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State and Federal Regulations Affecting Confinement Livestock Operations

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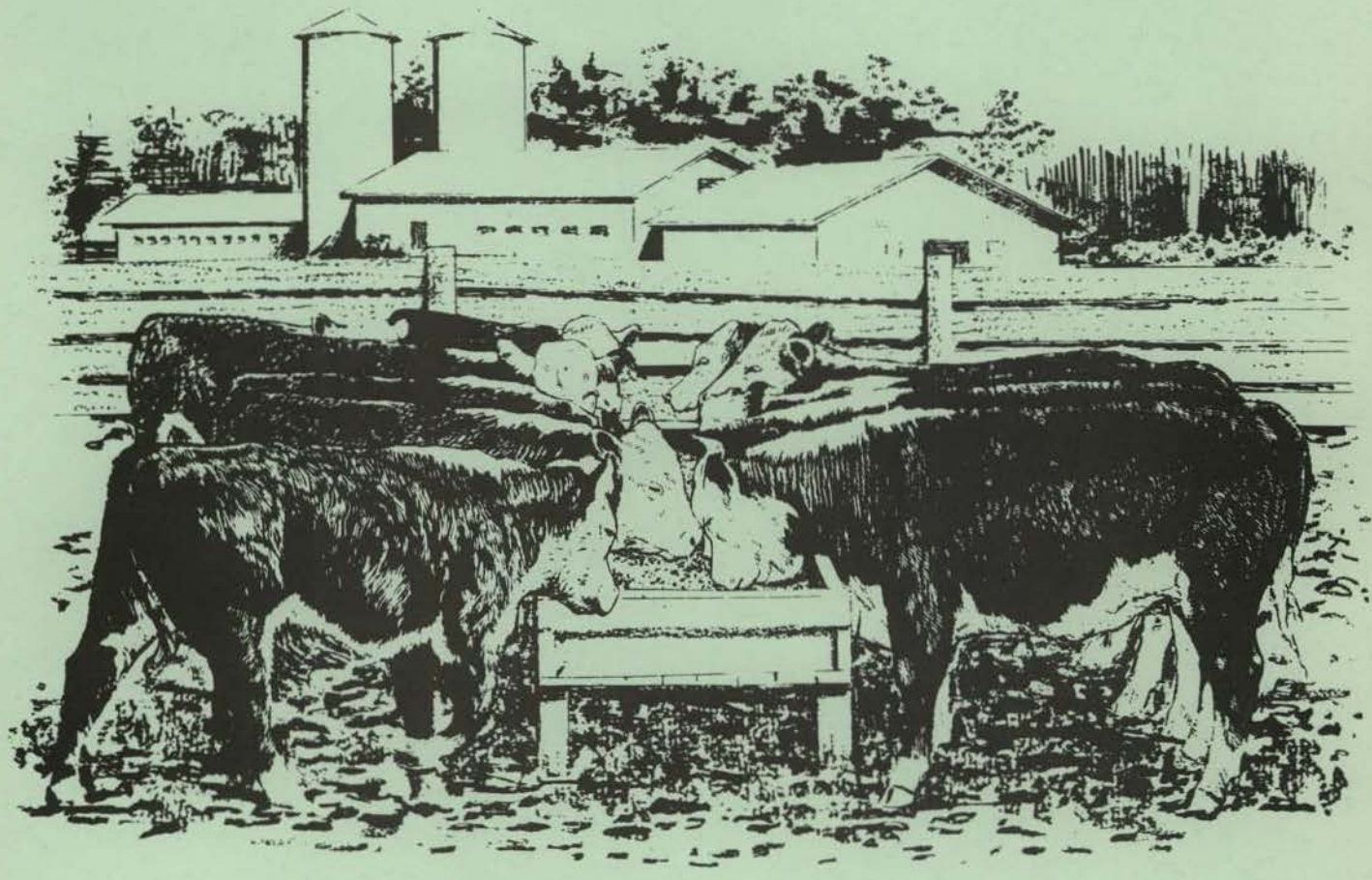

Cooperative Extension Service
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Until recent years, few if any state or federal regulations were applied to the management of waste from livestock facilities. Wastes were handled by the owners as they saw fit, at least until the wastes became a public nuisance. The increased number of people moving to rural areas to live together with increased numbers of animals confined in small areas have created concerns about waste problems within rural communities. This has led to more aggressive ways to enforce the management of livestock waste.

Regulation of water quality comes under both State and Federal jurisdiction. State of Idaho water quality regulations are found in the following sections of Idaho Water Quality Standards:

1. **Section 1-2200, General Water Quality Standards** — As a result of man-caused point or non-point source discharge. Excess nutrient discharges and oxygen-demanding material are the major areas of concern related to livestock production.
2. **Section 1-2280, Rock Creek, Cedar Draw, Deep Creek and Big Wood River-Canal System** — Protects the canal systems from use as a spillway, collection facility or means of conveyance for livestock waste.
3. **Section 1-2800, Hazardous and Deleterious Material Storage** — Also applies to manure storage.
4. **Section 1-2110 through 1-2160** — Covers multi-use waterways. Several specific waterways are designated for beneficial uses, such as agriculture.

All other Waterways are covered in Section 1-2250.

Other State regulations that may apply to an operation are as follows:

5. **Title 37, Idaho Code, Idaho Department of Agriculture** — Contains regulations that may pertain to dairy operations.
6. **Title 2, Chapter 18, Idaho Department of Health** — Covers Rules and Regulations Governing Grade A Pasteurized Milk. Also contains some regulations that may apply to dairy operations.

Environmental Protection Agency (EPA) regulations governing Confinement Animal Feeding Operations (CAFO) are found in the Clean Water Act's (CWA) National Pollutant Discharge Elimination System (NPDES) permit program. Effective July 1, 1987, the EPA began issuing a general permit that applies the same effluent limitations and requirements to all discharging CAFOs within the state.

The following is a summary of the EPA regulations as they apply to dairies and feedlot operations for the State of Idaho.

To understand the implications of the EPA permit process as it affects the Idaho livestock producer, one must identify to whom the regulations apply. Any Confinement Animal Feeding Operation that meets both of the following criteria is subject to the regulations and requirement for a permit:

1. Manure or wastewater is discharged into surface water. An example would be runoff from a corral that enters a live stream or irrigation canal.
2. More than 300 feeder cattle or dairy heifers, or 200 mature dairy cattle, are confined for at least 45 days in any 12-month period.

If a permit is obtained, a discharge may be made when unusual circumstances exist, such as a record storm or when excessive winter runoff occurs. This discharge is allowed only if there is a properly designed collection or storage facility that has accounted for runoff from a 25-year, 24-hour storm and has also included 3 inches of runoff from winter precipitation.

If no permit has been issued and a discharge occurs, the producer would be subject to penalties and/or may be placed on a schedule to upgrade the facilities to come into compliance.

An operation that does not qualify by size, but discharges one or more times, may also be required to obtain a permit.

If a discharge occurs, the producer, as a permit holder, is obligated to notify the EPA with the following information:

1. A description, the cause and the estimated volume of the discharge. If the cause of the discharge is weather-related, the specific weather conditions such as amount of precipitation and the time it occurred should be included.
2. The time period of the discharge, the estimated length of time the discharge was made and corrective actions taken to prevent further discharge or a reoccurrence of the discharge.

To be covered by general permit for the state, which allows for discharges under the specified conditions, a dairyman or feedlot operator must send a letter stating an intent to be covered by the EPA permit.

The following information should be contained in the letter in which the producer requests to be covered by the general permit:

1. Previous NPDES permit number if applicable;
2. Owner's name and address;
3. Operator's name, address and telephone number;
4. Name, address and location of the facility;
5. Description of the waste handling, treatment and management methods currently in use;
6. Type and number of animals in open or housed confinement;
7. Number of acres used for confined feeding and holding;
8. Name of surface waters into which a discharge might occur;
9. A sketch of the operation showing arrangement of buildings and pens, diversion ditches, waste storage facilities, slope and location of surface waters.

Letters requesting coverage under the general permit for the State of Idaho should be sent to the following addresses:

Required:

U.S. Environmental Protection Agency
Water Permits and Compliance Branch
WD-134 1200 6th Ave.
Seattle, WA 98101

and

Idaho Dept. of Health and Welfare
Administrator
Division of Environmental Quality
Statehouse
Boise, ID 83720

Recommended:

U.S. Environmental Protection Agency
Idaho Operations Office
422 West Washington
Boise, ID 83720

and Idaho Dept. of Health and Welfare Division of Environmental Quality (appropriate field office)

Coeur d'Alene Field Office
2110 Iron Wood Parkway
Coeur d'Alene, ID 83814

Lewiston Field Office
1118 F St.
Lewiston, ID 83501

Boise Field Office
801 Reserve Street
Boise, ID 83720

Twin Falls Field Office
963 Blue Lakes Blvd., Suite 1
P.O. Box 1626
Twin Falls, ID 83301

Pocatello Field Office
150 N. 3rd Ave.
Pocatello, ID 83201

Non-compliance with the NPDES requirements will be dealt with in one of three ways. First, an inspection will be made to verify that a failure to comply exists and a warning letter will be sent to the producer. Second, if continued violations occur, letters will be sent to the producer requesting information on the violations and a second letter will establish a schedule for compliance. The third and final step results in formal enforcement action and civil penalties up to a maximum of $25,000 per day for each violation of the permit requirements.

While the regulations spell out that process waste (water and manure deposited in the barn) and runoff must be contained, they do not specify the type of system that must be used to contain the waste. Several alternatives are available depending on the producer's specific situation. The three basic types of systems from which one may choose to handle livestock waste are (1) storage facilities, (2) anaerobic lagoons and (3) aerobic lagoons.

Storage Facilities

Storage systems are designed to hold a specific volume and use no biological treatment measures. The EPA recommends that the storage system should be designed to hold waste for a period of 6 months. This allows flexibility in timing the application of the waste to the soil. To reduce the risk of runoff, wastes should be applied when the soil is not frozen. Storage facilities may be a single cell or may be two cells. A single cell is easier to construct because plumbing needs are less. The benefit of a structure with two cells is that one cell can be dried up and cleaned while the other is in use.

A storage system should be designed to contain the process water as well as corral runoff that results from winter precipitation and corral runoff from 25-year, 24-hour storms. Any drainage that might come from a dry manure storage must also be contained, since this effluent is a pollutant as well. Runoff from the corrals

might be contained in a separate structure such as another pond or an evaporation ditch.

The storage facility is the simplest waste-containment system to design and operate since it is concerned only with volume, not with biological considerations. The limitation of the storage facility, however, is that all the waste must be disposed of by application to the soil. A storage facility also may have more odor problems than other means of handling waste.

Aerobic Facilities

An aerobic facility is designed to have liquid and waste deposited on a daily basis into a lagoon where the waste is degraded by aerobic organisms. The amount of waste or organic matter placed into an aerobic lagoon results in a "load" on the lagoon. The allowable amount of load per day on a lagoon is limited by a prescribed loading rate. A lagoon that is loaded properly will develop a sufficient level of aerobes to degrade the waste that comes into the lagoon.

Aerobic lagoons are usually only 3 to 5 feet deep and have a large surface area. The shallow depth and large surface area allows for oxygenation of the water. Oxygenation takes place when atmospheric oxygen is dissolved in the water. This provides the necessary dissolved oxygen to support the aerobic bacteria which digest the organic matter in the waste.

Size requirements of current waste regulations usually make it impractical to consider aerobic systems unless odor reduction is necessary.

Anaerobic Facilities

Anaerobic lagoons, like aerobic lagoons, will provide for the treatment of livestock waste. The difference is that the environment of the anaerobic lagoon is nearly devoid of oxygen. Anaerobic lagoons are not designed to purify the water they contain. Rather they provide effective storage of the livestock waste and at the same time allow the process of anaerobic decomposition to break down the organic matter in the waste until it can be applied to cropland.

One of the advantages of anaerobic treatment is that this type of lagoon uses a much heavier concentration of solids to liquid than does the aerobic lagoon. An anaerobic lagoon is deep, commonly 12 to 20 feet deep. An anaerobic lagoon will perform better if it is covered to retard the aeration process. On most anaerobic lagoons, the surface will form a "crust" that will provide a barrier between the atmospheric oxygen and the contents of the lagoon.

Since little if any evaporation occurs in anaerobic lagoons, they require more maintenance and operating labor than the aerobic lagoon. Anaerobic lagoons must be pumped dry and have the remaining solids cleaned out periodically, depending on the length of time they were designed to treat the waste.

Anaerobic systems do not have a major role in the containment of livestock wastes at this time since these systems require a larger size than is required for a containment structure. In addition, anaerobic systems produce hydrogen sulfide or rotten egg gas which makes them a less desirable system.

Solid Separator Facilities

The most effective way to handle wastes is to handle the solids as dry solids. Reducing the volume entering a storage or treatment structure reduces labor needed to clean ponds and to maintain the original storage volume of the structure. A system for solid separation can significantly reduce the amounts of solids entering the lagoon.

A solid separator will accomplish two different purposes: (1) reduce the volume to be stored, and (2) reduce the "load" placed on a lagoon by reducing the amounts of material requiring biological digestion.

Solid separators may be mechanical or may simply be a device used to settle out the majority of the solids. In one check done by the Division of Environment, total solids were reduced by 75 percent when a simple settling device was used. Even higher amounts of the solids can be extracted using a mechanical separator.

Regardless of the type of system being used, solid separation should be strongly considered as a part of the total plan. The fewer solids entering a lagoon or liquid storage system, the fewer the problems with the system.

Summary

The new regulations that affect the management of livestock waste are straightforward. Yet they allow producers the flexibility to design a system that will fit their particular situations. The requirements to contain the waste at the point of origin are reasonable for both the operator and for the protection of the environment. In many cases, proper management of waste will reduce the potential for disease and may even increase the efficiency of the animals.

Additional Sources of Information

Sources 1 and 2 provide pertinent guidance in design, operation and maintenance of livestock waste systems.

1. Midwest Plans Service. 1985. Livestock waste facilities handbook, MWPS-18. Iowa State Univ.
2. Idaho Department Health and Welfare. 1987. Idaho waste management guidelines for concentrated animal feeding operations. A report of the Water Quality Bureau, Division of Environment, Boise, ID.
3. USDA Soil Conservation Service. 1975. Agricultural waste management field guide.
4. Ohlensehlen, Robert M. 1986. Dairy waste management, a technical paper presented in partial fulfillment of an M.S. degree, Univ. of Idaho, Moscow.

Glossary of Animal Waste Management Terms

Aeration — Intimate contact between air and a liquid effected by bubbling air through the liquid or by agitation of the liquid to promote surface absorption of air.

Aerobic — Living or active only in the presence of oxygen.

Aerobic bacteria — Bacteria that require the presence of free (dissolved or molecular) oxygen for their metabolic processes. (Oxygen in chemical combination will not support aerobic organisms.)

Aerobic decomposition — Reduction of the net energy level of organic matter by aerobic microorganisms.

Aerobic lagoon — See Lagoon.

Agitation — The turbulent remixing of liquid and settled solids.

Agricultural waste — Wastes that originate from agriculture. Most such wastes are associated with the production of food and fiber on farms, ranges and forests. These wastes normally include animal manure, crop residues, dead animals and agricultural chemicals. Municipal solid wastes, effluents and sludges disposed of in agricultural areas are considered agriculture-related wastes in this publication.

Algae — Primitive plants, one or many-celled, usually aquatic and capable of synthesizing their food by photosynthesis.

Alkalinity — A quantitative measure of the capacity of liquids or suspensions to neutralize strong acids or to resist the establishment of acidic conditions. Alkalinity results from the presence of bicarbonates, carbonates, hydroxides, volatile acids, salts and occasionally borates, silicates and phosphates. Numerically, alkalinity is expressed in terms of the concentration of calcium carbonates that have an equivalent capacity to neutralize strong acids.

Anaerobic — Living or active in the absence of oxygen.

Anaerobic bacteria — Bacteria that do not require the presence of free or dissolved oxygen for metabolism.

Anaerobic decomposition — Reduction of the net energy level and change in chemical composition of organic matter caused by microorganisms in an anaerobic environment.

Bacteria — Primitive plants, generally free of pigment, that reproduce by dividing in one, two or three planes. They occur as single cells, chains, filaments, well-oriented groups or amorphous masses. Most bacteria do not require light, but a limited number are photosynthetic and draw upon light for energy. Most bacteria are heterothrophic (utilize organic matter for energy and for growth materials), but a few are autotrophic and derive their bodily needs from inorganic materials.

Bedding — Material, usually organic, placed on the floor surface of livestock buildings for animal comfort and to absorb urine and other liquids and promote cleanliness in the building.

BOD (Biochemical Oxygen Demand) — An indirect measure of the concentration of biologically degradable material present in organic wastes; the amount of free oxygen used by aerobic organisms when allowed to attack the organic matter in an aerobically maintained environment at a specified temperature (20°C) for a specific time period (5 days). BOD is expressed in milligrams of oxygen used per liter of liquid waste volume (mg/1) or in milligrams of oxygen per kilogram of waste solution (mg/kg = ppm = parts per million).

Biodegradation (biodegradability) — The destruction or mineralization of either natural or synthetic organic materials by the microorganisms populating soils, natural bodies of water or wastewater-treatment systems.

Biological stabilization — Reduction in the net energy level of organic matter and reduction in its tendency to putrefy, as a result of the metabolic activity of organisms.

Biological treatment — Organic waste treatment in which bacterial and/or biochemical action is intensified under controlled conditions.

Chemical oxidation — Oxidation of organic substances without benefit of living organisms. Examples are by thermal combustion or by oxidizing agents such as chlorine.

CAFO — A concentrated animal feeding operation with potential for pollution of Idaho's surface and ground water.

COD (Chemical Oxygen Demand) — An indirect measure of the biochemical load exerted on the oxygen content of a body of water when organic wastes are introduced into the water. COD is determined by the amount of potassium dichromate consumed in a boiling mixture of chromic and sulfuric acids. The amount of oxidizable organic matter is proportional to the potassium dichromate consumed. If the wastes contain only readily available organic bacterial food and no toxic matter, the COD values can be correlated with BOD values obtained from the same wastes.

Composting — Present-day composting is the aerobic, thermophilic decomposition of organic waste to relatively stable humus. Humus with no more than 25 percent dead or living organisms is stable enough not to reheat or cause odor or fly problems. It can undergo further, slower decay. In composting, mixing and aeration are provided to maintain aerobic conditions and permit adequate heat development. The decomposition is done by aerobic organisms, primarily bacteria, actinomycetes and fungi.

Contamination — A general term signifying the introduction into water of microorganisms, chemical, organic or inorganic wastes or sewage, which renders the water unfit for its intended use.

Dehydration — The chemical or physical process whereby water in either chemical or physical combination is removed from other matter.

Denitrification — The process by which nitrates or nitrites in the soil or organic deposits are reduced to ammonia or free nitrogen by bacterial action.

Digestion — Though aerobic digestion is being used, the term digestion commonly refers to the anaerobic breakdown of organic matter in water solution or suspension into compounds that are simpler or more biologically stable, or both. Organic matter is decomposed to soluble organic acids or alcohols and then converted to gases such as methane and carbon dioxide. Bacterial action alone never completely destroys organic solid materials.

Dissolved oxygen — The oxygen dissolved in sewage, water or other liquid and usually expressed as milligrams per liter or as percent of saturation.

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

Evaporation rate — The quantity of water that is evaporated from a specified surface per unit of time, generally expressed in inches or centimeters per day, month or year.

Facultative bacteria — Bacteria that can exist and reproduce under aerobic or anaerobic conditions.

Facultative decomposition — Reduction of the net energy level of organic matter by facultative microorganisms.

Fertilizer value — The worth of plant nutrients contained in wastes and available to plants when the waste is applied to soil. A monetary value assigned to a quantity of organic waste represents the cost of obtaining the same type and amount of plant nutrients in commercial form. The worth of waste as fertilizer can be estimated only for given soil conditions and other pertinent factors such as land availability, time and handling.

Filtration — The process of straining a liquid through a porous medium to remove suspended or colloidal material contained in the influent liquid.

Gasification — The process or processes whereby solid or liquid matter is converted to gases such as carbon dioxide, methane or ammonia through biological activity.

Holding pond — An impoundment made by constructing a dam or embankment or by excavation or a combination thereof, for temporary storage of livestock or other agricultural wastes, waste water or polluted runoff.

Infiltration rate — The rate at which water enters the soil. Units are usually inches of water per hour.

Influent — A liquid that flows into a containing space.

Lagoon — Also see Holding pond. An all-inclusive term commonly given to a water impoundment in which organic wastes are stored or stabilized or both. Lagoons may be described by the predominant biological characteristics (aerobic, anaerobic or facultative), by location (indoor, outdoor), by position in a series (first stage, second stage, etc.) and by the organic material accepted (sewage, sludge, manure or other).

Liquefication — Any of several processes whereby solids are converted to liquids. Suspended solids can be liquefied by the biochemical action of microorganisms or by the physical-chemical process of dissolving. Liquefication as a term is often applied to the operation whereby water or agitation or both are used to convert semisolid manure into thick slurries or thinner solid suspensions.

Liquid manure — A suspension of livestock manure in water in which the concentration of manure solids is low enough that flow characteristics of the mixture are more like those of Newtonian fluids than of plastic fluids. Synonymous with slurry.

Manure — The fecal and urinary defecations of livestock and poultry. Manure may often contain some spilled feed, bedding or litter.

Manure flume or gutter — Any restricted passageway, open along its full length to the atmosphere, through which liquid moves by gravity.

Manure pit or tank — A storage unit in which accumulations of manure are collected before treatment or disposal. Water may be added in the pit to promote liquefication.

Manure stack — A place with an impervious floor and side walls to contain manure and bedding until it may be recycled.

Milkcenter wastes — The wastewater containing milk residues, detergents and manure generated in the milkcenter.

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

Oxidation — Combining of oxygen with organic waste to produce simple chemical compounds such as carbon dioxide, water, nitrates, etc.

Oxidation ditch — A shallow and continuous ditch, often oval in shape, around which liquid wastes are circulated by rotors or propellers which also transfer oxygen from the atmosphere for aerobic treatment.

Oxidation lagoon or pond — Synonymous with aerobic lagoon.

pH — The symbol for the logarithm of the reciprocal of hydrogen ion concentration, expressed in moles per liter of a solution and used to indicate an acid or alkaline condition. A pH of 7 indicates neutrality; less than 7 is acid; greater than 7 is alkaline.

Percolation — The movement of water through soil.

Percolation rate — The rate, usually expressed as a velocity, at which water moves through saturated granular material.

Pesticide — A chemical substance used to kill or control pests such as weeds, insects, algae, rodents and other undesirable agents.

Pollution — The presence in a body of water (or soil or air) of substances of such character and in such quantities that the natural quality of the body of water (or soil or air) is degraded so as to impair its usefulness or render it offensive to the senses.

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

Sedimentation basin or tank — A basin or tank in which a liquid (water, sewage, liquid manure) containing settleable suspended solids is retained until part of the suspended solids settle out by gravity.

Seepage — The movement of liquid through the ground surface. Influent seepage is movement of liquid from surface bodies of water into the soil. Effluent seepage is discharge of liquid from within the soil to the surface of the soil or to surface waters.

Septic — A putrefactive condition produced by anaerobic decomposition of organic wastes, usually accompanied by production of malodorous gases.

Settleable solids — Those suspended solids contained in waste water that separate by settling when the carrier liquid is held in a quiescent condition for a specified time interval.

Sludge — The accumulated settled solids deposited from sewage or other raw or treated wastes in lagoons, basins or tanks, and containing enough water to form a semiliquid mass.

Suspended solids — Solids either floating or suspended in water, sewage or other liquid wastes and that can be removed by laboratory filtering.

Solids content — The residue from water, sewage, other liquids or semi-solid masses when moisture is evaporated and the remainder is dried at a specified temperature (usually 103°C).

Solid/liquid separation — See Sedimentation basin or tank and Settleable solids.

Total solids — The sum of dissolved and undissolved constituents in water or wastewater, usually stated in milligrams per liter.

Volatile solids — That portion of total or suspended solids driven off as volatile (combustible) gases at a specified temperature and time (usually 600°C for 1 hour).

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