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Human Health & Ecological Risk Assessment (HHERA) of Pesticide Products  
**Glossary of Technical Terms**

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*This glossary of technical terms is designed to support Forest Service (FS) human health and ecological risk assessments (HHERA) of pesticide products planned for use in FS operations. Some terms are also included that relate to other activities involving risk assessments, such as the preparation of Environmental Impact Statements (EIS) and Environmental Assessments.*

**Abiotic** – not involving living organisms.

**Absorbed dose** – in exposure assessment, the amount of a substance that penetrates an exposed organism's absorption barriers (e.g. skin, lung tissue, gastrointestinal tract) through physical or biological processes. Absorbed dose is synonymous with internal dose.

**Absorption** – the process by which a chemical or other substance is able to pass through body membranes and enter an organism. In mammals and many other animals, the main routes by which toxic agents are absorbed are the gastrointestinal tract, lungs, and skin.

**ACGIH** – American Conference of Governmental Industrial Hygienists. An organization of professionals in governmental agencies or educational institutions engaged in occupational safety and health programs. ACGIH develops and publishes recommended occupational exposure limits for chemicals (see TLV). (6500 Glenway Avenue, Bldg. D-7, Cincinnati, OH 45211; (513) 661-7881.

**ACS** – American Chemical Society.

**Active ingredient (a.i.)** – in any pesticide product, the component (a chemical or biological substance) that kills or otherwise controls the target pests. Pesticides are regulated primarily on the basis of active ingredients. The remaining ingredients are called "inert ingredients".

**Acute effect** – an adverse effect on any living organism in which severe symptoms develop rapidly and often subside after the exposure stops.

**Acute exposure** – a single exposure or multiple brief exposures occurring within a short time (e.g., 24 hours or less in humans). The classification of multiple brief exposures as "acute" is dependant on the life span of the organism.

**Acute lethality** – the death of animals in a short period of time (typically up to 14 days in mammals) after a single dose of a toxic substance.

**Acute toxicity** – any harmful effect produced in an organism through an acute exposure to one or more chemicals.

**Adaptation** – changes in an organism's physiological structure or function or habits that allow it to survive in new surroundings.

**Additive effect** – a situation in which the combined effects of exposure to two chemicals simultaneously is equal to the sum of the effect of exposure to each chemical given alone. The effect most commonly observed when an organism is exposed to two chemicals together is an additive effect.

**Adjuvant(s)** – chemicals that are added to pesticide products to enhance the toxicity of the active ingredient or to make the active ingredient easier to handle or mix.

**Adsorption** – the tendency of one chemical to adhere to another material such as soil.

**Adverse-effect level (AEL)** – signs of toxicity that must be detected by invasive methods, external monitoring devices, or prolonged systematic observations. Symptoms that are not accompanied by readily observable signs of toxicity. Compare to “Frank-effect level”.

**Advisory** – a non-regulatory document that communicates risk information to persons who may have to make risk management decisions.

**Aerobic** – life or processes that require, or are not destroyed by, the presence of oxygen. (see also, *anaerobic*).

**AgDrift** – aerial spray prediction model from ground boom and air-blast applications.

**Agent** – any substance, force, radiation, organism, or influence that affects the body. The effects may be beneficial or injurious.

**Algae** – simple plants containing chlorophyll. Many are microscopic, but under conditions favorable for their growth they grow in colonies and produce mats and similar nuisance masses.

**Algal blooms** – sudden spurts of algal growth, which can affect water quality adversely and indicate potentially hazardous changes in local water chemistry.

**Alkali** – broadly, any compound having highly basic properties (i.e., one that readily ionizes in aqueous solution to yield OH anions, with a pH above 7).

**Alkaline phosphatase** – an enzyme that occurs in various normal and malignant tissues. The activity of the enzyme in blood is useful in diagnosing many illnesses.

**Allelopathy** – the suppression of growth of one plant species due to the release of toxic substances by another plant.

**Allometric** – pertaining to allometry, the study and measure of growth. In toxicology, the study of the relationship of body size to various processes that may impact how chemicals effect the organism or how the chemicals are transported within the organism.

**Alopecia** – loss of hair.

**Alluvial** – relating to clay, silt, sand, gravel, or similar detrital material deposited by flowing water. Alluvial deposits may occur after a heavy rainstorm.

**Ambient** – usual or surrounding conditions.

**Amphibian** – any of a class of cold-blooded vertebrates (including frogs, toads, or salamanders) intermediate in many characteristics between fishes and reptiles and having gilled aquatic larvae and air-breathing adults

**Anadromous** – fish that spend their adult life in the sea but swim upriver to freshwater spawning grounds to reproduce.

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

**Anions** – negatively charged ions in solution e.g., hydroxyl or OH<sup>-</sup> ion.

**Anorexia** – loss of appetite, especially for a prolonged period of time.

**Anoxia** – literally, "without oxygen". A deficiency of oxygen reaching the tissues of the body especially of such severity as to result in permanent damage

**Antagonism** – the interaction of two chemicals having an opposing, or neutralizing, effect on each other, or a chemical interaction that appears to have an opposing or neutralizing effect on a specific biological effect over what might otherwise be expected.

**Antibodies** – proteins produced in the body by immune system cells in response to antigens, and capable of combining with antigens.

**Antidote** – a remedy to relieve, prevent, or counteract the effects of a poison. Eliminating the poison, neutralizing it, or absorbing it are effective.

**Antigens** – a substance that causes production of antibodies when introduced into animal or human tissue.

**Anuria** – absence or defective excretion of urine.

**Apnea** – a temporary stoppage of breathing.

**Application methods** – herbicides are applied using a variety of methods depending on the herbicide's physical state (e.g., liquid or granular), target areas, target vegetation and manufacturer's instructions. Some of the most common methods include:

- Boom sprayer – equipment mounted on tractor or truck, a pipe with attached nozzles distributes spray from a tank.
- Backpack – individual worker carries backpack with tank, uses a variety of wands and nozzle tips considered a selective foliar application method.
- Handgun sprayer – sprayer can operate off a truck-mounted pump or tank, sprayers come in a variety of lengths, sizes, and maximum flow rates, considered a selective foliar application method.
- Aerial broadcast method – uses fixed wing or rotary wing aircraft for dispersal of herbicide, spray nozzles and booms are designed to reduce drift onto non-target areas, considered a broadcast foliar application method.
- Trailing hoses behind watercraft – a hose that applies the herbicide below the surface to target submerged vegetation.
- Granular applications use drop or rotary equipment mounted to trucks or tractors to deposit granules onto the ground surface.

**Application rates** – the frequency and concentration of an herbicide applied to an area. The manufacturer recommends application rates for different scenarios. For example, the range of recommended labeled rates for a single terrestrial application are reported in pounds (lb) active ingredient (a.i) per acre. Units can also be in gallons/acre for backpack sprayers, handgun, or aerial methods. Granular products are applied as lbs/acre or lbs/square feet. Maximum application rates are also developed in unites of lb a.i./acre/year. For aquatic systems, the application concentration is given in lb a.i./Liter of water or parts per million (ppm).

**Aqueous or aquatic** – describes a water-based solution or suspension.

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

**Arid** – a terrestrial region lacking moisture, or a climate in which the rainfall is not sufficient to support the growth of most vegetation.

**Assay** – a kind of test (noun); to test (verb).

**Asymptomatic** – neither causing nor exhibiting symptoms.

**Ataxia** – loss of reflexes or muscular coordination.

**Atrophy** – reduction in size or function of tissue, organs, or the entire body caused by lack of use.

**ATSDR** – Agency for Toxic Substances and Disease Registry; federal agency within the Public Health Service charged with carrying out the health-related analyses under CERCLA and SARA.

**Background level** – in pollution, the level of pollutants commonly present in ambient media (air, water, soil).

**Bacteria** – microscopic living organisms that can aid in pollution control by metabolizing organic matter in soil, water, or other environmental media. Some bacteria can also cause human, animal, and plant health problems.

**Basal application** – in pesticides, the spreading of a chemical on stems or trunks of plants just above the soil line.

**Base** – substances that (usually) liberate OH anions when dissolved in water and weaken a strong acid.

**Benchmark** – a dose associated with a defined effect level or designated as a no effect level.

**Benthic region** – the bottom layer of a body of water.

**Benthos** – the plants and animals that inhabit the bottom of a water body.

**Bioaccumulation** – the increase in concentration of a substance in living organisms as they take in contaminated air, water, or food because the substance is very slowly metabolized or excreted.

**Bioassay** – 1.) to measure the effect of a substance, factor, or condition using living organisms; 2.) a test to determine the toxicity of an agent to an organism.

**Bioconcentration** – the accumulation of a chemical in tissues of a fish or other aquatic organism to levels greater than in the surrounding water.

**Bioconcentration factor (BCF)** – the concentration of a compound in an aquatic organism divided by the concentration in the ambient water of the organism.

**Biodegradability** – susceptibility of a substance to decomposition by microorganisms; specifically, the rate at which compounds may be chemically broken down by bacteria and/or natural environmental factors.

**Biological magnification** – the process whereby certain substances such as pesticides or heavy metals increase in concentration as they move up the food chain.

**Biologically sensitive** – a term used to identify a group of individuals who, because of their developmental stage or some other biological condition, are more susceptible than the general population to a chemical or biological agent in the environment.

**Biomass** – the amount of living matter.

**Biota or Biome** – all living organisms of a region or system.

**Biosynthesis** – the production of complex molecules within living organisms or cells.

**BMPs** – Best Management Practices.

**Body burden** – the amount of a chemical stored in the body at a given time, especially a potential toxin in the body as the result of exposure.

**Bog** – wet spongy ground; especially, a poorly drained usually acid wetland rich in accumulated plant material with a conspicuous mat of living green moss.

**Brackish** – mixed fresh and salt waters.

**Bradycardia** – a decrease in normal heart rate.

**Broadcast application** – in pesticides, to spread a chemical over an entire area.

**Broadleaf weed** – an herbaceous plant designated as a pest species in agricultural lands, rangelands, non-crop lands, or forests.

**Buffer zones** – a strip of untreated land that separates a waterway or other environmentally sensitive area from an area being treated with a pesticide.

**Cancer potency parameter** – a model-dependent measure of cancer potency (mg/kg/day)<sup>-1</sup> over lifetime exposure.

**Capillary fringe** – the zone above the water table within which the soil or rock is saturated by water under less than atmospheric pressure.

**Carboxyhemoglobin** – hemoglobin in which the iron is bound to carbon monoxide (CO) instead of oxygen.

**Carcinogen** – a chemical capable of inducing cancer.

**Carcinoma** – a malignant tumor (cancer).

**Cardiovascular** – the heart and blood vessels.

**Carrier** – a non-pesticidal substance added to a commercial pesticide formulation to make it easier to handle or apply.

**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 to help locate information about particular substances in the abstracts. Sequentially assigned CAS numbers identify specific chemicals. The numbers have no chemical significance. The CAS number is a concise, unique means of chemical identification.

**Categorical exclusion** – a class of actions which either individually or cumulatively would not have a significant effect on the human environment and therefore would not require preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act (NEPA).

**Cation** – positively charged ions in a solution.

**CBI herbicide** – herbicide with phytotoxicity from inhibition of cellulose biosynthesis.

**Central nervous system (CNS)** – the portion of the nervous system consisting of brain and spinal cord.

**Cellulose** - an insoluble substance which is the main constituent of plant cell walls and of vegetable fibers such as cotton. It is a polysaccharide consisting of chains of glucose monomers.

**CERCLA** – Comprehensive Environmental Response, Compensation, and Liability Act. The initial legislation authorizing Superfund passed by Congress in December, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

**Chlorophenoxy** – a class of herbicides including 2,4-D (2,4-dichlorophenoxy acetic acid) and 2,4,5-TP (2,4,5-Trichlorophenoxy propionic acid).

**Chlorophyll** – a class of molecules found in plant cells that convert the energy of sunlight to food in the process known as photosynthesis.

**Cholinesterase** – an enzyme found in animals that regulates nerve impulses. Cholinesterase inhibition is associated with a variety of acute symptoms such as nausea, vomiting, blurred vision, stomach cramps, and rapid heart rate, paralysis, convulsions, and death.

**Chlorosis** – yellowing or blanching of the leaves of plants due to loss of chlorophyll from causes other than lack of light.

**Chronic exposure** – exposures that extend over the average lifetime or for a significant fraction of the lifetime of the species (for a rat, chronic exposure is typically about 2 years). Chronic exposure studies are used to evaluate the carcinogenic potential of chemicals and other long-term health effects.

**Chronic reference dose (RfD)** – an estimate of a lifetime daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects. Chronic RfDs are specifically developed to be protective for long-term exposure to a compound (7 years to lifetime).

**Chronic toxicity** – the ability of a substance or mixture of substances to cause harmful effects over an extended period, usually upon repeated or continuous exposure sometimes lasting for the entire life of the exposed organism.

**Clay soil** – soil material containing more than 40 percent clay, less than 45 percent sand, and less than 40 percent silt.

**Clear cut** – harvesting all the trees in one area at one time.

**Code of Federal Regulations (CFR)** – document that codifies all rules of the executive departments and agencies of the federal government. It is divided into fifty volumes, known as titles. Title 40 of the CFR (referenced as 40 CFR) lists all environmental regulations, including regulations for U.S. EPA pesticide programs (40CFR Parts 150-189).

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

**Confidential Business Information (CBI)** – information submitted to U.S. EPA by a pesticide registrant to fulfill requirements for pesticide registration that contains trade secrets or commercial or financial information that has been claimed as confidential by its source. U.S. EPA has special procedures for handling such information.

**Conifer** – an order of the Gymnospermae, comprising a wide range of trees and a few shrubs, mostly evergreens that bear cones and have needle-shaped or scale-like leaves; Conifer timber is commercially identified as softwood.

**Conjunctivitis** – inflammation of the conjunctive, the delicate membrane that lines the eyelid and covers the eyeball.

**Connected actions** – exposure to other chemical and biological agents in addition to exposure to a specific pesticide formulation in a field application to control pest organisms

**Contaminants** – for chemicals, impurities present in a commercial grade chemical. For biological agents, other agents that may be present in a commercial product.

**Controls** – in toxicology or epidemiology studies, a population that is not exposed to the potentially toxic agent under study.

**Cornea** – the transparent structure of the external layer of the eyeball.

**Creatine** – an organic acid composed of nitrogen. It supplies the energy required for muscle contraction.

**Creatinine** – the end product of the metabolism of creatine. It is found in muscle and blood and is excreted in the urine.

**Critical effect** – the first adverse effect that occurs as a dose rate increases. Designation is based on evaluation of overall database.

**Cumulative exposures** – exposures resulting from one or more activities that are repeated over a period of time.

**Dams** – a term used to designate females of some animals such as rats.

**Defoliant** – an herbicide that removes leaves from growing plants.

**Degraded** – broken down or destroyed.

**Denitrification** – bacterial reduction of nitrite to gaseous nitrogen under anaerobic conditions.

**Dermal** – pertaining to the skin.

**Dermal absorption/penetration** – Process by which a chemical penetrates the skin and enters the body as an internal dose.

**Dermatitis** – inflammation of the skin.

**Detritus** – loose fragments, particles, or grains formed by the disintegration of rocks or organic matter.

**Diatoms** – organisms related to algae, having a brown pigmentation and silicate-based skeleton.

**Dicots** – most common garden plants, shrubs and trees, and broad-leafed flowering plants such as magnolias, roses, geraniums, and hollyhocks are dicots. Dicots typically also have flower parts (sepals, petals, stamens, and pistils) based on a plan of four or five, or multiples thereof, although there are exceptions.

**Dislodgeable residues** – the residue of a chemical or biological agent on foliage surface as a result of pesticide applications, which can be removed readily from the foliage by washing, rubbing or having some other form of direct contact with the treated vegetation.

**Dissociate** – the process of ionization of a salt upon being dissolved in water.

**Dorsal** – situated on or toward the upper side of the body, equivalent to the back, or posterior, in humans. situated on or toward the posterior plane in humans or toward the upper plane in quadrupeds.

**Dosage/Dose** – 1.) the actual quantity of a chemical administered to an organism or to which it is exposed; 2.) the amount of a substance that reaches a specific tissue (e.g. the liver); 3.) the amount of a substance available for interaction with metabolic processes after crossing the outer boundary of an organism. (See – absorbed dose, administered dose, applied dose, potential dose.)

**Dose rate** – in exposure assessment, dose per time unit (e.g. mg/day), sometimes also called dosage.

**Dose response** – changes in toxicological responses of an individual (such as alterations in severity of symptoms) or populations (such as alterations in incidence) that are related to changes in the dose of any given substance.

**Dose response curve** – graphical representation of the relationship between the dose of a stressor and the biological response thereto.

**Dose-response assessment** – a description of the relationship between the dose of a chemical and the incidence of occurrence or intensity of a specific biological or toxicological response.

**Dose-response relationship** – the quantitative relationship between the amount of exposure to a substance and the extent of toxic injury or disease produced.

**Drift** – that portion of a sprayed chemical that is moved by wind off a target site.

**Dystrophic** – acidic, shallow bodies of water that contain much humus and/or other organic matter, many plants but few fish.

**EC<sub>50</sub>** – effective concentration in air or in water that causes 50% inhibition of growth.

**EC<sub>100</sub>** – effective concentration in air or water that causes complete inhibition of growth.

**Ecosystem** – the interacting system of a biological community and its non-living environmental surroundings.

**Edema** – an abnormal accumulation of clear, watery fluid in body tissue.

**Effect endpoint** – effects and endpoints vary depending on the toxicological study. Example endpoints can be developmental, reproductive, neurological, or specific to major organs such as kidneys (renal failure, nephropathy), eyes (ophthalmologic), or blood (hematology).

**Embryo** – an organism in the early stages of development before birth. In humans, the developing child

is considered an embryo from conception to the end of the second month of pregnancy.

**Emergence, pre- and post-** – pre-emergence herbicide effect weeds before they sprout. Post-emergence herbicides actively effect growing weeds that are already through the soil surface.

**Empirical** – refers to an observed, but not necessarily fully understood, relationship in contrast to a hypothesized or theoretical relationship.

**Endangered species** – animals, birds, fish, plants, or other living organisms threatened with extinction by man-made and/or natural changes in their environment. Requirements for declaring a species endangered are contained in the Endangered Species Act.

**Endocrine** – referring to several glands in higher animals that secrete hormones.

**Environmental assessment** – a written environmental analysis which is prepared pursuant to the National Environmental Policy Act to determine whether a federal action would significantly affect the environment and thus require preparation of a more detailed environmental impact statement.

**Environmental equity/justice** – equal protection from environmental hazards for individuals, groups, or communities regardless of race, ethnicity, or economic status. This applies to the development, implementation, and enforcement of environmental laws, regulations, and policies, and implies that no population of people should be forced to shoulder a disproportionate share of negative environmental impacts of pollution or environmental hazard due to a lack of political or economic strength levels.

**Environmental fate** – the destiny of a chemical or biological pollutant after release into the environment.

**Environmental Impact Statement (EIS)** – a document which identifies and analyzes, in detail, environmental impacts of a proposed action. As a tool for decision-making, the EIS describes positive and negative effects and lists alternatives for a proposed activity. Required by NEPA.

**Enzymes** – a biological catalyst; a protein, produced by an organism itself, that enables the splitting (as in digestion) or fusion of other chemicals.

**Epidemiology study** – a study of a human population or human populations. In toxicology, a study which examines the relationship of exposures to one or more potentially toxic agent to adverse health effects in human populations.

**Epilimnion** – upper waters of a thermally stratified lake subject to wind action.

**Erosion** – the wearing away of land surface by wind or water.

**Estimated/Expected Environmental Concentration (EEC)** – the estimated or expected pesticide concentration in an environmental media based on a particular set of assumptions and/or models.

**Estuary** – brackish water ecosystems that are regions of interaction between rivers and ocean waters, where tidal action and river flow create a mixing of fresh and salt water. These areas may include bays, mouths of rivers, salt marshes, and lagoons.

**Eutrophication** – the slow aging process of a lake transforming into a marsh and eventually disappearing. During eutrophication the lake is choked by abundant plant life.

**Evapotranspiration** – the loss of water from the soil both by evaporation and by transpiration from the

plants growing in the soil.

**Exposure assessment** – the process of estimating the amount of contact with a chemical or biological agent that an individual or a population of organisms will receive from a pesticide application conducted under specific, stated circumstances

**Exotic species** – a species that is not indigenous to a region.

**Experimental Use Permit** – obtained by manufacturers for testing new, unregistered pesticides or new uses for registered pesticides whenever they conduct experimental field studies on 10 acres or more of land or one acre or more of water to support registration.

**Extrapolation** – the use of a model to make estimates of values of a variable in an unobserved interval from values within an already observed interval.

**Fetal anomaly** – an abnormal condition in a fetus, which is usually the result of a defect in development.

**Field capacity** – the maximum amount of water that a soil can retain after excess water from saturated conditions has been drained by the force of gravity.

**FIFRA pesticide ingredient** – an ingredient of a pesticide that must be registered with U.S. EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Products making pesticide claims must submit required information to U.S. EPA to register under FIFRA and may be subject to labeling and use requirements.

**Fire-break** - an obstacle to the spread of fire, such as a strip of open space in a forest.

**Flowable** – pesticide formulations in which the active ingredients are finely ground insoluble solids suspended in a liquid. They are mixed with water for application.

**Food chain** – a hierarchical sequence of organisms, each of which feeds on the next, lower member of the sequence.

**Formulation** – a commercial preparation of a chemical including any inert ingredients and/or contaminants.

**Fugitive loss** – when applied to dermal exposure, the chemical lost from the surface of the skin by means other than dermal absorption such as volatilization, washing, and loss of skin cells.

**Frank effects** – toxic effects that show obvious physical or behavioral symptoms/signs.

**Frank-effect level (FEL)** – the dose or concentration of a chemical or biological agent that causes obvious physical or behavioral symptoms/signs of toxicity.

**Fungi** – any of a major group of organisms usually classified as plants that lack chlorophyll and include molds, rusts, mildews, smuts, mushrooms, and yeasts. Some grow in the ground, others attach themselves to decaying trees and other plants, getting their nutrition from decomposing organic matter.

**Game fish** – species like trout, salmon, or bass, caught for sport. Many of them show more sensitivity to environmental change than non-game fish.

**Gavage** – the placement of a toxic agent directly into the stomach of an animal, using a gastric tube.

**Genotoxic** – causing direct damage to genetic material. Associated with carcinogenicity.

**Geometric mean** – the measure of an average value often applied to numbers for which a log normal distribution is assumed.

**Gestation** – the period between conception and birth; in humans, the period known as pregnancy. Gestational exposure occurs during pregnancy.

**GLEAMS** – Groundwater Loading Effects of Agricultural Management Systems. GLEAMS-Driver is used to model peak and longer-term (non-accidental) herbicide concentrations in surface water. GLEAMS-Driver was developed to support FS risk assessments and serves as a preprocessor and postprocessor for GLEAMS. GLEAMS is a field-scale model developed by the USDA/Agricultural Research Station, which the FS and other USDA agencies use to provide direct estimates of concentrations and/or amounts of pesticides in and losses of pesticides from treated fields. This output may then be used to estimate concentrations of pesticides in either non-target fields or bodies of water (pond or stream) that are immediately adjacent to the treated field.

**GRAS** – Generally Recognized As Safe. A phrase applied to food additives approved by the FDA.

**Granular** – resembling or consisting of small grains or particles. Some herbicides are available in granular form (see Application methods).

**Groundwater** – the supply of fresh water found beneath the Earth's surface, usually in aquifers, which is often supplies wells and springs.

**Habitat** – the place where a population (e.g., human, animal, plant, microorganism) lives and its surroundings, both living and non-living.

**Half-life** – the time required for the concentration of the chemical to decrease by one-half.

**Hazard Quotient (HQ)** – the ratio of the estimated level of exposure to a substance from a specific pesticide application to the RfD for that substance, or to some other index of acceptable exposure or toxicity. A HQ less than or equal to one is presumed to indicate an acceptably low level of risk for that specific application.

**Hazard identification** – the process of identifying the array of potential effects that an agent may induce in an exposed of humans or other organisms.

**Health advisory level** – a non-regulatory health-based reference level of chemical concentrations in drinking water at which there are no adverse health risks when ingested over various periods of time. Such levels are established by the Office of Drinking Water of the U.S. EPA for one day, 10 days, long-term and life-time exposure periods.

**Hematological** – pertaining to the blood.

**Hematology** – one or more measurements regarding the state or quality of the blood.

Hematuria – blood in the urine.

**Hemolytic anemia** – a medical condition in which the number of red blood cells is decreased due to breakdown in the bloodstream.

**Heme** – an iron-containing compound of the porphyrin class which forms the nonprotein part of hemoglobin and some other biological molecules.

**Henry's law constant** – an index of the tendency of a compound to dissolve in and/or volatilize from aqueous solutions.

**Herbaceous** – a plant that does not develop persistent woody tissue above the ground (annual, biennial, or perennial). Herbaceous vegetation includes grasses and grass-like vegetation, and broadleaved forbs.

**Herbicide** – a chemical used to control, suppress, or kill plants, or to severely interrupt their normal growth processes.

**Herbivore** – an animal that feeds on plants.

**Heterotroph** – bacteria and other microorganisms that use organic matter synthesized by other organisms for energy and growth.

**Histology** – the study of the structure of cells and tissues; usually involves microscopic examination of tissue slices.

**Histopathology** – signs of tissue damage that can be observed only by microscopic examination.

**Humus** – organic portion of the soil remaining after prolonged microbial decomposition.

**Hydrolysis** – decomposition or alteration of a chemical substance by water.

**Hydrogeology** – the geology of ground water, with particular emphasis on the chemistry and movement of water.

**Hydroxylation** – the addition of a hydrogen-oxygen or hydroxy (-OH) group to one of the rings. Hydroxylation increases the water solubility of most compounds and generally facilitates the elimination of the compound in the urine or bile.

**Hydrophilic** – having an affinity for or being very soluble in water.

**Hydrophobic** – lacking an affinity for water; is not wettable or soluble in water.

**Hydroxyl** – the anion of water or OH<sup>-</sup>, also present in all hydroxides.

**Hypolimnion** – bottom waters of a thermally stratified lake. The hypolimnion of a eutrophic lake is usually low or lacking in oxygen.

**Hypoxic** – a condition of low oxygen concentration.

**Immersion dermal exposure** – chemical is in constant contact with the surface of the skin

**In situ** – the original location in the body or environment.

**In vivo** – occurring in the living organism.

**In vitro** – isolated from the living organism and artificially maintained, as in a test tube.

**Indigenous** – living or occurring naturally in a specific area or environment; native.

**Inert ingredients** – anything other than the active ingredient in a pesticide product; not having pesticide properties.

**Ingestion** – the taking in of a substance through the mouth for digestion.

**Internal dose** – in exposure assessment, the amount of a substance penetrating the absorption barriers (e.g. skin, lung tissue, gastrointestinal tract) of an organism through either physical or biological processes; synonymous with absorbed dose.

**Interpolation** – the use of mathematical models within the range of observations

**Intraperitoneal** – injection into the abdominal cavity.

**Invasive** – for the FS context, it is a plant that spreads prolifically, is undesirable and potentially harmful.

**Invertebrate** – an animal that does not have a spine (backbone). Invertebrates can be in the aquatic or terrestrial environment.

**Integrated Risk Information System (IRIS)** – IRIS is a U.S. EPA database containing verified RfDs and related information for numerous chemicals. Available at: <https://www.epa.gov/iris>

**Iritis** – inflammation of the iris, the circular pigmented membrane behind the cornea, perforated by the pupil.

**Irreversible effect** – effect characterized by the inability of the body to partially or fully repair injury caused by a toxic agent.

**Irritant** – non-corrosive material that causes a reversible inflammatory effect on living tissue by chemical action at the site of contact as a function of concentration or duration of exposure.

**Laboratory test animal** – rats, mice and rabbits are commonly used as test animals to evaluate toxicity. Most animals used in toxicology studies are genetically inbred strains that have uniform genetic, biological and behavioral characteristics to minimize variability. Test animal strains are identified in the various studies referenced in the risk assessments; examples include Sprague-Dawley rats and CR:CD(SD) rats or JW:NIBS rabbits.

**LC<sub>50</sub> (lethal concentration<sub>50</sub>)** – a calculated concentration of a chemical in air or water to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

**LD<sub>50</sub> (lethal dose<sub>50</sub>)** – the dose of a chemical calculated to cause death in 50% of a defined experimental animal population over a specified observation period. The observation period is typically 14 days.

**Latency** – time from the first exposure to a chemical until the appearance of a toxic effect.

**Leachate** – water that collects chemicals as it trickles through soil or other porous media containing the chemicals.

**Leaching** – the process by which chemicals on or in soil or other porous media are dissolved and carried away by water or are moved into a lower layer of soil.

**Lesion** – a pathological or traumatic rupture or discontinuity of tissue or loss of function of a body part.

**Level of Concern (LOC)** – the concentration in media or some other estimate of exposure above which there may be effects.

**Lethargy** – sluggish behavior. Less than typical activity.

**Lipophilic** – having an affinity for oil or fat.

**Littoral zone** – 1). That portion of a body of fresh water extending from the shoreline lakeward to the limit of occupancy of rooted plants. 2). The strip of land along the shoreline between the high and low water levels.

**Loam** – a soil with roughly equal proportions of sand, silt, and clay.

**Lowest-observed-adverse-effect-concentration (LOAEC)** – the lowest concentration, usually in an aquatic environment, of a chemical in a study, or group of studies, that produces statistically or biologically significant increases in frequency or severity of adverse effects between the exposed and control populations.

**Lowest-observed-adverse-effect level (LOAEL) and Lowest-observed-effect-level (LOEL)** – the lowest dose of a chemical in a study, or group of studies, that produces statistically or biologically significant increases in frequency or severity of adverse effects between the exposed and control populations.

**Lymphatic** – pertaining to lymph, a lymph vessel, or a lymph node.

**Lymph** – a clear water fluid containing white blood cells. Lymph circulates throughout the lymphatic system, removing bacteria and certain proteins from body tissue. It also is responsible for transporting fat from the small intestine and supplying mature lymphocytes to the blood.

**Macrophyte** – terrestrial or aquatic plant that is large enough to be seen without the aid of a microscope. An example is duckweed (*Lemna gibba*).

**Macroscopic organisms** – organisms big enough to be seen by the eye without the aid of a microscope.

**Malignant** – cancerous.

**Margin of Safety (MOS)** – the ratio between an effect or no effect level in an animal and the estimated human dose.

**Margin of Exposure (MOE)** – the ratio of the no-observed adverse-effect-level to the estimated exposure dose.

**Marsh** – a type of wetland that does not accumulate appreciable peat deposits and is dominated by herbaceous vegetation. Marshes may be either fresh or saltwater, tidal or non-tidal.

**Maximum Exposed Individual (MEI)** – the person with the highest exposure in a given population. The MEI is estimated as the extreme but plausible upper bound of the distribution of individual exposures. This estimate involves many conservative assumptions and is used by U.S. EPA and other government agencies.

**Maximum acceptable toxic concentration** – for a given ecological effects test, the range (or geometric mean) between the no-observable-adverse-effect-level and the lowest-observable-adverse-effects-level.

**Maximum tolerated dose** – the maximum dose that an animal species can tolerate for a major portion of its lifetime without significant impairment or toxic effect other than carcinogenicity.

**Media** – specific environments such as air, water, soil, animal, or plant matter.

**Mesotrophic** – reservoirs and lakes which contain moderate quantities of nutrients and are moderately productive in terms of aquatic animal and plant life.

**Methemoglobin** – a soluble, brown, crystalline blood pigment that differs from hemoglobin in that it contains ferric iron and is unable to combine reversibly with molecular oxygen.

**Methemoglobinemia** – the presence of methemoglobin in the bloodstream caused by the reaction of materials with the hemoglobin in red blood cells that reduces their oxygen-carrying capacity.

**Metabolism** – the sum of the chemical reactions occurring within a cell or a whole organism; includes the energy-releasing breakdown of molecules (catabolism) and the synthesis of new molecules (anabolism).

**Metabolite** – a compound formed as a result of the metabolism or biochemical change of another compound.

**Microcosm** – a small but representative system analogous to a larger system in composition, development, or configuration.

**Microorganisms** – a generic term for all organisms consisting only of a single cell, such as bacteria, viruses, protozoans and some fungi.

**Microsomal** – pertaining to portions of cell preparations commonly associated with enzymes involved in the metabolism of xenobiotics.

**Mineralization** – the release of inorganic chemicals from organic matter in the process of aerobic or anaerobic decay (i.e., typically used as an expression of complete degradation).

**Minimal Risk Level (MRL)** – a route-specific (oral, dermal, or inhalation) and duration-specific estimate of an exposure level that is not likely to be associated with adverse effects in the general population, including sensitive subgroups.

**Mitigation** – measures taken to reduce adverse effects on the environment.

**Mitochondria** – a component in a cell this is involved in the conversion of food to stored chemical energy.

**Modeling** – use of mathematical equations to simulate and predict real events and processes.

**Molecule** – the smallest division of a compound that still retains or exhibits all the properties of the substance.

**Monocot** – monocotyledons, commonly referred to as monocots, are any plants that have flower parts in multiples of three, leaf veins that run parallel and adventitious roots. Common examples include tulips, onions, garlic, and lilies.

**Morbidity** – rate of disease, injury, or illness.

**Most sensitive effect** – the adverse effect, which is observed at the lowest dose level, given the available data. This is an important concept in risk assessment because, by definition, if the most sensitive effect is prevented, no other effects will develop. Thus, RfDs are normally based on doses at which the most sensitive effect is not likely to develop.

**Motile** – capable of self-propelled movement. A term that is sometimes used to distinguish between certain types of organisms found in water.

**Mucous membrane** – a thin, soft, pliable layer of tissue that secretes mucous (i.e., nose, mouth, stomach, intestine, bronchial tubes, and urinary tract).

**Multiple chemical sensitivity** – a syndrome that affects individual persons who are extremely sensitive to chemicals at extremely low levels of exposure.

**Mutagenicity** – the ability of a substance to cause genetic damage (that is damage to DNA or RNA).

**Mutagen** – a substance that causes mutations.

**Mutation** – a change in the genetic material in a cell. Mutations can lead to adverse clinical effects.

**Narcosis** – stupor or unconsciousness often produced by exposure to organic chemicals.

**National Pollutant Discharge Elimination System (NPDES)** – a provision of the Clean Water Act which prohibits discharge of pollutants into waters of the United States unless a special permit is issued by U.S. EPA, a state, or, where delegated, a tribal government on an Indian reservation.

**Necrosis** – death of plant or animal cells or tissues. In plants, necrosis can discolor stems or leaves or kill a plant entirely. In animals, necrosis can be minimal (focal or diffuse) or massive – i.e., resulting in loss of organ function that can sometimes lead to death of the organism.

**Nematodes** – roundworms, some of which are pathogenic for plants and sometimes animals.

**NEPA** – National Environmental Policy Act; requires federal agencies to analyze and disclose effects on the human environment of proposed programs or activities.

**Neurotoxin** – a material that affects the nerve cells and may produce muscular, emotional, behavioral abnormalities, impaired or abnormal motion and other physiologic changes.

**Neutral** – in pH terms, 7; neither acid nor basic.

**Nitrification** – the process whereby ammonia in soil or water is oxidized to nitrite and then to nitrate by bacterial or chemical reactions.

**Nitrogen fixation** – the biological or chemical process by which elemental nitrogen, from the air, is converted to organic or available nitrogen.

**Non-target** – any plant or animal that is not the intended organism to be controlled by a pesticide treatment.

**No-observed-adverse-effect-concentration (NOAEC)** – exposure concentration, usually in aquatic environment, at which there are no statistically or biological significant differences in the frequency or severity of any adverse effect in the exposed or control populations.

**No-observed-adverse-effect-level (NOAEL) or No-observed-effect-level** – exposure level at which there are no statistically or biological significant differences in the frequency or severity of any adverse effect in the exposed or control populations.

**Normal distribution** – a standard patterns used in statistics to describe one way in which variability occurs in a population.

**Nutrients** – elements or compounds essential to growth and development of living things, such as carbon, oxygen, nitrogen, potassium, and phosphorus.

**Octanol-water partition coefficient ( $K_{ow}$ )** – the equilibrium ratio of the concentrations of a chemical in n-octanol and water, in dilute solution.

**Ocular** – pertaining to the eye.

**OECD guidelines** – testing guidelines prepared by the Organization of Economic and Cooperative Development of the United Nations. They assist in preparation of protocols for studies of toxicology, environmental fate, etc.

**Oligotrophic** – a term applied to describe deep clear lakes with low nutrient supplies. They contain little organic matter and have a high dissolved oxygen level.

**Oliguria** – scanty or low volume of urine.

**Oral toxicity** – ability of a pesticide to cause injury when ingested.

**Organic matter** – carbonaceous material contained in soil, plants, or animal matter.

**Organism** – any living thing.

**Parameter** – a quantitative measure that is estimated by a model for a particular set of data.

**Parenteral** – any form of injection into the body.

**Partition** – in chemistry, the process by which a compound or mixture moves between two or more media.

**Partition coefficient** – the ratio of concentrations of a chemical in two different media at equilibrium (e.g., octanol/water).

**Pathogen** – a living organism, typically a bacteria or virus, that causes adverse effects in another organism.

**Pathway** – in metabolism, a sequence of metabolic reactions.

**Percolation** – downward flow or filtering of water through pores or spaces in rock or soil.

**Perennial** – a plant species having a life span of more than two years.

**Periphyton** – microscopic plants and animals that are firmly attached to solid surfaces under water such as rocks, logs, pilings, and other structures.

**Permeability** – for dermal exposures, permeability refers to the degree to which a chemical in contact with the skin is able to penetrate the skin.

**Peroxidation** – a type of reaction in which oxygen atoms are formed leading to the production of peroxides. It is stimulated in the body by certain toxins and infections.

**Persistence** – refers to the length of time a compound, once introduced into the environment, stays there.

**Personal Protective Equipment (PPE)** – clothing and equipment worn by pesticide mixers, loaders and applicators and re-entry workers, hazmat emergency responders, workers cleaning up Superfund sites, et. al., which is worn to reduce their exposure to potentially hazardous chemicals and other pollutants.

**Pest** – an insect, rodent, nematode, fungus, weed or other form of terrestrial or aquatic plant or animal life that is classified as undesirable because it is injurious to health or the environment.

**Pesticide** – a chemical or biological agent that is used to kill pests.

**Pesticide tolerance** – the amount of pesticide residue allowed by law to remain in or on a harvested crop.

**pH** – the negative log of the hydrogen ion concentration. A high pH (>7) is alkaline or basic and a low pH (<7) is acidic.

**Pharmacokinetics** – the quantitative study of the absorption, distribution, metabolism, and excretion of chemicals by an organism.

**pK<sub>a</sub>** – the negative log of the hydrogen ion concentration or pH at which 50% of a weak acid is dissociated.

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

**Photolysis** – breakdown of a chemical in soil or water by sunlight.

**Phytoplankton** – that portion of the plankton community (i.e., organisms in water) comprised of tiny plants (e.g., algae, diatoms).

**Phytotoxic** – something that harms plants.

**Piscivorous** – feeding on fish.

**Piloerection** – erection or bristling of hairs due to the involuntary contraction of small muscles at the base of hair follicles that occurs as a reflexive response of the sympathetic nervous system especially to cold, shock, or fright.

**Plankton** – small aquatic organisms with limited powers of locomotion, carried by water currents from place to place.

**Poplar** – a tall, fast-growing tree of north temperate regions, widely grown in shelter belts and for timber and pulp.

**Population** – a group of interbreeding organisms occupying a particular space; the number of humans or other living creatures in a designated area.

**Population at risk** – a population subgroup that is more likely to be exposed to a chemical, or is more sensitive to the chemical, than is the general population.

**Porosity** – degree to which soil, gravel, sediment, or rock is permeated with pores or cavities through which water or air can move.

**Porphyrin** – a class of pigments (including heme and chlorophyll) whose molecules contain a flat ring of four linked heterocyclic groups, sometimes with a central metal atom.

**Portal-of-Entry effect** – a local effect produced in the tissue or organ of first contact between a toxicant and the biological system.

**Potable water** – water that is considered safe for drinking and cooking.

**Potential** – the ability of one chemical to increase an effect of another chemical on an organism.

**Precautionary principle** – when information about potential risks is incomplete, basing decisions about the best ways to manage or reduce risks on avoiding unnecessary or uncertain health risks instead of on avoiding unnecessary economic expenditures.

**Predation** – the act or practice of capturing another creature (prey) as a food source.

**Prokaryote** – a single-celled organism in which the nucleus has no limiting membrane.

**Protoporphyrin oxidase (PPO)** – the enzyme responsible for converting protoporphyrinogen IX to protoporphyrin IX. The herbicidal mechanism of flumioxazin is inhibition of PPO.

**Protozoa** – single-celled, microorganisms without cell walls containing visibly evident nuclei and organelles. Most protozoa are free-living although many are parasitic.

**Prospective** – looking ahead. In epidemiology, a type of study in which the populations are identified prior to exposure to a presumptive toxic agent, in contrast to a retrospective study.

**Protonated** – an acid (A<sup>-</sup>) that is combined with a proton (H<sup>+</sup>) and has a neutral charge (AH). The dissociated form of the acid has a negative charge (A<sup>-</sup>) e.g.: Sulfuric acid:  $H_2SO_4 \rightleftharpoons 2H^+ + SO_4^-$

**Prudent industrial hygiene** – precautionary measures taken to protect human health when exposed to potentially harmful materials. This includes keeping hands, other parts of the body, work clothing, and equipment free of a material's residue, as well as not eating, drinking, applying makeup, or using toilet facilities where the material is in use.

**Pulmonary edema** – fluid in the lungs.

**Pup** – the offspring or young of some animal species.

**Receiving waters** – all distinct bodies of water that receive runoff or wastewater discharges, such as streams, rivers, ponds, lakes, and estuaries.

**Receptor** – ecological entity exposed to a stressor.

**Record of Decision (ROD)** – a public document that explains which alternative(s) the deciding official has selected for implementation of a project or program.

**Release** – a treatment done to free desirable trees from competition with less desirable vegetation.

**Reference Dose (RfD)** – the RfD is a numerical estimate of a daily exposure to the human population, including sensitive subgroups such as children, that is not likely to cause harmful effects during a lifetime. RfDs are generally used for health effects that are thought to have a threshold or minimum dose for producing effects. These values are derived by the U.S. EPA.

**Registration** – formal licensing with U.S. EPA of a new pesticide before it can be sold or distributed. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), U.S. EPA is responsible for registration (pre-market licensing) of pesticides on the basis of data demonstrating no unreasonable adverse effects on human health or the environment when applied according to approved label directions.

**Relative weight** – the weight of an organ, such as the liver or kidney, divided by the total body weight of the animal.

**Reproductive effects** – adverse effects on the reproductive system that may result from exposure to a chemical or biological agent. The toxicity of the agents may be directed to the reproductive organs or the related endocrine system. Toxic effects may be manifested as alterations in sexual behavior, fertility, pregnancy outcomes, or modifications in other functions dependent on the integrity of this system.

**Reregistration** – the reevaluation and relicensing by U.S. EPA of existing pesticides that were originally registered prior to current scientific and regulatory standards. U.S. EPA re-registers pesticides through its Registration Standards Program.

**Resorption** – removal by absorption. Often used in describing the unsuccessful development and subsequent removal of post-implantation embryos.

**Retrospective** – looking behind. In epidemiology, a type of study in which the populations are identified after exposure to a presumptive toxic agent, in contrast to a prospective study.

**Reversible** – not permanent, applied especially to adverse effects which diminish when exposure to a toxic chemical ends.

**Right-of-way** – a corridor of low growing shrubs or grasses that facilitate the maintenance and protection of utility and transportation routes.

**Riparian habitat** – areas adjacent to bodies of fresh water whose vegetation is influenced by its proximity to abundant water.

**Risk** – the chance of an adverse or undesirable effect.

**Risk assessment** – the qualitative and quantitative evaluation performed in an effort to estimate the risk posed to human health and/or the environment by the presence or potential presence and/or use of specific chemical or biological agents.

**Risk communication** – the exchange of information about health or environmental risks between risk assessors, risk managers, the general public, news media, interest groups, etc.

**Risk management** – the process of evaluating potential alternative regulatory and non regulatory responses to risk and selecting among them. The selection process necessarily requires the consideration of legal, economic, and social factors.

**River basin** – the geographic area drained by a river and its tributaries.

**Rough fish** – fish not prized for sport or eating, such as gar and suckers. Most are more tolerant of changing environmental conditions than are game or food species.

**Route of exposure** – the way in which a chemical or biological agent enters the body. Most typical routes include oral (eating or drinking), dermal (contact of the agent with the skin), ocular (eye contact), and inhalation.

**Run-off** – that part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface water.

**Safety Data Sheet (SDS)** – a compilation of information required under the OSHA Communication

Standard on the identity of hazardous chemicals, health, and physical hazards, exposure limits, and precautions.

**SARA** – Superfund Amendments and Reauthorization Act (1986); federal law reauthorizing and expanding the jurisdiction of CERCLA. Signed into law October 17, 1986. Title III of SARA is known as the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986. It is a revision and extension of CERCLA.

**Saturated zone** – a subsurface area in which all pores and cracks are filled with water under pressure equal to or greater than that of the atmosphere.

**Scientific notation** – the method of expressing quantities as the product of a number between 1 and 10 multiplied by 10 raised to some power. For example, in scientific notation, 1 kg = 1,000g would be expressed as 1 kg = 1 x 10<sup>3</sup> g and 1 mg = 0.001 would be expressed as 1 mg = 1 x 10<sup>-3</sup>.

**Sediment** – soil particles washed from land into water usually after rain.

**Sedges** – a grass-like plant with triangular stems and inconspicuous flowers, growing typically in wet ground. Sedges are widely distributed throughout temperate and cold regions.

**Sensitive subgroup** – subpopulations that are much more sensitive than the general public to certain agents in the environment.

**Sensitization** – a condition in which one is or becomes excessively or abnormally susceptible or reactive to an agent through repeated exposure.

**Signal words** – the words used on a pesticide label to indicate a level of toxicity specified by U.S. EPA: Danger, Warning, or Caution.

**Silt** – sedimentary materials composed of fine or intermediate sized mineral particles.

**Silviculture** – management of forest land for diverse purposes through manipulation of the density, structure, and species composition of the trees thereon.

**Sink** – place in the environment where a compound or material collects.

**Site preparation** – the removal of competing vegetation and debris to enhance a site for planting, and survival and growth of seedlings, or to enhance germination of natural seed (on site).

**Soil adsorption coefficient (Koc)** – provides a measure of the ability of a chemical to sorb (adhere) to the organic portion of soil. Used to indicate the potential for the chemical to leach through soil.

**Special review** – formerly known as Rebuttable Presumption Against Registration (RPAR), this is the regulatory process through which U.S. EPA reviews existing pesticides suspected of posing unreasonable risks to human health, non-target organisms, or the environment. Special review requires an intensive risk/benefit analysis with opportunity for public comment. If U.S. EPA determines that risks outweigh social and economic benefits, U.S. EPA may initiate regulatory actions ranging from label revisions and use-restriction to cancellation or suspended registration.

**Species-to-species extrapolation** – a method using exposure data on one species (usually an experimental animal) to estimate the effects of exposure in another species (usually humans or wildlife).

**Stokes' Law** – a formula for calculating the rate of fall of particles through a air or a fluid based on

densities, viscosity, and particle size.

**Subchronic exposure** – typically, exposures of 15 days to < one year. Applies to relatively long-lived organisms such as mammals.

**Subchronic toxicity** – the ability of one or more substances to cause effects over periods from about 15 days to < 1 year but substantially less than the lifetime of the exposed organism. Subchronic toxicity applies to relatively long-lived organisms such as mammals.

**Subcutaneous** – beneath the skin.

**Submerged aquatic vegetation** – Vegetation that lives at or below the water surface; an important habitat for young fish and other aquatic organisms.

**Substrate** – with reference to enzymes, the chemical that the enzyme acts upon.

**Surface water** – all water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.) and all springs, wells, or other collectors which are directly influenced by surface water.

**Surfactant** – a surface active agent; usually an organic compound whose molecules contain a hydrophilic group at one end and a lipophilic group at the other. Promotes solubility of a chemical, or lathering, or reduces surface tension of a solution.

**Synergistic effect** – a situation in which the combined effects of exposure to two chemicals simultaneously is much greater than the sum of the effect of exposure to each chemical given alone.

**Systemic effects** – effects observed at sites distant from the entry point of a chemical due to its absorption and distribution in the body.

**Systemic toxicity** – effects that require absorption and distribution of a toxic agent to a site distant from its entry point at which point effects are produced. Systemic effects are the opposite of local effects.

**Tachycardia** – excessively rapid heartbeat.

**Tachypnea** – increased rate of respiration.

**Teratogenic** – causing structural defects that affect the development of an organism; causing birth defects.

**Teratology** – the study of malformations induced during development of young animals including humans from conception to birth.

**Terrestrial** – anything that lives on land as opposed to living in an aquatic environment.

**Threshold** – the maximum dose or concentration level of a chemical or biological agent that will not cause an effect in the organism.

**Threshold Limit Value (TLV)** – the concentration of an airborne substance to which an average person can be repeatedly exposed without adverse effects. TLVs may be expressed in three ways – (1) TLV-TWA--Time weighted average, based on an allowable exposure averaged over a normal 8-hour workday or 40-hour work-week; (2) TLV-STEL--Short-term exposure limit or maximum concentration for a brief specified period of time, depending on a specific chemical (TWA must still be met); and (3) TLV-C--

Ceiling Exposure Limit or maximum exposure concentration not to be exceeded under any circumstances. (TWA must still be met.)

**Thymus** – a small gland that is the site of T-cell production. The gland is composed largely of lymphatic tissue and is situated behind the breastbone. The gland plays an important role in the human immune system.

**Time-Weighted Average (TWA)** – the average air concentration of material during a given period of time.

**Tolerances** – permissible residue levels for pesticides in raw agricultural produce and processed foods. Whenever a pesticide is registered for use on a food or a feed crop, a tolerance (or exemption from the tolerance requirement) must be established. U.S. EPA establishes the tolerance levels, which are enforced by the Food and Drug Administration (FDA) and the Department of Agriculture (DEA).

**Toxicity** – the inherent ability of an agent to affect living organisms adversely. As defined by U.S. EPA, toxicity is "...the degree to which a substance or mixture of substances can harm humans or animals.

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

**Transpiration** – the process by which living plants release water vapor to the atmosphere.

**Utility corridor** – a corridor of low growing shrubs or grasses that facilitate the maintenance and protection of utility infrastructure.

**Uncertainty factor (UF)** – a factor used in operationally deriving the RfD and similar values from experimental data such as NOAEL or LOAEL. UFs are intended to account for 1.) the variation in sensitivity among members of the human population; 2.) the uncertainty in extrapolating animal data to humans; 3.) the uncertainty in extrapolating from data obtained in a study that is less than lifetime exposure; and 4.) the uncertainty in using LOAEL data rather than NOAEL data. Usually each of these factors is set equal to 10.

**Unsaturated** – in terms of molecular structure, a carbon atom in a hydrocarbon molecule that shares a double bond with another carbon atom.

**Unsaturated/Vadose zone** – the area above the water table where the soil pores are not fully saturated, although some water may be present.

**Vegetative vigor** – general term used to describe toxicity endpoint for testing effects on vegetation. Specific measurements include biomass of surviving plants (dry or fresh shoot weight, shoot height), visible detrimental effects on different parts of the plant, visual phytotoxicity and mortality.

**Vehicle** – an inert ingredient (usually a liquid) used as a medium for suspending or dissolving the pesticidal active ingredient. Commonly used vehicles include water, acetone, and corn oil.

**Vertebrate** – an animal that has a spinal column (backbone).

**Volatile** – referring to compounds or substances that have a tendency to vaporize; a material that will evaporate quickly.

**Water table** – the level of groundwater.

**Watershed** – the land area that drains into a stream.

**Weak acid** – an acid that is not substantially dissociated at a neutral pH. Many herbicides as well as many naturally occurring organic chemicals are weak acids. Mammals have well developed systems to excrete weak acids.

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

**Xenobiotic** – term for non-naturally occurring or man-made substances found in the environment.

**Zooplankton** – tiny aquatic animals that fish feed on.