

# ***GLOSSARY OF HAZARDOUS MATERIALS TERMS***

The following glossary explains terms commonly used to describe chemical properties and hazards. Some terms are used extensively on chemical labels and Materials Safety Data Sheets (MSDSs). In most cases, the terms are explained from a work site standpoint based on health and safety. These definitions may differ from the more technical ones used in a chemistry or physics course, but do serve the purpose of providing working information necessary for field use.

**Absorbents:** Any material that is capable of "soaking up" a spilled liquid. Commonly known as "3M pads" or "spill socks," absorbents come in many shapes and sizes. For spills on a flat surface such as a concrete pad, the best type is the sausage type absorbent boom that can be placed around the spill. Absorbents are also useful for stopping liquids from entering a storm drain or sewer. Be aware that all absorbents that are used and absorb hazardous materials must be disposed of as would the hazardous material itself.

**Absorption:** In toxicology, this refers to the passage of toxic materials through some body surface into body fluids and tissue. Generally speaking, this refers to passage through the skin, eyes, or mucous membranes. In decontamination, it is the process where the contaminant is picked up by a neutral material.

**Acceptable Entry Conditions:** The conditions that must exist in a Permit Required Confined Space to allow entry and to ensure that employees involved in the operation can safely enter into and work within the space.

**Acid:** An inorganic or organic compound that: 1) reacts with metals to yield hydrogen; 2) reacts with a base to form a salt; 3) dissociates in water to yield hydrogen ions; 4) has a pH of less than 7.0; and 5) neutralizes bases or alkalis. All acids contain hydrogen and turn litmus paper red. They are corrosive to human tissue and should be handled with care. Examples include sulfuric and hydrochloric acid.

**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 record keeping. 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 high amounts of the material.

**Acute Health Effect:** Adverse effect on a human or animal which has severe symptoms developing rapidly and coming quickly to a crisis. Acute effects are often immediate and can be severe or life threatening. Also see "chronic effect."

## Glossary (Cont.)

**Acute Toxicity:** The ability of a substance to do damage (generally systemic) as a result of a one time exposure from a single dose of or exposure to a material. This exposure is generally brief in duration.

**ACGIH (American Council of Governmental Industrial Hygienists):** Founded in 1938, this is an organization comprised of persons employed by official government units responsible for programs of industrial hygiene, education, and research. It was founded for the purpose of determining standards of exposure to toxic and otherwise harmful materials in workroom air. The standards are revised annually. See TLV (Threshold Limit Value).

**Adhesion:** A union of two surfaces that are normally separate.

**Adiabatic Heat:** The technical definition is descriptive of a system in which no net heat loss or gain is allowed.

**Aerosol:** A fine aerial suspension of particles sufficiently small in size to confer some degree of stability from sedimentation (for example, smoke or fog).

**Air Bill:** A shipping paper, prepared from a bill of lading that accompanies each piece in an air shipment.

**Air Line Respirator:** A respirator that is connected to a compressed breathing air source by a hose of small inside diameter. The air is delivered continuously or intermittently in a sufficient volume to meet the wearer's breathing requirements from a tank or compressor located in a remote location.

**Air Monitoring:** The process of evaluating the air in a given work environment. This process can be accomplished using a variety of instrumentation depending on the anticipated hazards. In relation to Confined Spaces, this is a program that must be carried out by the Confined Space Attendant during Confined Space entry. Air monitoring includes the use of a Combustible Gas Indicator (see CGI) and a Colorimetric tube system (see Colorimetric tubes) to determine if the confined space is oxygen deficient, has a combustible gas present, or a known hazardous gas such as hydrogen chloride or ammonia. Air monitoring must be conducted before entry is made, any time conditions change (temperature, humidity, hot-work), and on a regular basis during the time entry personnel are in the confined space.

**Air Purifying Respirator:** A respirator that uses chemicals to remove specific gases and vapors from the air or that uses a mechanical filter to remove particulate matter. An air purifying respirator must be used only when there is sufficient oxygen to sustain life and the air contaminant level is below the concentration limits of the device. This type of respirator is effective for concentrations of substances that are generally no more than ten times the threshold limit value (TLV) of the contaminant but never more than the IDLH value, and if the contaminant has warning properties (odor or irritation) below the TLV.

**Air Reactive Materials:** Substances that ignite when exposed to air at normal temperatures. Also called pyrophoric.

## Glossary (Cont.)

**Alkali:** Any chemical substance that forms soluble soaps with fatty acids. Alkalis are also referred to as bases. They may cause severe burns to the skin. Alkalis turn litmus paper blue and have pH values from 7.1 to 14. Sodium hydroxide, sodium bicarbonate and ammonium hydroxide are all examples of alkalis.

**Allergic Reaction:** An abnormal physiological response to chemical or physical stimuli by a sensitive person.

**Alpha Particle:** A small, charged particle emitted from the nucleus of an unstable atom. The small particle is essentially a helium nucleus consisting of two neutrons and two protons. This particle is of high energy and is thrown off by many radioactive elements.

**Anesthetic:** A chemical that causes a total or partial loss of sensation. Exposure to anesthetic can cause impaired judgment, dizziness, drowsiness, headache, unconsciousness, and even death. Examples include alcohol, paint remover, and degreasers.

**Anhydrous:** A chemical compound containing no free water. Anhydrous Ammonia for example, would be virtually pure ammonia with only trace amounts of water.

**Anion:** A negatively charged ion. This is created when an atom gains an electron in its orbit. The addition of a negatively charged electron results in an imbalance between the protons and electrons. Since there are more electrons in this case, it shifts the electrical charge to the negatively charged state.

**ANSI (American National Standards Institute):** ANSI is a privately funded, voluntary membership organization that identifies industrial and public needs for national consensus standards and coordinates development of such standards.

**Antidote:** A remedy to relieve, prevent or counteract the effects of a poison.

**APR:** See Air Purifying Respirator

**Aquatic Toxicity:** The adverse effects to marine life that result from exposure to a toxic substance.

**Asbestos:** A fibrous form of silicate minerals that has many uses in society. Although found naturally in California, its prime use is in fireproof fabrics, brake linings, gaskets, roofing compositions, electrical and mechanical insulation, paint filler, chemical filters, reinforcing agent in rubber and plastics and tile flooring. Its prime hazard is being a carcinogen (see carcinogen). It is highly toxic by inhalation of dust particles.

**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 oxygen in the air (normally about 21 percent) to dangerous levels (17 percent or lower). Asphyxiation is one of the principal potential hazards of working in confined and enclosed spaces.

## Glossary (Cont.)

**ASTM (American Society for Testing and Materials):** ASTM is the world's largest source of voluntary consensus standards for materials, products, systems, and services. ASTM is a resource for sampling and testing methods, health and safety aspects of materials, safe performance guidelines, and effects of physical and biological agents and chemicals.

**Asymptomatic:** Showing no symptoms.

**ATM:** Atmosphere, a unit of pressure equal to 760 mm Hg (mercury) at sea level.

**Atomic Number:** The number of protons in the nucleus of a particular atom. This number determines the element's position on the periodic table. See also proton.

**Atomic Weight:** The total weight of any atom is the sum of all its subatomic parts -the protons, neutrons, and electrons.

**Authorized Attendant:** See Confined Space Attendant.

**Authorized Entrant:** See Confined Space Entrant.

**Auto-Ignition Temperature:** The lowest temperature to which a material will ignite spontaneously or burn. This is sometimes referred to as ignition temperature. Almost all materials have an auto-ignition temperature since this is the level to which most materials must be heated in order to begin to burn.

**Atomic Symbol:** A one or two letter designation for a given element. These symbols are found on the periodic table and pertain to only one element. Symbols are also used in chemical formulas to identify the components of a given substance. LiF for example, is called Lithium Fluoride and is made up of the elements Lithium and Fluorine.

**Base:** See Alkali.

**Benign:** The term expressing that the disease (usually tumor) is not recurrent; not progressing; and/or not malignant.

**Beta Particle:** A byproduct of radioactive decay from an unstable nucleus. The process changes a neutron into a proton and subsequently emits an electron from its orbit. The released electron can take the form of a positron (positive charge) or a negatron (negative charge). This type of decay involves a change in the atomic number but no change in the mass of the atom. Beta particles are of high velocity and in some cases exceed 98% of the speed of light.

**Biodegradable:** Capable of being broken down into innocuous products by the action of living things. If the material is biodegradable, it is generally less hazardous to the environment.

**Blanking or Blinding:** The absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line or duct with no leakage beyond the plate.

## Glossary (Cont.)

**Blasting Agents:** A material designed for blasting which has been tested in accordance with Sec 173.114a(b) of 49 CFR and found to be so insensitive that there is very little probability of accidental initiation to explosion or of transition from deflagration to detonation. (Sec 173.114a(a))

**BLEVE (Boiling Liquid Expanding Vapor Explosion):** A major failure of a closed liquid container into two or more pieces. It is usually caused when the temperature of the liquid is well above its boiling point at normal atmospheric pressure.

**Boiling Point:** The temperature at which a liquid changes to a vapor state at a given pressure. The boiling point is usually expressed in degrees Fahrenheit at sea level pressure (760 mm Hg, or one atmosphere). For mixtures, the initial boiling point or the boiling range may be given. Some examples of flammable materials with low boiling points include:

Propane	-44 degree F
Anhydrous Ammonia	-28 degrees F
Butane	31 degrees F
Gasoline	>100 degrees F
Ethylene Glycol	387 degrees F

**BOM, or BuMines:** Bureau of Mines, US Department of Interior.

**Bonding:** The interconnecting of two objects by means of a clamp and bare wire. Its purpose is to equalize the electrical potential between the objects to prevent a static discharge when transferring a flammable liquid from one container to another. The conductive path is provided by clamps that make contact with the charged object and a low resistance flexible cable which allows the charge to equalize. See Grounding.

**Brisance:** An expression of the shattering effect of a particular explosive material.

**C:** Centigrade, a unit of temperature that has a scale ranging from 0 to 100 with 0 being the temperature at which water freezes, and 100 the temperature at which water boils.

**"C", or Ceiling:** The maximum allowable human exposure limit, usually for an airborne substance, that is not to be exceeded even momentarily. Also see "PEL" and "TLV".

**Cancer, Carcinoma:** An abnormal multiplication of cells that tends to infiltrate other tissues and metastasize (spread). Each cancer is believed to originate from a single "transformed" cell that grows (splits) at a fast, abnormally regulated pace, no matter where it occurs in the body. Cancer is the second most common cause of death in the US and is expected to be the number one cause by the year 2000. Most cancers are caused by our lifestyle - i.e. smoking and diet.

**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)

## Glossary (Cont.)

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. Following is a listing of one breakdown of carcinogens. It is the system used by the ACGIH in their classification of carcinogens.

**A1 - Confirmed Human Carcinogen:** The agent is carcinogenic to humans based on the weight of evidence from epidemiological studies of, or convincing clinical evidence in exposed humans.

**A2 - Suspected Human Carcinogen:** The agent is carcinogenic in experimental animals at dose levels, by route(s) of administrations, at site(s), of histologic type(s), or by mechanism(s) that are considered relevant to worker exposure. Available epidemiological studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.

**A3 - Animal Carcinogen:** The agent is carcinogenic in experimental animals at relatively high dose, by route(s) of administration, at site(s), of histologic types(s), or by mechanisms(s) that are not considered relevant to worker exposure. Available epidemiological studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggest that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

**A4 - Not Classifiable as a Human Carcinogen:** There are inadequate data on which to classify the agent in terms of its carcinogenicity in humans and/or animals.

**A5 - Not Suspected as a Human Carcinogen:** The agent is not suspected to be a human carcinogen on the basis of properly conducted epidemiological studies in humans. These studies have sufficiently long follow-up, reliable exposure histories, sufficiently high dose, and adequate statistical power to conclude that exposure to the agent does not convey a significant risk of cancer to humans. Evidence suggesting a lack of carcinogenicity in experimental animals will be considered if it is supported by other relevant data.

**Carcinogenicity:** The ability to cause or contribute to cancer.

**CAS Number (CAS Registration Number):** An assigned number used to identify a chemical. CAS stands for Chemical Abstracts Service, an organization that indexes information published in Chemical Abstracts by the American Chemical Society and that provides index guides by which information about particular substances may be located in the abstracts. The CAS number is concise, unique means of material identification.

**Catalyst:** A substance that modifies (slows, or more often quickens) a chemical reaction without being consumed in the reaction.

**Cation:** A positively charged ion. This is created when an atom loses an electron from its orbit. The reduction of a negatively charged electron results in an imbalance between the protons and electrons. Since there are more protons in this case, it shifts the electrical charge to the positively charged state.

## Glossary (Cont.)

**Caustic:** See Alkali.

**cc:** Cubic centimeter is a volume measurement in the metric system which is equal in capacity to one milliliter (ml). One quart is about 946 cubic centimeters.

**Central Nervous System (CNS):** The term that generally refers to the brain and spinal cord. These organs supervise and coordinate the activity of the entire nervous system. Sensory impulses are transmitted into the central nervous system and motor impulses are transmitted out. The remainder of the nervous system that is not part of the CNS, is generally classified as the peripheral nervous system.

**CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The Act requires that the Coast Guard provide a national response capability that can be used in the event of a hazardous substance release. The Act also provides for a fund (the Superfund) to be used for the cleanup of abandoned hazardous waste disposal sites.

**CFR (Code of Federal Regulations):** These are the codes which codify the various federal regulation. The most important example for workplace safety is book number 29 (29 CFR) that contains the OSHA regulations. Other examples include 40 CFR that contains EPA regulations and 49 CFR that contains Department of Transportation regulations.

**CGI (Combustible Gas Indicator):** A mechanical device that can detect any gas or vapor with a defined flash point (see flash point) and lower explosive limit (see LEL), if the concentration is high enough. This includes both flammable and combustible materials. Most CGI's also have the capability to monitor oxygen levels in the atmosphere. This is especially important for monitoring areas that have the potential to be oxygen deficient (below 19.5% Oxygen) or oxygen enriched (above 23% oxygen).

**Chemical:** Any element, chemical compound, or mixture of elements and/or compounds where chemical(s) are distributed.

**Chemical Cartridge Respirator:** See Air Purifying Respirator.

**Chemical Name:** The name given to a chemical in the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS).

**Chemical Family:** A group of single elements or compounds with a common general name. Example: Acetone, Methyl Ethyl Ketone (MEK), and Methyl Iso Butyl Ketone (MIBK) are of the Ketone family: Acrolein, Furfural, and Acetaldehyde are of the Aldehyde family.

**Chemical Hygiene Plan:** A written program developed and implemented by the employer setting forth procedures, equipment, personal protective equipment, and work practices that (a) are capable of protecting employees from the health hazards presented by hazardous chemicals used in the particular workplace and (b) meet the requirements of the Laboratory Standard.

**Chemical Structure:** The arrangement within the molecule of atoms and their chemical bonds.

## Glossary (Cont.)

**Chemistry:** The branch of study concerning the composition of chemical substances and their effects and interactions with one another. This includes the study of atoms and their behavior, the make up of chemical compounds, the reactions that occur between these compounds and the energies resulting from those reactions. Chemistry is not an isolated discipline however, and it includes theories from thermodynamics, physics, and biology.

**CHEMTREC (Chemical Transportation Emergency Center):** CHEMTREC is a national center established by the Chemical Manufacturers Association (CMA) to relay pertinent emergency information concerning specific chemicals on requests from individuals and response agencies. CHEMTREC has a 24 hour toll free telephone number (800-424-9300) to help agencies who respond to chemical transportation emergencies.

**Chronic Exposure:** Long - term contact with a substance or repeated exposures to the material. Such exposures often result in long-term health effects such as the development of cancers or organ damage.

**Chronic Toxicity:** Harmful systemic effects produced by long term, low level exposure to chemicals. Typically, this period of time is considered to be more than three months.

**Class A Flammable Materials:** These are fires involving solid, organic materials including wood, cloth, paper, and many plastics.

**Class A Explosive:** Detonating or otherwise of maximum explosion hazard. The nine types of class A explosives are defined in Sec 173.53 of 49 CFR.

**Class B Explosive:** In general, the type of explosive that functions by rapid combustion rather than detonation and include some explosive devices such as special fireworks, flash powders, etc. Flammable hazard. (Sec 173.88 of 49 CFR)

**Class C Explosive:** Certain types of materials that are manufactured articles containing Class A or Class B explosives, or both, as components but in restricted quantities, and certain types of fireworks. These present a minimum hazard.

**Class IA Flammable Liquids:** A class of flammable liquids with a flash point below 73° F and a boiling point below 100° F.

**Class IB Flammable Liquids:** A class of flammable liquids with a flash point below 73° F and a boiling point at or above 100° F.

**Class IC Flammable Liquids:** A class of flammable liquids with a flash point at or above 73° F and below 100° F.

**Class II Liquids:** A class of combustible liquids with a flash point at or above 100° F and below 140° F.

**Class III Liquids:** A class of flammable liquids with a flash point above 140° F.

## Glossary (Cont.)

**Clean Air Act:** Federal law enacted to regulate and reduce air pollution and administered by the Environmental Protection Agency.

**Clean Water Act:** Federal law enacted to regulate and reduce water pollution. The CWA is administered by the EPA.

**Clinical Toxicology:** Designates within the realm of medical science an area of professional emphasis concerned with diseases caused by, or uniquely associated with toxic substances. This area of toxicology generally deals with drug overdoses and its treatment.

**CO (Carbon Monoxide):** CO is a colorless, odorless, flammable and very toxic gas produced by the incomplete combustion of carbon. It is a byproduct of many chemical processes.

**CO<sub>2</sub> (Carbon Dioxide):** CO<sub>2</sub> is a heavy, colorless gas that is produced by the combustion and decomposition of organic substances and as a byproduct of many chemical processes. CO<sub>2</sub> will not burn and is relatively non toxic (although high concentrations, especially in confined spaces, can create hazardous oxygen-deficient environments).

**COC:** Cleveland Open Cup is a flash point test method.

**Cold Zone:** See Zones.

**Colorimetric Detector Tubes:** These are sealed glass tubes, that, when the tips are broken off and an air sample is drawn through with a bellows device, will turn chemicals in the tube a different color when exposed to a specific air contaminant. There are several different brands available with the most common being the Draeger system.

**Combustible:** A term used by NFPA, DOT, and others to classify on the basis of flash points certain liquids that will burn. NFPA generally defines "combustible liquids" as having a flash point of 100° F (38.7° C) or higher. In 1992, DOT modified their definition to a liquid with a flash point greater than 140° F. Also see Flammable. Another use for the term is with non-liquid substances such as wood and paper. In this case, materials which are capable of burning are often referred to as combustible or as "ordinary combustibles."

**Combustible Liquid:** NFPA classifies this as any liquid having a flash point at or above 100 degrees F (37.8 degrees C). Combustible liquids are also referred to as either Class II or Class III liquids depending on their flash point. Note that DOT has a definition that is different - see Combustible above.

**Compound:** A compound can be defined as the chemical combination of two or more elements that results in the creation of unique properties and a definite, identifiable composition of the substance.

**Compressed Gas:** (a) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 degrees F (21.1 degrees C); or (b) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 degrees F (54.4 degrees C) regardless of

## Glossary (Cont.)

the pressure at 70 degrees F (21.1 degrees C); or (c) A liquid having a vapor pressure exceeding 40 psi at 100 degrees F (37.8 degrees C) as determined by ASTM D-323-72.

**Concentration:** The relative amount of a substance when combined or mixed with other substances. Examples: 2 ppm, hydrogen sulfide in air, or a 50 percent caustic solution.

**Confined Space:** Any area as defined by OSHA that has all of the following characteristics: 1) Is large enough so that a person can bodily enter; 2) Is not designed for continuous occupancy; and 3) Has limited ingress and egress. To be classified as a "permit required" confined space, the area must also possess, or have the potential to possess one of the following: 1) an oxygen deficient atmosphere; 2) a potentially hazardous atmosphere (toxicity); 3) a flammable atmosphere; 4) the risk of entrapment due to converging walls or sloping floors; 5) risk of engulfment, 5) any other recognized serious health or safety hazard. Examples of confined spaces include storage tanks, pits, vaults, or chambers.

**Confined Space Attendant:** Whenever an entry is made into a confined space, an attendant is required. Entry can be as simple as sticking ones head into an opening or as complex as entering an underground storage tank. The attendant is responsible for ensuring entry personnel have the correct respiratory protection and chemical protective clothing. The attendant will also conduct monitoring when required, ensure communications are in place, and ensure the entry team act in a safe and competent manner. At no time is the attendant allowed to leave the confined space area.

**Confined Space Permit:** This form is filled out by a competent authority such as a qualified confined space attendant, industrial hygienist, safety professional or marine chemist. The form will state what the space was tested for, report that it is safe for entry, what specific (if any) equipment is required and signed.

**Consist:** A rail shipping paper containing a list of cars in the train by order. Those containing hazardous materials are indicated. Some railroads include information on emergency operations for the hazardous materials on the train with the consist.

**Consumer Commodity:** Means a material that is packaged or distributed in a form intended and suitable for sale through retail sales agencies or instrumentality's for consumption by individuals for purposes of personal care or household use. This term also includes drugs and medicines. (see ORM-D)

**Container:** Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For the purposes of an MSDS or the Hazard Communication Standard, pipes or piping systems re not considered to be containers.

**Contamination Reduction Zone:** See Zones.

**Controls:** These are methods required by OSHA to eliminate the hazards or reduce the risk when working with hazardous materials or hazardous operations. They consist of, in this order:

**Engineering controls:** The first level of controlling hazards in the workplace and include

## Glossary (Cont.)

the use of built-in safety systems such as guardrails, ventilation systems and machine guarding devices. Engineering controls largely eliminate the hazard and do not generally require employee action since they are most often automatic.

**Administrative controls:** These types of controls reduce the exposure by alerting the employee to the hazard or controlling the amount of exposure through rules and practices. These types of controls can include work rules, schedules, standard procedures, signage, barrier tape and other methods to limit the potential exposure of the worker.

**PPE:** Personal Protective Equipment that is required to be worn by the employee during the time of potential exposure to the hazard.

**Corrosive:** A material that causes visible destruction of, or irreversible alterations in living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the US Department of Transportation in Appendix A to 49 CFR Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of 4 hours.

**CPSC:** Consumer Product Safety Commission has responsibility for regulating hazardous materials when they appear in consumer goods. For CPSC purposes, hazards are defined the Hazardous Substances Act and the Poison Prevention Packaging Act 1970.

**Cryogenic:** Gases that are cooled to a very low temperature, usually below -150 degrees F (-101 C), to change to a liquid. Also called refrigerated liquids. Some common cryogenics include liquid oxygen, nitrogen and helium.

**Cutaneous Toxicity:** See Dermal Toxicity.

**Cutting, Welding and Burning:** Any action involving the use of oxy-acetylene or heliarc welding on metal that will create sparks, heats or fumes that may collect in one space or effect the atmosphere in a nearby space. Welding also applies to using "Weld-on" type glues in affixing PVC piping and joints. All of the actions may change the hazards and conditions especially in a confined space.

**Dangerous Cargo Manifest:** A cargo manifest listing the hazardous materials on board a ship and their location.

**Dangerous Goods (Canada):** Any product, substance, or organism included by its nature or by the regulation in any of the classes listed in the schedule (UN 9 Classes of Hazardous Materials).

**DASHO:** Designated Agency Safety and Health Official is the executive official of a federal department or agency who is responsible for safety and occupational health matters within a federal agency and who is so designated or appointed by the head of the agency.

**Decontamination:** The systematic process of removing hazardous materials from personnel and their equipment. It is necessary to reduce the potential for exposure to personnel and to

## Glossary (Cont.)

minimize the spread of contamination from the site.) Decontamination is sometimes abbreviated to the term decon. The term can also be expanded to include area cleanup (decon).

**Decomposition:** Breakdown of a material or substance (by heat, chemical reaction, electrolysis, decay, or other processes) into parts or elements or simpler compounds.

**Deflagration:** A rapid combustion of a material occurring in the explosive mass at sub sonic speeds. The event is usually caused by contact with a flame source but may also be caused by mechanical heat or friction.

**Delayed Effects:** Effects from chemical exposure that are not seen for up to several hours after the initial event or exposure.

**Density:** The mass (weight) per unit volume of a substance. For example, Lead is much more dense than Aluminum.

**Dermal:** Relating to the skin.

**Dermal Toxicity:** Adverse effects resulting from skin exposure to a substance. The term was ordinarily used to denote effects in experimental animals.

**Descriptive Toxicology:** The branch of toxicology concerned directly with toxicity testing.

**Detonation:** An extremely rapid decomposition of an explosive materials. This decomposition propagates throughout the explosive agent at supersonic speeds and is accompanied by pressure and temperature waves. This detonation could be initiated by mechanical friction, impact and /or heat.

**DHHS:** US Department of Health and Human Services (replaced US Department of Health, Education and Welfare). NIOSH and the Public Health Service are part of DHHS.

**Designated Area:** An area that may be used for work with select carcinogens, reproductive toxins, and substances with a high degree of acute toxicity. A designated area may be the entire laboratory, or a device such as a laboratory hood.

**Diatomic Gas:** A gaseous element requiring two atoms to achieve stability. Examples of diatomic gases are Oxygen and Nitrogen.

**Dike:** A barrier constructed to control or confine hazardous substances and prevent them from entering sewers, ditches, streams, or other flowing waters.

**Dilution:** A term used in decontamination as the process of using water to flush the contaminants from personnel, the environment or equipment.

**Diurnal Effects:** Daily weather changes such as barometric pressure, wind direction, temperature, fog or rain.

## Glossary (Cont.)

**DOL:** The US Department of Labor. OSHA and MSHA are part of DOL.

**Dose:** The amount of a given material or chemical that enters the body of an exposed organism in a given period of time. The time can be as short as a few seconds (to inject a substance) or as long as a life-time (in the case of chronic exposures).

- Internal dose refers to the amount of a chemical which is absorbed by the body.
- Biologically effective dose refers to the amount that interacts with a particular target tissue or organ.

$$\text{Dose} = \text{Concentration} \times \text{Time} \times \text{Exchange Rate}$$

Where the "exchange rate" refers to the breathing rate (e.g. m<sup>3</sup>/hr) or ingestion rate (liters or grams/day)

Note that if the internal dose is to be calculated, then another factor must be included, viz. the fraction of the chemical which is taken up. This fraction is the retention factor, which ranges from 0 to 1.0.

**DOT:** US Department of Transportation regulates transportation of chemicals and other substances.

**Dynamite:** An industrial high explosive that is moderately sensitive to shock and heat. The main ingredients are Nitroglycerin or sensitized Ammonium Nitrate. This material is then distributed in diatomaceous earth or a mass of hydrated silica.

**Edema:** An abnormal accumulation of clear watery fluid in the tissues.

**Electromagnetic Radiation:** The propagation of waves of energy of varying electric and magnetic fields through space. The waves move at the speed of light from matter in the form of photons or energy packets. The strength of the waves depends on their individual frequency. See also gamma radiation.

**Electron:** A sub atomic particle having a negative electric charge. The electron has mass, which is approximately 1/1837th of a proton. Electrons surround the nucleus of atoms, and are equal in number to the protons for the given element they are orbiting. Electrons that have been separated from an atomic orbit are said to be *free electrons*. Electrons are the sub atomic particle responsible for bonding and are pivotal in the formation of compounds.

**Element:** One of the 109 recognized substances that comprise all matter at the atomic level. Elements are the building blocks for the compounds formed by chemical reactions. A listing of the elements can be found on the periodic table. Some examples include sodium, oxygen, neon, and carbon.

**Emergency:** Any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of controls which results in an uncontrolled release of a hazardous chemical

## Glossary (Cont.)

into the workplace. Emergencies generally involve exposure of personnel outside the immediate area to a hazard.

**Emergency Response Plan:** A plan that is developed in advance of an emergency situation that identifies the actions to be taken by all employees at the site in the vent of an emergency.

**Emergency Response Planning Guideline (ERPG):** These are values established to assist emergency response planning when a release involves exposure of the public to the substance. There are three levels developed to describe the effects of the exposure at each level.

**Employee:** An individual employed in a workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

**End of Service Life Indicator (ESLI):** The system that warns the user that the respirator cartridge is reaching the end of its useful life and needs to be change.

**Endothermic:** A description of a process that ultimately absorbs heat and requires large amounts of energy for initiation and maintenance.

**Engulfment:** The surrounding and effective capture of a person by a liquid or finely divided solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

**Entry:** The action by which a person passes through an opening into a Permit Required Confined Space. Entry includes ensuing work activities in that space and is considered to have occurred a soon as any part of the entrant's body breaks the plane of an opening into the space.

**Environmental Toxicity:** Information obtained as a result of conducting environmental testing designed to study the effects on aquatic and plant life.

**Environmental Toxicology:** The branch of toxicology dedicated to developing an understanding of "chemicals in the environment and their effect on man and other organisms." Environmental media may include air, ground water, surface water, and soil. Impact may be from fish to philosopher. This area of toxicology is (or should be) the most significant for the development of risk assessments.

**EPA (Environmental Protection Agency):** Established in 1970, the Federal EPA is required to ensure the safe manufacture, use and transportation of hazardous chemicals. The State of California has also established California EPA that follows the same guidelines on the state level.

**Epidemiology:** Science concerned with the study of disease in a general population. Determination of the incidence (rate of occurrence) and distribution of a particular disease (as by age, sex, or occupation) which may provide information about the cause of the disease.

**Epithelium:** The covering of internal and external surfaces of the body.

## Glossary (Cont.)

**Etiologic Agent:** A material or substance that is capable of causing disease. The material could contain a viable micro-organism, or its toxin which causes or may cause human disease. A biohazard or biologic agent.

**Evaporation Rate:** The rate at which a material will vaporize (evaporate) when compared to the known rate of vaporization of a standard material. The evaporation rate can be useful in evaluating the health and fire hazards of a material. The designated standard material is usually normal butyl acetate (NBUAC or n-BuAc), with a vaporization rate designated as 1.0. Vaporization rates of other solvents or materials are then classified as:

Fast evaporating if greater than 3.0. Examples: Methyl Ethyl Ketone = 3.8, Acetone = 5.6, Hexane = 8.3.

Medium evaporating if 0.8 to 3.0. Examples: 190 proof (95%) Ethyl Alcohol = 1.4, VM&P Naphtha = 1.4, MIBK = 1.6

Slow evaporating if less than 0.9. Examples: Xylene = 0.6, Isobutyl Alcohol = 0.6, Normal Butyl Alcohol = 0.4, Water = 0.3, Mineral Spirits = 0.1.

**Exclusionary Zone:** See Zones.

**Exothermic:** An expression of a reaction or process that evolves energy in the form of heat. The process of neutralization evolves heat-this is considered to be an exothermic reaction.

**Explosive:** A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature. Explosives are broken down into various classifications by the Department of Transportation.

**Exposure:** An event in which a pollutant (Chemical Toxicant in the present context) has contact with an organism, such as a person, over a certain interval of time. Exposure is thus the product of concentration and time (e.g. mg/m<sup>3</sup> x hr).

**Exposure Limits:** The levels of exposure established by studies that determine the safe levels to enable workers to maintain a margin of safety when functioning in contaminated atmospheres.

**Extremely Hazardous Substance:** Chemicals determined by the Environmental Protection Agency (EPA) to be extremely hazardous to a community during an emergency spill or release as a result of their toxicities and physical/ chemical properties.

**Eye Protection:** Recommended safety glasses, chemical splash goggles, face shields, etc., to be utilized when handling a hazardous material.

**F:** Fahrenheit is a scale for measuring temperature. On the Fahrenheit scale, water boils at 212 degrees F and freezes at 32 degrees F.

**FACOSH:** Federal Advisory Council for Occupational Safety and Health is a joint

## Glossary (Cont.)

management-labor council that advises the Secretary of Labor on matters relating to the occupational safety and health of federal employees.

**FDA:** US Food and Drug Administration.

**Fetus:** The developing young in the uterus from the seventh week of gestation until birth.

**FFSCH:** Field Federal Safety and Health Councils are organized throughout the country to improve federal safety and health programs at the field level and within a geographic location.

**FIFRA:** Federal Insecticide, Fungicide, and Rodenticide Act regulates poisons, such as chemical pesticides, sold to the public and requires labels that carry health hazard warnings to protect users. It is administered by EPA.

**Fit Factor:** This refers to the number that defines the ratio between the levels of particulates inside the mask versus those measured outside the mask.

**Flammable:** A chemical that includes one of the following categories:

**Flammable Aerosol:** An aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening.

**Flammable Gas:** (1) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or (2) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit.

**Flammable Liquid:** Any liquid having a flash point below 100 degrees F (37.8 degrees C), except any mixture having components with flash points of 100 degrees F (37.8 degrees C) or higher, the total of which make up 99 percent or more of the total volume of mixture.

**Class IA:** A class of flammable liquids with a flash point below 73° F and a boiling point below 100° F.

**Class IB:** A class of flammable liquids with a flash point below 73° F and a boiling point at or above 100° F.

**Class IC:** A class of flammable liquids with a flash point at or above 73° F and below 100° F.

**Flammable Solid:** A solid, other than a blasting agent or explosive as defined in 24 CFR 1910.109 (A), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A substance is a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

## Glossary (Cont.)

**Flammable Range:** The concentration of gas or vapor in air that will burn if ignited. It is expressed as a percentage that defines the range between a lower explosive limit (LEL) and an upper explosive limit (UEL). A mixture below the LEL is too "lean" to burn; a mixture above the UEL is too "rich" to burn.

**Flash Point:** The minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested by the following methods:

- (a) Tagliabue Closed Tester (see American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24 1979 [ASTM D5-79] ) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 degrees F (37.8 degrees C), that do not have a tendency to form a surface film under test; or
- (b) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.771979 [ASTM D9-79] ) for liquids with a viscosity equal to or greater than 45 SUS at 100 degrees F (37.8 degrees C), or that contain suspended solids, or that have a tendency to form a surface film under test; or
- (c) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester [ASTM D 3278-78]).

Organic peroxides, which undergo auto accelerating thermal decomposition, are excluded from any of the flash point determination methods specified above.

For practical purposes, this temperature denotes the point at which vapors will be emitted from a liquid and will be ignitable in the presence of a flame or ignition source. It is probably the single most important fire term used in our study.

**Forbidden:** A hazardous material that must not be offered or accepted for transportation.

**Forensic Toxicology:** The branch of toxicology concerned with medico legal aspects of the harmful effects of chemicals on man and animals.

**Formula:** The scientific expression of the chemical composition of a material (e.g., water is H<sub>2</sub>O, sulfuric acid is H<sub>2</sub>SO<sub>4</sub>, sulfur dioxide is SO<sub>2</sub>).

**FRA:** First Responder Awareness Level. The first level of training under the HAZWOPER standard for persons who would likely come across a hazardous materials release and whose job it would be to report the spill to the correct agency.

**FRO:** First Responder Operations Level. The second level of training under the HAZWOPER standards. This level is designed for those personnel whose role it is to respond to a hazardous materials release and initiate defensive control operations.

**Fume:** A solid condensation particle of extremely small diameter, commonly generated from molten metal as metal fume.

## Glossary (Cont.)

**Gamma Radiation:** This form of radiation is essentially electromagnetic radiation. The wavelengths of gamma rays are shorter than x-rays and are emitted as photons. Photons are massless, and are considered to be pure energy. See also electromagnetic radiation.

**Gases:** Materials that form one of the three states of matter. They move freely when released and can occupy the entire area of release.

**General Exhaust:** A system for exhausting air that contains contaminants from a general work area. Also see Local Exhaust.

**General Site Worker:** An employee who works at a cleanup site regulated by the HAZWOPER regulation and whose work exposes or potentially exposes them to high levels of hazardous substances.

**Genetic:** Pertaining to or carried by genes. Hereditary.

**Gestation:** The development of the fetus from conception to birth.

**g/kg:** Grams per kilogram is an expression of dose used in oral and dermal toxicology testing to denote grams of a substance dosed per kilogram of animal body weight. Also see kg (Kilogram).

**Grounding:** The procedure used to carry an electrical charge to ground through a conductive path. A typical ground may be connected directly to a conductive water pipe or to a grounding bus and ground rod. See Bonding.

**Half Life:** It is the time required for the decay process to reduce the energy production to one half of its original value. This means that half the atoms are present, therefore, half the radioactive energy is occurring. This time period varies from isotope to isotope. Half lives can range from millionths of a second to more than a million years.

**Hand Protection:** Specific type of gloves or other hand protection required to prevent the harmful exposure to hazardous materials.

**HASP (Health and Safety Plan):** A plan that is written for a specific clean up activity required under the HAZWOPER regulation. It is broad in its scope and very detailed covering the specific operations that must be conducted.

**Haz Mat Team Member:** Those employees who are trained to respond to an emergency response involving hazardous substances and who will assume an aggressive role in stopping the release.

**Hazard Communication:** The title of the OSHA regulation that is sometimes known as the Employee Right-To-Know rule. It requires employers to make information available to employees on all of the hazardous substances in the workplace to which they may be exposed.

**Hazard and Risk Assessment:** The process of determining the hazards of a particular materials and interjecting action that will be taken.

## Glossary (Cont.)

**Hazard Assessment:** The process that identifies the potential harm that a material presents.

**Hazard Categorizing (Haz-Cat):** Field analysis that can be performed by appropriate trained personnel working at an emergency response site.

**Hazard Warning:** Words, pictures, symbols, or combination thereof presented on a label or other appropriate form to inform of the presence of various materials.

**Hazardous Atmosphere:** An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (for example escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

1. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);
2. Airborne combustible dust at a concentration that meets or exceeds its LFL;

NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52m) or less.

3. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
4. Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this part and which could result in employee exposure in excess of its dose or permissible limit;

NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

5. Any other atmospheric condition that is immediately dangerous to life or health.

NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limits, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard 1910.1200 of this part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

**Hazardous Chemical:** Any chemical whose presence or use is a physical hazard or a health hazard. For purposes of the OSHA Laboratory Standard, a chemical for which there is significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which affect the hematopoietic system, and agents that damage the lungs, skin, eyes, or mucous membranes.

## Glossary (Cont.)

**Hazardous Materials Specialist:** An individual trained to the fourth level of HAZWOPER emergency response training. Their actions are similar to those of the Hazardous Materials Technician, but may also include training on the handling of specific materials and interaction with outside agencies.

**Hazardous Materials Technician:** An individual trained to the third level of HAZWOPER emergency response training and whose job function involves an aggressive/offensive response to a release of a hazardous material. Personnel at this level are trained to select and use appropriate chemical protective equipment that will allow them to approach a release for the purpose of stopping the release.

**Hazardous Substance:** Any substance designated under the Clean Water Act and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as posing a threat to waterways and the environment when released. (US Environmental Protection Agency).

**Hazardous Wastes:** Discarded materials regulated by the Environmental Protection Agency because of public health and safety concerns. Regulatory authority is granted under the Resource Conservation and Recovery Act. (US Environmental Protection Agency)

**HAZWOPER:** The term used to describe the Hazardous Waste Operations and Emergency Response regulation.

**Hepatotoxin:** A substance that causes injury to the liver.

**Heroic Dose:** An expression of exposure levels used in animal testing. Heroic doses are referred to as the maximum tolerated doses of the test chemical. Essentially, it is the highest, non lethal dose the animal can tolerate during the testing process.

**Highly Toxic:** Defined by OSHA as a chemical falling within any of the following categories:

- (a) A material with a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
- (b) A material with a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
- (c) A material that has a median lethal concentration (LC50) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

**Heterogeneous:** A substance that does not display a uniform make up. The composition of heterogeneous substances or mixtures differs from sample point to sample point.

## Glossary (Cont.)

**Homogeneous:** A substance that displays a uniform composition throughout.

**Hot Work Permit:** The employers written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

**Hot Zone:** See Zones.

**Hydrolysis:** A chemical decomposition of a substance by water. The products of the decomposition results in the formation of two or more new substances.

**Hygroscopic:** The ability of a substance to absorb moisture from the air.

**Hypocalcemia:** A condition characterized by abnormally low levels of calcium in the blood.

**Hypergolic:** Substances that spontaneously ignite on contact with another. Many hypergolic materials are used as rocket fuels.

**Hyperthermia:** A condition where excess heat builds inside the body.

**IARC:** International Agency for Research on Cancer. One of the leading agencies that list and identify carcinogens and suspected carcinogens.

**IDLH (Immediately Dangerous to Life or Health):** The term is usually expressed in parts per million and reflects the atmospheric level of any toxic, corrosive, or asphyxiant that poses a danger to life or would cause irreversible or delayed adverse health effects or would impair the ability of an individual to escape the area. In many cases this value is based on an exposure of 30 minutes.

**Ignition Temperature:** The minimum temperature to which a fuel in air must be heated in order to start self-sustained combustion independent of the heating source.

**Impervious:** A material that does not allow another substance to pass through or penetrate it.

**Incident Commander:** The person responsible for all operations at a hazardous materials emergency.

**Incident Command System (ICS):** A management system that is used for managing emergency response operations.

**Incident Action Plan:** An emergency response plan that is used to identify the specific hazards and operations that must be conducted in the event of an emergency response to a hazardous substance. It is different than the Site Safety Plan in that it is less detailed and deals only with the emergency phase of the incident.

**Incompatible:** Materials that could cause dangerous reactions by direct contact with one another.

## Glossary (Cont.)

**Inerting:** The displacement of the atmosphere in an area such as a Permit Required Confined Space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

NOTE: This procedure often produces an IDLH oxygen-deficient atmosphere.

**Ingestion:** Taking in by the mouth.

**Inhalation:** Breathing in of a substance in the form of a gas, vapor, fume, mist, or dust.

**Inhibitor:** A chemical added to another substance to prevent an unwanted chemical change.

**Insoluble:** Incapable of being dissolved in a liquid.

**Ion:** An atom or molecule that has acquired a positive or negative charge by gaining or losing an electron. The atom or molecule is no longer considered neutral in this state.

**Ionization:** The formation of ions. This ion formation occurs when a neutral molecule of an inorganic solid, liquid, or gas undergoes a chemical change. These highly energetic, short wavelength rays are capable of causing mutations in cell nuclei and DNA. These changes in the cell structures of the body may cause cancer or other long term disease processes.

**Ionizing Radiation:** Radiation that is capable of causing the ionization of solids, liquids, or gases either directly or indirectly. This process can be caused by alpha and beta or gamma radiation.

**Irritant:** A chemical, that is not corrosive but that causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for 4 hours exposure or by other appropriate techniques, it results in an empirical score of 5 or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

**Irritating:** An irritating material, as defined by DOT, is a liquid or solid substance that, upon contact with fire or when exposed to air, gives off dangerous or intensely irritating fumes (not including poisonous materials). See Poison, Class A and Poison Class B.

**Isolation:** The process by which an area such as a Permit Required Confined Space is removed from service and completely protected against the release of energy and material into the area by such means as: blanking or blinding, or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

**Isotope:** One of two or more types of atoms of an element. These atoms have the same atomic number but a differing number of neutrons. Uranium 238 as compared to Uranium 235 is an example of an isotope. U-238 has 92 protons and 146 neutrons. U-235 has 92 protons and 143 neutrons. See radioactive isotope.

## Glossary (Cont.)

**kg:** Kilogram is a metric unit of weight, about 2.2 US pounds. Also see "g/kg", "g", and "mg".

**L:** Liter is a metric unit of capacity. A US quart is about 9/10 of a liter.

**Label:** Notice attached to a container, bearing information concerning its contents.

**Laboratory:** A facility where the "laboratory use" of hazardous chemicals occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

**Laboratory-Type Hood:** A device located in a laboratory, enclosed on five sides with a moveable sash or fixed partial enclosure on the remaining side, constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory. A hood allows a worker to conduct chemical manipulations in the enclosure without inserting any portion of the body other than hands and arms. Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.

**LC:** Lethal concentration is the concentration of a substance being tested that is expected to kill. It is a measurement of the material in the air and is expressed in either ppm or ppb.

**LClo:** Lethal concentration low; lowest concentration of a gas or vapor as measured in the air which is capable of killing a specified species over a specified time.

**LC50:** The concentration of a material in air that is expected to kill 50 percent of a group of test animals with a single exposure (usually 1 to 4 hours). The LC50 is expressed as parts of material per million parts of air, by volume (ppm) for gases and vapors, or as micrograms of material per liter of air (mcg/l) or milligrams of material per cubic meter of air (mg/m<sup>3</sup>) for dusts and mists, as well as for gases and vapors.

**LChi:** The airborne concentration of a chemical that will be fatal to 100% of a test population

**LD:** Lethal dose is the quantity of a substance being tested that will kill. It is a measurement of the actual dose taken in via ingestion, injection, or dermal exposure and is expressed in mg/kg.

**LD50:** A single dose of a material expected to kill 50 percent of a group of test animals. The LD50 dose is usually expressed as milligrams or grams of material per kilogram of animal body weight (mg/kg or g/kg). The material may be administered by mouth or applied to the skin.

**LDlo:** Lethal dose low: lowest administered dose of a material capable of killing a specified test species.

**LDhi:** The concentration of a chemical by dermal contact or absorption, that will be fatal to 100% of a test population

## Glossary (Cont.)

**LEL, or LFL:** Lower explosive limit, or lower flammable limit, of a vapor or gas. The lowest concentration (lowest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc, or flame) is present. At concentrations lower than the LEL, the mixture is too "lean" to burn. Also see UEL.

**Limited Quantity:** Means the maximum amount of hazardous material; as specified in those sections applicable to the particular hazard class, for which there are specific exceptions from the requirements of this subchapter. See Sec. 173.118, 173.118(a), 173.153, 173.244, 173.306, 173.345, and 173.364 of 49 CFR.

**Local effects:** Effects of chemical exposure that occur at the site where the material contacts the body.

**Local Exhaust:** A system for capturing and exhausting contaminants from the air at the point where the contaminants are produced (welding, grinding, sanding, or other processes or operations). Also see General Exhaust.

**Long Term Health Effects:** Effects that do not show until months or years following exposure.

**M:** Meter is a unit of length in the metric system. One meter is about 39 inches.

**m<sup>3</sup>:** Cubic meter is a metric measure of volume, approximately 35.3 cubic feet or 1.3 cubic yards.

**Malleable:** Substances exhibiting the properties of flexibility, the ability to bend or be hammered into thin sheets. Most metallic elements are considered to be malleable.

**Matter:** Anything that has mass and occupies space. Matter is generally accepted to found in three basic forms, solid, liquid, and gas. Most of the subatomic particles that make up matter are invisible to the naked eye.

**Malignant:** Tending to become progressively worse and to result in death.

**Mechanical Exhaust:** A powered device, such as a motor-driven fan or air stream venturi tube, for exhausting contaminants from a workplace, vessel or enclosure.

**Mechanical Filter Respirator:** A respirator used to protect against airborne particulate matter like dusts, mists, metal fume and smoke. Mechanical filter respirators do not provide protection against gases, vapors, or oxygen deficient atmospheres.

**Melting Point:** The temperature at which a solid substance changes to a liquid state.

**Miscibility:** See solubility.

**Mitigation:** The terms used to describe the tactics and strategies used to handle an emergency or clean up operation.

## Glossary (Cont.)

**Metabolism:** Physical and chemical processes taking place among the ions, atoms, and molecules of the body. Metabolism is an important element in the study of how the toxic materials that we take into our bodies are processed by it.

**mg:** Milligram is a metric unit of weight which is one-thousandth of a gram.

**mg/kg:** Milligrams of substance per kilogram of body weight is an expression of toxicological dose.

**mg/m<sup>3</sup>:** Milligrams per cubic meter is a unit for expressing concentrations of dusts, gases, or mists in air.

**Micron:** Micrometer is a unit of length equal to one-millionth of a meter. A micron is approximately 1/23,000 of an inch.

**Mist:** Suspended liquid droplets generated by condensation from the gaseous to the liquid state, or by breaking up a liquid into a dispersed state, such as splashing, foaming, or atomizing. Mist is formed when a finely divided liquid is suspended in air.

**Mitigation:** An operational term used in the industry to describe the process of bringing a chemical release under control

**Mixture:** Any combination of two or more chemicals if the combination is not, in whole or part, the result of a chemical reaction.

**ml:** Milliliter is a metric unit of capacity, equal in volume to one cubic centimeter (cc), or approximately one-sixteenth of a cubic inch. One-thousandth of a liter.

**mmHg:** Millimeters (mm) of mercury (Hg) is a unit of measurement for gas pressure.

**Molecular Weight:** Weight (mass) of a molecule based on the sum of the atomic weights of the atoms that make up the molecule.

**mppcf:** Million particles per cubic foot is a unit for expressing concentration of particles of a substance suspended in air. Exposure limits for mineral dusts (silica, graphite, Portland cement, nuisance dusts, and others), formerly expressed as mppcf, are now more commonly expressed in mg/m.

**MSDS:** Material Safety Data Sheet. The written information on a specific chemical compound that expresses such items as physical hazards, signs and symptoms of exposure, toxicology information and other pertinent data.

**MSHA:** Mine Safety and Health Administration, US Department of Labor.

**Mutagen:** A substance or agent capable of altering the genetic material in a living cell.

**MW:** see molecular Weight.

## Glossary (Cont.)

**Nausea:** Tendency to vomit, feeling of sickness at the stomach.

**NCI:** National Cancer Institute is that part of the National Institutes of Health which studies cancer causes and prevention as well as diagnosis, treatment, and rehabilitation of cancer patients.

**NFPA:** National Fire Protection Association is an international membership organization which promotes/improves fire protection and prevention and establishes safeguards against loss of life and property by fire. Best known on the industrial scene for the National Fire Codes, 13 volumes of codes, standards, recommended practices, and manuals developed (and regularly updated) by NFPA technical committees. Among these are NFPA 704, the code for showing hazards of materials as they might be encountered under fire or related emergency conditions, using the familiar diamond shaped label or placard with appropriate numbers or symbols, and NFPA 471 and 472 that cover practices for hazardous materials incidents, and procedures for responding to hazardous materials incidents.

**Neonatal:** The first four weeks after birth.

**Nephrotoxin:** A substance that causes injury to the kidneys.

**Neurotoxin:** A material that affects the nerve cells and may produce emotional or behavioral abnormalities.

**Neutralization:** A neutralization reaction occurs when a mutual reaction occurs between an acid and a base. The products of the reaction include a salt compound, water and heat. This reaction can occur between organic and non organic materials.

**Neutron:** An elementary sub atomic particle existing in the nucleus having a mass of 1.009 amu's (atomic mass units). The neutron has no electrical charge and exists in the nucleus of all atoms except hydrogen. This atom is comprised of one proton and one electron. To find the amount of neutrons in an atom, subtract the atomic number from the atomic weight. The remainder will be the number of neutrons.

**ng:** Nanogram, one billionth of a gram.

**NIOSH (National Institute for Occupational Safety and Health):** A government agency under the Department of Health and Human Services that is responsible for investigating the toxicity of workroom environments and all other matters relating to safe industrial practice. NIOSH publishes the Pocket Guide to Chemical Hazards that is an excellent source of health hazards relating to hazardous materials. Other activities NIOSH is involved in includes testing and certifying respiratory protective devices and air sampling detector tubes.

**Nonflammable:** Not easily ignited, or if ignited, not burning rapidly.

**Nonflammable Gas:** Any compressed gas other than a flammable compressed gas.

## Glossary (Cont.)

**Non Liquefied Gases:** A gas other than a gas in solution that under the charging pressure is entirely gaseous at 70 degrees F (21 degrees C).

**Non-Permit Confined Space:** A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

**Non-Sparking Tools:** Tools made from beryllium-copper or aluminum-bronze greatly reduce the possibility of igniting dusts, gases, or flammable vapors. Although these tools may emit some sparks when striking metal, the sparks have a low heat content and are not likely to ignite most flammable liquids.

**NPIRS:** National Pesticide Information Retrieval System is an automated data base operated by Purdue University containing information on EPA registered pesticides, including reference file MSDSs.

**NRC:** National Response Center is a notification center that must be called when significant oil or chemical spills or other environment related accidents occur. The toll free telephone number is 1-800-424-8802.

**NOx:** Oxides of nitrogen, which are undesirable air pollutants. NOx emissions are regulated by the EPA under the Clean Air Act.

**NTP:** National Toxicology Program. The NTP publishes an "Annual Report on Carcinogens."

**Occasional Site Worker:** Those cleanup workers at a HAZWOPER regulated site whose exposure to hazardous materials is below the established PEL for the material.

**Odor:** A description of the smell of the substance.

**Odor Threshold:** The lowest concentration of a substance's vapor, in air, that can be smelled.

**Offensive Actions:** Those actions allowed to be performed by Hazardous Materials Technicians. They include entering the hazardous areas with appropriate levels of protection, rescuing exposed personnel, and stopping the release of the hazardous substances.

**Olfactory:** Relating to the sense of smell.

**On Scene Incident Commander:** The fifth level of emergency responder under the HAZOPER regulation. These individuals direct the activities of all emergency response personnel at the scene.)

**Oral:** Used in or taken into the body through the mouth.

**OFAP:** Office of Federal Agency Programs is the organizational unit of OSHA that provides federal agencies with guidance to develop and implement occupational safety and health programs for federal employees.

## Glossary (Cont.)

**Oral Toxicity:** Adverse effects resulting from taking a substance into the body by mouth. Ordinarily used to demote effects in experimental animals.

**Organic Peroxide:** An organic compound that contains the bivalent -O-O- structure and may be considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical.

**Organogenesis:** The development of tissues into different organs in embryonic development. This period begins approximately 18 days into the pregnancy in humans.

**ORMS:** A class of materials used by the Department of Transportation which does not meet the definition of a hazardous material but poses some risk when transported in commerce. The materials are broken into classifications called ORM-A, ORM-B, ORM-C, ORM-D, and ORM-E. The use of these terms is less used with the new DOT regulations.

**ORM-A:** A material which has an anesthetic, irritating, noxious, toxic, or other similar property and which can cause extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation. 49 CFR, Sec 173.500(b)(1))

**ORM-B:** A material (including a solid when wet with water) capable of causing significant damage to a transport vehicle from leakage during transportation. Materials meeting one or both of the following criteria are ORM-B materials: (i) A liquid substance that has a corrosion rate exceeding 0.250 inch per year (IPY) on aluminum (nonclad 7075-T6) at a test temperature of 130 degrees F. An acceptable test is described in NACE Standard TM-01-60 and (ii) Specifically designated by name in Sec 172.101. (Sec 173.500(b)(2)) of 49 CFR.

**ORM-C:** A material that has other inherent characteristics not described as an ORM-A or ORM-B but which make it unsuitable for shipment, unless properly identified and prepared for transportation. Each ORM-C material is specifically named in Sec. 172.101. (Sec. 173.500(b)(4)) of 49 CFR.

**ORM-D:** A material such as a consumer commodity which, though otherwise subject to the regulations of this subchapter, presents a limited hazard during transportation due to its form, quantity and packaging. They must be materials for which exceptions are provided in Sec. 172.101. A shipping description applicable to each ORM-D material or category of ORM-D materials is found in Sec. 172.101 (Sec. 173.500(b)(4)) of 49 CFR.

**ORM-E:** A material that is not included in any other hazard class, but is subject to the requirements of this subchapter. Materials in this class include hazardous wastes and hazardous substances as defined in Sec. 171.8 of 49 CFR.

**OSHA (Occupational Safety and Health Administration):** On both the Federal and State levels, OSHA is responsible for establishing and enforcing standards for exposure of workers to harmful materials in industrial atmospheres and other matter affecting the health and well-being of industrial workers. Federal OSHA is part of the US Department of Labor.

**Overpacking:** The process of placing one smaller drum inside a larger one for control or disposal.

## Glossary (Cont.)

**Oxidizer:** A chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials, causing fire either by itself or through the release of oxygen or other gases.

**Oxidation:** A chemical reaction that brings about an oxidation reaction. An oxidizing agent may (1) provide the oxygen to the substance being oxidized (in which case the agent has to be oxygen or contain oxygen), or (2) it may receive electrons being transferred from the substance undergoing oxidation. Chlorine is a good oxidizing agent for electron-transfer purposes, even though it contains no oxygen.

**Oxygen Deficient Atmosphere:** An atmosphere containing less than 19.5 percent oxygen by volume.

**Oxygen Enriched Atmosphere:** An atmosphere containing more than 23.5 percent oxygen by volume.

**Particulate Matter:** A solid or liquid matter that is dispersed in a gas, or insoluble solid matter dispersed in a liquid. The prime hazard of particulate matter is inhalation along with the possibility of the matter lodging in the lung tissue. Asbestos fibers are especially dangerous when captured by lung tissues.

**PCB:** An abbreviation for poly chlorinated bi-phenyl. This chemical compound was commonly used as a cooling agent in electrical transformers. It is an aromatic hydrocarbon compound consisting of two benzene nuclei combined with two chlorine atoms. This compound is highly toxic.

**PEL (Permissible Exposure Limit):** Permissible exposure limit is an exposure limit established by OSHA's regulatory authority. It is generally the eight hour time-weighted average (TWA) limit, but also could be expressed as the maximum concentration exposure limit. The PEL is usually established for airborne hazards.

**Periodic Table:** An arrangement of the elements in such a form as to emphasize the similarities of their physical and chemical properties.

**Permanent Gas:** A gas that cannot be liquefied by pressure alone.

**pH:** The symbol relating the hydrogen ion concentration to that of a given standard solution. A pH of 7 is neutral. Numbers increasing from 7 to 14 indicate greater alkalinity. Numbers decreasing from 7 to 0 indicate greater acidity.

**Physical Effects:** The non-health effects that hazardous materials can produce. Examples include the ability to catch fire or create explosive conditions.

**Physical Hazard:** Describes a chemical for which there is scientifically valid evidence that is it a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water reactive.

## Glossary (Cont.)

**Placards:** 10-3/4 inch square diamond markers required on transporting vehicles, like trucks, rail cars, or freight containers 640 cubic feet or larger.

**PMCC:** Pensky Martens Closed Cup. See Flash point.

**PPE (Personal Protective Equipment):** The correct clothing and respiratory equipment that is needed to perform a job involving hazardous materials and protect the worker. PPE includes proper boots, gloves, splash protective clothing, gas protective clothing, tyvek suits, eye protection, hearing protection, air purifying respirators (see APR) and air supplying respirators (see SCBA). It is important that all PPE be used properly and when required.

**Pneumoconiosis:** A condition of the lung in which there is permanent deposition of particulate matter and tissue reaction to its presence. It may range from relatively harmless forms of iron oxide deposition to destructive forms of silicosis.

**Poison:** A material falling into one of the following two categories.

**Class A:** A DOT term for extremely dangerous poisons, poisonous gases or liquids that, in very small amounts, either as gas or as vapor of the liquid, mixed with air, are dangerous to life. Examples: phosgene, cyanogen, hydrocyanic acid, nitrogen peroxide.

**Class B:** A DOT term for liquid, solid, paste or semisolid substances, other than Class A poisons or irritating materials, that are known (or presumed on the basis of animal tests) to be so toxic to humans that they are hazardous to health during transportation.

**Polar:** The description of a molecule where the positive and negative charges are permanently separated. This differs from non-polar substances in which the electrical charges may coincide. Polar molecules will ionize in water and conduct an electrical current. Water is the most common polar substance. Non-polar substances include Gasoline, diesel fuel, and most hydrocarbons. If a substance is polar, it will mix with water.

**Polymerization:** A chemical reaction in which one or more small molecules combine to form larger molecules. A hazardous polymerization is such a reaction that takes place at a rate that releases large amounts of energy. If hazardous polymerization can occur with a given material, the MSDS usually will list conditions that could start the reaction and, since the material usually contains polymerization inhibitors, the length of time during which the inhibitor will be effective.

**ppm (Part per Million):** Parts per million is the concentration of a gas or vapor in air, parts (by volume) of the gas or vapor in air, parts (by volume) of the gas or vapor in a million parts of air; also the concentration of a particular substance in a liquid or solid.

**ppb (Part per Billion):** Parts per billion is the concentration of a gas or vapor in air, parts (by volume) of the gas or vapor in a billion parts of air. Usually used to express extremely low concentrations of unusually toxic gases or vapors; also the concentration of a particular substance in a liquid or solid.

## Glossary (Cont.)

**Pressure:** See PSI

**Prohibited Condition:** Any condition in a Permit Required Confined Space that is not allowed by the permit during the period when entry is authorized.

**Protection Factor:** The number assigned by OSHA to illustrate the level of protection for a type of respiratory protection equipment.

**Proton:** A basic sub atomic particle existing in the nucleus of all atoms. A proton has mass and an atomic weight of 1 amu (atomic mass unit). The number of protons is also expressed as the atomic number for a given element. Carbon has an atomic number of 6, which means it has 6 protons in the nucleus.

**PSI (Pounds per Square Inch):** Pounds per square inch (for MSDS purposes) is the pressure a material exerts on the walls of a confining vessel or enclosure. For technical accuracy, pressure must be expressed as psig (pounds per square inch gauge) or psia (Pounds per square inch absolute). Absolute pressure is gauge pressure plus sea level atmospheric pressure, or psig plus approximately 14.7 pounds per square inch. Also see mmHg.

**Pulmonary:** Relating to, or associated with, the lungs.

**Pulmonary Edema:** Fluid in the lungs.

**PVC (Polyvinyl Chloride):** A synthetic thermoplastic polymer that is used widely in society. Due to its resistance to most acids, fats and oils it is used for piping or for specific types of PPE.

**Pyrophoric:** A chemical that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

**Radiation:** Energy that is released as waves or particles.

**Radiation Safety Officer:** This person is in charge of the program that handles radiation related issues at fixed facilities. This person develops training programs, safe handling procedures and emergency response information.

**Radiation Sickness:** A group of symptoms associated with a radiation exposure. These symptoms run from mild to extreme and include nausea, vomiting, malaise etc.

**Radioactive Isotope:** Also referred to as radioisotope. A radioactive isotope of any element. These isotopes can be naturally occurring or artificially created by bombarding an atom with neutrons. See isotope.

**Radioactive Materials:** Materials that spontaneously emit ionizing radiation from the nucleus of an atom. See ionizing radiation.

**Reaction:** A chemical transformation or change. The interaction of two or more substances to form new substances.

## Glossary (Cont.)

**Reactive:** See Unstable.

**Reactivity:** Chemical reaction with the release of energy. Undesirable effects, such as pressure buildup, temperature increase, formation of noxious, toxic, or corrosive byproducts, may occur because of the reactivity of a substance to heating, burning, direct contact with other materials, or other conditions in use or in storage.

**Reducing Agent:** In a reduction reaction (which always occurs simultaneously with an oxidation reaction) the reducing agent is the chemical or substance that (1) combines with oxygen or (2) loses electrons in the reactions. See Oxidation.

**Reproductive Toxin:** A substance that affects either male or female reproductive systems and may impair the ability to have children; the term includes chromosomal damage (mutagenesis) and effects on fetuses (teratogenesis).

**Respiratory Protection:** Devices that will protect the wearer's respiratory system from exposure to airborne contaminants by inhalation. Respiratory protection is used when a worker must work in an area where he/she might be exposed to concentrations in excess of the allowable exposure limit.

**Respiratory System:** The breathing system that includes the lungs and the air passages (trachea, larynx, mouth, and nose) to the air outside the body, plus the associated nervous and circulatory supply.

**Retention Factor:** The time it takes for the body to rid itself of a hazardous material.

**Retrieval System:** The equipment (including a retrieval line, chest or full body harness, wristlets if appropriate, and a lifting device or anchor) used for non entry rescue of persons from permit spaces.

**Risk Assessment:** The process of used to determine how the hazards will potentially harm those involved in the operation.

**Routes of Entry:** The means by which materials may gain access to the body, for example, inhalation, ingestion, injection, and absorption.

**RCRA:** Resource Conservation and Recovery Act is environmental legislation aimed at controlling the generation, treatment, storage, transportation, and disposal of hazardous wastes. It is administered by the EPA.

**Saponification:** The process where a Base dissolves fat and turns the fat into water soluble materials.

**SAR:** See Supplied Air Respirator

**SARA:** Superfund Amendments and Reauthorization Act of 1986. SARA, was the actual forerunner to the HAZWOPER regulation in that it mandated the Occupational Safety and

## Glossary (Cont.)

Health Administration (OSHA) to develop a worker protection regulation for those who persons who work with hazardous wastes.

**Secondary Exposures:** Those exposures that occur as a result of contact with a material with our hands, which are then contaminated and could then transfer the contamination into our mouths where the material is then ingested.

**Select Carcinogen:** A chemical that meets one of the following criteria:

(a) it is regulated by OSHA as a carcinogen; (b) it is listed under the category "known to be carcinogens" in the National Toxicology Program's latest Annual Report on Carcinogens; (c) it is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs; or (d) it is listed in Group 2A or 2B by IARC or under the category "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals after inhalation exposure of 6 - 7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m<sup>3</sup>; or after repeated skin application of less than 300 mg/kg of body weight per week; or after oral dosages of less than 50 mg/kg of body weight per day.

**Self Contained Breathing Apparatus (SCBA):** A respiratory protection device that consists of a supply or a means of usable air, oxygen, or oxygen-generating material, carried by the wearer. If an air-purifying respirator cannot be used due to one of the conditions listed under APR, then a worker must protect themselves with a SCBA. Sometimes known as Scott Packs (a brand name), SCBA's and Air-line respirators deliver air to the user from a tank (SCBA) or an air-line. Although they negate all of the problems of an APR, they still have problems of their own. Air-line systems are bulky, and more difficult to work with due to the attached air-line. SCBA's are heavy, require more training, more expensive, and reduce the mobility of the worker. Both however have the advantage of having positive pressure in the facemask that greatly reduces the risk of exposure if there is a leak in the mask by pushing the material out instead of sucking it in as with an APR.

**Sensitizer:** A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

**SETA:** Setaflash Closed Tester. See Flash point.

**SCBA:** Self Contained Breathing Apparatus.

**Shipping Papers:** A shipping order, bill of lading, manifest, waybill, or other shipping document issued by the carrier.

**Silicosis:** A disease of the lungs caused by the inhalation of silica dust.

**Skin Absorption:** Ability of some hazardous chemicals to pass directly through the skin and enter the bloodstream.

**Skin Toxicity:** See Dermal Toxicity.

## Glossary (Cont.)

**SLUD:** A mnemonic denoting the effects of exposure to certain types of pesticides (mostly organophosphates and carbamates). It stands for salivation, lacrimation, urination, and defecation.

**SOx:** Oxides of sulfur.

**Solubility in Water:** A term expressing the percentage of a material (by weight) that will dissolve in water at ambient temperature. Solubility information can be useful in determining spill cleanup methods and re-extinguishing agents and methods for a material.

**Solvation:** The process that occurs when an Acid mixes with water. Hydrogen ions are released, which then bond with some of the water molecules to become  $H_3O$ .

**Solvent:** A substance, usually a liquid, in which other substances are dissolved. The most common solvent is water.

**Specific Chemical Identity:** The chemical name, Chemical Abstracts Service (CAS) Registry Number, or any precise chemical designation of a substance.

**Specific Gravity:** The weight of a material compared to the weight of an equal volume of water is an expression of the density (or heaviness) of a material. Insoluble materials with specific gravity of less than 1.0 will float on water. Insoluble materials with a specific gravity greater than 1.0 will sink in water. Most (but not all) flammable liquids have specific gravity less than 1.0 and, if not soluble, will float on water, an important consideration for fire suppression.

**Spontaneously Combustible:** A material that ignites as a result of retained heat from processing, or will oxidize to generate heat and ignite, or absorbs moisture to generate heat and ignite.

**Stability:** The ability of a material to remain unchanged. For MSDS purposes, a material is stable if it remains in the same form under expected and reasonable conditions or storage or use. Conditions which may cause instability (dangerous change) are stated; for example, temperatures above 150 degrees F; shock from dropping.

**Stable Atom:** An atom that is not in the process of radioactive decay or the formation of an ion. Stable atoms have equal numbers of protons and electrons without an unusual imbalance of protons to neutrons.

**State Plan State:** A state or U.S. territory that has its own OSHA programs.

**STEL:** A term denoting one of the occupational exposure limits for workers. It stands for Short Term Exposure Limit and was developed by the ACGIH. The term represents the maximum exposure limit for workers based on a 15-minute exposure. This level would presumably be harmful if it were exceeded for more than this 15-minute exposure.

**Strong Acid:** An acid with a pH of 2.5 or less.

## Glossary (Cont.)

**Strong Base:** A base with a pH of 12.5 or greater.

**Subcutaneous:** Beneath the layers of skin.

**Sublimation:** The ability of a material to pass from a solid state to a gas state without becoming a liquid. Mothballs are examples of materials that sublime.

**Supplied Air Respirators (SAR):** Air-line respirators or self-contained breathing apparatus. This type of respirator is different than the Air Purifying Respirator in that the air that is breathed by the individual does not come from the atmosphere in the area where work is performed. Air that is breathed with a SAR system comes either an air bottle carried by the individual, or an air-line system that either uses bottles or compressors that supply air from an outside clean-air source.

**Support Zone:** See Zones.

**Surface Area:** The amount of area exposed from a given system. For example, the surface area of the skin is approximately 25 square feet. Surface area also greatly influences vapor production in spilled liquids. The larger the surface area-the greater the vapor production.

**Synonym:** Another name or names by which a material is also known. Methyl alcohol, for example, also is known as methanol or wood alcohol.

**Systemic Poison:** A poison that spreads throughout the body, affecting all or some of the body systems and organs. Its adverse effect is not localized in one spot or area. Carbon monoxide has systemic effects upon exposure.

**Systemic Toxicity:** Adverse effects caused by a substance that affects the body in a general rather than local manner.

**Tactics:** Methods or procedures used to deploy various tactical units (resources) to achieve objectives.

**Target Organ Effects:** The following is a target organ categorization of effects that may occur, including examples of signs and symptoms and chemicals that have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace and the broad scope employers must consider in this area, but are not intended to be all-inclusive.

**Hepatotoxins:** Substances that produce liver damage. Signs and Symptoms: Jaundice; liver enlargement. Chemicals: Carbon tetrachloride; nitrosamines.

**Nephrotoxins:** Substances that produce kidney damage. Signs and Symptoms: Edema; proteinuria. Chemicals: Halogenated hydrocarbons; uranium.

**Neurotoxins:** Substances that produce their primary toxic effects on the nervous system.

## Glossary (Cont.)

Signs and Symptoms: Narcosis; behavioral changes; decrease in motor functions.  
Chemicals: Mercury, Carbon Disulfide.

**Agents that act on blood hematopoietic system:** Chemicals that decrease hemoglobin function; deprive the body tissues of oxygen. Signs and Symptoms: Cyanosis; loss of consciousness. Chemicals: Carbon monoxide; Cyanides.

**Agents which damage the lung:** Chemicals that irritate or damage the pulmonary tissue. Signs and Symptoms: Cough, tightness in chest, shortness of breath. Chemicals: Silica; Asbestos.

**Reproductive toxins:** Chemicals that affect the reproductive capabilities, including chromosomal damage (mutations) and effects on fetuses (Teratogenesis). Signs and Symptoms: Birth defects; sterility. Chemicals: Lead; DBCP.

**Cutaneous hazards:** Chemicals that affect the dermal layer of the body. Signs and Symptoms: Defatting of the skin; rashes; irritation. Chemicals: Ketones; chlorinated compounds.

**Eye hazards:** Chemicals that affect the eye or visual capacity. Signs and Symptoms: conjunctivitis; corneal damage. Chemicals: Organic solvents; Acids.

**Target organ toxin:** A toxic substance that attacks a specific organ of the body. For example, exposure to carbon tetrachloride can cause liver damage.

**TCC:** Tag (Tagliabue) Closed Cup. See Flash point.

**TCL:** Toxic concentration low, the lowest concentration of a gas or vapor capable of producing a defined toxic effect in a specified test species over a specified time.

**TDL:** Toxic dose low, lowest administered dose of a material capable of producing a defined toxic effect in a specified test species.

**Teratogen:** A substance or agent that can cause malformations in the fetus of a pregnant female exposed to it.

**Testing:** The process by which the hazards that may confront personnel such as entrants of a confined space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

**Threshold:** The dividing line between effect and no effect levels of exposure.

**TLV (Threshold Limit Value):** A set of standards established by the American Conference of Governmental Industrial Hygienists for concentrations of airborne substances in workroom air. They are time-weighted averages based on conditions that it is believed workers may be repeatedly exposed to day after day without adverse effects. The TLV values are revised annually and provide the basis for the safety regulations of OSHA.

## Glossary (Cont.)

**TLV/TWA (Threshold Limit Value/Time Weighted Average):** The TLV/TWA is a term used to denote one of the occupational exposure limits for types of hazardous materials. The term was developed by the ACGIH that denotes the average amount of a material that the average worker can be exposed to in the course of a typical eight hour day, five day work week. At or below this level, it is presumed that a worker would suffer no ill effects from exposure to a given substance. It is usually given in either ppm, ppb, or mg/m<sup>3</sup> of air and is for airborne substances.

**TLV/C (Threshold Limit Value/Ceiling):** Another term that denotes an occupational exposure limit. This term represents the maximum level or amount of a substance that a worker can be exposed to at any given time. It is usually given in either ppm, ppb, or mg/m<sup>3</sup>.

**Toxic:** A substance as defined by OSHA as falling within any of the following categories:

- (a) A substance that has median lethal dose (LD<sub>50</sub>) of 50 milligrams or more per kilogram of body weight but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
- (b) A substance with a median lethal dose (LD<sub>50</sub>) of more than 200 milligrams or less per kilogram of body weight but not more than 1000 milligrams per kilogram of body weight when administered by continuous contact (dermal) for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
- (c) A chemical that has a median lethal concentration (LC<sub>50</sub>) in air of more than 200 parts per million but not more than 2,000 parts per million by volume or vapor, or 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

**Toxicologist:** A person trained to examine the nature of these adverse effects and to assess the probability of their occurrence.

**Toxicology:** The study of the adverse effects of chemicals on living organisms.

**TSCA:** Toxic Substances Control Act is federal environmental legislation (administered by EPA) that regulates the manufacture, handling, and use of materials classified as "toxic substances".

**TSDF (Treatment, Storage and Disposal Facility):** Regulated sites where hazardous wastes are taken for final disposal or treatment.

**TWA (Time Weighted Average):** TWA exposure is the airborne concentration of a material to which a person is exposed, averaged over the total exposure time, generally the total workday (8 to 12 hours). Also see TLV/TWA.

**UEL or UFL:** Upper explosive limit or upper flammable limit of a vapor or gas; the highest concentration (highest percentage of the substance in air) that will produce a flash of fire when

## Glossary (Cont.)

an ignition source (heat, arc, or flame) is present. At higher concentrations, the mixture is too "rich" to burn. Also see LEL.

**Unified Command:** This is the system of command used in the ICS where multiple agencies or jurisdictions will assign a person to share key responsibilities within the ICS, including that of IC.

**Uniform Hazardous Waste Manifest:** A standard shipping document required by the EPA for shipments of hazardous wastes.

**Unstable:** Tending toward decomposition or other unwanted chemical change during normal handling or storage.

**Unstable Reactive:** A chemical that, in the pure state or as produced or transported, will vigorously polymerize, decompose, condense, or become self-reactive under conditions of shock, pressure, or temperature.

**USDA:** US Department of Agriculture.

**Vapor:** The gaseous form of a solid or liquid substance as it evaporates.

**Vapor Density:** The weight of a vapor or gas compared to the weight of an equal volume of air is an expression of the density of the vapor or gas. Materials lighter than air have vapor densities less than 1.0. (Propane, hydrogen sulfide, butane, chlorine, and sulfur dioxide, e.g. have vapor densities greater than 1.0.) All vapors and gases will mix with air, but the lighter materials will tend to rise and dissipate (unless confined). Heavier vapors and gases are likely to concentrate in low places, along or under floors, in sumps, sewers and manholes, in trenches and ditches, where they may create fire or health hazards.

**Vapor Pressure:** The pressure exerted by a saturated vapor above its own liquid in a closed container. When quality control tests are performed on products, the test temperature is usually 100 degrees F, and the vapor pressure is expressed as pounds per square inch (psig or psia), but vapor pressures reported on MSDSs are in millimeters of mercury (mmHg) at 68 degrees F (20 degrees C), unless stated otherwise.

Three facts are important to remember:

1. Vapor pressure of a substance at 100 degrees F will always be higher than the vapor pressure of the substance at 68 degrees F (20 degrees C).
2. Vapor pressures reported on MSDSs in mmHg are usually very low pressures; 760 mmHg is equivalent to 14.7 pounds per square inch.
3. The lower the boiling point of a substance, the higher its vapor pressure.

**Ventilation:** See General Exhaust, Local Exhaust, and Mechanical Exhaust.

## Glossary (Cont.)

**Viscosity:** The ability or the resistance of a liquid material to flow. The higher the viscosity, the less that the material will flow. Maple syrup is a substance with a high viscosity. Water is less viscous and would tend to flow easier. Viscosity will assist you in determining if a liquid has a high risk of spreading out and potentially finding its way to a storm drain or sewer before adequate containment or cleanup procedures can be initiated.

**V-Roll Technique:** The method to slide a leaking drum into a larger salvage drum laid in a V position near each other.

**Warm Zone:** See Zones.

**Waste Site Supervisor:** A trained and certified individual under the HAZWOPER regulation whose job includes oversight of other certified HAZWOPER waste site cleanup personnel.

**Water-Reactive:** Means any solid substance (including sludges and pastes) that, by interaction with water, is likely to become spontaneously flammable or to give off flammable or toxic gases in dangerous quantities.

**Water Solubility:** The ability of a liquid or solid to mix with or dissolve in water.

**Way bill:** The shipping paper used by the railroads indicating origin, destination, route, and product. There is a waybill for each car and they are generally carried by the conductor.

**Zones:** Although zoning is usually applied to hazardous materials spills and isolation, setting up work zones such as hot or exclusionary zone assists any task involving hazardous materials. By isolating the work area and letting other personnel know of the hazards, an employer can reduce the possibility of other workers being injured or exposed. The following work zones are areas designated for specific operations to occur:

**Hot Zone:** The area where the potential for hazards to exist. This zone is sometimes referred to as the Exclusionary Zone or the Red Zone.

**Cold Zone:** The area where no contamination or hazards are present. This zone may also be referred to as the Support or Green Zone.

**Warm Zone:** The area just outside the Hot Zone where decontamination operations stake place. The Decontamination corridor can be found in the Warm Zone. This zone is sometimes referred to as the contamination reduction zone or the yellow zone.