD

Initial standing for "Gallons *Per Capita per Day."*

GRAB SAMPLE

A single sample of water collected at a particular time and place which represents the composition of the water only at that time and place.

GRAY WATER GRIT

The heavy material present in wastewater, such as sand, coffee grounds, eggshells, gravel and cinders.

GRIT REMOVAL

Grit removal is accomplished by providing an enlarged channel or chamber which causes the flow velocity to be reduced and allows the heavier grit to settle to the bottom of the channel where it can be removed.

GROUNDWATER

Subsurface water in the saturation zone from which wells and springs are fed. In a strict sense the term applies only to water below the water table. Also called "phreatic water" and "plerotic water."

GROUNDWATER DEPTH

The distance of the groundwater table below the surface at any selected location.

GROUNDWATER TABLE

The average depth or elevation of the groundwater over a selected area.

HEAD LOSS

An indirect measure of loss of energy or pressure. Flowing water will lose some of its energy when it passes through a pipe, bar screen, comminutor, filter or other obstruction. The amount of energy or pressure lost is called "head loss". Head loss is measured at the difference in elevation between the upstream water surface and the downstream water surface and may be expressed in feet or meters.

HYDROGEN SULFIDE GAS

Hydrogen sulfide is gas with a rotten egg odor. This gas is produced under anaerobic conditions. Hydrogen sulfide is particularly dangerous because it dulls your sense of smell so that you don't notice it after you have been around it for a while and because the odor is not noticeable in high concentrations. The gas is very poisonous to your respiratory system, explosive, flammable and colorless.

HYDROLOGIC CYCLE (HI-dro-LOJ-ic)

The process of evaporation of water into the air and its return to earth by precipitation (rain or snow). This process also includes transpiration from plants, groundwater movement and runoff into rivers, streams and the ocean. Also called WATER CYCLE.

HYDROLOGY

The applied science concerned with the waters of the earth in all their states - their occurrence, distribution, and circulation through the unending hydrologic cycle of precipitation, consequent runoff, stream flow, infiltration, and storage, eventual evaporation, and reprecipitation. Hydrology is concerned with the physical, chemical, and physiological reactions of water with the rest of the earth and its relation to the life of the earth.

INDICATOR (CHEMICAL)

A substance that gives a visible change, usually of color, at a desired point in a chemical reaction, generally at a specified end point.

INDUSTRIAL WASTEWATER

Liquid wastes originating from industrial processing. Because industries have peculiar liquid waste characteristics requiring special consideration, these sources are usually handled and treated separately before being discharged to a wastewater collection system.

INFLOW

Water discharged into a sewer system and service connections from sources other than regular connections. This includes flow from yard drains, foundation drains and around manhole covers. Inflow differs from infiltration in that it is a direct discharge into the sewer rather than a leak into the sewer itself.

INFLUENT (IN-flu-ent)

Wastewater or other liquid-raw (untreated) or partially treated-flowing INTO a reservoir, basin, treatment process, or treatment plant.

INORGANIC WASTE

Waste material such as sand, salt, iron, calcium, and other mineral materials which are only slightly affected by the action of organisms. Inorganic *wastes are* chemical substances of mineral origin; whereas organic wastes are chemical substances usually of animal or plant origin. Also see NONVOLATILE MATTER.

IONIZATION

The process of adding electrons to, or removing electrons from, atoms or molecules, thereby creating ions. High temperatures, electrical discharges, and nuclear radiation can cause ionization.

JAR TEST

A laboratory procedure that simulates coagulation/flocculation with differing chemical doses. The purpose of the procedure is to ESTIMATE the minimum coagulant dose required to achieve certain water quality goals. Samples of water to be treated are placed in six jars. Various amounts of chemicals are added to each jar, stirred and the settling of solids is observed. The lowest dose of chemicals that provides satisfactory settling is the dose used to treat the water.

MG

Initial for "Million Gallons."

MSDS

Material Safety Data Sheet. A document which provides pertinent information and a profile of a particular hazardous substance or mixture. An MSDS is normally developed by the manufacturer or formulator of the hazardous substance or mixture. The MSDS is required to be made available to

employees and operators whenever there is the likelihood of the hazardous substance or mixture being introduced into the workplace. Some manufacturers are preparing MSDSs for products that are not considered to be hazardous to show that the product or substance is NOT hazardous.

MANIFOLD

A large pipe to which the ends of a series of smaller pipes are connected. Also called a HEADER.

MANOMETER (man-NOM-mut-ter)

An instrument for measuring pressure. Usually, a manometer is a glass tube filled with a liquid that is used to measure the difference in pressure across a flow-measuring device such as an orifice or a Venturi meter. The instrument used to measure blood pressure is a type of manometer.

MASKING AGENTS

Substances used to cover up or disguise unpleasant odors. Liquid masking agents are dripped into the wastewater, sprayed into the air, or evaporated (using head) with the unpleasant fumes or odors and then discharged into the air by blowers to make an undesirable odor less noticeable.

MECHANICAL AERATION

The use of machinery to mix air and water so that oxygen can be absorbed into the water. Some examples are: paddle wheels, *mixers, or* rotating brushes to agitate the surface of an aeration tank; pumps to create fountains; and pumps to discharge water down a series of steps forming falls or cascades.

MEDIA

The material in a trickling filter on which slime accumulates and organisms grow. As settled wastewater trickles over the media, organisms in the slime remove certain types of wastes thereby partially treating the wastewater. Also the material in a rotating biological contactor or in a gravity or pressure filter.

MICROORGANISMS (MY-crow-OR-gan-IS-zums)

Very small organisms that can be seen only through a microscope. Some microorganisms use the wastes in wastewater for food and thus remove or *alter much of the* undesirable matter.

MIXED LIQUOR

When the activated sludge in an aeration tank is mixed with primary effluent or the raw wastewater and return sludge, this mixture is then referred to as mixed liquor as long as it is in the aeration tank. Mixed liquor also may refer to the contents of mixed aerobic or anaerobic digesters.

MIXED LIQUOR SUSPENDED SOLIDS (MLSS)

Suspended solids in the mixed liquor of an aeration tank.

MIXED LIQUOR VOLATILE SUSPENDED SOLIDS (MLVSS)

The organic or volatile suspended solids in the mixed liquor of an aeration tank. This volatile portion is used as a measure or indication of the microorganisms present.

MOLECULAR OXYGEN

The oxygen molecule that is not combined with another element to form a compound.

MOLECULE (MOLL-uh-KULE)

The smallest division of a compound that still retains or exhibits all of the properties of the substance.

NPDES PERMIT

National Pollutant Discharge Elimination System permit is the regulatory agency document issued by either a federal or state agency which is designed to control all discharges of pollutants from point sources into U.S. waterways. NPDES permits regulate discharges into navigable waters from all point sources of pollution, including industries, municipal wastewater treatment plants, sanitary landfills, large agricultural feed lots and return irrigation flows.

NEUTRALIZATION

Addition of an acid or alkali (base) to a liquid to cause the pH of the liquid to move towards a neutral pH of 7.0.

NINETY-FIRST (91ST) AVENUE WASTEWATER FACILITY

This is the regional wastewater facility which treats a portion of the wastewater generated from the *6 SROG cities. This* plant can treat 153 million gallons of wastewater a day.

NITRIFICATION (NYE-tri-fi-KAY-shun)

An aerobic process in which bacteria change the ammonia and organic nitrogen *in wastewater into* oxidized nitrogen (usually nitrate). The second-stage BOD is sometimes referred to as the "nitrification stage" (first-stage BOD is called the "carbonaceous stage").

NITRIFICATION STAGE

A stage of decomposition that occurs in biological treatment processes when aerobic bacteria, using dissolved oxygen, change nitrogen compounds (ammonia and organic nitrogen) into oxidized nitrogen (usually nitrate). The second-stage BOD is sometimes referred to as the "nitrification stage" (first-stage BOD is called the "carbonaceous stage").

NITRIFYING BACTERIA

Bacteria that change the ammonia and organic nitrogen in wastewater into oxidized nitrogen (usually nitrate).

NITROGENOUS (nye-TRAH-jen-us)

A term used to describe chemical compounds (usually organic) containing nitrogen in combined forms. Proteins and nitrates are nitrogenous compounds.

NONCORRODIBLE

A material that resists corrosion and will not be eaten away by wastewater or chemicals in wastewater.

NONVOLATILE MATTER

Material such as sand, salt, iron, calcium and other mineral materials which are only slightly affected by the actions of organisms and are not lost on ignition of dry solids at 550 degrees C. Volatile materials are chemical substances usually of animal or plant origin. Also see INORGANIC WASTE and VOLATILE SOLIDS.

NUTRIENT CYCLE

The transformation or change of a nutrient from one form to another until the *nutrient has* returned to the original form, thus completing *the* cycle. The cycle may take place under either aerobic or anaerobic *conditions.*

0 & M MANUAL

Operation and Maintenance Manual. A manual that describes procedures for operators to follow to operate and maintain a specific wastewater treatment or pretreatment plant and the equipment of that plant.

OSHA

The Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA) is a federal law designed to protect the health and safety of industrial workers and treatment plant operators. It regulates the design, construction, operation and maintenance of industrial plant and wastewater treatment plants. The Act does not apply directly to municipalities, EXCEPT in those states that have approved plans and have asserted jurisdiction under Section 18 of the OSHA Act. Wastewater treatment plants have come under stricter regulation in all phases of activity as a result of OSHA standards. OSHA also refers to the federal and state agencies which administer the OSHA regulations.

ORGANIC WASTE

Waste material which comes mainly from animal or plant sources. Organic waste generally can be consumed by bacteria and other small organisms. Inorganic wastes are chemical substances of mineral origin.

ORGANISM

Any form of animal or plant life. Also see BACTERIA. OXIDATION (ox-uh-DAY-shun)

Oxidation is the addition of oxygen, removal of hydrogen, or the removal of electrons from an element or compound. In wastewater treatment, organic matter is oxidized to more stable substances. The opposite of REDUCTION.

OXIDATION-REDUCTION POTENTIAL

The electrical potential required to transfer electrons from one compound or element (the oxidant) to another compound or element (the reductant); used as a qualitative measure of the state of oxidation in wastewater treatment systems.

OXIDIZED ORGANICS

Organic material that have been broken down in a biological process. Examples of there materials are carbohydrates and proteins that are broken down to simple sugars.

OXIDIZING AGENT

Any substance, such as oxygen or chlorine that will readily add (take on) electrons. When oxygen or chlorine is added to wastewater, organic substances are oxidized. These oxidized organic substances are more stable and less likely to give off odors or to contain disease-causing bacteria. The opposite is a REDUCING AGENT.

OXONATION (O-zoe-NAY-shun)

The application of ozone to water, wastewater, in air generally for the purposes of disinfection or odor control.

POTW

Publicly Owned Treatment Works. A treatment works which is owned by a state, municipality, city, town, special sewer district or other publicly owned and financed entity as opposed to a privately (industrial) owned treatment facility. This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW treatment plant. The term also means the municipality (public entity) which has jurisdiction over the indirect discharge to and the discharges from such a treatment works.

PPM

Initials for "Parts Per Million". The number of weight or volume units of a minor constituent present with each one million units of the major constituent of a solution or mixture. Used to express the results of most water and wastewater analyses, but more recently milligrams per liter "mg/L" is the preferred term.

PARASITIC BACTERIA (PAIR-a-SIT-tick)

Parasitic bacteria are those bacteria that normally live off another living organism, known as the "host".

PEAKING FACTOR

Ratio of a maximum flow to the average flow, such as maximum hourly flow or maximum daily flow to the average daily flow.

PERCENT SATURATION

The amount of a substance that is dissolved in a solution compared with the amount that could be dissolved in the solution, expressed as a percent.

Amount of Substance that is Dissolved x 100% Percent Saturation, % = *Amount That* Could be Dissolved in Solution

PERCOLATION (PURR-co-LAY-shun)

The movement or flow of water through soil or rocks.

pH (pronounce as separate letters)

pH is an expression of the intensity of the basic or acidic condition of a liquid. Mathematically, pH is the logarithm (base 10) of the reciprocal of the hydrogen ion activity.
1pH = Log ---[H+]

The pH may range fro 0 to 14, where 0 is most acidic, 14 most basic, and 7 neutral. Natural waters usually have a pH between 6.5 and 8.5.

PHYSICAL WASTE TREATMENT PROCESS

Physical wastewater treatment processes include use of racks, screens, comminutors, clarifiers (sedimentation and flotation and filtration). Chemical or biological reactions are important treatment processes, but NOT part of a physical treatment process.

POLLUTION

The impairment (reduction) of water quality by agricultural, domestic or industrial wastes (including thermal and radioactive wastes), to a degree that the natural water quality is changed to hinder any beneficial use of the water or render it offensive to the senses of sight, taste, or smell or when sufficient amounts of wastes create or pose a potential threat to human health or the environment.

POLYMER (POLY-mer)

A chemical formed by the union of many monomers (a molecule of low molecular weight). Polymers are used with other chemical coagulants to aid in binding small suspended particles to larger chemical flocs for their removal from water. All polyelectrolytes are polymers, but not all polymers are polyelectrolytes.

PONDING

A condition occurring on trickling filters when the hollow spaces (voids) become plugged to the extent that water passage through the filter is inadequate. Ponding may be the result of excessive slime growths, trash, or media breakdown.

POTABLE WATER (POE-tuh-bull)

Water that does not contain objectionable pollution, contamination, minerals, or infective agents and is considered satisfactory for drinking.

PRE-AERATION / RE-AERATION

The addition or air at the initial stages of treatment to *freshen the* wastewater, remove gases, add oxygen, promote flotation of grease, and aid coagulation.

PRECHLORINATION

The addition of chlorine in the collection system serving the plant or at the headworks of the plant PRIOR TO other treatment processes mainly for odor and corrosion control. Also applied to aid disinfection, to reduce plant SOD load, *to aid in* settling, *to* control foaming in Imhoff units and to help remove oil.

PRECIPITATE (pre-SIP-uh-TATE)

(1) When used as a noun, precipitate means an insoluble, finely divided *substance* which is a product of a chemical *reaction* within a liquid.
(2) When used as a verb, it means the separation from solution of an insoluble substance.

PRELIMINARY TREATMENT

The removal of metal, rocks, rags, sand, eggshells, and similar materials that may hinder the operation of a treatment plant. Preliminary treatment is accomplished by using equipment such as racks, bar screens, comminutors, and grit removal systems.

PRETREATMENT FACILITY

Industrial wastewater treatment plant consisting of one or more treatment devices designed to remove sufficient pollutants from wastestreams to allow an industry to comply with effluent limits established by the US EPA General and Categorical Pretreatment Regulation or locally derived prohibited discharge requirements and local effluent limits. Compliance with effluent limits allows for a legal discharge to a POTW.

PRIMARY TREATMENT

A wastewater treatment process that takes place in a rectangular or circular tank and allows those substances in wastewater that readily settle or float to be separated from the water being treated.

PROCESS VARIABLE

A physical or chemical quantity which is usually measured and controlled in the operation of a wastewater treatment plant or an industrial plant.

PUTREFACTION (PEW-truh-FACK-shun)

Biological decomposition *of organic matter* with the production of ill-smelling products associated with anaerobic conditions.

PYRAMID PEAK WATER TREATMENT PLANT

This facility treats Central Arizona Project water for use by Glendale residents. The facility can treat 15 million gallons of water per day.

RACK

Evenly spaced parallel metal bars or rods located in the influent channel to remove rags, rocks, and cans from wastewater.

RAW WASTEWATER

Plant influent or wastewater BEFORE any treatment. REAGENT (re-A-gent)

A pure chemical substance that is used to make new products or is used in chemical tests to measure, detect, or examine other substances.

RECEIVING WATER

A stream, river, lake, ocean, or other surface or groundwaters into which treated or untreated wastewater is discharged.

RECHARGE RATE

Rate at which water is added beneath the ground surface to replenish or recharge groundwater.

RECLAMATION

Water reclamation means using water over again. Once used and treated, this water is called reclaimed, reused, or effluent water. All facilities designed to treat municipal wastewater for reuse are referred to as reclamation facilities.

REDUCING AGENT

Any substance, such as base metal (iron) or the sulfide ion, that will readily donate (give up) electrons. The opposite is an OXIDIZING AGENT.

REDUCTION

Reduction is the addition of hydrogen, removal of oxygen, or the addition of electrons to an element or compound. Under anaerobic conditions (no dissolved oxygen present), sulfur compounds are reduced to odor-producing hydrogen sulfide and other compounds. The opposite of OXIDATION.

REPRESENTATIVE SAMPLE

A sample portion of material or wastestream that is as nearly identical in content and consistency as possible to that in the larger body of material or wastestream being sampled.

RESIDUAL CHLORINE

The amount of free and/or available chlorine remaining after a given contact time under specified condition.

RETENTION TIME

The time water, sludge or solids are retained or held in a clarifier or sedimentation tank. See DETENTION TIME.

REUSE

This refers to cleaning wastewater to meet certain health and safety standards such that the treated wastewater, or reclaimed water, may be used again. Common uses for reclaimed water include irrigating golf courses, parks, green belts, etc.

SANITARY SEWER

A pipe or conduit (sewer) intended to carry wastewater or waterborne wastes from homes, businesses and industries to the POTW. Storm water runoff or unpolluted water should be collected and transported in a separate system or pipes or conduits (storm sewers) to natural watercourses.

SCREEN

A device used to retain or remove suspended or floating objects in wastewater. The screen has openings that are generally uniform in size. It retains or removes objects larger that the openings. A screen may consist of bars, rods, wires, gratings, wire mesh, or perforated plates.

SECONDARY TREATMENT

A wastewater treatment process used to convert dissolved or suspended materials *into a* form more readily separated from the water being treated. Usually to process follows primary treatment by sedimentation. The process commonly is a type of biological treatment process followed by secondary clarifiers that allow the solids to settle out from the water being treated.

SEPTIC

A condition produced by anaerobic bacteria. If sever, the wastewater produces hydrogen sulfide, turns black, gives off foul odors, contains little or no dissolved oxygen, and creates a high *oxygen* demand.

SEPTICITY

Septicity is the condition in which organic matter decomposes to form foul-smelling products associated with the absence of free oxygen. If sever, the wastewater turns black, *gives off* foul odors, contains little or no dissolved oxygen, and creates a high oxygen demand.

SEWAGE

The used water and water-carried solids from homes that flow to a wastewater treatment plant. The preferred term is WASTEWATER.

SHOCK LOAD

The arrival at a plant of a waste which is toxic to organisms in sufficient quantity or strength to cause operating problems. Possible problems including odors and sloughing off of the growth or slime on the trickling filter media. Organic or hydraulic overloads also can cause a shock load.

SLUDGE

(1) The settleable solids separated from liquids during processing.
(2) The deposits of foreign materials on the bottoms of streams or other bodies of water.

SLUDGE DIGESTION

The process of changing organic matter in sludge into a gas or a liquid or a more stable solid form. These changes take place as microorganisms feed on sludge in anaerobic (more common) or aerobic digesters.

SOLUBLE BOD

Soluble BOD is the BOD of water that has *been* filtered in the standard suspended solids test.

SOLUTION

A liquid mixture of dissolved substances. In a solution it is impossible to see all the separate parts.

SROG

Sub Regional Operating Group. This refers to the group of six cities which participate in the regional 91st Ave wastewater facility. Glendale *is a* member of SROG along with Phoenix, Mesa, Tempe, Scottsdale and Youngtown.

SRP (Pronounced as separate letters)

Salt River Project provides the City with water from the Salt and Verde Rivers. Approximately 40% of the City's water originates from this area.

STABILIZE

To convert to a form that resists change. Organic material is stabilized by bacteria which convert the material to *gases and* other relatively inert substances. Stabilized organic material generally will not give off obnoxious odors.

STABILIZED WASTE

A waste that has been treated or decomposed to the extent that, if discharged or released, its rate and state of decomposition would be *such* that the waste would not cause a nuisance or odors.

STANDARDIZE

To compare with a standard.

(1) In wet chemistry, to find out the exact strength of a solution by comparing it with a standard of known strength. This information is used to adjust the strength by adding more water or more of the substance dissolved.

(2) To set up an instrument or device to read a standard. This allows you to adjust the instrument so that it reads accurately, or enables you to apply a correction factor to the readings.

STERILIZATION

The removal or destruction of all microorganisms, including pathogenic and other bacteria, vegetative forms and spores. Compare with DISINFECTION.

STORM SEWER

A separate pipe, conduit or open channel (sewer) that carries runoff from storms, surface drainage and street wash, but does not include domestic and industrial wastes. Storm sewers are often the recipients of hazardous or toxic substances due to the illegal dumping of hazardous wastes or spills created by accidents involving vehicles and trains transporting these substances. Also see SANITARY SEWER.

SUSPENDED SOLIDS

(1) Solids that either float on the surface or are suspended in water, wastewater, or other liquids, and which are largely removable by laboratory filtering.
(2) The quantity of material removed from wastewater in a laboratory test, as prescribed in STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER and referred to as Total Suspended Solids Dried at 103-105 degrees C.

TOC

Total Organic Carbon. TOC measures the amount of organic carbon in water.

TERTIARY TREATMENT (TER-she-AIR-ee)

Any process of water renovation that upgrades treated wastewater to meet specific reuse requirements. May include general cleanup of water or removal of specific parts of wastes insufficiently removed by conventional treatment processes. Typical processes include chemical treatment and pressure filtration. Also called ADVANCED WASTE TREATMENT.

TITRATE (TIE-trate)

To TITRATE a sample, a chemical solution of known strength is added on a drop-by-drop basis until a color change, precipitate, or pH *change in* the sample is observed (end point). Titration is the process of adding the chemical reagent *in increments* until completion of the reaction, as signaled by the end point.

TOXIC

A substance which is poisonous to a living organism.

TURBIDITY UNITS (TU)

Turbidity units are a measure of the cloudiness of water. If measured by a nephelometric (deflected light). instrumental procedure, turbidity units are expressed in nephelometric turbidity units (NTU) or

simply TU. Those turbidity units obtained by visual methods are expressed in Jackson Turbidity Units (JTU) which are a measure of the cloudiness of water; they are used to indicate the clarity of water. There is no real connection between NTUs and JTUs. The Jackson turbidimeter is a visual method and the nephelometer is an instrumental method based on deflected light.

TURF USAGE

Refers to water applied to grassed areas such as parks, golf courses, green belts. Reclaimed water is commonly used on turf areas.

TWO-STAGE FILTERS

Two filters are used. Effluent from the first filter goes to the second filter, either directly or after passing through a clarifier.

VOLATILE (VOL-uh-tull)

(1) A volatile substance is one that is capable of being evaporated or changed to a vapor at relatively low temperatures. Volatile substances also can be partially removed by air stripping.
(2) In terms of solids analysis, volatile refers to materials lost (including most organic matter) upon ignition in a muffle furnace for 60 minutes at 550 degrees C. Natural volatile materials are chemical substances usually of animal or plant origin. Manufactured or synthetic volatile material such as ether, acetone, and carbon tetrachloride are highly volatile and not of plant or animal *origin.* Also see NONVOLATILE MATTER.

WASTEWATER

The used water and solids from a community that flow to a treatment plant. Storm water, surface water, and groundwater infiltration also may be included in the wastewater that enters a wastewater treatment plant. The term "sewage" usually refers to household wastes, but this word is being replaced by the term "wastewater".

WASTEWATER FACILITIES

The pipes, structures, equipment, and processes required to collect, convey, and treat domestic and industrial wastes, and dispose of the effluent and sludge.

WATER CYCLE

The process of evaporation of water into the air and its return to earth by precipitation (rain or snow). This process also includes transpiration from plants, groundwater movement, and runoff into rivers, streams and the ocean. Also called the HYDROLOGIC CYCLE.

WATER/SEWER RATES WATER RECLAMATION

Using water over again. Once used and treated, this water is called reclaimed, reused, or effluent water. All facilities designed to treat municipal wastewater for reuse are referred to as water reclamation facilities.

ZOOGLEAL MASS (ZOE-glee-al)

Jelly-like masses of bacteria found in both the trickling filter and activated sludge processes. These masses may be formed for or function as the protection against predators and for storage of food supplies. Also see BIOMASS.