Appendix G
Abbreviations and Glossary of Terms

Section I
Abbreviations

ANSI
American National Standards Institute

ATV
Any Terrain Vehicle

BPJ
Best Professional Judgement

CFR
Code of Federal Regulations

CLR
Closed-Loop Reactor

CWA
Clean Water Act

DNA
Deoxyribonucleic acid

ENRCC
Engineering News-Record Construction Cost

EPA
Environmental Protection Agency

FWS
Free Water Surface

MPN
Most Probable Number

MSC
Major Subordinate Commands

NPDES
National Pollutant Discharge Elimination System

NSFC
National Small Flows Clearinghouse

O&M
Operation and Maintenance

OF
Overland Flow

OSHA
Occupational Safety and Health Administration

PFRP
Process to Further Reduce Pathogens

POTW
Publicly Owned Treatment Works

PSRP
Process to Significantly Reduce Pathogens

RI
Rapid Infiltration

RBC
Rotating Biological Contactor

SBR
Sequencing Batch Reactor

SFS
Subsurface Flow System

SR
Slow Rate

TSS
Total Suspended Solids

USACE
U.S. Army Corps of Engineers

USACERL
U.S. Army Construction Engineering Research Laboratory

UV
Ultraviolet

WES
Waterways Experiment Station

Section II
Glossary of Terms

Absorption
The taking up of one substance into the body of another.

Acid
(1) A substance that tends to lose a proton. (2) A substance that dissolves in water with the formation of hydrogen ions. (3) A substance containing hydrogen which may be replaced by metals to form salts.

Acidity
The quantitative capacity of aqueous solutions to react with hydroxyl ions. It is measured by titration with a standard solution of a base to a specified end point. Usually expressed as milligrams per liter of calcium carbonate.

Activated Sludge
Sludge floc produced in raw or settled wastewater by the growth of zoogleal bacteria and other organisms in the presence of dissolved oxygen and accumulated in sufficient concentration by returning floc previously formed.

Activated Sludge Loading
The pounds of biochemical oxygen demand (BOD) in the applied liquid-per-unit volume of aeration capacity or per pound of activated sludge per day.

Activated Sludge Process
A biological wastewater treatment process in which a mixture of wastewater and activated sludge is agitated and aerated. The activated sludge is subsequently separated from the treated wastewater (mixed liquor) by sedimentation and wasted or returned to the process as needed.

Adsorption
(1) The adherence of a gas, liquid, or dissolved material on the surface of a solid. (2) A change in concentration of gas or solute at the interface of a two-phase system. Should not be confused with absorption.

Advanced Wastewater Treatment
Those processes that achieve pollutant reductions by methods other than those used in conventional treatment (sedimentation, activated sludge, trickling filter, etc.). It employs a number of different unit operations, including lagoons, post-aeration, micro-straining, filtration, carbon adsorption, membrane solids separation, phosphorus removal, and nitrogen removal.

Aerated Contact Bed
A biological unit consisting of stone, cement-asbestos, or other surfaces supported in an aeration tank, in which air is diffused up and around the surfaces and settled wastewater flows throughout the tank. Also called contact aerator.

Aerated Pond
A natural or artificial wastewater treatment pond in which mechanical or diffused-air aeration is used to supplement the oxygen supply. See *oxidation pond*.

Aeration
The bringing about of intimate contact between air and a liquid by one or more of the following methods: (a) spraying the liquid in the air; (b) bubbling air throughout the liquid; (c) agitating the liquid to promote surface absorption of air. See following terms modifying *aeration:* diffused-air, mechanical, modified, spiral-flow, step.

Aeration Period
(1) The theoretical time, usually expressed in hours, during which mixed liquor is subjected to aeration in an aeration tank while undergoing activated sludge treatment. It is equal to the volume of the tank divided by the volumetric rate of flow of the wastewater and return sludge. (2) The theoretical time during which water is subjected to aeration.

Aeration Tank
A tank in which sludge, wastewater, or other liquid is aerated.

Aerator
A device that promotes aeration.

Aerobic
Requiring, or not destroyed by, the presence of free elemental oxygen.

Aerobic Bacteria
Bacteria that require free elemental oxygen for their growth.

Aerobic Digestion
Digestion of suspended organic matter by means of aeration. See *digestion*.

Agglomeration
The coalescence of dispersed suspended matter into larger flocs or particles which settle rapidly.

Agitator
(1) Mechanical apparatus for mixing and/or aerating. (2) A device for creating turbulence.

Air
The mixture of gases that surrounds the earth and forms its atmosphere, composed primarily of oxygen and nitrogen. It also contains carbon dioxide, some water vapor, argon, and traces of other gases.

Algae
Primitive plants, one- or many-celled, usually aquatic, and capable of elaborating their foodstuffs by photosynthesis.

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

Alkaline
The condition of water, wastewater, or soil which contains a sufficient amount of alkali substances to raise the pH above 7.0.

Alkalinity
The capacity of water to neutralize acids, a property imparted by the water's content of carbonates, bicarbonates, hydroxides, and occasionally borates, silicates, and phosphates. It is expressed in milligrams per liter of equivalent calcium carbonate.

Alum
A common name, in the water and wastewater treatment field, for commercial-grade aluminum sulfate.

Aluminum Sulfate
A chemical, sometimes called "waterworks alum" in water or wastewater treatment, prepared by combining bauxite with sulfuric acid.

Ammonia
A chemical combination of hydrogen (H) and nitrogen (N) occurring extensively in nature. The combination used in water and wastewater engineering is expressed in NH_3.

Ammonia Stripping
A modification of the aeration process for removing gases in water. Ammonium ions in wastewater exist in equilibrium with ammonia and hydrogen ions. As pH increases, the equilibrium shifts to the right, and above-pH-9 ammonia may be liberated as a gas by agitating the wastewater in the presence of air. This is usually done in a packed tower with an air blower.

Ammonification
Bacterial decomposition of organic nitrogen to ammonia.

Anaerobic
Requiring, or not destroyed by, the absence of air or free elemental oxygen.

Anaerobic Bacteria
Bacteria that grow only in the absence of free elemental oxygen.

Anaerobic Contact Process
An aerobic waste treatment process in which the microorganisms responsible for waste stabilization are removed from the treated effluent stream by sedimentation or other means and held in or returned to the process to enhance the rate of treatment.

Anaerobic Denitrification
A means to remove nitrates from wastewaters, especially irrigation return waters that may be high in nitrates and low in organics. In this method, an organic chemical such as methanol, ethanol, acetone, or acetic acid is added as a carbon source and the waste is placed in an anaerobic environment. Under these conditions, nitrate will be reduced by denitrifying bacteria to nitrogen gas and some nitrous oxide, which escapes to the atmosphere. With methanol, the chemistry can be represented as:

$$6H^+ + 6NO_3^- + 5CH_3OH \rightarrow 5CO_2 + 3N_2 + 13H_2O$$

Anaerobic Digestion
The degradation of organic matter brought about through the action of microorganisms in the absence of elemental oxygen**.**

Anaerobic Digestion Process of Sewage Solids
The first stage of the anaerobic digestion process of sewage solids is characterized by the production of organic acids. Proteins, carbohydrates, and fats are decomposed by the anaerobic bacteria, and the products of the decomposition are organic acids. This digestion stage is evident in sludge by a lowering of the pH and the presence of a disagreeable sour odor. Unless the amount of acid produced is excessive, the digestion will normally proceed to the second stage. With excess acidity, such as is obtained when the addition of fresh solids is too rapid, the bacteria will be destroyed and the process will end with the first stage. The second stage is characterized by liquefaction of sewage solids under mildly acid conditions. The bacteria, by enzyme action, convert the insoluble solids material to the soluble form. This is in accordance with the requirements of the bacterial cells that all food material must be in solution before it can pass through the cell wall. The third stage of digestion is characterized by production of gases, carbon dioxide, methane, and hydrogen sulfide, as well as an increase of pH and the production of carbonate salts.

Anaerobic Waste Treatment
Waste stabilization brought about through the action of microorganisms in the absence of air or elemental oxygen. Usually refers to waste treatment by methane fermentation.

Boat
Any vessel or other watercraft, privately owned or owned by the Corps of Engineers, whether moved by oars, paddles, sails, or other power mechanism, inboard or outboard, or any other vessel or structure floating on waters of a given state, whether or not capable of self-locomotion, including but not limited to cruisers, cabin cruisers, runabouts, houseboats, and barges. Excluded are commercial, passenger, or cargo-carrying vessels.

Current
(1) The flowing of water or other fluid. (2) That portion of a stream of water which is moving with a velocity much greater than the average or in which the progress of the water is principally concentrated.

Cycle
Filtration interval; length of time filter operates before cleaning.

Dechlorination
The partial or complete reduction of residual chlorine in a liquid by any chemical or physical process.

Decomposition of Wastewater
(1) The breakdown of organic matter in wastewater by bacterial action, either aerobic or anaerobic. (2) Transformation of organic or inorganic materials contained in wastewater through the action of chemical or biological processes.

Defoamant
A material having low compatibility with foam and a low surface tension. Defoamants are used to control, prevent, or destroy various types of foam, the most widely used being silicone defoamers. A droplet of silicone defoamant which contacts a bubble of foam will cause the bubble to undergo a local and drastic reduction in film strength, thereby breaking the film. Unchanged, the defoamant continues to contact other bubbles, thus breaking up the foam. A valuable property of most defoamants is their effectiveness in extremely low concentration. In addition to silicones, defoamants for special purposes are based on polymides, vegetable oils, and stearic acid.

Defoaming Agent
A material having low compatibility with foam and a low surface tension. See *defoamant*.

Denitrification
(1) Chemically bound oxygen in the form of either nitrates or nitrites is stripped away for use by microorganisms. This produces nitrogen gas which can bring up flow in the final sedimentation process. (2) An effective method of removing nitrogen from wastewater. (3) A biological process in which gaseous nitrogen is produced from nitrite and nitrate.

Depth of Side Water
The depth of a liquid measured along the inside of the vertical exterior wall of a tank.

Detention Time
The theoretical time required to displace the contents of a tank or unit at a given rate of discharge (volume divided by rate of discharge).

Dewatering
Any process of water removal or concentration of a sludge slurry, as by filtration, centrifugation, or drying. (A dewatering method is any process which will concentrate the sludge solids to at least 15 percent solids by weight.)

Diatomaceous Earth
A fine, siliceous earth consisting mainly of the skeletal remains of diatoms (unicellular organisms).

Diatomaceous Earth Filter
A filter used in water treatment in which a built-up layer of diatomaceous earth serves as the filtering medium.

Diffused Air
A technique by which air under pressure is forced into sewage in an aeration tank. The air is pumped down into the sewage through a pipe and escapes out through holes in the side of the pipe.

Diffused Air Aeration
Aeration produced in a liquid by air passed through a diffuser.

Diffusion Aerator
An aerator that blows air under low pressure through submerged porous plates, perforated pipes, or other devices so that small air bubbles rise through the water or wastewater continuously.

Digested Sludge
Sludge digested under either aerobic or anaerobic conditions until the volatile content has been reduced to the point at which the solids are relatively non-putrescible and inoffensive.

Digestor
A tank in which sludge is placed to permit digestion to occur. Also called sludge digestion tank. See *sludge digestion*.

Digestion
(1) The biological decomposition of organic matter in sludge, resulting in partial gasification, liquefaction, and mineralization. (2) The process carried out in a digester. See *sludge digestion*.

Digestion Chamber
A sludge-digestion tank. Frequently refers specifically to the lower or sludge-digestion compartment of an Imhoff tank.

Digestion of Sludge
Takes place in heated tanks where the material can decompose naturally and odors can be controlled.

Digestion Tank
A tank in which sludge is placed to permit digestion to occur. See *sludge digestion*.

Diluent
A diluting agent.

Dilution
Disposal of wastewater or treated effluent by discharging it into a stream or body of water.

Discharge
(1) As applied to a stream or conduit, the rate of flow or volume of water flowing in the stream or conduit at a given place and within a given period of time. (2) The passing of water or other liquid through an opening or along a conduit or channel. (3) The rate of flow of water, silt, or other mobile substance which emerges from an opening, pump, or turbine, or which passes along a conduit or channel, usually expressed as cubic feet per second, gallons per minute, or million gallons per day.

Disinfectant
A substance used for disinfection.

Disinfected Wastewater
Wastewater to which chlorine or other disinfecting agents have been added, during or after treatment, to destroy pathogenic organisms.

Disinfection
The treatment of the larger portion of microorganisms in or on a substance with the probability that all pathogenic bacteria are killed by the agent used.

Disk Screen
A screen in the form of a circular disk which rotates about a central axis perpendicular to its plane.

Dissolved Air Flotation
A process that adds energy in the form of air bubbles, which become attached to suspended sludge particles, increasing the buoyancy of the particles and producing more positive flotation.

Dissolved Oxygen (DO)
The oxygen dissolved in water, wastewater, or other liquid, usually expressed in milligrams per liter, parts per million, or percent of saturation.

Dissolved Solids
Theoretically, the anhydrous residues of the dissolved constituents in water. Actually, the term is defined by the method used in determination. In water and wastewater treatment the Standard Methods tests are used.

Ditch
A small artificial open channel or waterway constructed through earth or rock to convey water.

Domestic Wastewater
Wastewater derived principally from dwellings, business buildings, institutions, and the like. It may or may not contain groundwater, surface water, or storm water.

Dose
(1) The quantity of substance applied to a unit quantity of liquid for treatment purposes. It can be expressed in terms of either volume or weight, e.g., pounds per million gallons, parts per million, grains per gallon, milligrams per liter, or grams per cubic meter. (2) Generally, a quantity of material applied to obtain a specific effect.

Drum Screen
A screen in the form of a cylinder or truncated cone which rotates on its axis.

Drying Bed
A wastewater treatment unit usually containing a bed of sand on which sludge is placed to dry by evaporation and drainage.

Dumping
A method for solid waste disposal.

Effective Size
The diameter of the particles, spherical in shape, equal in size, and arranged in a given manner, of a hypothetical sample of granular material that would have the same transmission constant as the actual material under consideration.

Efficiency
(1) The relative results obtained in any operation in relation to the energy or effort required to achieve such results. (2) The ratio of the total output to the total input, expressed as a percentage.

Effluent
(1) A liquid which flows out of a containing space. (2) Wastewater or other liquid, partially or completely treated or in its natural state, flowing out of a reservoir, basin, treatment plant, or part thereof.

Effluent Stream
A stream or stretch of stream which receives water from groundwater in the zone of saturation. The water surface of such a stream stands at a lower level than the water table or piezometric surface of the groundwater body from which it receives water.

Endogenous Respiration
An auto-oxidation of cellular material, which takes place in the absence of assimilable organic material, to furnish energy required for the replacement of protoplasm.

Environment
The physical environment of the world consisting of the atmosphere, the hydrosphere, and the lithosphere.

Environmental Pollution
The presence of any foreign substance or interference (organic, inorganic, radiological, acoustic, or biological) in the environment (water, air, or land) which tends to degrade its quality so as to constitute a hazard or impair the usefulness of environmental resources.

Equalization
A process by which variations in flow and composition of a waste stream are averaged in an equalizing unit.

Equalizing Basin
A holding basin in which variations in flow and composition of a liquid are averaged. Also called balancing reservoir.

Eutrophication
(1) The normally slow aging process by which a lake evolves into marsh and ultimately becomes completely filled with detritus and disappears. (2) The intentional or unintentional enrichment of water.

Evaporation
(1) The process by which water becomes a vapor at a temperature below the boiling point. (2) The quantity of water that is evaporated; the rate is expressed in depth of water, measured as liquid water, removed from a specified surface per unit of time, generally in inches or centimeters per day, month, or year.

Evaporation Rate
The quantity of water, expressed in terms of depth of liquid water, evaporated from a given water surface per unit of time. It is usually expressed in inches depth per day, month, or year.

Evapotranspiration
Water withdrawn from soil by evaporation and/or plant transpiration. Considered synonymous with consumptive use.

Evapotranspiration Potential
Water loss that would occur if there was never was a deficiency of water in the soil for use by vegetation.

Evapotranspiration Tank
A tank, filled with soil and provided with a water supply, in which representative plants are grown to determine the amount of water transpired and evaporated from the soil under observed climatic conditions. Sometimes improperly referred to as a lysimeter.

Excess Sludge
The sludge produced in an activated sludge treatment plant that is not needed to maintain the process and is withdrawn from circulation.

Extended Aeration
A modification of the activated sludge process which provides for aerobic sludge digestion within the aeration system. The concept envisages the stabilization of organic matter under aerobic conditions, and disposal of the end products into the air as gases, with the plant effluent in the form of finely divided suspended and soluble matter.

Facultative Anaerobic Bacteria
Bacteria which can adapt to growth in the presence, as well as in the absence, of oxygen. May be referred to as facultative bacteria.

Ferric Chloride
A chemical ($FeCl_3$) often used for sludge conditioning.

Filter
A device or structure for removing solid or colloidal material, usually of a type that cannot be removed by sedimentation, from water, wastewater, or other liquid. The liquid is passed through a filtering medium, usually a granular material but sometimes finely woven cloth, unglazed porcelain, or specially prepared paper. There are many types of filters used in water or wastewater treatment. See *trickling filter*.

Filter Bed
(1) A type of bank revetment consisting of layers of filtering medium of which the particles gradually increase in size from the bottom upward. Such a filter allows the groundwater to flow freely, but it prevents even the smallest soil particles from being washed out. (2) A tank for water filtration having a false bottom covered with sand, as a rapid sand filter. (3) A pond with sand bedding, as a sand filter or slow sand filter.

Filter Cake
The dewatered sludge discharged from the filter, containing 65 to 80 percent moisture, depending upon the type of sludge, the type of dewatering equipment, and the conditioning of the sludge.

Filter Cloth
A fabric stretched around the drum of a vacuum filter.

Filtered Wastewater
Wastewater that has passed through a mechanical filtering process but not through a trickling filter bed.

Filter Efficiency
The operating results from a filter as measured by various criteria such as percentage reduction in suspended matter, total solids, biochemical oxygen demand, bacteria, and color.

Filtering Medium
(1) Any material through which water, wastewater, or other liquid is passed for the purpose of purification, treatment, or conditioning. (2) A cloth or metal material of some appropriate design used to intercept sludge solids in sludge filtration.

Filter Loading
Organically, the pounds of biochemical oxygen demand (BOD) in the applied-liquid-per-unit-filter-bed area or volume per day. Hydraulically, the quantity of liquid applied per unit filter bed area or volume per day.

Filter Rate
The rate of application of material to some process involving filtration, for example, application of wastewater sludge to a vacuum filter, wastewater flow to a trickling filter, or water flow to a rapid sand filter.

Filter Run
(1) The interval between the cleaning and washing operations of a rapid sand filter. (2) The interval between the changes of the filter medium on a sludge-dewatering filter.

Filter Underdrains
A system of underdraining for collecting water that has passed through a sand filter or biological bed.

Filter Wash
The reversal of flow through a rapid sand filter to wash clogging material out of the filtering medium and reduce conditions causing loss of head. See *backwash*.

Filtrate
The process of passing a liquid through a filtering medium (which may consist of granular material such as sand, magnetite, or diatomaceous earth, finely woven cloth, unglazed porcelain, or specially prepared paper) for the removal of suspended or colloidal matter.

Filtration Rate
The rate of application of wastewater to a filter, usually expressed in million gallons per acre per day or gallons per minute per square foot.

Final Effluent
The effluent from the final treatment unit of a wastewater treatment plant.

Final Sedimentation
The separation of solids from wastewater in a final settling tank.

Final Sedimentation tank
A tank through which the effluent from a trickling filter or an aeration or contact-aeration tank is passed to remove the settleable solids. Also called final settling basin. See *sedimentation tank.*

Final Settling Tank
A tank through which the effluent from a trickling filter or an aeration or contact-aeration tank is passed to remove the settleable solids. Also called final settling basin. See *sedimentation tank.*

Fine Screen
A relative term, usually applied to screens with openings of less than 2.54 mm (1 in.), but in wastewater treatment often reserved for openings that may be 1.651 mm (1/16 in.).

Five-day BOD (BOD_5)
That part of oxygen demand associated with biochemical oxidation of carbonaceous, as distinct from nitrogeneous, material. It is determined by allowing biochemical oxidation to proceed, under conditions specified in Standard Methods, for 5 days.

Flash Dryer
A device for vaporizing water from partly dewatered and finely divided sludge through contact with a current of hot gas or superheated vapor. It includes a squirrel-cage mill for separating the sludge cake into fine particles.

Flash Mixer
A device for quickly dispersing chemicals uniformly throughout a liquid.

Floc
Small gelatinous masses formed in a liquid by a reaction of a coagulant added thereto, through biochemical processes, or by agglomeration.

Flocculating Tank
A tank used for the formation of floc by the gentle agitation of liquid suspensions, with or without the aid of chemicals.

Flocculation
In water and wastewater treatment, the agglomeration of colloidal and finely divided suspended matter after coagulation by gentle stirring by either mechanical or hydraulic means. In biological wastewater treatment where coagulation is not used, agglomeration may be accomplished biologically.

Flocculation Agent
A coagulating substance which, when added to water, forms a flocculent precipitate which will entrain suspended matter and expedite sedimentation; examples are alum, ferrous sulfate, and lime.

Flocculator
(1) A mechanical device to enhance the formation of flow in a liquid. (2) An apparatus for the formation of flow in water and wastewater.

Flotation
The raising of suspended matter to the surface of the liquid in a tank as scum—by aeration, the evolution of gas, chemicals, electrolysis, heat, or bacterial decomposition—and the subsequent removal of the scum by skimming.

Flow Rate
The rate at which a substance is passed through a system.

Flow Regulator
A structure installed in a canal, conduit, or channel to control the flow of water or wastewater at intake or to control the water level in a canal, channel, or treatment unit.

Flume
(1) An open conduit of wood, masonry, or metal constructed on a grade and sometimes elevated. Sometimes called aqueduct. (2) A ravine or gorge with a stream running through it. (3) To transport in a flume, as logs.

Foam
(1) A collection of minute bubbles formed on the surface of a liquid by agitation, fermentation, etc. (2) The frothy substance composed of an aggregation of bubbles on the surface of liquids by violent agitation or by the admission of air bubbles to liquid containing surface-active materials, solid particles, or both.

Foam Separation
The planned frothing of wastewater or wastewater effluent as a means of removing excessive amounts of detergent materials, through the introduction of air in the form of fine bubbles. Also called foam fractionation.

Food-to-Microorganism Ratio
An aeration tank loading parameter.

Gravity Filter
A rapid sand filter of the open type, the operating level of which is placed near the hydraulic grade line of the influent and through which the water flows by gravity.

Grease
In wastewater, a group of substances including fats, waxes, free fatty acids, calcium and magnesium soaps, mineral oils, and certain other non-fatty materials. The type of solvent and method used for extraction should be stated for quantitation.

Grinding
A process for solid waste handling and disposal by which refuse is reduced to less than 50 mm (2 in.) by a shredder. Also called shredding.

Grit
The heavy suspended mineral matter present in water or wastewater, such as sand, gravel, or cinders.

Grit Chamber
A detention chamber or an enlargement of a sewer designed to reduce the velocity of flow of the liquid to permit the separation of mineral from organic solids by differential sedimentation.

Grit Collector
A device placed in a grit chamber to convey deposited grit to a point of collection.

Groundwater
Subsurface water occupying 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, or plerotic water.

Gutter
An artificially surfaced, and generally shallow, waterway provided at the margin of a roadway for surface drainage.

Halogen
Any one of the chemically related elements—fluorine, chlorine, bromine, iodine, and astatine.

Hardness
A characteristic of water—imparted by salts of calcium, magnesium, and iron such as bicarbonates, carbonates, sulfates, chlorides, and nitrates—that causes curdling and increased consumption of soap, deposition of scale in boilers, damage in some industrial processes, and sometimes objectionable taste. See *carbonate hardness*.

Head Loss
The loss in liquid pressure resulting from the passage of the solution through a pipe, a channel, or a treatment unit.

Heavy Metals
Metals that can be precipitated by hydrogen sulfide in acid solution—for example, lead, silver, gold, mercury, bismuth, or copper.

High-Rate Digestion
Accelerated anaerobic digestion resulting primarily from thorough mixing of digester contents. May be enhanced by thermophilic digestion.

High-Rate Filter
A trickling filter operated at a high average daily dosing rate, usually between 10 and 40 mgd/acre including any recirculation of effluent.

Horizontal Flow Tank
A tank or basin, with or without baffles, in which the direction of flow is horizontal.

Humus Sludge
(1) Sludge deposited in final or secondary settling tanks following trickling filters or contact beds. (2) Sludge resembling humus in appearance.

Hydraulic Loading
The flow (volume per unit time) applied to the surface area of the clarification or biological reactor units (where applicable).

Hydraulic Loss
The loss of head attributable to obstructions, friction, changes in velocity, and changes in the form of the conduit.

Hydraulic Radius
The right cross-sectional area of a stream of water divided by the length of that part of its periphery in contact with its containing conduit; the ratio of area to wetted perimeter. Also called hydraulic mean depth.

Hydraulic Surface Loading Influent
(1) The flow (volume per unit time) applied to a unit of surface area (square ft), applicable to trickling filter and filtration processes. (2) Wastewater or other liquid—raw or partially treated—flowing into a reservoir, basin, treatment process, or treatment plant.

Impeller
A rotating set of vanes designed to impel rotation of a mass of fluid.

Impervious
Not allowing, or allowing only with great difficulty, the movement of water; impermeable.

Infiltrate
(1) To filter into. (2) The penetration by a liquid or gas of the pores or interstices.

Infiltration
(1) The flow or movement of water through the interstices or pores of a soil or other porous medium. (2) The quantity of groundwater that leaks into a pipe through joints, porous walls, or breaks. (3) The entrance of water from the ground into a gallery. (4) The absorption of liquid by the soil, either as it falls as precipitation or from a stream flowing over the surface. See *percolation*.

Influent
Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant, or any unit thereof.

Inhibitory Toxicity
Any demonstrable inhibitory action of a substance on the rate of general metabolism (including rate of reproduction) of living organisms.

Inorganic Matter
Chemical substances of mineral origin, or more correctly, not of basically carbon structure.

Intake
(1) The works or structures at the head of a conduit into which water is diverted. (2) The process or operation by which water is absorbed into the ground and added to the saturation zone.

Interface
(1) A stratum of water of varying thickness lying between the fresh water above and ocean water below in certain estuaries. (2) A boundary layer between two fluids such as liquid-liquid or liquid-gas.

Intermediate Screen
A screen, with openings from 6.35 to 38.1 mm (0.25 to 1.5 in.), which prepares the waste flow for passage through grit chambers, primary sedimentation tanks, and reciprocating pumps.

Intermediate Treatment
Wastewater treatment such as aeration or chemical treatment, supplementary to primary treatment.

Irrigation
The artificial application of water to lands to meet the water needs of growing plants not met by rainfall.

Lagoon
A pond containing raw or partially treated wastewater in which aerobic or anaerobic stabilization occurs.

Land Disposal
Disposal of wastewater onto land.

Lime
Any of a family of chemicals consisting essentially of calcium hydroxide made from limestone (calcite) which is composed almost wholly of calcium carbonate or a mixture of calcium and magnesium carbonate.

Liquid
A substance that flows freely. Characterized by free movement of the constituent molecules among themselves, but without the tendency to separate from one another characteristic of gases. Liquid and fluid are often used synonymously, but fluid has the broader significance, including both liquids and gases.

Liquid Sludge
Sludge containing sufficient water (ordinarily more than 85 percent) to permit flow by gravity or pumping.

Liquor
Water, wastewater, or any combination; commonly used to designate liquid phase when other phases are present.

Load
See following terms modifying *load*: *BOD*, *peak*, *pollutional*.

Loading
The time rate at which material is applied to a treatment device involving length, area, or volume, or other design factor.

Marina
Any installation operating under public ownership which provides dockage or moorage for boats (exclusive of paddle or rowboats) and provides through sale, rental, or fee basis any equipment, supply, or service (fuel, electricity, or water) for the convenience of the public or its leasers, renters, or users of its facilities.

Marine Sanitation Device
Any equipment, piping, or appurtenances such as holding tanks for installation onboard a boat and any process to treat wastewater.

Mechanical Aeration
(1) The mixing, by mechanical means, of wastewater and activated sludge in the aeration tank of the activated sludge process to bring fresh surfaces of liquid into contact with the atmosphere. (2) The introduction of atmospheric oxygen into a liquid by the mechanical action of paddle, paddle wheel, spray, or turbine mechanisms.

Mechanical Aerator
A mechanical device for the introduction of atmospheric oxygen into a liquid. See *mechanical aeration*.

Mechanical Agitation
The introduction of atmospheric oxygen into a liquid by the mechanical action of paddle, paddle wheel, spray, or turbine mechanisms. See *mechanical aeration*.

Mechanically Cleaned Screen
A screen equipped with a mechanical cleaning apparatus for removal of retained solids.

Mesh Screen
A screen composed of woven fabric of any of various materials.

Methane Fermentation
Fermentation resulting in conversion of organic matter into methane gas.

Microbial Activity
Chemical changes resulting from the metabolism of living organisms. Biochemical action.

Microbial Film
A gelatinous film of microbial growth attached to or spanning the interstices of a support medium. Also called biological slime.

Microbiology
Study of very small units of living matter and their processes.

Micron
Unit of length: 10^{-6} (39×10^{-6} in).

Microorganism
Minute organism, either plant or animal, invisible or barely visible to the naked eye.

Milligrams per Liter (mg/L)
A unit of the concentration of water or wastewater constituent. It is 0.001 grams of the constituent in 1000 mL of water. It has replaced the unit formerly used commonly, parts per million, to which it is approximately equivalent, in reporting the results of water and wastewater analysis.

Minimum Flow
The flow occurring in a stream during the driest period of the year. Also called low flow.

Mixed Liquor
A mixture of activated sludge and organic matter undergoing activated sludge treatment in the aeration tank.

Mixed-Liquor Volatile Suspended Solids (MLVSS)
The concentration of volatile suspended solids in an aeration basin. It is commonly assumed to equal the biological solids concentration in the basin.

Mixing Basin
(1) A basin or tank wherein agitation is applied to water, wastewater, or sludge to increase the dispersion rate of applied chemicals. (2) A tank used for general mixing purposes.

Mixing Tank
A tank designed to provide a through mixing of chemicals introduced into liquids or of two or more liquids of different characteristics.

Modified Aeration
A modification of the activated sludge process in which a shortened period of aeration is used with a reduced quantity of suspended solids in the mixed liquor.

Moisture
Condensed or diffused liquid, especially water.

Moisture Content
The quantity of water present in soil, wastewater sludge, industrial waste sludge, and screenings, usually expressed in percentage of wet weight.

Municipal Waste
The combined residential and commercial waste materials generated in a given municipal area.

Natural Water
Water as it occurs in its natural state, usually containing other solid, liquid, or gaseous materials in solution or suspension.

Nitrification
(1) The conversion of nitrogenous matter into nitrates by bacterial. (2) The treatment of a material with nitric acid.

Nitrosomonas
A genus of bacteria that oxidize ammonia to nitrite.

Nonbiodegradable
Incapable of being broken down into innocuous products by the actions of living beings (especially microorganisms).

Nonpotable Water
Water which is unsatisfactory for consumption.

Nonsettleable Matter
That suspended matter which does not settle or float to the surface of water in a period of 1 hr.

Nonsettleable Solids
Wastewater matter that will stay in suspension for an extended period of time. Such period may be arbitrarily taken for testing purposes as 1 hr. See *suspended solids*.

Nutrient
(1) Any substance assimilated by organisms which promotes growth and replacement of cellular constituents. (2) A chemical substance (an element or an inorganic compound, e.g., nitrogen or phosphate) absorbed by a green plant and used in organic synthesis.

Odor Control
(1) In water treatment, the elimination or reduction of odors in a water supply by aeration, algae elimination, super-chlorination, activated carbon treatment, and other methods. (2) In wastewater treatment, the prevention or reduction of objectionable odors by chlorination, aeration, or other processes or by masking with chemical aerosols.

Organic Loading
Pounds of BOD applied per day to a biological reactor.

Organic Matter
Chemical substances of animal or vegetable origin, or more correctly, of basically carbon structure, comprising compounds consisting of hydrocarbons and their derivatives.

Organic Matter Degradation
The conversion of organic matter to inorganic forms by biological action.

Orthophosphate
An acid or salt containing phosphorus as PO_4.

Overflow
(1) The excess water that overflows the ordinary limits such as the stream banks, the spillway crest, or the ordinary level of a container. (2) To cover or inundate with water or other fluid.

Overflow Rate
One of the criteria for the design of settling tanks in treatment plants; expressed in gallons per day per square foot of surface area in the settling tank.

Overland Runoff
Water flowing over the land surface before it reaches a definite stream channel or body of water.

Oxidation
The addition of oxygen to a compound. More generally, any reaction which involves the loss of electrons from an atom.

Oxidation Ditch
A modification of the activated sludge process or the aerated pond, in which the mixture under treatment is circulated in an endless ditch and aeration and circulation are produced by a mechanical device such as a Kessener brush.

Oxidation Pond
A basin used for retention of wastewater before final disposal, in which biological oxidation of organic material is effected by natural or artificially accelerated transfer of oxygen to the water from air.

Oxidation Process
Any method of wastewater treatment for the oxidation of the putrescible organic matter. The usual methods are biological filtration and the activated sludge process.

Oxidation Rate
The rate at which the organic matter in wastewater is stabilized.

Oxidized Sludge
The liquid and solid product of the wet air oxidation of wastewater sludge.

Oxidized Wastewater
Wastewater in which the organic matter has been stabilized.

Oxygen Demand
(1) The quantity of oxygen utilized in the biochemical oxidation of organic matter in a specified time, at a specified temperature, and under specified conditions. See *BOD*.

Oxygen Saturation
The maximum quantity of dissolved oxygen that liquid of given chemical characteristics, in equilibrium with the atmosphere, can contain at a given temperature and pressure.

Ozone
Oxygen in molecular form with three atoms of oxygen forming each molecule (O_3).

Parshall flume
A calibrated device developed by Parshall for measuring the flow of liquid in an open conduit. It consists essentially of a contracting length, a throat, and an expanding length. At the throat is a sill over which the flow passes at Belanger's critical depth. The upper and lower head need not be measured unless the sill is submerged more than about 67 percent.

Particle
Any dispersed matter, solid or liquid, in which the individual aggregates are larger than single small molecules (about 0.0002 mm in diameter), but smaller than about 500 mm (20 in.) in diameter.

Particle Size
(1) The size of liquid or solid particles expressed as the average or equivalent diameter. (2) The sizes of the two screens, either in the U.S. Sieve Series or the Tyler Series, between which the bulk of a carbon sample falls, e.g., 8 x 30 means most of the carbon passes a No. 8 screen but is retained on a No. 30 screen.

Parts per Million (ppm)
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. Formerly used to express the results of most water and wastewater analyses, but more recently replaced by the ratio mg/L.

Pathogens
Pathogenic or disease-producing organisms.

Peak Demand
The maximum momentary load placed on a water or wastewater plant or pumping statio or on an electric generating plant or system. This is usually the maximum average load in 1 hr or less, but may be specified as instantaneous or with some other short time period.

Peak Load
(1) The maximum average load carried by an electric generating plant or system for a short time period such as 1 hr or less. See *peak*. (2) The maximum demand for water placed on a pumping station, treatment plant, or distribution system, expressed as a rate. (3) The maximum rate of flow of wastewater to a pumping station or treatment plant. Also called peak demand.

Percolating Filter
A type of trickling filter.

Percolation
(1) The flow or trickling of a liquid downward through a contact or filtering medium. The liquid may or may not fill the pores of the medium. Also called filtration. (2) The movement or flow of water through the interstices or the pores of a soil or other porous medium.

pH
The reciprocal of the logarithm of the hydrogen-ion concentration. The concentration is the weight of hydrogen ions, in grams, per liter of solution. Neutral water, for example, has a pH value of 7 and a hydrogen-ion concentration of 10-7.

Phosphate
A salt or ester or phosphoric acid.

Pipe Gallery
(1) Any conduit for pipe, usually of a size to allow a man to walk through. (2) A gallery provided in a treatment plant for the installation of the conduits and valves and for a passageway to provide access to them.

Pit Privy
A privy placed directly over an excavation in the ground.

Pollution
A condition created by the presence of harmful or objectionable material or water.

Pollutional Load
(1) The quantity of material in a waste stream that requires treatment or exerts an adverse effect on the receiving system. (2) The quantity of material carried in a body of water that exerts a detrimental effect on some subsequent use of that water.

Polyelectrolyte
Long-chained, ionic, high-molecular-weight, synthetic, water-soluble, organic coagulants. Also referred to as polymers.

Porous
Having small passages; permeable by fluids.

Postchlorination
The application of chlorine to water or wastewater subsequent to any treatment, including prechlorination.

Potable Water
Water that does not contain objectional pollution, contamination, minerals, or infective agents and is considered satisfactory for domestic consumption.

Preaeration
A preparatory treatment of wastewater consisting of aeration to remove gases, add oxygen, promote flotation of grease, and aid coagulation.

Prechlorination
The application of chlorine to water or wastewater prior to any treatment.

Precipitation
(1) The total measurable supply of water received directly from clouds as rain, snow, hail, or sleet; usually expressed as depth in a day, month, or year, and designated as daily, monthly, or annual precipitation. (2) The process by which atmospheric moisture is discharged onto a land or water surface. (3) The phenomenon that occurs when a substance held in solution in a liquid passes out of solution into solid form.

Preliminary Treatment
(1) The conditioning of a waste at its source before discharge, to remove or to neutralize substances injurious to sewers and treatment processes or to effect a partial reduction in load on the treatment process. (2) In the treatment process, unit operations, such as screening and comminution, that prepare the liquor for subsequent major operations.

Presettling
The process of sedimentation applied to a liquid before subsequent treatment.

Pressure Regulator
A device for controlling pressure in a pipeline or pressurized tank, such as a pressure-regulating valve or a pump drive-speed controller.

Primary Settling Tank
The first settling tank for the removal of settleable soils through which wastewater is passed in a treatment works.

Primary Sludge
Sludge obtained from a primary settling tank.

Primary Treatment
(1) The first major (sometimes the only) treatment in a wastewater treatment works, usually sedimentation. (2) The removal of a substantial amount of suspended matter but little or no colloidal and dissolved matter.

Privy
A building, either portable or fixed directly to a pit or vault, equipped with seating and used for excretion of bodily wastes.

Privy Vault
A concrete or masonry vault that is provided with a cleanout opening and over which is placed a privy building containing seats.

Proportional Weir
A special type of weir in which the discharge through the weir is directly proportional to the head.

Public Water Supply
A water supply from which water is available to the people at large or to any considerable number of members of the public indiscriminately.

Pump-out Facilities
Any device, equipment, or method of removing wastewater from a marine sanitation device, including any holding tanks either portable, movable, or permanently installed, and any wastewater treatment method or disposable equipment used to treat, or ultimately dispose of, wastewater removed from boats.

Pumping Station
A station housing relatively large pumps and their accessories. Pump house is the usual term for shelters for small water pumps.

Purification
The removal of objectionable matter from water by natural or artificial methods.

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

Radiation
The emission and propagation of energy through space or through a material medium; also, the energy so propagated.

Rakings
The screenings or trash removed from bar screens cleaned manually or by mechanical rakes.

Rapid Filter
A rapid sand filter or pressure filter.

Rapid Sand Filter
A filter for the purification of water, in which water that has been previously treated, usually by coagulation and sedimentation, is passed downward through a filtering medium. The medium consists of a layer of sand, prepared anthracite coal, or other suitable material, usually 24-30 in. thick, resting on a supporting bed of gravel or a porous medium such as carborundum. It is characterized by a rapid rate of filtration, commonly from two to three gallons per minute per square foot of filter area.

Raw Sludge
Settled sludge promptly removed from sedimentation tanks before decomposition has much advanced. Frequently referred to as undigested sludge.

Raw Wastewater
Wastewater before it receives any treatment.

Receiving Body of Water
A natural watercourse, lake, or ocean into which treated or untreated wastewater is discharged.

Recycling
An operation in which a substance is passed through the same series of processes, pipes, or vessels more than once.

Retention
That part of the precipitation falling on a drainage area which does not escape as surface stream flow, during a given period. It is the difference between total precipitation and total runoff during the period, and represents evaporation, transpiration, sub-surface leakage, infiltration, and, when short periods are considered, temporary surface or underground storage on the area.

Returned Sludge
Settled activated sludge returned to mix with incoming raw or primary settled wastewater.

Rotary Distributor
A movable distributor made up of horizontal arms that extend to the edge of the circular trickling filter bed, revolve about a central post, and distribute liquid over the bed through orifices in the arms. The jet action of the discharging liquid normally supplies the motive power.

Runoff
(1) That portion of the earth's available water supply that is transmitted through natural surface channels. (2) Total quantity of runoff water during a specified time. (3) In the general sense, that portion of the precipitation which is not absorbed by the deep strata, but finds its way into the streams after meeting the persistent demands of evapotranspiration, including interception and other losses. (4) The discharge of water in surface streams, usually expressed in inches depth on the drainage area, or as volume in such terms as cubic feet or acre-feet. (5) That part of the precipitation which runs off the surface of a drainage area and reaches a stream or other body of water or a drain or sewer.

Sand Filter
A filter in which sand is used as a filtering medium. Also see *rapid sand filter, slow sand filter*.

Sanitary Facilities
Bathrooms, toilets, closets or other enclosures where commodes, stools, water closets, lavatories, showers, urinals, sinks, or other such plumbing fixtures are installed.

Scale
An accumulation of solid material precipitated out of waters containing certain mineral salts in solution and formed on interior surfaces, such as those of pipelines, tanks, and boilers, under certain physical conditions. May also be formed from interaction of water with metallic pipe.

Screen
A device with openings, generally of uniform size, used to retain or remove suspended or floating solids in flowing water or wastewater and to prevent them from entering an intake or passing a given point in a conduit. The screening element may consist of parallel bars, rods, wires, grating, wire mesh, or perforated plate, and the openings may be of any shape, although they are usually circular or rectangular.

Screening
The removal of relatively coarse floating and suspended solids by straining through racks or screens.

Screenings
Material removed from liquids by screens.

Screenings Dewatering
The removal of a large part of the water content of waste screenings by draining or by mechanical means.

Screenings Grinder
A device for grinding, shredding, or macerating material removed from wastewater by screens.

Screenings Shredder
A device that disintegrates screenings.

Screw-feed Pump
A pump with either horizontal or vertical cylindrical casing, in which operates a runner with radial blades like those of a ship's propeller.

Scum
(1) The layer or film of extraneous or foreign matter that rises to the surface of a liquid and is formed there. (2) A residue deposited on a container or channel at the water surface. (3) A mass of solid matter that floats on the surface.

Secondary Settling Tank
A tank through which effluent from some prior treatment process flows for the purpose of removing settleable solids. See *sedimentation tank*.

Secondary Wastewater Treatment
The treatment of wastewater by biological methods after primary treatment by sedimentation.

Sedimentation
The process of subsidence and deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material. Also called settling. See *chemical precipitation*.

Sedimentation Basin
A basin or tank in which water or wastewater containing settleable solids is retained to remove by gravity a part of the suspended matter. Also called sedimentation tank, settling basing, settling tank.

Sedimentation Tank
A basin or tank in which water or wastewater containing settleable solids is retained to remove by gravity a part of the suspended matter. Also called sedimentation tank, settling basin, settling tank.

Septicity
A condition produced by growth of anaerobic organisms.

Septicization
In anaerobic decomposition, the process whereby intensive growths of bacteria with the enzymes secreted by them liquefy and gasify solid organic matter.

Septic Sludge
Sludge from a septic tank or partially digested sludge from an Imhoff tank or sludge-digestion tank.

Septic Tank
A settling tank in which settled sludge is in immediate contact with the wastewater flowing through the tank and the organic solids are decomposed by anaerobic bacterial action.

Septic Wastewater
Wastewater undergoing putrefaction under anaerobic conditions.

Settleable Solids
(1) That matter in wastewater which will not stay in suspension during a preselected settling period, such as 1 hr, but either settles to the bottom or floats to the top. (2) In the Imhoff cone test, the volume of matter that settles to the bottom of the cone in 1 hr.

Settled Wastewater
Wastewater from which most of the settleable solids have been removed by sedimentation. Also called clarified wastewater.

Settling
The process of subsidence and deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material. Also called sedimentation. See chemical precipitation.

Settling Basin
A basin or tank in which water or wastewater containing settleable solids is retained to remove by gravity a part of the suspended matter. Also called sedimentation basin, sedimentation tank, settling tank.

Settling Solids
Solids that are settling in sedimentation tanks or sedimentation chambers and other such tanks constructed for the purpose of removing this fraction of suspended solids. See *settleable solids*.

Settling Tank
A basin or bank in which water or wastewater containing settleables solids is retained to remove by gravity a part of the suspended matter. Also called sedimentation basin, sedimentation tank, settling basin.

Settling Velocity
The velocity at which subsidence and deposition of the settleable suspended solids in water and wastewater will occur.

Sewage
The spent water of a community. Term now being replaced in technical usage by preferable term "wastewater." See *wastewater*.

Sewer
A pipe or conduit that carries wastewater or drainage water.

Sewerage Facilities
Entire wastewater collection and disposal system including commodes, toilets, lavatories, showers, sinks, and all other plumbing fixtures which are connected to a collection system consisting of sewer pipe, conduit, holding tanks, pumps and all appurtenances, including the wastewater treatment or disposal system.

Sewer Gas
Gas evolved in sewers that results from the decomposition of the organic matter in the wastewater.

Sharp-Crested Weir
A weir having a crest, usually consisting of a thin plate (generally of metal), so sharp that the water in passing over it touches only a line.

Short-Circuiting
A hydraulic condition occurring in parts of a tank where the time of travel is less than the flowing-through time.

Shredder
A device for size reduction.

Shredding
A process for the treatment and handling of solid wastes. The refuse is reduced to particles having no greater dimension than 2 in. by a shredder. Also called grinding.

Side Water Depth
The depth of water measured along a vertical exterior wall.

Skimming
The process of removing floating grease or scum from the surface of wastewater in a tank.

Skimmings
Grease, solids, liquids, and scum skimmed from wastewater settling tanks.

Skimming Tank
A tank designed so that floating matter will rise and remain on the surface of the wastewater until removed, while the liquid discharges continuously under curtain walls or scum boards.

Slimes
Substances of viscous organic nature, usually formed from microbiological growth.

Slow Sand Filter
A filter for the purification of water in which water without previous treatment is passed downward through a filtering medium consisting of a layer of sand or other suitable material, usually finer than for a rapid sand filter and from 610 mm to 1 m (24 to 40 in.) thick.

Sludge
(1) The accumulated solids separated from liquids, such as water or wastewater, during processing, or deposits on bottoms of streams or other bodies of water. (2) The precipitate resulting from chemical treatment, coagulation, or sedimentation of water or wastewater.

Sludge Bed
An area comprising natural or artificial layers of porous material on which digested wastewater sludge is dried by drainage and evaporation. A sludge bed may be open to the atmosphere or covered, usually with a greenhouse-type superstructure. Also called sludge drying bed.

Sludge Blanket
Accumulation of sludge hydrodynamically suspended within an enclosed body of water or wastewater.

Sludge Cake
The sludge that has been dewatered by a treatment process to a moisture content of 60-85 percent, depending on type of sludge and manner of treatment.

Sludge Circulation
The overturning of sludge in sludge-digestion tanks by mechanical or hydraulic means or by use of gas recirculation to disperse scum layers and to promote digestion.

Sludge Collector
A mechanical device for scraping the sludge on the bottom of a settling tank to a sump from which it can be drawn.

Sludge Concentration
Any process of reducing the water content of sludge that leaves the sludge in a fluid condition.

Sludge Conditioning
Treatment of liquid sludge before dewatering to facilitate dewatering and enhance drain ability, usually by the addition of chemicals.

Sludge Density Index
The reciprocal of the sludge volume index multiplied by 100.

Sludge Dewatering
The process of removing a part of the water in sludge by any method such as draining, evaporation, pressing, vacuum filtration, centrifuging, exhausting, passing between rollers, acid flotation, or dissolved-air flotation with or without heat. It involves reducing from a liquid to a spadable condition rather than merely changing the density of the liquid (concentration) on the one hand or drying (as in a kiln) on the other.

Sludge Digestion
The process by which organic or volatile matter in sludge is gasified, liquefied, mineralized, or converted into more stable organic matter through the activities of either anaerobic or aerobic organisms.

Sludge-Digestion Gas
Gas resulting from the decomposition of organic matter in sludge removed from wastewater and placed in a tank to decompose under anaerobic conditions. Also see *sewage gas, sludge digestion*.

Sludge-Digestion Tank
A tank in which sludge is placed for the purpose of permitting digestion to occur. See *sludge digestion*.

Sludge Dryer
A device for removal of a large percentage of moisture from sludge or screenings by heat.

Sludge Drying
The process of removing a large percentage of moisture from sludge by drainage or evaporation by any method.

Sludge Filter
A device in which wet sludge, usually conditioned by a coagulant, is partly dewatered by vacuum or pressure.

Sludge Foaming
An increase in the gas in sludge in Imhoff and separate digestion tanks, causing large quantities of froth, scum, and sludge to rise and overflow from openings at or near the top of the tanks.

Sludge Lagoon
A basin used for the storage, digestion, or dewatering of sludge.

Sludge Reaeration
The continuous aeration of sludge after its initial aeration for the purpose of improving or maintaining its condition.

Sludge Reduction
The reduction in quantity and change in character of sludge as the result of digestion.

Sludge Solids
Dissolved and suspended solids in sludge.

Sludge Thickener
A tank or other equipment designed to concentrate wastewater sludges.

Sludge Thickening
The increase in solids concentration of sludge in sedimentation or digestion tank. See *sludge concentration*.

Sludge Treatment
The processing of wastewater sludges to render them innocuous. This may be done by aerobic or anaerobic digestion followed by drying on sand beds, filtering and incineration, filtering and drying, or wet air oxidation.

Sludge Utilization
The use of wastewater sludges as soil builders and fertilizer admixtures. Sludges produced by aerobic and anaerobic digestion and activated sludge are used for these purposes.

Sludge Volume Index (SVI)
The ratio of the volume in milliliters of sludge settled from a 1 L sample in 30 min to the concentration of mixed liquor in milligrams per liter.

Slurry
A thin watery mud, or any substance resembling it, such as a lime slurry.

Sodium Carbonate
A salt used in water treatment to increase the alkalinity or pH value of water or to neutralize acidity. Chemical symbol is Na_2CO_3. Also called soda ash.

Solids Retention Time
The average residence time of suspended soils in a biological waste treatment system, equal to the total weight of suspended solids in the system divided by the total weight of suspended solids leaving the system per unit of time (usually per day).

Specific Gravity
(1) The ratio of the weight of a solid or liquid particle, substance, or chemical solution to the weight of an equal volume of water. Water has a specific gravity of 1.000 at 4 °C (39 °F). Particulates in raw water may have a specific gravity of 1.005 to 2.5.

(2) The ratio of the weight of a particular gas to an equal volume of air at the same temperature and pressure (air has a specific gravity of 1.0). Chlorine gas has a specific gravity of 2.5.

Spiral Air Flow Diffusion
A method of diffusing air in an aeration tank of the activated sludge process where, by means of properly designed baffles and the proper location of diffusers, a spiral or helical movement is given to the air and the tank liquor.

Spiral Flow Aeration
A method of diffusing air in an aeration tank of the activated sludge process. See *spiral air-flow diffusion*.

Spiral-flow Tank
An aeration tank or channel in which a spiral or helicoidal motion is given to the liquid in its flow through the tank by the introduction of air through a line of diffusers placed on one side of the bottom of each channel, by longitudinally revolving paddles, or by other means.

Spray Irrigation
A method for disposing of some organic wastewaters by spraying them on land, usually from pipes equipped with spray nozzles. This has proved to be an effective way to dispose of wastes from the canning, meat-packing, and sulfite-pulp industries where suitable land is available.

Stabilization
(1) Maintenance at a relatively non-fluctuating level, quantity, flow, or condition. (2) In lime-soda water softening, any process that will minimize or eliminate scale-forming tendencies. (3) In waste treatment, a process used to equalize wastewater flow composition prior to regulated discharge.

Stabilization Lagoon
A shallow pond for storage of wastewater before discharge. Such lagoons may serve only to detain and equalize wastewater composition before regulated discharge to a stream, but often they are used for biological oxidation. See *stabilization pond*.

Stabilization Pond
A type of oxidation pond in which biological oxidation of organic matter is effected by natural or artificially accelerated transfer of oxygen to the water from air.

Step Aeration
A procedure for adding increments of settled wastewater along the line of flow in the aeration tanks of an activated sludge plant.

Sterilization
The destruction of all living microorganisms, as pathogenic or saprophytic bacteria, vegetative forms, and spores.

Sterilized Wastewater
An effluent from a wastewater treatment plant in which all microorganisms have been destroyed by sterilization.

Subsoil
That portion of a normal soil profile underlying the surface. In humid climates it is lower in content of organic matter, lighter in color, usually of finer particles, of denser structure, and of lower fertility than the surface soil. Its depth and physical properties control to a considerable degree the movement of soil moisture. In arid climates there is less difference between surface and subsoil.

Sump
(1) A tank or pit that receives drainage and stores it temporarily, and from which the drainage is pumped or ejected. (2) A tank or pit that receives liquids.

Supernatant
The liquid standing above a sediment or precipitate

Surface Evaporation
Evaporation from the surface of a body of water, moist soil, snow, or ice. See *evapotranspiration*.

Surface Wash
(1) A supplementary method of washing the filtering medium of a rapid sand filter by applying water under pressure at or near the surface of the sand by means of a system of stationary or rotating jets. (2) The surface runoff draining into a ditch or drain.

Suspended Solids
Solids that either float on the surface of, or are in suspension in, water, wastewater, or other liquids, and which are largely removable by laboratory filtering.

Tank
Any artificial receptacle through which liquids pass or in which they are held in reserve or detained for any purpose.

Temperature
(1) The thermal state of a substance with respect to its ability to communicate heat to its environment. (2) The measure of the thermal state on some arbitrarily chosen numerical scale.

Tertiary Treatment
A method used to refine the effluents from secondary treatment systems or otherwise increase the removal of pollutants.

Thickened Sludge
A sludge concentrated to a higher solids content by gentle mixing, gravimetric settling, centrifugation, or air flotation.

Thickener, Sludge
A type of sedimentation tank in which sludge is permitted to settle, usually equipped with scrapers traveling along or around the bottom of the tank to push the settled sludge to a sump.

Thickening Tank
A sedimentation tank for concentrated suspensions.

Total Kjeldahl Nitrogen (TKN)
The sum of free ammonia and of organic compounds which are converted to $(NH_4)_2SO_4$ under the conditions of digestion.

Total Organic Carbon (TOC)
A measure of the amount of organic material in a water sample expressed in milligrams of carbon per liter of solution.

Toxin
Poisonous compounds produced by the metabolic activity or death and disintegration of microorganisms.

Transient Slips
Temporary docking or mooring space which may be used for short periods of time, including overnight, days, or weeks but less than 30 days.

Trash
Floating debris that may be removed from reservoirs, combined sewers, and storm-water sewers by coarse racks.

Trash Rack
A grid or screen placed across a waterway to catch floating debris.

Trash Screen
A screen installed or constructed in a waterway to collect and prevent the passage of trash.

Treated Sewage
Wastewater that has received partial or complete treatment.

Treatment
See following terms modifying *treatment: anaerobic waste, biological wastewater, chemical, intermediate, ion-exchange, preliminary, primary, secondary wastewater, sludge, waste, wastewater, water.*

Trickling Filter
A treatment unit consisting of a material such as broken stone, clinkers, slate, slats, or brush, over which sewage is distributed and applied in drops, films, or spray, from troughs, drippers, moving distributors, or fixed nozzles, and through which it trickles to the underdrains, giving opportunity for the formation of zoological slimes which clarify and oxidize the sewage.

Trickling Filter Humus
The sludge removed from clarifiers following biological stabilization in trickling filter units.

Trickling Filter Ponding
A condition occurring when voids in filter media become clogged with excessive growth of organisms, preventing the free flow of the wastewater.

Trickling Filter Process
In wastewater treatment, a process in which the liquid from a primary clarifier is distributed on a bed of stones. As the wastewater trickles through to drains underneath, it comes in contact with slime on the stones, by which organic material in the water is oxidized and impurities are reduced.

Turbidity
(1) A condition in water or wastewater caused by the presence of suspended matter, resulting in the scattering and absorption of light rays. (2) A measure of fine suspended matter in liquids. (3) An analytical quantity usually reported in arbitrary turbidity units determined by measurements of light diffraction.

Ultraviolet Radiation
Light waves shorter than visible blue-violet waves of the spectrum, having wave lengths of less than 3 900 Å.

Ultraviolet Rays
Those invisible light rays beyond the violet of the spectrum.

Underdrain
A drain that carries away groundwater or the drainage from prepared beds to which water or wastewater has been applied.

Underflow
(1) The movement of water through a given cross section of permeable rock or earth, possible under the bed of a stream or a structure. (2) The flow of water under a structure.

Undigested Sludge
Settled sludge promptly removed from sedimentation tanks before decomposition has much advanced. Also called raw sludge.

Vacuum Filter
A filter consisting of a cylindrical drum mounted on a horizontal axis, covered with a filter cloth, and revolving with a partial submergence in liquid. A vacuum is maintained under the cloth for the larger part of a revolution to extract moisture. The cake is scraped off continuously.

Velocity
See *settling velocity*.

Viscosity
The cohesive force existing between particles of a fluid which causes the fluid to offer resistance to a relative sliding motion between particles.

Volatile
Capable of being evaporated at relatively low temperatures.

Volatile Solids
The quantity of solids in water, wastewater, or other liquids, lost on ignition of the dry solids at 600°C (1 112°F).

Wash Water
Water used to wash filter beds in a rapid sand filter.

Wash Water Gutter
A trough or gutter used to carry away the water that has washed the sand in a rapid sand filter. Also called wash-water trough.

Wash Water Rate
The rate at which wash water is applied to a rapid sand filter during the washing process. Usually expressed as the rise of water in the filter in inches per minute or gallons per minute per square foot.

Waste
Something that is superfluous or rejected; something that can no longer be used for its originally intended purpose.

Wasted Sludge
The portion of settled solids from the final clarifier that was removed from the wastewater treatment processes and transferred to the solids handling facilities for ultimate disposal.

Waste(s)
See following terms modifying *waste*(*s*): *industrial, municipal*.

Waste Treatment
Any process to which wastewater or industrial waste is subjected to make it suitable for subsequent use.

Wastewater
The spent water or wastewater containing human excrement coming from toilets, bathrooms, commodes and holding tanks. From the standpoint of source, it may be a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with any groundwater, surface water, and storm water that may be present. Also referred to as sewage.

Wastewater Decomposition
Transformations of organic or inorganic materials contained in wastewater through the action of chemical or biological processes. See *decomposition of wastewater*.

Wastewater Disposal
The act of disposing of wastewater by any method (not synonymous with wastewater treatment). Common methods of disposal are dispersion, dilution, broad irrigation, privy, cesspool.

Wastewater Facilities
The structures, equipment, and processes required to collect, carry away, and treat domestic and industrial wastes, and dispose of the effluent.

Wastewater Lagoon
An impoundment into which wastewater is discharged at a rate low enough to permit oxidation to occur without substantial nuisance.

Wastewater Treatment
Any process to which wastewater is subjected in order to remove or alter its objectional constituents and thus render it less offensive or dangerous. See *intermediate treatment, primary treatment*.

Wastewater Treatment or Disposal Systems
The device, process, or plant designed to treat wastewater and remove solids and other objectionable constituents which will permit discharge to another approved system, or an approved discharge to state waters, or disposal through an approved subsurface drain field or other acceptable method.

Wastewater Treatment Works
(1) An arrangement of devices and structures for treating wastewater, industrial wastes, and sludge. Sometimes used synonymously with waste treatment plant or wastewater treatment plant. (2) A water pollution control plant.

Water
A transparent, odorless, tasteless liquid, a compound of hydrogen and oxygen, H_20, freezing at 0°C (32°F) and boiling at 100°C (212°F), which, in more or less impure state, constitutes rain, oceans, lakes, rivers, and other such bodies; it contains 11.188 percent hydrogen and 88.812 percent oxygen, by weight. It may exist as a solid, liquid, or gas and, as normally found in the lithosphere, hydrosphere, and atmosphere, may have other solid, gaseous, or liquid materials in solution or suspension.

Waterborne Disease
A disease caused by organisms or toxic substances carried by water; the most common such diseases are typhoid fever, Asiastic cholera, dysentery, and other intestinal disturbances.

Water Closet
A plumbing fixture, usually a toilet bowl, seat, and water tank, or valved pressure water connection, for carrying off excreta and liquid wastes to a drain pipe connected below, by the agency of flushing water.

Water Conditioning
Treatments, exclusive of disinfection, intended to produce a water free of taste, odor, and other undesirable qualities.

Water Treatment
The filtration or conditioning of water to render it acceptable for a specific use.

Water Treatment Plant
That portion of water treatment works intended specifically for water treatment; may include, among other operations, sedimentation, chemical coagulation, filtration, and chlorination. See *water treatment works*.

Water Treatment Works
A group or assemblage of processes, devices, and structures used for the treatment or conditioning of water.

Weir
(1) A diversion dam. (2) A device that has a crest and some side containment of known geometric shape, such as a V, trapezoid, or rectangle, and is used to measure flow of liquid. The liquid surface is exposed to the atmosphere. Flow is related to upstream height of water above the crest, to position of crest with respect to downstream water surface, and to geometry of the weir opening.

Weir Loading
In a solids-contact or sedimentation unit, the rate in gallons per minute per foot of weir length at which clarified or treated liquid is leaving the unit. See *overflow rate*.

Wet Well
A compartment in which a liquid is collected, and to which the suction pipe of a pump is connected.

Zooglea
A jelly-like matrix developed by bacteria, associated with growths in oxidizing beds.

Zoogleal Matrix
The flow formed primarily by slime-producing bacteria in the activated sludge process or in biological beds.