Glossary of Environmental Terms

Abatement. Reducing the degree or intensity of, or eliminating, pollution.

Absorption. The passage of one substance into or through another; e.g., an operation in which one or more soluble components of a gas mixture are dissolved in a liquid.

Accident site. The location of an unexpected occurrence, failure, or loss, either at a plant or along a transportation route, resulting in a release of hazardous materials.

Acid deposition. A complex chemical and atmospheric phenomenon that occurs when emissions of sulfur and nitrogen compounds and other substances are transformed by chemical processes in the atmosphere, often far from the original sources, and then deposited on earth in either a wet or a dry form. The wet forms, popularly called "acid rain," can fall as rain, snow, or fog. The dry forms are acidic gases or particulates.

Acid rain. *See* Acid deposition

Activated carbon. A highly adsorbent form of carbon used to remove odors and toxic substances from liquid or gaseous emissions. In waste treatment, it is used to remove dissolved organic matter from wastewater. It is also used in motor vehicle evaporative control systems.

Activated sludge. Residue that results when primary effluent is mixed with bacteria-laden sludge and then agitated and aerated to promote biological treatment. This speeds breakdown of organic matter in raw sewage undergoing secondary wastewater treatment.

Active ingredient. In any pesticide product, the component that kills, or otherwise controls, target pests. Pesticides are regulated primarily on the basis of active ingredients.

Acute exposure. A single exposure to a toxic substance that results in severe biological harm or death. Acute exposures are usually characterized as lasting no longer than a day.

Acute toxicity. The ability of a substance to cause poisonous effects resulting in severe biological harm or death soon after a single exposure or dose; also, any severe poisonous effect resulting from a single short-term exposure to a toxic substance. *See also* Chronic toxicity; Toxicity

Adaptation. Changes in an organism's structure or habit that help it adjust to its surroundings.

Add-on control device. An air pollution control device such as a carbon adsorber or incinerator that reduces the pollution in an exhaust gas. The control device usually does not affect the process being controlled and thus is "add-on" technology as opposed to a scheme to control pollution by making some alteration to the basic process.

Adsorption. 1. Adhesion of molecules of gas, liquid, or dissolved solids to a surface. 2. An advanced method of treating wastes in which

Note: This glossary is based on United States Environmental Protection Agency, Office of Communications and Public Affairs, "Glossary of Environmental Terms and Acronym List," 19K-1002 (Washington, D.C., December 1989).

activated carbon removes organic matter from wastewater.

Advanced wastewater treatment. Any treatment of sewage that goes beyond the secondary or biological water treatment stage and includes the removal of nutrients such as phosphorus and nitrogen and a high percentage of suspended solids. *See also* Primary wastewater treatment; Secondary wastewater treatment

Aeration. A process that promotes biological degradation of organic water. The process may be passive (as when waste is exposed to air), or active (as when a mixing or bubbling device introduces the air).

Aerobic. Life or processes that require, or are not destroyed by, the presence of oxygen. *See also* Anaerobic

Aerobic treatment. Process by which microbes decompose complex organic compounds in the presence of oxygen and use the liberated energy for reproduction and growth. Types of aerobic processes include extended aeration, trickling filtration, and rotating biological contactors.

Aerosol. A suspension of liquid or solid particles in a gas.

Agricultural pollution. The liquid and solid wastes from farming, including runoff and leaching of pesticides and fertilizers; erosion and dust from plowing; animal manure and carcasses; and crop residues and debris.

Airborne particulates. Total suspended particulate matter found in the atmosphere as solid particles or liquid droplets. The chemical composition of particulates varies widely, depending on location and time of year. Airborne particulates include windblown dust, emissions from industrial processes, smoke from the burning of wood and coal, and the exhaust of motor vehicles.

Air mass. A widespread body of air that gains certain meteorological or polluted characteristics—for example, a heat inversion or smokiness—while standing in one location. The characteristics can change as the air mass moves away. *See also* Inversion

Air monitoring. See Monitoring.

Air pollutant. Any substance in air that could, in high enough concentration, harm human beings, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of matter capable of being airborne. They may be in the form of solid particles, liquid droplets, gases, or combinations of these states. Generally, they fall into two main groups: (a) those emitted directly from identifiable sources and (b) those produced in the air by interaction between two or more primary pollutants or by reaction with normal atmospheric constituents, with or without photoactivation. Exclusive of pollen, fog, and dust, which are of natural origin, about 100 contaminants have been identified. They fall into the following categories: solids, sulfur compounds, volatile organic chemicals, nitrogen compounds, oxygen compounds, halogen compounds, radioactive compounds, and odors.

Air pollution. The presence of contaminant or pollutant substances in the air that do not disperse properly and interfere with human health or welfare or produce other harmful environmental effects.

Air pollution episode. A period of abnormally high concentration of air pollutants, often due to low winds and temperature inversion, that can cause illness and death. *See also* Inversion

Algae. Simple rootless plants that grow in sunlit waters in relative proportion to the amounts of nutrients available. They can affect water quality adversely by lowering the dissolved oxygen in the water. Algae are food for fish and small aquatic animals.

Algal blooms. Sudden spurts of algal growth that can affect water quality adversely and that indicate potentially hazardous changes in local water chemistry.

Ambient air. Any unconfined portion of the atmosphere: open air, surrounding air.

Anaerobic. A life or process that occurs in, or is not destroyed by, the absence of oxygen.

Aquifer. An underground geological formation, or group of formations, containing usable amounts of groundwater that can supply wells and springs.

Assimilation. The ability of a body of water to purify itself of pollutants.

Atmosphere (as a measurement)**.** A standard unit of pressure representing the pressure exerted by a 29.92-inch column of mercury at sea level at 45° latitude and equal to 1,000 grams per square centimeter.

Attenuation. The process by which a compound is reduced in concentration over time, through adsorption, degradation, dilution, or transformation.

Background level. In air pollution control, the concentration of air pollutants in a definite area during a fixed period of time prior to the starting up or on the stoppage of a source of emission under control. In toxic substances monitoring, the average presence in the environment, originally referring to naturally occurring phenomena.

Bacteria (singular: bacterium). Microscopic living organisms that can aid in pollution control by consuming or breaking down organic matter in sewage or by similarly acting on oil spills or other water pollutants. Bacteria in soil, water, or air can cause human, animal, and plant health problems.

Baghouse filter. Large fabric bag, usually made of glass fibers, used to eliminate intermediate and large (greater than 20 microns in diameter) particles. This device operates in a way similar to the bag of an electric vacuum cleaner, passing the air and smaller particulate matter while entrapping the larger particulates.

Bar screen. In wastewater treatment, a device used to remove large solids.

Benthic organism (benthos). A form of aquatic plant or animal life found on or near the bottom of a stream, lake, or ocean.

Bioaccumulative. Substances that are very slowly metabolized or excreted by living organisms and thus increase in concentration within the organisms as the organisms breathe contaminated air, drink contaminated water, or eat contaminated food. *See also* Biological magnification

Bioassay. Using living organisms to measure the effect of a substance, factor, or condition by comparing before-and-after data; often used to mean cancer bioassays.

Biochemical oxygen demand (BOD). A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the BOD, the greater the degree of pollution. In this *Handbook*, BOD is understood to be BOD_5, the amount of dissolved oxygen so consumed in five days.

Biodegradable. The ability to break down or decompose rapidly under natural conditions and processes.

Biological control. In pest control, the use of animals and organisms that eat or otherwise kill or outcompete pests.

Biological magnification. Refers to the process whereby certain substances such as pesticides or heavy metals move up the food chain, work their way into a river or lake, and are eaten by aquatic organisms such as fish, which in turn are eaten by large birds, animals, or humans. The substances become concentrated in tissues or internal organs as they move up the chain.

Biological oxidation. The way bacteria and microorganisms feed on and decompose complex organic materials; used in self-purification of water bodies and in activated sludge wastewater treatment.

Biological treatment. A treatment technology that uses bacteria to consume waste and thus break down organic materials.

Biomass. All the living material in a given area; often refers to vegetation. Also called *biota.*

Biomonitoring. 1. The use of living organisms to test the suitability of effluents for discharge into receiving waters and to test the quality of such waters downstream from the discharge. 2. Analysis of blood, urine, tissues, etc., to measure chemical exposure in humans.

Biotechnology. Techniques that use living organisms or parts of organisms to produce a variety of products—from medicines to industrial enzymes–to improve plants or animals or to develop microorganisms for specific uses such as removing toxics from bodies of water or for pesticides.

BOD_5. The amount of dissolved oxygen consumed in five days by biological processes breaking down organic matter.

Brackish water. A mixture of fresh and salt water.

Bubble. A system under which existing emissions sources can propose alternate means for complying with a set of emissions limitations; under the bubble concept, sources can hold emissions to a lower level, where this is cost-effective, in return for a comparable realization of controls at a second emission point where costs are higher.

By-product. Material, other than the principal product, that is generated as a consequence of an industrial process.

Cadmium (Cd). A heavy metal element that accumulates in the environment.

Carbon adsorber. An add-on control device that uses activated carbon to absorb volatile organic compounds (VOCs) from a gas stream. The VOCs are later recovered from the carbon.

Carbon dioxide (CO_2). A colorless, odorless, nonpoisonous gas that results from fossil fuel combustion and is normally a part of the ambient air.

Carbon monoxide (CO). A colorless, odorless, poisonous gas produced by incomplete fossil fuel combustion.

Carcinogen. Any substance that can cause or contribute to the production of cancer.

Catalytic converter. An air pollution abatement device that removes pollutants from motor vehicle exhaust, either by oxidizing them into carbon dioxide and water or by reducing them to nitrogen and oxygen.

Catalytic incinerator. A control device that oxidizes volatile organic compounds (VOCs) by using a catalyst to promote the combustion process. Catalytic incinerators require lower temperatures than conventional thermal incinerators, yielding fuel and cost savings.

Cells. 1. In solid waste disposal, holes in which waste is dumped, compacted, and covered with layers of dirt on a daily basis. 2. The smallest structural part of living matter capable of functioning as an independent unit.

Chemical oxygen demand (COD). A measure of the oxygen required to oxidize all compounds in water, both organic and inorganic.

Chemical treatment. Any one of a variety of technologies that use chemicals or a variety of chemical processes to treat waste.

Chlorinated hydrocarbons. A category which includes a class of persistent, broad-spectrum insecticides that linger in the environment and accumulate in the food chain. Among them are DDT, aldrin, dieldrin, heptaclor, chlordane, lindane, endrin, mirex, hexachloride, and toxaphene. Trichloroethylene (TCE), used as an industrial solvent, is also a chlorinated hydrocarbon.

Chlorinated solvent. An organic solvent containing chlorine atoms, e.g., methylene chloride and 1,1,1-trichloromethane, which is used in aerosol spray containers and in roadway paint.

Chlorination. The application of chlorine to drinking water, sewage, or industrial waste to disinfect or to oxidize undesirable compounds.

Chlorofluorocarbons (CFCs). A family of inert, nontoxic, and easily liquefied chemicals used in

refrigeration, air conditioning, packaging, and insulation or as solvents and aerosol propellants. Because CFCs are not destroyed in the lower atmosphere, they drift into the upper atmosphere, where their chlorine components destroy ozone.

Chromium. *See* Heavy metals

Chronic toxicity. The capacity of a substance to cause long-term poisonous human health effects. *See also* Acute toxicity

Cleanup. Actions taken to deal with a release or threat of release of a hazardous substance that could affect humans, the environment, or both. The term is sometimes used interchangeably with the terms *remedial action*, *removal action*, *response action*, or *corrective action*.

Coagulation. A clumping of particles in wastewater to settle out impurities; often induced by chemicals such as lime, alum, and iron salts.

Coliform index. A rating of the purity of water based on a count of fecal bacteria.

Coliform organism. Microorganisms found in the intestinal tracts of humans and animals. Their presence in water indicates fecal pollution and potentially dangerous bacterial contamination by disease-causing microorganisms.

Combined sewers. A sewer system that carries both sewage and stormwater runoff. Normally, its entire flow goes to a waste treatment plant, but during a heavy storm the stormwater volume may be so great as to cause overflows. When this happens, untreated mixtures of stormwater and sewage may flow into receiving waters. Stormwater runoff may also carry toxic chemicals from industrial areas or streets into the sewer system.

Comminution. Mechanical shredding or pulverizing of waste; used in both solid waste management and wastewater treatment.

Compaction. Reduction of the bulk of solid waste by rolling and tamping.

Composting. The natural biological decomposition of organic material in the presence of air to form a humus-like material. Controlled methods of composting include mechanical mixing and aerating, ventilating the materials by dropping them through a vertical series of aerated chambers, or placing the compost in piles in the open air and mixing or turning it periodically.

Contaminant. Any physical, chemical, biological, or radiological substance or matter that has an adverse affect on air, water, or soil.

Conventional systems. Sewerage systems that have been traditionally used to collect municipal wastewater in gravity sewers and convey it to a central primary or secondary treatment plant prior to discharge to surface waters.

Cooling tower. A structure that helps remove heat from water used as a coolant, e.g., in electric power generating plants.

Corrosion. The dissolving and wearing away of metal caused by a chemical reaction that occurs between water and the pipes that the water contacts, or when chemicals touching a metal surface, or when two metals are in contact.

Cover material. Soil used to cover compacted solid waste in a sanitary landfill.

Cubic feet per minute (cfm). A measure of the volume of a substance flowing through air within a fixed period of time. With regard to indoor air, refers to the amount of air, in cubic feet, that is exchanged with indoor air in a minute's time, or an air exchange rate.

Curie. A quantitative measure of radioactivity equal to 3.7×10^{10} disintegrations per second.

Cyclone collector. A device that uses centrifugal force to pull large particles from polluted air.

Decomposition. The breakdown of matter by bacteria and fungi; changes the chemical makeup and physical appearance of materials.

Degradation. The process by which a chemical is reduced to a less complex form.

Denitrification. The anaerobic biological reduction of nitrate nitrogen to nitrogen gas.

Desulfurization. Removal of sulfur from fossil fuels to reduce pollution.

Detergent. Synthetic washing agent that helps to remove dirt and oil. Some detergents contain compounds that kill useful bacteria and encourage algal growth when they are discharged in wastewater that reaches receiving waters.

Digester. In wastewater treatment, a closed tank; in solid waste conversion, a unit in which bacterial action is induced and accelerated to break down organic matter and establish the proper carbon-to-nitrogen ratio.

Dilution ratio. The relationship between the volume of water in a stream and the volume of incoming water; it affects the ability of the stream to assimilate waste.

Dioxin. Any of a family of compounds known chemically as dibenzo-p-dioxins. Concern about them arises from their potential toxicity and contamination in commercial products. Tests on laboratory animals indicate that it is one of the more toxic man-made chemicals known.

Disinfectant. A chemical or physical process that kills pathogenic organisms in water. Chlorine is often used to disinfect sewage treatment effluent, water supplies, wells, and swimming pools.

Dispersant. A chemical agent used to break up concentrations of organic material such as spilled oil.

Disposal. Final placement or destruction of toxic, radioactive, or other wastes; surplus or banned pesticides or other chemicals; polluted soils; and drums containing hazardous materials from removal actions or accidental releases. Disposal may be accomplished through use of approved secure landfills, surface impoundments, land farming, deep well injection, ocean dumping, or incineration.

Dissolved oxygen (DO). The oxygen freely available in water; vital to fish and other aquatic life and for the prevention of odors. Traditionally, the level of dissolved oxygen has been accepted as the single most important indicator of the ability of a water body to support desirable aquatic life. Secondary wastewater treatment and advanced wastewater treatment are generally designed to protect DO in waste-receiving waters.

Dissolved solids. Disintegrated organic and inorganic material contained in water. Excessive amounts make water unfit for drinking or for use in industrial processes.

Distillation. The act of purifying liquids through boiling so that the steam condenses to a pure liquid and the pollutants remain in a concentrated residue.

Dump. A site used to dispose of solid wastes without environmental controls.

Ecology. The relationship of living things to one another and their environment, or the study of such relationships.

Ecosystem. The interacting system of a biological community and its nonliving environmental surroundings.

Effluent. Wastewater—treated or untreated—that flows out of a treatment plant, sewer, or industrial outfall; generally refers to wastes discharged into surface waters.

Effluent limitation. Restrictions established by a national environmental agency or by a subnational jurisdiction on quantities, rates, and concentrations in wastewater discharges.

Electrostatic precipitator (ESP). An air pollution control device that removes particles from a gas stream (smoke) after combustion occurs. The ESP imparts an electrical charge to the particles, causing them to adhere to metal plates inside the precipitator. Rapping on the plates causes the particles to fall into a hopper for disposal.

Emission. Pollution discharged into the atmosphere from smokestacks, other vents, and sur-

face areas of commercial or industrial facilities, from residential chimneys; and from motor vehicle, locomotive, or aircraft exhausts.

Emission factor. The relationship between the amount of pollution produced and the amount of raw material processed. For example, an emission factor for a blast furnace making iron would be the number of pounds of particulates per ton of raw material.

Emission standard. The maximum amount of air-polluting discharge legally allowed from a single source, mobile or stationary.

Enrichment. The addition of nutrients (e.g., nitrogen, phosphorus, or carbon compounds) from sewage effluent or agricultural runoff to surface water. This process greatly increases the growth potential of algae and aquatic plants.

Environment. The sum of all external conditions affecting the life, development, and survival of an organism.

Environmental assessment (EA). A process whose breadth, depth, and type of analysis depend on the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence and identifies ways of improving project design and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and by enhancing positive impacts.

Environmental audit. 1. An independent assessment of the current status of a party's compliance with applicable environmental requirements. 2. An independent evaluation of a party's environmental compliance policies, practices, and controls.

Eutrophication. The slow aging process during which a lake, estuary, or bay evolves into a bog or marsh and eventually disappears. During the later stages of eutrophication the water body is choked by abundant plant life as the result of increased amounts of nutritive compounds such as nitrogen and phosphorus. Human activities can accelerate the process.

Evapotranspiration. The loss of water from the soil both by evaporation and by transpiration from the plants growing in the soil.

Exposure. A potential health threat to the living organisms in the environment due to the amount of radiation or pollutant present in the environment.

Fabric filter. A cloth device that catches dust particles from industrial emissions.

Fecal coliform bacteria. Bacteria found in the intestinal tracts of mammals. Their presence in water or sludge is an indicator of pollution and possible contamination by pathogens.

Fertilizer. Materials such as nitrogen and phosphorus that provide nutrients for plants. Commercially sold fertilizers may contain other chemicals or may be in the form of processed sewage sludge.

Filtration. A treatment process, under the control of qualified operators, for removing solid (particulate) matter from water by passing the water through porous media such as sand or a man-made filter. The process is often used to remove particles that contain pathogenic organisms.

Flocculation. The process by which clumps of solids in water or sewage are made to increase in size by biological or chemical action so that they can be separated from the water.

Flowmeter. A gauge that shows the speed of wastewater moving through a treatment plant; also used to measure the speed of liquids moving through various industrial processes.

Flue gas. Vented air coming out of a chimney after combustion in the burner; can include nitrogen oxides, carbon oxides, water vapor, sulfur oxides, particles, and many chemical pollutants.

Flue gas desulfurization. A technology that uses a sorbent, usually lime or limestone, to remove sulfur dioxide from the gases produced by burning fossil fuels. Flue gas desulfurization is currently the state-of-the-art technology in use by

major sulfur dioxide emitters such as power plants.

Fluorides. Gaseous, solid, or dissolved compounds containing fluorine that result from industrial processes; excessive amounts in food can lead to fluorosis.

Fluorocarbon (FCs). Any of a number of organic compounds analogous to hydrocarbons in which one or more hydrogen atoms are replaced by fluorine. Once used in the United States as a propellant in aerosols, they are now primarily used in coolants and some industrial processes. FCs containing chlorine are called chlorofluorocarbons (CFCs). They are believed to be modifying the ozone layer in the stratosphere, thereby allowing more harmful solar radiation to reach the Earth's surface.

Fly ash. Noncombustible residual particles from the combustion process carried by flue gas.

Food chain. A sequence of organisms each of which uses the next lower member of the sequence as a food source.

Fugitive emissions. Emissions not caught by a capture system.

Geiger counter. An electrical device that detects the presence of certain types of radioactivity.

Generator. A facility or mobile source that emits pollutants into the air or releases hazardous wastes into water or soil.

Granular activated carbon (GAC) treatment. A filtering system often used in small water systems and individual homes to remove organics. GAC can be highly effective in removing elevated levels of radon from water.

Greenhouse effect. The warming of the Earth's atmosphere caused by a buildup of carbon dioxide or other trace gases; many scientists believe that this buildup allows light from the sun's rays to heat the Earth but prevents a counterbalancing loss of heat.

Groundwater. The supply of fresh water found beneath the Earth's surface (usually in aquifers), which is often used for supplying wells and springs. Because groundwater is a major source of drinking water, there is growing concern about areas where leaching agricultural or industrial pollutants or substances from leaking underground storage tanks are contaminating it.

Habitat. The place where a population (e.g., human, animal, plant, or microorganism) lives, and its surroundings, both living and nonliving.

Half-life. 1. The time required for a pollutant to lose half its effect on the environment. For example, the half-life of DDT in the environment is 15 years and that of radium is 1,580 years. 2. The time required for half of the atoms of a radioactive element to undergo decay. 3. The time required for the elimination of half of a total dose from the body.

Hazardous wastes. By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Substances classified as hazardous wastes possess at least one of four characteristics—ignitability, corrosivity, reactivity, or toxicity—or appear on special lists.

Heavy metals. Metallic elements with atomic number greater than 20, such as mercury and lead. They can damage living things at low concentrations and tend to accumulate in the food chain.

Herbicide. A chemical pesticide designed to control or destroy plants, weeds, or grasses.

Holding pond. A pond or reservoir, usually made of earth, built to store polluted runoff.

Hydrocarbons (HC). Chemical compounds that consist entirely of carbon and hydrogen.

Hydrogen sulfide (HS). Gas emitted during organic decomposition and as a by-product of oil refining and burning. It smells like rotten eggs and, in heavy concentration, can cause illness.

Hydrology. The science dealing with the properties, distribution, and circulation of water.

Impoundment. A body of water or sludge confined by a dam, dike, floodgate, or other barrier.

Incineration. 1. Burning of certain types of solid, liquid, or gaseous materials. 2. A treatment technology involving destruction of waste by controlled burning at high temperatures, e.g., burning sludge to remove the water and reduce the remaining residues to a safe, nonburnable ash that can be disposed of safely on land, in some waters, or in underground locations.

Incinerator. A furnace for burning wastes under controlled conditions.

Indicator. In biology, an organism, species, or community whose characteristics show the presence of specific environmental conditions.

Indirect discharge. Introduction of pollutants from a nondomestic source into a publicly owned waste treatment system. Indirect dischargers can be commercial or industrial facilities whose wastes go into the local sewers.

Infiltration. 1. The penetration of water through the ground surface into subsurface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls. 2. A land application technique whereby large volumes of wastewater are applied to land and allowed to penetrate the surface and percolate through the underlying soil. *See also* Percolation

Inorganic chemicals. Chemical substances of mineral origin, not of basically carbon structure.

Insecticide. A pesticide compound specifically used to kill or control the growth of insects.

Instream use. Water use taking place within a stream channel, e.g., hydroelectric power generation, navigation, water quality improvement, fish propagation, or recreation.

Inversion. An atmospheric condition that occurs when a layer of warm air prevents the rise of cooling air trapped beneath it. This in turn prevents the rise of pollutants that might otherwise be dispersed and can cause an air pollution episode.

Ion exchange treatment. A water-softening method often found on a large scale at water purification plants; the treatment removes some organics and radium by adding calcium oxide or calcium hydroxide to increase the pH to a level at which the metals will precipitate out.

Irrigation. Technique for applying water or wastewater to land areas to supply the water and nutrient needs of plants.

Lagoon. 1. A shallow pond in which sunlight, bacterial action, and oxygen work to purify wastewater; also used for storage of wastewaters or spent nuclear fuel rods. 2. A shallow body of water, often separated from the sea by coral reefs or sandbars.

Land application. Discharge of wastewater onto the ground for treatment or reuse. *See also* Irrigation

Landfills. 1. *Sanitary landfills* are land disposal sites for nonhazardous solid wastes at which wastes are spread in layers, compacted to the smallest practical volume, and covered at the end of each operating day. 2. *Secure chemical landfills* are disposal sites for hazardous wastes that are selected and designed to minimize the chance of release of hazardous substances into the environment.

Leachate. A liquid that results when water collects contaminants as it trickles through wastes, agricultural pesticides, or fertilizers.

Leaching. The process by which soluble constituents are dissolved and carried down through the soil by a percolating fluid. Leaching may occur in farming areas, feedlots, and landfills and may result in hazardous substances entering surface water, groundwater, or soil. *See also* Leachate

Limnology. The study of the physical, chemical, meteorological, and biological aspects of fresh water.

Liner. 1. A relatively impermeable barrier designed to prevent leachate from leaking from a landfill. Liner materials include plastic and dense clay. 2. An insert or sleeve for sewer pipes to prevent leakage or infiltration.

Mechanical aeration. Use of mechanical energy to inject air into water, causing a waste stream to absorb oxygen.

Methane. A colorless, nonpoisonous, flammable gas created by anaerobic decomposition of organic compounds.

Microbes. Microscopic organisms such as algae, viruses, bacteria, fungi, and protozoa, some of which cause disease.

Mitigation. Measures taken to reduce adverse impacts on the environment.

Mixed liquor. A mixture of activated sludge and water containing organic matter undergoing activated sludge treatment in an aeration tank.

Mobile source. A moving producer of air pollution, mainly forms of transport such as cars, trucks, motorcycles, and airplanes.

Modeling. An investigative technique using a mathematical or physical representation of a system or theory that accounts for all or some of its known properties. Models are often used to test the effect of changes in system components on the overall performance of the system.

Monitoring. Periodic or continuous surveillance or testing to determine the level of compliance with statutory requirements or pollutant levels in various media or in humans, animals, and other living things.

Monitoring wells. Wells drilled at a site to collect groundwater samples for the purpose of physical, chemical, or biological analysis to determine the amounts, types, and distribution of contaminants in the groundwater beneath the site.

Mutagen. Any substance that can cause a change in genetic material.

Neutralization. Decreasing the acidity or alkalinity of a substance by adding to it alkaline or acidic materials, respectively.

Nitrate. A compound containing nitrogen that can exist in the atmosphere or as a dissolved gas in water and can have harmful effects on humans and animals. Nitrates in water can cause severe illness in infants and cows.

Nitric oxide (NO). A gas formed by combustion under high temperature and high pressure in an internal combustion engine. It changes to nitrogen dioxide in the ambient air and contributes to photochemical smog.

Nitrification. The process whereby ammonia in wastewater is oxidized to nitrite and then to nitrate by bacterial or chemical reactions.

Nitrogen dioxide (NO_2). The result of nitric oxide combining with oxygen in the atmosphere; a major component of photochemical smog.

Nitrogenous wastes. Animal or vegetable residues that contain significant amounts of nitrogen.

Nitrogen oxides (NO_x). Products of combustion from transport and stationary sources and major contributors to acid deposition and the formation of ground-level ozone in the troposphere.

Nonpoint sources. Pollution sources that are diffuse and do not have a single point of origin or are not introduced into a receiving stream from a specific outlet. The pollutants are generally carried off the land by storm-water runoff. The commonly used categories for nonpoint sources are agriculture, forestry, urban, mining, construction, dams and channels, land disposal, and saltwater intrusion.

Nutrient. Any substance assimilated by living things that promotes growth. The term is gener-

ally applied to nitrogen and phosphorus in wastewater but is also applied to other essential and trace elements.

Organic. 1. Referring to or derived from living organisms. 2. In chemistry, any compound containing carbon.

Organic chemicals/compounds. Animal- or plant-produced substances containing mainly carbon, hydrogen, and oxygen.

Organophosphates. Pesticide chemicals that contain phosphorus; used to control insects. They are short-lived, but some can be toxic when first applied.

Outfall. The place where an effluent is discharged into receiving waters.

Overburden. The rock and soil cleared away before mining.

Overland flow. A land application technique that cleanses waste by allowing it to flow over a sloped surface. As the water flows over the surface, the contaminants are removed. The water is collected at the bottom of the slope for reuse.

Oxidation. 1. The addition of oxygen, which breaks down organic waste or chemicals such as cyanides, phenols, and organic sulfur compounds in sewage by bacterial and chemical means. 2. Oxygen combining with other elements. 3. The process in chemistry whereby electrons are removed from a molecule.

Oxidation pond. A man-made lake or body of water in which liquid waste is consumed by bacteria. It is used most frequently with other water-treatment processes. An oxidation pond is basically the same as a sewage lagoon.

Ozone (O_3). Found in two layers of the atmosphere, the troposphere and the stratosphere. In the troposphere (the layer extending 7 to 10 miles up from the Earth's surface), ozone is a chemical oxidant and major component of photochemical smog. In the stratosphere (the atmospheric layer beginning 7 to 10 miles above the Earth's surface), ozone is a form of oxygen found naturally that provides a protective layer shielding the Earth from the harmful health effects of ultraviolet radiation on humans and the environment.

Ozone depletion. Destruction of the stratospheric ozone layer that shields the Earth from ultraviolet radiation harmful to biological life. This destruction of ozone is caused by the breakdown of certain chlorine- or bromine-containing compounds (chlorofluorocarbons or halons) that break down when they reach the stratosphere and catalytically destroy ozone molecules.

Particulates. Fine liquid or solid particles, such as dust, smoke, mist, fumes, or smog, found in air or emissions.

Pathogenic. Capable of causing disease.

Pathogens. Microorganisms that can cause disease in other organisms or in humans, other animals, and plants. They may be bacteria, viruses, or parasites and are found in sewage, in runoff from animal farms or rural areas populated with domestic or wild animals, and in water used for swimming. Fish and shellfish contaminated by pathogens, or the contaminated water itself, can cause serious illness.

Percolation. The movement of water downward and radially through the subsurface soil layers, usually continuing downward to the groundwater.

Permeability. The rate at which liquids pass through soil or other materials in a specified direction.

Permit. An authorization, license, or equivalent control document issued by an approved agency to implement the requirements of an environmental regulation; e.g., a permit to operate a wastewater treatment plant or to operate a facility that may generate harmful emissions.

Persistence. Refers to the length of time a compound, once introduced into the environment, stays there. A compound may persist for less than a second or indefinitely.

Pesticide. Substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Also, any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant. Pesticides can accumulate in the food chain or contaminate the environment if misused.

pH. A measure of the acidity or alkalinity of a liquid or solid material.

Phenols. Organic compounds that are byproducts of petroleum refining, tanning, and textile, dye, and resin manufacturing. Low concentrations cause taste and odor problems in water; higher concentrations can kill aquatic life and humans.

Phosphates. Certain chemical compounds containing phosphorus.

Phosphorus. An essential chemical food element that can contribute to the eutrophication of lakes and other water bodies. Increased phosphorus levels result from discharge of phosphorus-containing materials into surface waters.

Photochemical oxidants. Air pollutants formed by the action of sunlight on oxides of nitrogen and hydrocarbons.

Photosynthesis. The manufacture of carbohydrates and oxygen by plants from carbon dioxide and water in the presence of chlorophyll, using sunlight as an energy source.

Physical and chemical treatment. Processes generally used in large-scale wastewater treatment facilities. Physical processes may involve air stripping or filtration. Chemical treatment includes coagulation, chlorination, or ozone addition. The term can also refer to treatment of toxic materials in surface waters and groundwater, oil spills, and some methods of dealing with hazardous materials on or in the ground.

Phytoplankton. That portion of the plankton community comprised of tiny plants, e.g., algae, diatoms.

Phytotoxic. Something that harms plants.

Plume. 1. Visible or measurable discharge of a contaminant from a given point of origin; can be visible or thermal in water or visible in the air as, for example, a plume of smoke. 2. The area of measurable and potentially harmful radiation leaking from a damaged reactor. 3. The distance from a toxic release considered dangerous for those exposed to the leaking fumes.

Point source. A stationary location or fixed facility from which pollutants are discharged or emitted; any single identifiable source of pollution, e.g., a pipe, ditch, ship, ore pit, or factory smokestack.

Pollutant. Generally, the presence of matter or energy whose nature, location, or quantity produces undesired environmental effects. Under the U.S. Clean Water Act, for example, the term is defined as the man-made or man-induced alteration of the physical, biological, and radiological integrity of water.

Polychlorinated biphenyls (PCBs). a group of toxic, persistent chemicals used in transformers and capacitators for insulating purposes and in gas pipeline systems as a lubricant.

Polyelectrolytes. Synthetic chemicals that help solids to clump during sewage treatment.

Polymers. The basic molecular ingredients in plastic.

Polyvinyl chloride (PVC). A tough, environmentally indestructible plastic that releases hydrochloric acid when burned.

Potable water. Water that is safe for drinking and cooking.

ppm/ppb. Parts per million / parts per billion, a way of expressing tiny concentrations of pollutants in air, water, soil, human tissue, and food and or other products.

Precipitation. Removal of solids from liquid waste so that the hazardous solid portion can be

disposed of safely; removal of particles from airborne emissions.

Precipitators. Air pollution control devices that collect particles from an emission.

Precursor. In photochemical terminology, a compound such as a volatile organic compound (VOC) that "precedes" an oxidant. Precursors react in sunlight to form ozone or other photochemical oxidants.

Pretreatment. Processes used to reduce, eliminate, or alter the nature of wastewater pollutants from nondomestic sources before they are discharged into publicly owned treatment works.

Prevention. Measures taken to minimize the release of wastes to the environment.

Primary wastewater treatment. First steps in wastewater treatment; screens and sedimentation tanks are used to remove most materials that float or will settle. Primary treatment results in the removal of about 30% of carbonaceous biochemical oxygen demand (BOD) from domestic sewage. *See also* Secondary wastewater treatment; tertiary wastewater treatment

Putrescible. Able to rot quickly enough to cause odors and attract flies.

Pyrolysis. Decomposition of a chemical by extreme heat.

Radiobiology. The study of the effects of radiation on living things.

Radiation. Any form of energy propagated as rays, waves, or streams of energetic particles. The term is frequently used in relation to the emission of rays from the nucleus of an atom.

Raw sewage. Untreated wastewater.

Receiving waters. A river, lake, ocean, stream, or other watercourse into which wastewater or treated effluent is discharged.

Recycle/reuse. The process of minimizing the generation of waste by recovering usable products that might otherwise become wastes. Examples are the recycling of aluminum cans, waste paper, and bottles.

Red tide. A proliferation of a marine plankton that is toxic and often fatal to fish. This natural phenomenon may be stimulated by the addition of nutrients. A tide can be called red, green, or brown, depending on the coloration of the plankton.

Refuse. *See* Solid waste

Residual. Amount of a pollutant remaining in the environment after a natural or technological process has taken place, e.g., the sludge remaining after initial wastewater treatment, or particulates remaining in air after the air passes through a scrubbing or other pollutant removal process.

Resistance. For plants and animals, the ability to withstand poor environmental conditions or attacks by chemicals or disease. The ability may be inborn or developed.

Resource recovery. The process of obtaining matter or energy from materials formerly discarded.

Reverse osmosis. A water treatment process used in small water systems by adding pressure to force water through a semipermeable membrane, Reverse osmosis removes most drinking water contaminants. It is also used in wastewater treatment. Large-scale reverse osmosis plants are now being developed.

Risk assessment. The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health or the environment by the presence or potential presence and use of specific pollutants.

Rubbish. Solid waste, excluding wood waste and ashes, from homes, institutions, and workplaces.

Runoff. That part of precipitation, snowmelt, or irrigation water that runs off the land into streams

or other surface water; can carry pollutants from the air and land into the receiving waters.

Salinity. The degree of salt in water.

Salts. Minerals that water picks up as it passes through the air and over and under the ground and as it is used by households and industry.

Sand filters. Devices that remove some suspended solids from sewage. Air and bacteria decompose additional wastes filtering through the sand so that cleaner water drains from the bed.

Sanitary landfill. *See* Landfills

Sanitary sewers. Underground pipes that carry off only domestic or industrial waste, not stormwater.

Sanitation. Control of physical factors in the environment that could harm human development, health, or survival.

Screening. Use of screens to remove coarse floating and suspended solids from sewage.

Scrubber. An air pollution device that uses a spray of water or reactant or a dry process to trap pollutants in emissions.

Secondary wastewater treatment. The second step in most publicly owned water treatment systems, in which bacteria consume the organic parts of the waste. It is accomplished by bringing together waste, bacteria, and oxygen in trickling filters or in the activated sludge process. This treatment removes floating and settleable solids and about 90% of the oxygen-demanding substances and suspended solids. Disinfection is the final stage of secondary treatment. *See also* Primary wastewater treatment; Tertiary wastewater treatment

Sedimentation. Letting solids settle out of wastewater by gravity during wastewater treatment.

Sedimentation tanks. Holding areas for wastewater in which floating wastes are skimmed off and settled solids are removed for disposal.

Sediments. Soil, sand, and minerals washed from land into water, usually after rain. Sediments pile up in reservoirs, rivers, and harbors, destroying fish-nesting areas and holes of water animals and clouding the water so that needed sunlight may not reach aquatic plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to be washed off the land after rainfalls.

Septic tank. An underground storage tank for wastes from homes having no sewer line to a treatment plant. The wastes go directly from the home to the tank, where the organic waste is decomposed by bacteria and the sludge settles to the bottom. The effluent flows out of the tank into the ground through drains; the sludge is pumped out periodically.

Settleable solids. Material heavy enough to sink to the bottom of a wastewater treatment tank.

Settling tank. A holding area for wastewater in which heavier particles sink to the bottom for removal and disposal.

Sewage. The waste and wastewater produced by residential and commercial establishments and discharged into sewers.

Sewage sludge. Sludge produced at a municipal treatment works.

Sewer. A channel or conduit that carries wastewater and stormwater runoff from the source to a treatment plant or receiving stream. Sanitary sewers carry household, industrial, and commercial wastes. Storm sewers carry runoff from rain or snow. Combined sewers are used for both purposes.

Silt. Fine particles of sand or rock that can be picked up by the air or water and deposited as sediment.

Siting. The process of choosing a location for a facility.

Skimming. Using a machine to remove oil or scum from the surface of the water.

Slow sand filtration. Treatment process involving passage of raw water through a bed of sand at low velocity that results in the substantial removal of chemical and biological contaminants.

Sludge. A semisolid residue from any of a number of air or water treatment processes. Sludge can be a hazardous waste.

Slurry. A watery mixture of insoluble matter that results from some pollution control techniques.

Smelter. A facility that melts or fuses ore, often with an accompanying chemical change, to separate the metal. Emissions from smelters are known to cause pollution.

Smog. Fog made heavier and darker by smoke. Air pollution associated with oxidants. *See also* Photochemical oxidants

Smoke. Particles suspended in air after incomplete combustion of materials.

Solid wastes. Nonliquid, nonsoluble materials, ranging from municipal garbage to industrial wastes, that contain complex, and sometimes hazardous, substances. Solid wastes include sewage sludge, agricultural refuse, demolition wastes, and mining residues. Technically, solid wastes also refer to liquids and gases in containers.

Solid waste disposal. The final placement of refuse that is not salvaged or recycled.

Solid waste management. Supervised handling of waste materials from their source through recovery processes to disposal.

Solidification and stabilization. Removal of wastewater from a waste or changing it chemically to make the waste less permeable and less susceptible to transport by water.

Solvent. Substance (usually liquid) capable of dissolving or dispersing one or more other substances.

Stabilization. Conversion of the active organic matter in sludge into inert, harmless material.

Stable air. A mass of air that is not moving normally, so that it holds rather than disperses pollutants.

Stack. A chimney or smokestack; a vertical pipe that discharges used air.

Stack effect. Used air, as in a chimney, that moves upward because it is warmer than the surrounding atmosphere.

Sterilization. 1. In pest control, the use of radiation and chemicals to damage body cells needed for reproduction. 2. The destruction of all living organisms in water or on the surface of various materials. In contrast, disinfection is the destruction of most living organisms in water or on surfaces.

Strip mining. A process that uses machines to scrape soil or rock away from mineral deposits just under the earth's surface.

Sulfur dioxide (SO_2). A heavy, pungent, colorless, gaseous air pollutant formed primarily by processes involving fossil fuel combustion.

Sump. A pit or tank that catches liquid runoff for drainage or disposal.

Surface water. All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.); also refers to springs, wells, or other collectors that are directly influenced by surface water.

Surfactant. A surface-active agent used in detergents to cause lathering.

Suspended solids. Small particles of solid pollutants that float on the surface of or are suspended in sewage or other liquids. They resist removal by conventional means. *See also* Total suspended solids

Tailings. Residue of raw materials or waste separated out during the processing of crops or mineral ores.

Teratogen. Substance that causes malformation or serious deviation from normal development of embryos and fetuses.

Tertiary wastewater treatment. Advanced cleaning of wastewater that goes beyond the secondary or biological stage to remove nutrients such as phosphorus and nitrogen and most biochemical oxygen demand (BOD) and suspended solids. *See also* Primary wastewater treatment; Secondary wastewater treatment

Thermal pollution. Discharge of heated water from industrial processes that can affect the life processes of aquatic organisms.

Total suspended solids (TSS). A measure of the suspended solids in wastewater, effluent, or water bodies. *See also* Suspended solids

Toxic pollutants. Materials contaminating the environment that cause death, disease, or birth defects in organisms that ingest or absorb them. The quantities and length of exposure necessary to cause these effects can vary widely.

Toxic substance. A chemical or mixture that may present an unreasonable risk of injury to health or the environment.

Toxicity. The degree of danger posed by a substance to animal or plant life. *See also* Acute toxicity; Chronic toxicity

Trichloroethylene (TCE). A stable, low-boiling-point colorless liquid, toxic by inhalation. TCE is used as a solvent, as a metal degreasing agent, and in other industrial applications.

Trickling filter. A coarse biological treatment system in which wastewater trickles over a bed of stones or other material covered with bacterial growth. The bacteria break down the organic waste in the sewage and produce clean water.

Turbidity. 1. Haziness in air caused by the presence of particles and pollutants. 2. A similar cloudy condition in water due to suspended silt or organic matter.

Underground storage tank. A tank located wholly or partially under ground that is designed to hold gasoline or other petroleum products or chemical solutions.

Urban runoff. Stormwater from city streets and adjacent domestic or commercial properties that may carry pollutants of various kinds into sewer systems or receiving waters.

Vapor. The gaseous phase of substances that are liquid or solid at atmospheric temperature and pressure, e.g., steam.

Vapor capture system. Any combination of hoods and ventilation system that captures or contains organic vapors so that they may be directed to an abatement or recovery device.

Vector. 1. An organism, often an insect or rodent, that carries disease. 2. An object (e.g., plasmids, viruses, or other bacteria) used to transport genes into a host cell. A gene is placed in the vector; the vector then "infects" the bacterium.

Vinyl chloride. A chemical compound, used in producing some plastics, that is believed to be carcinogenic.

Volatile. Description of any substance that evaporates readily.

Volatile organic compound (VOC). Any organic compound that participates in atmospheric photochemical reactions; generally have a boiling point of less than 145° Celsius. See Anthony J. Buonicore and Wayne T. Davis, eds., *Air Pollution Engineering Manual* (New York: Van Nostrand Reinhold,1992), Table 7, p. 45.

Wastes. 1. Unwanted materials left over from a manufacturing process. 2. Refuse from places of human or animal habitation.

Wastewater treatment plant. A facility containing a series of tanks, screens, filters, and other processes by which pollutants are removed from water.

Wastewater treatment stream. The continuous movement of wastes from generator to treater and disposer.

Wastewater. Spent or used water from individual homes, communities, farms, or industries that contains dissolved or suspended matter.

Wastewater operations and maintenance. Actions taken after construction to ensure that facilities constructed to treat wastewater will be properly operated, maintained, and managed to achieve efficiency levels and prescribed effluent levels in an optimum manner.

Water pollution. The presence in water of enough harmful or objectionable material to damage water quality.

Water quality criteria. Specific levels of water quality that, if reached, are expected to render a body of water suitable for its designated use. The criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, fish production, or industrial processes.

Watershed. The land area that drains into a stream.

Wetlands. An area that is regularly saturated by surface water or groundwater and is subsequently characterized by a prevalence of vegetation adapted for life in saturated soil conditions. Examples include swamps, bogs, fens, marshes, and estuaries.