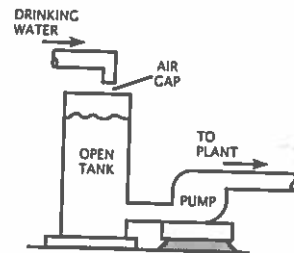


WORDS

Chapter 3. WELLS

AIR GAP

An open, vertical drop, or vertical empty space, between a drinking (potable) water supply and potentially contaminated water. This gap prevents the contamination of drinking water by backsiphonage because there is no way potentially contaminated water can reach the drinking water supply.



AIR GAP

ALARM CONTACT

A switch that operates when some preset low, high, or abnormal condition exists.

ALARM CONTACT

ALLUVIAL (uh-LOO-vee-ul)

Relating to mud or sand deposited by flowing water. Alluvial deposits may occur after a heavy rainstorm.

ALLUVIAL

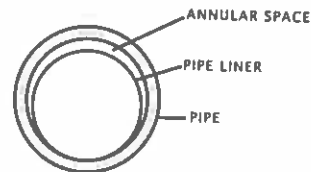
ANALYZER

A device that conducts a periodic or continuous measurement of turbidity or some factor such as chlorine or fluoride concentration. Analyzers operate by any of several methods including photocells, conductivity, or complex instrumentation.

ANALYZER

ANNULAR (AN-yoo-ler) SPACE

A ring-shaped space located between two circular objects. For example, the space between the outside of a pipe liner and the inside of a pipe.



ANNULAR SPACE

APPURTENANCE (uh-PURR-ten-nans)

Machinery, appliances, structures, and other parts of the main structure necessary to allow it to operate as intended, but not considered part of the main structure.

APPURTENANCE

AQUIFER (ACK-wi-fer)

A natural, underground layer of porous, water-bearing materials (sand, gravel) usually capable of yielding a large amount or supply of water.

AQUIFER

ARTESIAN (are-TEE-zhun)

Pertaining to groundwater, a well, or underground basin where the water is under a pressure greater than atmospheric and will rise above the level of its upper confining surface if given an opportunity to do so.

ARTESIAN

AVAILABLE CHLORINE

A measure of the amount of chlorine available in chlorinated lime, hypochlorite compounds, and other materials that are used as a source of chlorine when compared with that of elemental (liquid or gaseous) chlorine.

AVAILABLE CHLORINE

BAILER (BAY-ler)

A length of pipe equipped with a valve at the lower end used to remove slurry from the bottom or the side of a well as it is being drilled.

BAILER

BOWL, PUMP

The submerged pumping unit in a well, including the shaft, impellers, and housing.

BRAKE HORSEPOWER (BHP)

- (1) The horsepower required at the top or end of a pump shaft (input to a pump).
- (2) The energy provided by a motor or other power source.

CAISSON (KAY-sawn)

A structure or chamber that is usually sunk or lowered by digging from the inside. Used to gain access to the bottom of a stream or other body of water.

CAPILLARY (KAP-uh-larry) ACTION

The movement of water through very small spaces due to molecular forces.

CAPILLARY (KAP-uh-larry) FORCES

The molecular forces that cause the movement of water through very small spaces.

CENTRIFUGAL (sen-TRIF-uh-gull) PUMP

A pump consisting of an impeller fixed on a rotating shaft that is enclosed in a casing, and having an inlet and discharge connection. As the rotating impeller whirls the liquid around, centrifugal force builds up enough pressure to force the water through the discharge outlet.

CHECK VALVE

A special valve with a hinged disk or flap that opens in the direction of normal flow and is forced shut when flows go in the reverse or opposite direction of normal flows. Also see **FLAP GATE** and **TIDE GATE**.

CIRCLE OF INFLUENCE

The circular outer edge of a depression produced in the water table by the pumping of water from a well. Also see **CONE OF INFLUENCE** and **CONE OF DEPRESSION**.

[SEE DRAWING ON PAGE 51]

CONDUCTOR CASING

The outer casing of a well. The purpose of this casing is to prevent contaminants from surface waters or shallow groundwaters from entering a well.

CONE OF DEPRESSION

The depression, roughly conical in shape, produced in the water table by the pumping of water from a well. Also called the **CONE OF INFLUENCE**. Also see **CIRCLE OF INFLUENCE**.

[SEE DRAWING ON PAGE 51]

CONE OF INFLUENCE

The depression, roughly conical in shape, produced in the water table by the pumping of water from a well. Also called the **CONE OF DEPRESSION**. Also see **CIRCLE OF INFLUENCE**.

[SEE DRAWING ON PAGE 51]

CONFINING UNIT

A layer of rock or soil of very low hydraulic conductivity that hampers the movement of groundwater in and out of an aquifer.

CONSOLIDATED FORMATION

A geologic material whose particles are stratified (layered), cemented, or firmly packed together (hard rock); usually occurring at a depth below the ground surface. Also see **UNCONSOLIDATED FORMATION**.

BOWL, PUMP

BRAKE HORSEPOWER (BHP)

CAISSON

CAPILLARY ACTION

CAPILLARY FORCES

CENTRIFUGAL PUMP

CHECK VALVE

CIRCLE OF INFLUENCE

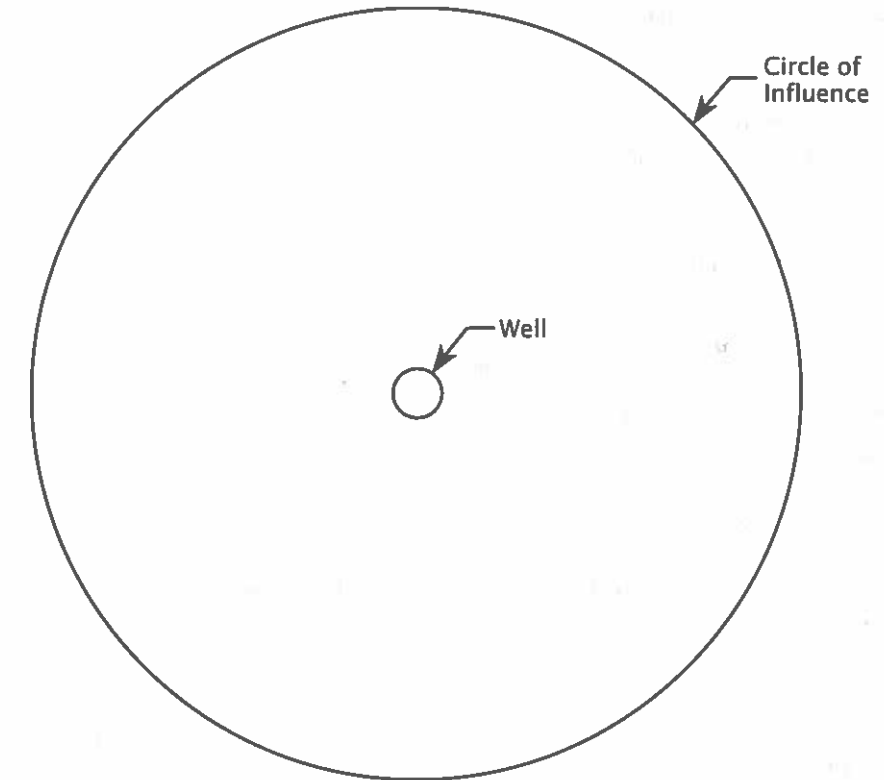
CONDUCTOR CASING

CONE OF DEPRESSION

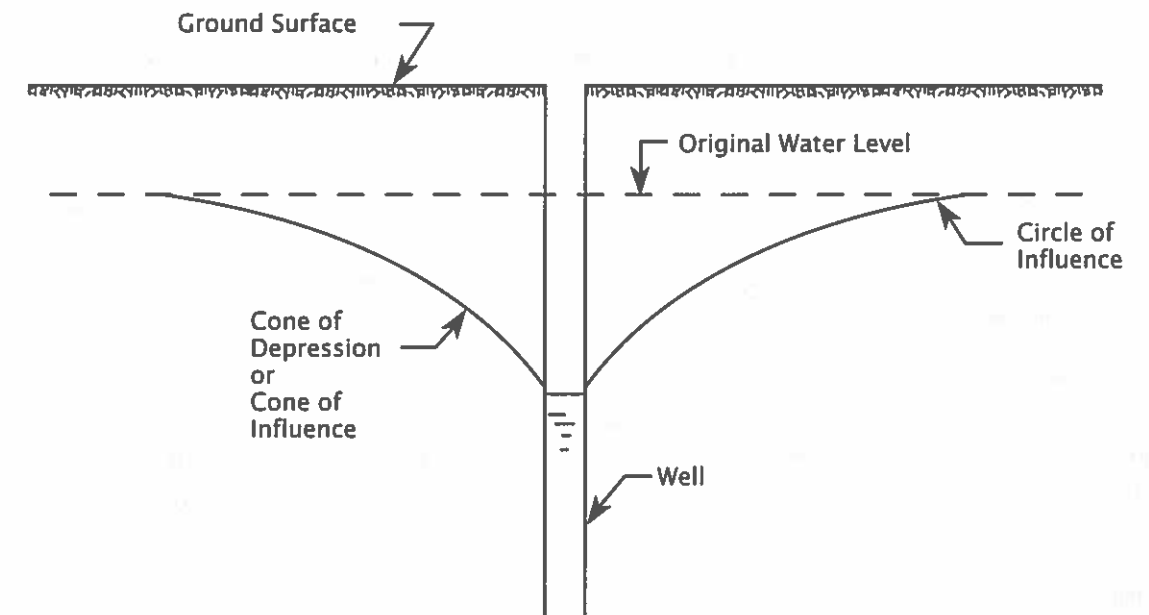
CONE OF INFLUENCE

CONFINING UNIT

CONSOLIDATED FORMATION



TOP or PLAN VIEW



SIDE or ELEVATION VIEW

Circle of influence and cone of depression/cone of influence

CONTACTOR

An electric switch, usually magnetically operated.

CONTAMINATION

The introduction into water of microorganisms, chemicals, toxic substances, wastes, or wastewater in a concentration that makes the water unfit for its next intended use.

CONTROLLER

A device that controls the starting, stopping, or operation of a device or piece of equipment.

CROSS CONNECTION

- (1) A connection between drinking (potable) water and an unapproved water supply.
- (2) A connection between a storm drain system and a sanitary collection system.
- (3) Less frequently used to mean a connection between two sections of a collection system to handle anticipated overloads of one system.

DATUM LINE

A line from which heights and depths are calculated or measured. Also called a datum plane or a datum level.

DISCHARGE HEAD

The pressure (in pounds per square inch (psi) or kilopascals (kPa)) measured at the centerline of a pump discharge and very close to the discharge flange, converted into feet or meters. The pressure is measured from the centerline of the pump to the hydraulic grade line of the water in the discharge pipe.

$$\text{Discharge Head, ft} = (\text{Discharge Pressure, psi})(2.31 \text{ ft/psi})$$

or

$$\text{Discharge Head, m} = (\text{Discharge Pressure, kPa})(1 \text{ m}/9.8 \text{ kPa})$$

DRAWDOWN

- (1) The drop in the water table or level of water in the ground when water is being pumped from a well.
- (2) The amount of water used from a tank or reservoir.
- (3) The drop in the water level of a tank or reservoir.

EFFECTIVE SIZE (ES)

The diameter of the particles in a granular sample (filter media) for which 10 percent of the total grains are smaller and 90 percent larger on a weight basis. Effective size is obtained by passing granular material through sieves with varying dimensions of mesh and weighing the material retained by each sieve. The effective size is also approximately the average size of the grains.

ELECTRICAL LOGGING

A procedure used to search for water-bearing formations (aquifers) by determining the porosity (spaces or voids) of geologic materials. Electrical probes are lowered into wells, an electric current is induced at various depths, and the resistance measured indicates the porosity of the formation.

ENERGY GRADE LINE (EGL)

A line that represents the elevation of energy head (in feet or meters) of water flowing in a pipe, conduit, or channel. The line is drawn above the hydraulic grade line (gradient) a distance equal to the velocity head ($V^2/2g$) of the water flowing at each section or point along the pipe or channel. Also see HYDRAULIC GRADE LINE.

[SEE DRAWING ON PAGE 53]

EVAPORATION

The process by which water or other liquid becomes a gas (water vapor or ammonia vapor).

CONTACTOR

CONTAMINATION

CONTROLLER

CROSS CONNECTION

DATUM LINE

DISCHARGE HEAD

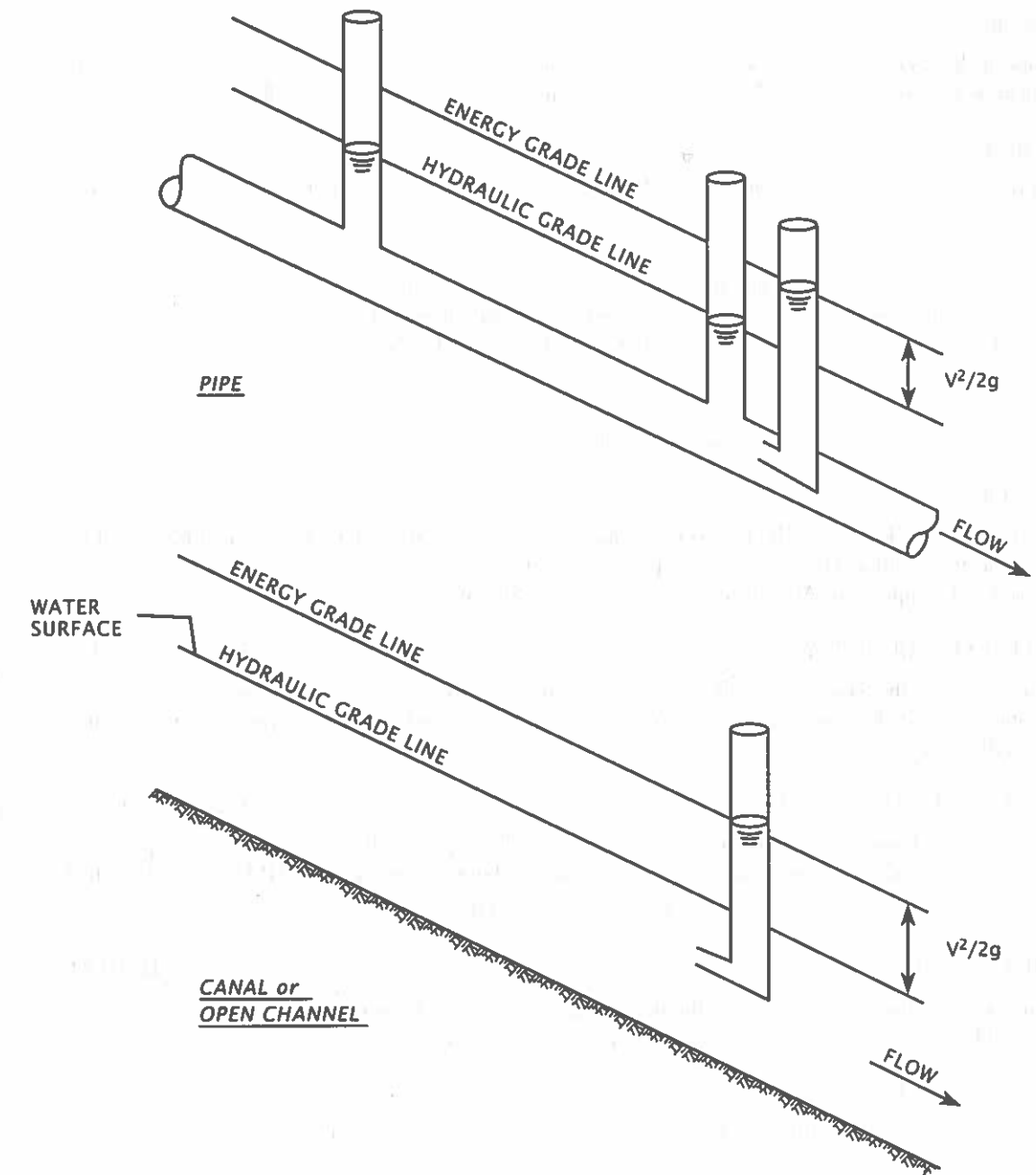
DRAWDOWN

EFFECTIVE SIZE (ES)

ELECTRICAL LOGGING

ENERGY GRADE LINE (EGL)

EVAPORATION



$$V^2/2g = \text{Velocity Head}$$

Energy grade line and hydraulic grade line

EVAPOTRANSPIRATION (ee-VAP-o-TRANS-purr-A-shun)

- (1) The process by which water vapor is released to the atmosphere from living plants. Also called TRANSPIRATION.
- (2) The total water removed from an area by transpiration (plants) and by evaporation from soil, snow, and water surfaces.

FOOT VALVE

A special type of check valve located at the bottom end of the suction pipe on a pump. This valve opens when the pump operates to allow water to enter the suction pipe but closes when the pump shuts off to prevent water from flowing out of the suction pipe.

GEOPHYSICAL LOG

A record of the structure and composition of the earth encountered when drilling a well or similar type of test hole or boring.

HEAD

The vertical distance, height, or energy of water above a reference point. A head of water may be measured in either height (feet or meters) or pressure (pounds per square inch or kilograms per square centimeter). Also see DISCHARGE HEAD, DYNAMIC HEAD, STATIC HEAD, SUCTION HEAD, SUCTION LIFT, and VELOCITY HEAD.

HEADER

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

HEAT SENSOR

A device that opens and closes a switch in response to changes in the temperature. This device might be a metal contact, or a thermocouple that generates a minute electric current proportional to the difference in heat, or a variable resistor whose value changes in response to changes in temperature. Also called a TEMPERATURE SENSOR.

HYDRAULIC CONDUCTIVITY (K)

A coefficient describing the relative ease with which groundwater can move through a permeable layer of rock or soil. Typical units of hydraulic conductivity are feet per day, gallons per day per square foot, or meters per day (depending on the unit chosen for the total discharge and the cross-sectional area).

HYDRAULIC GRADE LINE (HGL)

The surface or profile of water flowing in an open channel or a pipe flowing partially full. If a pipe is under pressure, the hydraulic grade line is that level water would rise to in a small, vertical tube connected to the pipe. Also see ENERGY GRADE LINE.

[SEE DRAWING ON PAGE 53]

HYDRAULIC GRADIENT

The slope of the hydraulic grade line. This is the slope of the water surface in an open channel, the slope of the water surface of the groundwater table, or the slope of the water pressure for pipes under pressure.

HYDROGEOLOGIST (HI-dro-jee-ALL-uh-jist)

A person who studies and works with groundwater.

HYDROLOGIC (HI-dro-LOJ-ick) 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 WATER CYCLE.

HYDROPNEUMATIC (hi-dro-new-MAT-ick)

A water system, usually small, in which a water pump is automatically controlled (started and stopped) by the air pressure in a compressed-air tank.

HYDROSTATIC (hi-dro-STAT-ick) PRESSURE

- (1) The pressure at a specific elevation exerted by a body of water at rest.
- (2) In the case of groundwater, the pressure at a specific elevation due to the weight of water at higher levels in the same zone of saturation.

EVAPOTRANSPIRATION

FOOT VALVE

GEOPHYSICAL LOG

HEAD

HEADER

HEAT SENSOR

HYDRAULIC CONDUCTIVITY (K)

HYDRAULIC GRADE LINE (HGL)

HYDRAULIC GRADIENT

HYDROGEOLOGIST

HYDROLOGIC CYCLE

HYDROPNEUMATIC

HYDROSTATIC PRESSURE

IMPELLER

A rotating set of vanes in a pump or compressor designed to pump or move water or air.

INDICATOR

- (1) (Chemical indicator) A substance that gives a visible change, usually of color, at a desired point in a chemical reaction, generally at a specified end point.
- (2) (Instrument indicator) A device that indicates the result of a measurement, usually using either a fixed scale and movable indicator (pointer), such as a pressure gauge, or a moving chart with a movable pen like those used on a circular flow-recording chart. Also called a RECEIVER.

INPUT HORSEPOWER

The total power used in operating a pump and motor.

$$\text{Input Horsepower, HP} = \frac{(\text{Brake Horsepower, HP})(100\%)}{\text{Motor Efficiency, \%}}$$

INTERLOCK

A physical device, equipment, or software routine that prevents an operation from beginning or changing function until some condition or set of conditions is fulfilled. An example would be a switch that prevents a piece of equipment from operating when a hazard exists.

INTERSTICE (in-TUR-stuhz)

A very small open space in a rock or granular material. Also called a PORE, VOID, or void space. Also see VOID.

KELLY

The square section of a rod that causes the rotation of the drill bit. Torque from a drive table is applied to the square rod to cause the rotary motion. The drive table is chain- or gear-driven by an engine.

KINETIC ENERGY

Energy possessed by a moving body of matter, such as water, as a result of its motion.

LEATHERS

O-rings or gaskets used with piston pumps to provide a seal between the piston and the side wall.

LEVEL CONTROL

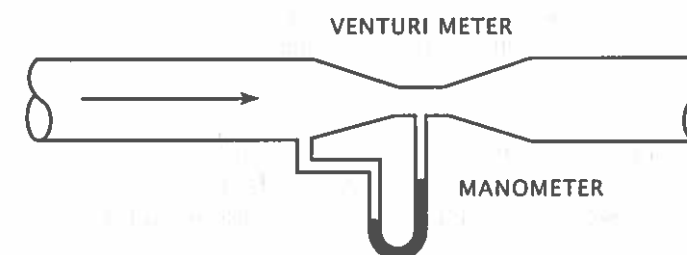
A float device (or pressure switch) that senses changes in a measured variable and opens or closes a switch in response to that change. In its simplest form, this control might be a floating ball connected mechanically to a switch or valve, such as is used to stop water flow into a toilet when the tank is full.

MANIFOLD

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

MANOMETER (man-NAH-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.



IMPELLER

INDICATOR

INPUT HORSEPOWER

INTERLOCK

INTERSTICE

KELLY

KINETIC ENERGY

LEATHERS

LEVEL CONTROL

MANIFOLD

MANOMETER

MEASURED VARIABLE

A factor (flow, temperature) that is sensed and quantified (reduced to a reading of some kind) by a primary element or sensor.

MECHANICAL JOINT

A flexible device that joins pipes or fittings together by the use of lugs and bolts.

MEG

- (1) Abbreviation of MEGOHM.
- (2) A procedure used for checking the insulation resistance on motors, feeders, bus bar systems, grounds, and branch circuit wiring. Also see MEGGER.

MEGGER (from megohm)

An instrument used for checking the insulation resistance on motors, feeders, bus bar systems, grounds, and branch circuit wiring. A megger reads in millions of ohms. Also see MEG.

MESH

One of the openings or spaces in a screen or woven fabric. The value of the mesh is usually given as the number of openings per inch. This value does not consider the diameter of the wire or fabric; therefore, the mesh number does not always have a definite relationship to the size of the hole.

MOTOR EFFICIENCY

The ratio of energy delivered by a motor to the energy supplied to it during a fixed period or cycle. Motor efficiency ratings will vary depending on motor manufacturer and usually will be near 90.0 percent.

NIOSH (NYE-osh)

The National Institute of Occupational Safety and Health is an organization that tests and approves safety equipment for particular applications. NIOSH is the primary federal agency engaged in research in the national effort to eliminate on-the-job hazards to the health and safety of working people. The NIOSH Publications Catalog, Seventh Edition, NIOSH Pub. No. 87-115, lists the NIOSH publications concerning industrial hygiene and occupational health. To obtain a copy of the catalog, write to National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161. NTIS Stock No. PB88-175013.

NAMEPLATE

A durable, metal plate found on equipment that lists critical installation and operating conditions for the equipment.

NOMINAL DIAMETER

An approximate measurement of the diameter of a pipe. Although the nominal diameter is used to describe the size or diameter of a pipe, it is usually not the exact inside diameter of the pipe.

OSHA (O-shuh)

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 also the operators of water supply systems and treatment plants. The Act regulates the design, construction, operation, and maintenance of water supply systems and water treatment plants. OSHA also refers to the federal and state agencies that administer the OSHA regulations.

OPERATING PRESSURE DIFFERENTIAL

The operating pressure range for a hydropneumatic system. For example, when the pressure drops below 40 psi in a system designed to operate between 40 psi and 60 psi, the pump will come on and stay on until the pressure builds up to 60 psi. When the pressure reaches 60 psi the pump will shut off. The operating pressure differential in this example is 20 psi.

ORIFICE (OR-uh-fiss)

An opening (hole) in a plate, wall, or partition. An orifice flange or plate placed in a pipe consists of a slot or a calibrated circular hole smaller than the pipe diameter. The difference in pressure in the pipe above and at the orifice may be used to determine the flow in the pipe. In a trickling filter distributor, the wastewater passes through an orifice to the surface of the filter media.

MEASURED VARIABLE

MECHANICAL JOINT

MEG

MEGGER

MESH

MOTOR EFFICIENCY

NIOSH

NAMEPLATE

NOMINAL DIAMETER

OSHA

OPERATING PRESSURE DIFFERENTIAL

ORIFICE

OVERALL EFFICIENCY, PUMP

The combined efficiency of a pump and motor together. Also called the WIRE-TO-WATER EFFICIENCY.

OVERDRAFT

The pumping of water from a groundwater basin or aquifer in excess of the supply flowing into the basin. This pumping results in a depletion or "mining" of the groundwater in the basin.

PCBs

Polychlorinated biphenyls. A class of organic compounds that cause adverse health effects in domestic water supplies.

PACKER ASSEMBLY

An inflatable device used to seal the tremie pipe inside the well casing to prevent the grout from entering the inside of the conductor casing.

PERCOLATING (PURR-ko-lay-ting) WATER

Water that passes through soil or rocks under the force of gravity.

PERMEABILITY (PURR-me-uh-BILL-uh-tee)

The property of a material or soil that permits considerable movement of water through it when it is saturated.

PET COCK

A small valve or faucet used to drain a cylinder or fitting.

PITLESS ADAPTER

A fitting that allows the well casing to be extended above ground while having a discharge connection located below the frost line. Advantages of using a pitless adapter include the elimination of the need for a pit or pump house and it is a watertight design, which helps maintain a sanitary water supply.

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.

PORE

A very small open space in a rock or granular material. Also called an INTERSTICE, VOID, or void space. Also see VOID.

POROSITY

- (1) A measure of the spaces or voids in a material or aquifer.
- (2) The ratio of the volume of spaces in a rock or soil to the total volume. This ratio is usually expressed as a percentage.

$$\text{Porosity, \%} = \frac{(\text{Volume of Spaces})(100\%)}{\text{Total Volume}}$$

POTABLE (POE-tuh-bull) WATER

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

PRESSURE CONTROL

A switch that operates on changes in pressure. Usually this is a diaphragm pressing against a spring. When the force on the diaphragm overcomes the spring pressure, the switch is activated.

OVERALL EFFICIENCY, PUMP

OVERDRAFT

PCBs

PACKER ASSEMBLY

PERCOLATING WATER

PERMEABILITY

PET COCK

PITLESS ADAPTER

POLLUTION

PORE

POROSITY

POTABLE WATER

PRESSURE CONTROL

PRIMARY ELEMENT

- (1) A device that measures (senses) a physical condition or variable of interest. Floats and thermocouples are examples of primary elements. Also called a SENSOR.
- (2) The hydraulic structure used to measure flows. In open channels, weirs and flumes are primary elements or devices. Venturi meters and orifice plates are the primary elements in pipes or pressure conduits.

PRIME

The action of filling a pump casing with water to remove the air. Most pumps must be primed before start-up or they will not pump any water.

PUMP BOWL

The submerged pumping unit in a well, including the shaft, impellers, and housing.

PUMPING WATER LEVEL

The vertical distance from the centerline of the pump discharge to the level of the free pool while water is being drawn from the pool.

PURVEYOR (purr-VAY-or), WATER

An agency or person that supplies water (usually potable water).

RANNEY COLLECTOR

This water collector is constructed as a dug well from 12 to 16 feet (3.5 to 5 m) in diameter that has been sunk as a caisson near the bank of a river or lake. Screens are driven radially and approximately horizontally from this well into the sand and gravel deposits underlying the river.

[SEE DRAWING ON PAGE 59]

RECEIVER

A device that indicates the result of a measurement, usually using either a fixed scale and movable indicator (pointer), such as a pressure gauge, or a moving chart with a movable pen like those used on a circular flow-recording chart. Also called an INDICATOR.

RECORDER

A device that creates a permanent record, on a paper chart, magnetic tape, or in a computer, of the changes in a measured variable.

SAFE YIELD

The annual quantity of water that can be taken from a source of supply over a period of years without depleting the source permanently (beyond its ability to be replenished naturally in "wet years").

SENSOR

A device that measures (senses) a physical condition or variable of interest. Floats and thermocouples are examples of sensors. Also called a PRIMARY ELEMENT.

SET POINT

The position at which the control or controller is set. This is the same as the desired value of the process variable. For example, a thermostat is set to maintain a desired temperature.

SLURRY

A watery mixture or suspension of insoluble (not dissolved) matter; a thin, watery mud or any substance resembling it (such as a grit slurry or a lime slurry).

SOLENOID (SO-luh-noid)

A magnetically operated mechanical device (electric coil). Solenoids can operate small valves or electric switches.

PRIMARY ELEMENT

PRIME

PUMP BOWL

PUMPING WATER LEVEL

PURVEYOR, WATER

RANNEY COLLECTOR

RECEIVER

RECORDER

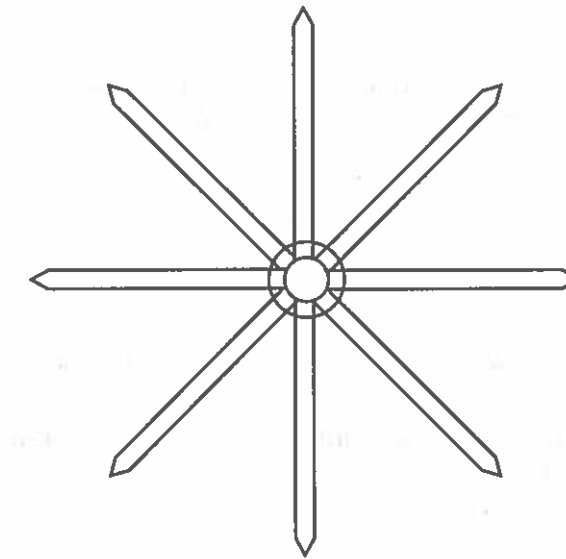
SAFE YIELD

SENSOR

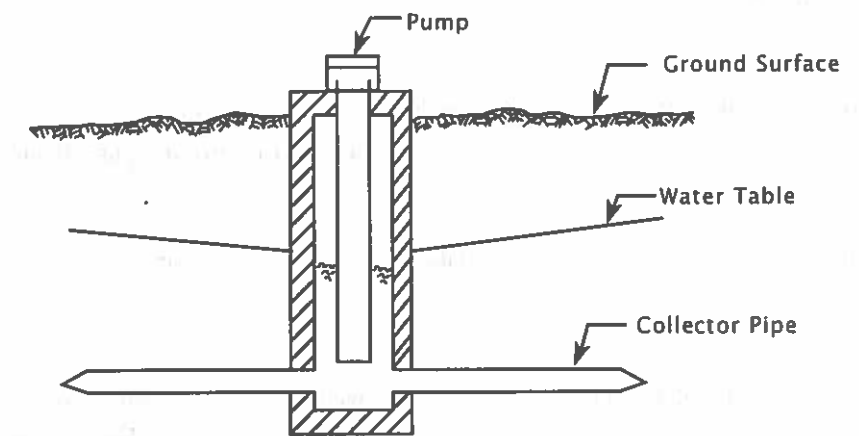
SET POINT

SLURRY

SOLENOID



PLAN VIEW OF COLLECTOR PIPES



ELEVATION VIEW

Ranney collector

SOUNDING TUBE

A pipe or tube used for measuring the depths of water.

SPECIFIC CAPACITY

A measurement of well yield per unit depth of drawdown after a specific time has passed, usually 24 hours. Typically expressed as gallons per minute per foot or cubic meters per day per meter (GPM/ft or cu m/day/m).

SPECIFIC CAPACITY TEST

A testing method used to determine the adequacy of an aquifer or well by measuring the specific capacity.

SPECIFIC GRAVITY

- (1) Weight of a particle, substance, or chemical solution in relation to the weight of an equal volume of water. Water has a specific gravity of 1.000 at 4°C (39°F). Particulates with specific gravity less than 1.0 float to the surface and particulates with specific gravity greater than 1.0 sink.
- (2) Weight of a particular gas in relation to the weight of 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.

SPECIFIC YIELD

The quantity of water that a unit volume of saturated permeable rock or soil will yield when drained by gravity. Specific yield may be expressed as a ratio or as a percentage by volume.

STARTERS (MOTOR)

Devices used to start up large motors gradually to avoid severe mechanical shock to a driven machine and to prevent disturbance to the electrical lines (causing dimming and flickering of lights).

STATIC WATER DEPTH

The vertical distance in feet (or meters) from the centerline of the pump discharge down to the surface level of the free pool while no water is being drawn from the pool or water table.

STATIC WATER LEVEL

- (1) The elevation or level of the water table in a well when the pump is not operating.
- (2) The level or elevation to which water would rise in a tube connected to an artesian aquifer, basin, or conduit under pressure.

STORATIVITY (S)

The volume of groundwater an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. Also called the storage coefficient.

SUBSIDENCE (sub-SIDE-ence)

The dropping or lowering of the ground surface as a result of removing excess water (overdraft or overpumping) from an aquifer. After excess water has been removed, the soil will settle, become compacted, and the ground surface will drop, which can cause the settling of underground utilities.

SUCTION LIFT

The negative pressure [in feet (meters) of water or inches (centimeters) of mercury vacuum] on the suction side of a pump. The pressure can be measured from the centerline of the pump down to (lift) the elevation of the hydraulic grade line on the suction side of the pump.

TIME LAG

The time required for processes and control systems to respond to a signal or to reach a desired level.

TIMER

A device for automatically starting or stopping a machine or other device at a given time.

SOUNDING TUBE

SPECIFIC CAPACITY

SPECIFIC CAPACITY TEST

SPECIFIC GRAVITY

SPECIFIC YIELD

STARTERS (MOTOR)

STATIC WATER DEPTH

STATIC WATER LEVEL

STORATIVITY (S)

SUBSIDENCE

SUCTION LIFT

TIME LAG

TIMER

TRANSDUCER (trans-DUE-sir)

A device that senses some varying condition measured by a primary sensor and converts it to an electrical or other signal for transmission to some other device (a receiver) for processing or decision making.

TRANSMISSIVITY (TRANS-miss-SIV-it-tee)

A measure of the ability to transmit (as in the ability of an aquifer to transmit water).

TRANSPIRATION (TRAN-spur-RAY-shun)

The process by which water vapor is released to the atmosphere by living plants. This process is similar to people sweating. Also see EVAPOTRANSPIRATION.

TREMIE (TREH-me)

A device used to place concrete or grout under water.

UNCONSOLIDATED FORMATION

A sediment that is loosely arranged or unstratified (not in layers) or whose particles are not cemented together (soft rock); occurring either at the ground surface or at a depth below the surface. Also see CONSOLIDATED FORMATION.

UNIFORMITY COEFFICIENT (UC)

The ratio of (1) the diameter of a grain (particle) of a size that is barely too large to pass through a sieve that allows 60 percent of the material (by weight) to pass through, to (2) the diameter of a grain (particle) of a size that is barely too large to pass through a sieve that allows 10 percent of the material (by weight) to pass through. The resulting ratio is a measure of the degree of uniformity in a granular material, such as filter media.

$$\text{Uniformity Coefficient} = \frac{\text{Particle Diameter}_{60\%}}{\text{Particle Diameter}_{10\%}}$$

VARIABLE FREQUENCY DRIVE

A control system that allows the frequency of the current applied to a motor to be varied. The motor is connected to a low-frequency source while standing still; the frequency is then increased gradually until the motor and pump (or other driven machine) are operating at the desired speed.

VARIABLE, MEASURED

A factor (flow, temperature) that is sensed and quantified (reduced to a reading of some kind) by a primary element or sensor.

VELOCITY HEAD

The energy in flowing water as determined by a vertical height (in feet or meters) equal to the square of the velocity of flowing water divided by twice the acceleration due to gravity ($V^2/2g$).

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 can be partially removed from water or wastewater by the air stripping process.
- (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°C (1,022°F). Natural volatile materials are chemical substances usually of animal or plant origin. Manufactured or synthetic volatile materials, such as plastics, ether, acetone, and carbon tetrachloride, are highly volatile and not of plant or animal origin. Also see NONVOLATILE MATTER.

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.

TRANSDUCER

TRANSMISSIVITY

TRANSPIRATION

TREMIE

UNCONSOLIDATED FORMATION

UNIFORMITY COEFFICIENT (UC)

VARIABLE FREQUENCY DRIVE

VARIABLE, MEASURED

VELOCITY HEAD

VOLATILE

WATER CYCLE

WATER HAMMER

The sound like someone hammering on a pipe that occurs when a valve is opened or closed very rapidly. When a valve position is changed quickly, the water pressure in a pipe will increase and decrease back and forth very quickly. This rise and fall in pressures can cause serious damage to the system.



WATER HAMMER

WATER TABLE

The upper surface of the zone of saturation of groundwater in an unconfined aquifer.

WATER TABLE

WELL ISOLATION ZONE

A surface or zone with restricted land uses surrounding a public water system water well or well field. The zone is established to prevent contaminants from a nonpermitted land use to move toward and reach the water well or well field. Also see WELLHEAD PROTECTION AREA.

WELL ISOLATION ZONE

WELL LOG

A record of the thickness and characteristics of the soil, rock, and water-bearing formations encountered during the drilling (sinking) of a well.

WELL LOG

WELLHEAD PROTECTION AREA (WHPA)

The surface and subsurface area surrounding a public water system water well or well field, through which contaminants are reasonably likely to move toward and reach such water well or well field. Also see WELL ISOLATION ZONE.

WELLHEAD PROTECTION AREA (WHPA)

WIRE-TO-WATER EFFICIENCY

The combined efficiency of a pump and motor together. Also called the OVERALL EFFICIENCY.

WIRE-TO-WATER EFFICIENCY

YIELD

The quantity of water (expressed as a rate of flow—GPM, GPH, GPD, cu m/day, ML/day, or total quantity per year) that can be collected for a given use from surface or groundwater sources. The yield may vary with the use proposed, with the plan of development, and also with economic considerations. Also see SAFE YIELD.

YIELD

ZONE OF SATURATION

- (1) The soil or rock located below the top of the groundwater table. By definition, the zone of saturation is saturated with water. Also see WATER TABLE.
- (2) Where raw wastewater is exfiltrating from a sewer pipe, the area of soil that is moistened around the leak point is often called the zone of saturation.

ZONE OF SATURATION