**Action Level.** The exposure level (concentration in air) at which OSHA regulations to protect employees take effect (29 CFR 1910.1001-1047); e.g. workplace air analysis, employee training, medical monitoring, and recordkeeping. Exposure at or above action level is termed occupational exposure. Exposure below this level can also be harmful. This level is generally half the PEL.

**Acute Exposure.** Exposure of short duration, usually to relatively high concentrations or amounts of material.

**Allergen.** A substance that causes an allergic reaction.

**Allergy.** A condition in which an initial symptomless exposure to a specific allergen later gives rise to a sensitivity to further exposure. Symptoms may be exhibited in a variety of ways, usually by respiratory distress or skin eruptions.

**Asphyxiant.** A vapor or gas that can cause unconsciousness or death by suffocation (lack of oxygen). Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce (displace) the available oxygen in the air (normally about 21%) to dangerous levels (18% or lower). Examples of simple asphyxiants are carbon dioxide, nitrogen, hydrogen, and helium. Chemical asphyxiants like carbon monoxide (CO) reduce the blood's ability to carry oxygen, or like cyanide, interfere with the body's utilization of oxygen.

**Autoignition Temperature.** The minimum temperature at which a substance ignites without application of a flame or spark. Do not heat materials to greater than 80% of this temperature.

**Boiling Point, BP.** The temperature at which a liquid's vapor pressure equals the surrounding atmospheric pressure so that the liquid rapidly vaporizes. Flammable materials with low BPs generally present special fire hazards [e.g. butane, BP = -0.5EC (31EF); gasoline, BP = 38EC (100EF)]. For mixtures, a range of temperature is given.

**Carcinogen.** A material that either causes cancer in humans, or, because it causes cancer in animals, is considered capable of causing cancer in humans. Findings are based on the feeding of large quantities of a material to test animals or by the application of concentrated solutions to the animals' skin. A material is considered a carcinogen if: 1) the International Agency for Research on Cancer (IARC) has evaluated and found it a carcinogen or potential carcinogen; 2) the National Toxicology Program's (NTP) *Annual Report on Carcinogens* lists it as a carcinogen or potential carcinogen; 3) OSHA regulates it as a carcinogen; or 4) one positive study has been published. "Select Carcinogen" is defined in 29 CFR 1910.1450, within OSHA's *Occupational Exposures to Hazardous Chemicals in Laboratories* standard as a substance that: a) OSHA regulates as a carcinogen; b) the NTP lists as "known to be carcinogen;" c) the IARC lists as Group 1, "carcinogenic to humans;" or d) the IARD lists as Group 2A or 2B, "reasonably anticipated to be carcinogen," since it causes statistically significant tumor incidence in animals per criteria listed in section 2, paragraph b.

**Ceiling Limit, C.** The concentration not to exceed at any time. "An employee's exposure [to a hazardous material] shall at no time exceed the ceiling value" (OSHA).

**Chronic Exposure.** Continuous or intermittent exposure extending over a long time period, usually applies to relatively low material amounts or concentrations.

**Chronic Health Effect**. An adverse effect on a human or animal body with symptoms that develop slowly over a long time period and persist or that recur frequently. See Acute Health Effect.

**Chronic Toxicity.** A material's property that produces chronic health effects (see above), usually resulting from repeated doses of or exposure to the material over a relatively prolonged time period. Ordinarily used to denote effects noted in experimental animals.

Combustible. A term the NFPA, DOT, and others use to classify certain materials with low flash points that ignite easily. Both NFPA and DOT generally define combustible liquids as having a flash point of 38EC (100EF) but below 93.3EC (200EF). See Flammable.

**Corrosive.** A chemical that causes visible destruction of or irreversible alterations in living tissue by chemical action at the site of contact, or that causes a severe corrosion rate in steel or aluminum. A waste that exhibits a "characteristic of corrosivity (40 CFR 261.22)," when they are used in consumer goods per the *Hazardous Substances Act and Poison Prevention Packaging Act* of 1970.

**Cryogenic.** Relating to extremely low temperatures as for refrigerated gases.

**Dermatitis.** Inflammation of the skin.

**Engineering Controls.** Engineering control systems reduce potential hazards by isolating the worker from the hazard or by removing the hazard from the work environment. Methods include substitution, ventilation, isolation, and enclosure. This is preferred over administrative controls and personal protective equipment.

**Ergonomics.** The study of human characteristics for appropriate design of living and work environments.

**Explosive.** A material that produces a sudden, almost instantaneous release of pressure, gas, and heat when subjected to abrupt shock, pressure, or high temperature.

**Exposure Limits.** The concentration in workplace air of a chemical deemed the maximum acceptable. This means that most workers can be exposed at given levels or lower without harmful effects. Exposure limits in common use are: 1) TLV-TWA (threshold limit value-time-weighted average); 2) STEL (short-term exposure limit); and 3) C (ceiling value).

**Flammable.** Describes any solid, liquid, vapor, or gas that ignites easily and burns rapidly.

**Flammable Limits (Flammability Limits, Explosive Limits).** Minimum and maximum concentrations of a flammable gas or vapor between which ignition can occur. Concentrations below the lower flammable limit (LFL) are too lean to burn, while concentrations above the upper flammable limit (UFL) are too rich. All concentrations between LFL and UFL are in the flammable range, and special precautions are needed to prevent ignition or explosion.

**Flash Point, FP.** Lowest temperature at which a flammable liquid gives off sufficient vapor to form an ignitable mixture with air near its surface or within a vessel. Combustion does not continue. FP is determined by laboratory tests in cups.

**Fume.** An airborne dispersion of minute solid particles arising from the heating of a solid (such as molten metal, welding).

**Gas.** A formless fluid that occupies the space of its enclosure. It can settle to the bottom or top of an enclosure when mixed with other materials. It can be changed to its liquid or solid state only by increased pressure and/or decreased temperature.

**General Ventilation.** Also known as dilution ventilation. The removal of contaminated air and its replacement with clean air from the general workplace area as opposed to local ventilation, which is specific air changing in the immediate area of a contamination source. An example of local ventilation is a laboratory fume hood.

**Hazard Communication.** Requires chemical manufacturers and importers to assess the hazards associated with the materials in their workplace (29 CFR 1910.1200). Material safety data sheets, labeling, and training are all results of this law. See *OSH Act.*

**Hazardous Chemical, Material.** In a broad sense, any substance or mixture of substances having properties capable of producing adverse effects on the health or safety of a human. In 1971 OSHA adopted the following definition in regulations affecting employers in operations subject to the *Federal Longshoremen's and Harbor Worker's Compensation Act.* "The term hazardous material means a material which has one or more of these characteristics: 1) Has a flash point below 60EC (140EF), closed cup, or is subject to spontaneous heating; 2) Has a threshold limit value below 400 ppm for gases and vapors, below 15 mg/$m^3$ for fumes, and below 25 mppcf (million particles per cubic foot) for dusts; 3) Has a single dose oral $LD_{50}$ below 50 mg/kg; 4) Is subject to polymerization with the release of large amounts of energy; 5) Is a strong oxidizing or reducing agent; 6) Causes first-degree burns to skin [from a] short time exposure, or is systemically toxic by skin contact; or 7) In the course of normal operations, may produce dusts, gases, fumes, vapors, mists, or smokes that have one or more of the above characteristics." Included are substances that are carcinogens, toxic, irritants, corrosives, sensitizers, and agents that damage the lungs, skin, eyes, mucous membranes, etc.

**HEPA.** High-efficiency particulate air filter. Has a 99.97% removal efficiency for .03-micron particles.

**Incompatible.** Describes materials that could cause dangerous reactions and the release of energy from direct contact with one another.

**Label.** Any written, printed, or graphic sign or symbol displayed on or affixed to containers of hazardous chemicals. A label should identify the hazardous material, appropriate hazard warnings, and name and address of the chemical manufacturer, importer, or other responsible party.

**Latency Period.** Time that elapses between exposure and first manifestations of disease or illness. Latency periods can range from minutes to decades, depending on hazardous material and disease produced.

**Local Ventilation.** The drawing off of contaminated air directly from its source. This type of ventilation is recommended for hazardous airborne materials. Treatment of exhausted air to remove contaminants may be required.

**Lower Explosive Limit, Lower Flammable Limit.** Refers to the lowest concentration of gas or vapor (% by volume in air) that burns or explodes if an ignition source is present at ambient temperatures.

**Material Safety Data Sheet.** Also MSDS. Material safety data sheet. OSHA has established guidelines for descriptive data that should be concisely provided on a data sheet to serve as the basis for written hazard communication programs. The thrust of the law is to have those who make, distribute, and use hazardous materials responsible for effective communication. See *Hazard Communication Rule*, 29 CFR, Part 1910.1200, as amended, Sec. g. See Schedule I, Sec. 12, of the *Canadian Hazardous Products Act.*

**NFPA.** National Fire Protection Association.

**NIOSH.** National Institute of Occupational Safety and Health.

**Nonflammable.** Incapable of easy ignition. Does not burn, or burns very slowly. Also, a DOT hazard class for any compressed gas other than a flammable one.

**Nuisance Particulates.** Dusts that do not produce significant organic disease or toxic effect from "reasonable" concentrations and exposures. Otherwise known as "Particulates not otherwise classified: (PNOC). The 1992-93 ACGIH TLV is 10 $mg/m^3$. The value is for total dust containing no asbestos and less than 1% crystalline silica.

**Odor Threshold.** The lowest concentration of a material's vapor (or a gas) in air that is detectable by odor.

**OSHA.** The Occupational Safety and Health Administration. Part of the U.S. Department of Labor.

**OSHA Flammable/Combustible Liquid Classification.** (29 CFR 1910.106). Flammable/combustible liquid is a standard classification used to identify the risks of fire or explosion associated with a liquid. Flammable, or Class I, liquids (flash point below 38EC [100EF]) are divided into: Class IA - flash point below 22.8EC (73EF), boiling point below 38EC (100EF); Class IB - flash point below 22.8EC (73EF), boiling point at or above 38EC (100EF); and Class IC - flash point at or above 22.8EC (73EF), boiling point below 38EC (100EF). Combustible liquids (flash point at or above 38EC [100EF]) are divided into two classes: Class II, flash point at or above 38EC (100EF) and below 60EC (140EF), except any mixture having components with flash points of 93.3EC (200EF) or higher, the volume of which makes up 99% or more of the mixture's total volume; and Class III, flash point at or above 60EC (140EF). Class III liquids are divided into two subclasses: Class IIIA, flash point at or above 60EC (140EF) and below 93.3EC (200EF), except any mixture having components with flash points of 93.3EC (200EF) or higher, the volume of which makes up 99% or more of the mixture's total volume; and Class IIIB, flash point at or above 93.3EC (200EF).

**Oxidizer.** The DOT defines an oxidizer or oxidizing material as a substance that yields oxygen readily to stimulate the combustion (oxidation) of organic matter. Chlorate (ClO123), permanganate ($MnO_4$), and nitrate ($NO_3$) compounds are examples of oxidizers. Note that they all contain large amounts of oxygen (O).

**PEL.** Permissible Exposure Limit. Established by OSHA. This may be expressed as a time-weighted average (TWA) limit, short-term exposure limit (STEL), or as a ceiling exposure limit. A ceiling limit must never be exceeded instantaneously even if the TWA exposure limit is not violated. OSHA PELs have the force of law. Note that ACGIH TLVs and NIOSH RELs are recommended exposure limits that OSHA may or may not enact into law.

**Physical Hazard.** A substance for which there is valid evidence that it is a combustible liquid, compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water reactive. In the general safety sense, a hazard of physical origin, such as a fall, a heat burn, etc., and not a chemical or infective disease hazard.

**PPE.** Personal protective equipment. Devices or clothing worn to help insulate a worker from direct exposure to hazardous materials. Example include gloves and respirators.

**RCRA.** *Resource Conservation and Recovery Act,* PL 94-580. Found at 40 CFR 240-271. EPA has jurisdiction.

**Reactivity.** A substance's tendency to undergo chemical reaction either by itself or with other material with the release of energy. Undesirable effects such as pressure buildup, temperature increase, or formation of noxious, toxic, or corrosive by-products may occur because of the substance's reactivity to heating, burning, direct contact with other materials, or other conditions in use or in storage. A solid waste that exhibits a "characteristic of reactivity," as defined by RCRA, may be regulated (by the EPA) as a hazardous waste and assigned the number D003.

**Reproductive Health Hazard/Toxin.** Any agent with a harmful effect on the adult male or female reproductive systems or on the developing fetus or child. Such hazards affect people in many ways, including loss of sexual drive, mental disorders, impotence, infertility, sterility, mutagenic effects on germ cells, teratogenic effects on the fetus, and transplacental carcinogenesis.

**Respirator.** A variety of devices that limit inhalation of toxic materials. They range from disposable dust masks to self-contained breathing apparatus (SCBA). All have specific uses and limitations. Their use is covered by OSHA, 29 CFR 1910.134 See SCBA, Chemical Cartridge Respirator.

**Routes of Entry.** To do bodily damage, a material must contact the body. The method of bodily contact is called the route of entry. The routes of entry are: 1) absorption (eye or skin contact); 2) ingestion; and 3) inhalation.

**Synonyms.** Alternative names by which a material may be known.

**Target Organ Effects.** Chemically-caused effects from exposure to a material on specific listed organs and systems such as liver, kidneys, nervous system, lungs, skin and eyes.

**TLV.** Threshold limit value. A term ACGIG used to express the airborne concentration of a material to which most workers can be exposed during a normal daily and weekly schedule without adverse effects. "Workers" means healthy individuals; "healthy" is defined as a 150 lb. male, age 25 to 44. The young, old, ill, or naturally susceptible have lower tolerances and need to take additional precautions. ACGIH expresses TLVs in three ways: 1) TLV-TWA, the allowable time-weighted average concentration for a normal 8-hour workday or 40-hour week; 2) TLV-STEL, the short-term exposure limit or maximum concentration for a continuous exposure period of 15 minutes (with a maximum of four such periods per day, with at least 60 minutes between exposure periods, and provided that the daily TLV-TWA is not exceeded); and 3) Ceiling (C), the concentration not to exceed at any time.

**Toxicology.** The study of the nature, effects, and detection of poisons in living organisms. Also, substances that are otherwise harmless but prove toxic under particular conditions. The basic assumption of toxicology is that there is a relationship among the dose (amount), the concentration at the affected site, and the resulting effects.

**Toxic Substance.** Any chemical or material that: 1) has evidence of an acute or chronic health hazard and 2) is listed in the NIOSH *Registry of Toxic Effects of Chemical Substances* (RTECS), provided that the substance causes harm at any dose level; causes cancer or reproductive effects in animals at any dose level; has a median lethal dose ($LD_{50}$) of less than 500 mg/kg of body weight when administered orally to rats; has a median $LD_{50}$ of less than 1000 mg/kg of body weight when administered by continuous contact to the bare skin of albino rabbits; or has a median lethal concentration ($LD_{50}$) in air of less than 2000 ppm by volume of gas vapor, or less than 20 mg/L of mist, fume, or dust when administered to albino rats.

**Upper Explosive Limit, Upper Flammable Limit.** UEL, UFL. The highest concentration of a material in air that produces an explosion or fire, or that ignites when it contacts an ignition source (high heat, electric arc, spark, or flame). Any concentration above the UEL in air is too rich to be ignited. See Flammable Limits.

**UV.** Ultraviolet (light).

**Vapor.** The gaseous state of a material normally encountered as liquid or solid.

**VOC.** Volatile organic compounds. Used in coatings and paint because they evaporate very rapidly. Regulated by the EPA per the *Clean Water Act*.

REVIEW CYCLE

Annually