

Glossary

(Terms in definitions that are defined elsewhere in the Glossary are shown in boldface within the definition. Most definitions are described as they apply to pesticides.)

A

10⁻⁶ cancer risk concentration (CRC) The concentration of a chemical in drinking water that corresponds to an excess estimated lifetime cancer risk (in addition to cancer risk from other causes) of 1 in 1,000,000.

Acetanilide herbicides A class of pesticides derived from N-acetylaniline and used primarily for weed control in corn, soybeans, and sorghum.

Active ingredient The chemical component of a pesticide product that kills or otherwise controls the target organism(s).

Acute effects Rapid physiological response of an organism (such as death or immobility) resulting from relatively short-term exposure to elevated concentrations of one or more chemicals or other changes in biological, chemical, or physical conditions in the environment.

Adjuvants Chemicals included in a pesticide product to facilitate the application of the product or to enhance the effectiveness of the **active ingredient**. Adjuvants are often referred to as “inert ingredients.”

Agricultural management practices Methods used as part of crop cultivation and livestock husbandry (such as irrigation, fertilization, or integrated pest management) to maximize product yields, control soil erosion, maintain soil quality, and (or) minimize any adverse effects on water quality or ecosystem health.

Agricultural stream A stream draining a watershed with more than 50 percent agricultural land (cropland or pasture) and 5 percent or less of urban land.

Ambient water-quality criteria (AWQC) Guidelines issued by USEPA for pollutants designated as toxic under the Clean Water Act and that may provide the basis for state standards. There are two types of these guidelines—those for the protection of human health and those for the protection of aquatic organisms. Aquatic-life criteria may be acute (established for short-term exposure) or chronic (for long-term exposure).

Aquatic-life benchmark A threshold value above which the concentration of a chemical in water or bed sediment may have adverse effects on aquatic organisms. Benchmarks for water are established to address either acute (short-term) or chronic (long-term) exposures.

Aquifer A geologic formation, group of formations, or part of a formation that contains a sufficient amount of saturated permeable material (for example, soil, sand, gravel and (or) rock) to yield significant quantities of water to wells and springs.

B

Baseflow Hydrologic regime in streams, following extended periods of minimal precipitation, during which streamflow is derived primarily from ground-water discharge.

Bed sediment Sediment particles, including eroded soil and organic matter, deposited at the bottom of a stream or other surface-water body.

Benchmark See **water-quality benchmark**.

Benthic Living on or close to the bottom of a stream, lake, or sea.

Bioaccumulative The tendency of a chemical compound to be taken up and retained by organisms from all sources in their environment, such as diet, sediment, soil, or water.

Bioassay The quantitative measurement, under standardized conditions, of the biological effects of a substance on an organism or part of an organism.

C

Carbamate insecticides A class of pesticides consisting of various esters of carbamic acid. Like the **organophosphate insecticides**, they are inhibitors of cholinesterase—the enzyme required for nerve function in the animal body—and are used to kill or control insects in a variety of agricultural and non-agricultural settings.

Chlordane group The set of five compounds whose concentrations are summed to compute the concentration of **total chlordane**, including the *cis* and *trans* isomers of chlordane and nonachlor, and the chlordane **degradate**, oxychlordane.

Chronic effects Physiological responses of an organism (such as death, impaired reproduction, or changes in organ function) resulting from long-term exposure to one or more chemicals or other changes in biological, chemical, or physical conditions in the environment.

Common detection level A single concentration threshold, used for assessing the presence or absence of each one of a group of compounds within a sample or set of samples on an equal basis. Use of this threshold avoids biases in detection frequencies caused by varying analytical sensitivities to different compounds—it is also sometimes referred to as a “common assessment level.”

Confidence level The probability threshold used to decide whether a particular observation or result of a statistical test was likely to have arisen solely by chance.

Conventional pesticides Compounds that are commonly used to kill or control unwanted organisms in either agricultural or nonagricultural settings. Such chemicals include **herbicides, insecticides, fumigants, fungicides**, and many other types of biocidal compounds, but exclude several other types, such as antifouling agents, disinfectants, and wood preservatives.

Corn Belt The area of the Great Plains and the Midwest where corn and soybeans are the principal crops. It generally

includes Illinois, Indiana, Iowa, Nebraska, and Ohio, as well as parts of adjoining states.

Crop-group setting A classification of agricultural land that is based on the dominant presence of one, two, or three specific crops (such as “rice,” or “corn and soybeans”), as derived from the classification system described by Gilliom and Thelin (1997).

D

DDT group Six compounds derived from the parent pesticides DDT and DDD whose concentrations are summed to compute the concentration of **total DDT**, specifically the *p,p'* and *o,p'* isomers of DDT, DDD, and DDE.

Deethylatrazine-to-atrazine ratio The ratio of concentrations of deethylatrazine to atrazine in a particular environmental medium (usually water), used to track the transformation of atrazine to one of its principal **degradates** over time or distance.

Degradate A compound produced from the transformation of a **parent pesticide** or another degradate through either abiotic or biotic processes.

Diffusion The movement of chemicals (in either the gas, liquid, or solid phase) from regions of higher concentration to those of lower concentration.

Domestic well A privately owned well that usually serves one home and supplies water for human consumption and other homeowner uses.

E

EC₅₀ In a toxicity test, the “50 percent effect concentration”—that is, the concentration of a chemical at which a specified effect is observed in half of the test organisms within a specified period of time (typically 48 hours).

Endocrine disruptor A chemical that interferes with the **endocrine system** in an organism by mimicking a natural hormone, blocking the effects of a hormone on certain receptors, or causing the overproduction or underproduction of hormones.

Endocrine system A biochemical regulatory system in mammals, birds, fish, and other organisms that is comprised of hormones (which act as chemical messengers), glands that produce hormones, and receptors in various organs and tissues that recognize and respond to the hormones. The system regulates a wide variety of physiological processes in the body, including the development of the brain and nervous system, the growth and function of the reproductive system, metabolic activity, and blood sugar levels.

Environmental medium Any natural solid, liquid, or gas in the environment—such as ground water, stream water, bed sediment, or biological tissues.

Explanatory variable A parameter (for example, chemical use, population, or soil permeability) whose value is used in

regression and other statistical models to evaluate and estimate the magnitude of another parameter (the **response variable**).

F

Fish-consumption advisory A recommendation issued by a public agency that people limit or avoid consumption of certain fish species caught from particular water bodies because of contamination of fish with bacterial or **bioaccumulative** pollutants.

Flow path The route or pathway followed by water flowing through the **hydrologic system**. Usually refers to **subsurface** flow.

Fumigant A compound or mixture of compounds that produces a gas, vapor, fumes, or smoke intended to destroy, repel, or control organisms such as insects, bacteria, or rodents.

Fungicides Pesticides that are used to kill unwanted fungi.

G

Glacial till Poorly sorted unconsolidated geologic material deposited by glaciers and generally having low **permeability**, unless fractures or other interconnected openings for flow are present.

Ground-water recharge Water that reaches ground water by infiltration of precipitation or irrigation water through the **unsaturated zone** or by seepage of water from surface-water bodies, such as streams and lakes.

Guideline A threshold value for the maximum acceptable concentration of a pesticide or other contaminant in a given **environmental medium**, specified for the protection of humans, aquatic life, or wildlife. Guidelines are issued for advisory purposes and are not legally enforceable.

H

Half-life The time required for the concentration of a compound in a given **environmental medium** to be reduced to half of its original value by one or more processes, such as degradation or transport into another environmental medium.

Health advisory An estimate of acceptable drinking-water concentrations for a chemical substance, established by USEPA on the basis of health effects information. Although it is not a legally enforceable federal standard, it provides technical guidance to assist Federal, State, and local officials.

Henry's law constant (K_H) A measure of the partitioning of a compound between an aqueous solution and a gas with which it is in contact, quantified as the ratio between the concentrations of the compound in the gas phase and in the aqueous solution at equilibrium.

Herbicides Pesticides that are used to kill unwanted plants.

Human-health benchmark A threshold value above which the concentration of a chemical in water may have adverse effects on humans if the water is used as drinking water without treatment or other measures to lower the concentration.

Hydraulic conductivity The rate at which a porous medium transmits water.

Hydrogeology The geologic and hydrologic features that control the movement of water, solutes, and small particles through the **subsurface**.

Hydrologic system The assemblage of pathways by which water travels as it circulates beneath, at, and above the Earth's surface through various processes such as precipitation, runoff, evaporation, infiltration, transpiration, and ground-water discharge.

Hydrophilic The tendency of a compound to favor dissolution in, or association with water, rather than organic matter. Often used to refer to compounds with comparatively low K_{oc} values.

Hydrophobic The tendency of a compound to favor sorption to, or association with organic matter, rather than dissolution in water. Often used to refer to compounds with comparatively high K_{oc} values.

I

Immobile zones Regions within the **subsurface** through which water and solutes move relatively slowly, if at all. (Contrast with **mobile zones**.)

Inert ingredients See **adjuvants**.

Insecticides Pesticides that are used to kill unwanted insects.

Isomers Compounds with identical chemical composition but with slightly different structures (arrangement of atoms). Examples include *o,p'*- and *p,p'*-DDT; and *cis*- and *trans*-chlordane.

K

K_{oc} See **soil organic carbon-water partition coefficient**.

K_H See **Henry's law constant**.

Kendall's tau test A nonparametric statistical test used to determine whether a particular trend in magnitude is significant at a specified **confidence level**.

L

LC_{50} In a toxicity test, the "50 percent lethal concentration"—that is, the concentration of a chemical at which 50 percent of test organisms die within a specified period of time (typically 48 or 96 hours).

Lifetime Health Advisory (HA-L) The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects in humans over a lifetime of exposure (70 years). This parameter is not a legally enforceable federal standard, but provides technical guidance to assist Federal, State, Tribal, and local officials.

Linear regression A statistical method for analyzing and estimating the magnitude of a **response variable** as a function of one or more **explanatory variables**.

Lipid Any one of a diverse group of **hydrophobic** organic compounds produced and stored by living organisms and that contain long hydrocarbon chains or rings. Examples include fats, oils, waxes, steroids, and carotenoids.

M

Major aquifer A regionally extensive subsurface geologic formation or group of formations that is used, or has the potential to be used, as a significant ground-water resource.

Major aquifer studies NAWQA investigations involving the sampling of 20 to 30 **domestic** and (or) **public-supply wells** that withdraw water from **major aquifers**.

Manufacturing by-products Compounds used for, or generated during, the production of a particular chemical (such as a pesticide **active ingredient**) that may be present in the commercial formulation itself, especially those such as **technical mixtures** that are less highly purified.

Maximum Contaminant Level (MCL) A drinking-water standard that is legally enforceable and that sets the highest permissible concentration of a specific compound in water that is delivered to any user of a public water system. In this report, only values established by the USEPA are used.

Mixed-land-use streams Streams draining watersheds in which no single type of land use (agricultural, urban, or undeveloped) predominates. These include all streams not meeting the specific land-use criteria for **agricultural, urban, or undeveloped streams**.

Mixture A combination of two or more compounds detected in the same environmental sample.

Mobile zones Regions within the **subsurface** through which water flows more rapidly than in other locations, often consisting of worm holes, cracks, fractures, and other highly conductive channels. Also referred to as zones of "preferential flow." (Contrast with **immobile zones**.)

Mobility The speed or ease with which a compound moves through the **hydrologic system** relative to the rate of water flow—mobility generally increases with decreasing K_{oc} values.

N

No-effect level In a toxicity study, the highest concentration or dose that was observed to have a negligible impact on the health of the test organisms.

Nonpoint sources Contaminant releases that are diffuse and widely dispersed, such as agricultural runoff or atmospheric deposition.

Nontarget organisms Organisms other than those that a pesticide active ingredient is applied to control or kill.

O

Observation well A well designed for measuring water levels and testing ground-water quality, and generally not used as a source for drinking water. Also referred to as a “monitoring well.”

Organochlorine pesticide compounds A class of synthetic organic chemicals (mostly **insecticides**) with hydrocarbon structures containing one or more chlorine substituents, and that includes **manufacturing by-products** and **degradates**, in addition to **active ingredients**.

Organophosphate insecticides A group of pesticides, consisting of various derivatives of phosphoric, phosphorothioic, or phosphorodithioic acids, in some cases with a nitrogen, fluorine, methyl, or cyano group substituting for one or more of the phosphate oxygens. Like the **carbamate insecticides**, they are inhibitors of cholinesterase—the enzyme required for nerve function in the animal body—and are used to kill or control insects in a variety of agricultural and nonagricultural settings.

P

Parent pesticide The form of an active ingredient as it is released into the environment.

Partitioning The processes by which a compound becomes distributed among different **environmental media**. Such processes include **sorption**, volatilization, dissolution, and biological uptake.

Permeability A measure of the relative ease with which a porous medium can transmit a fluid.

Persistence The tendency of a compound to remain in its original form, rather than undergo **transformation**, in the environment.

Pesticide A chemical applied to crops, rights-of-way, lawns, residences, golf courses, or other settings to kill or control weeds, insects, fungi, nematodes, rodents, or other unwanted organisms.

Pesticide compounds A term used to refer collectively to **parent pesticides**, their **degradates** and, where applicable, their **manufacturing by-products**.

Point source A specific location at which one or more contaminants are known to be released into the **hydrologic system**.

Public-supply well A privately or publicly owned well that provides water for public use to: (1) community water systems, (2) transient non-community water systems, such as campgrounds, or (3) non-transient, non-community systems, such as schools.

R

Rainfall erosivity A parameter in the **Universal Soil Loss Equation** that quantifies the effects of rainfall on soil loss within a particular area, and accounts for both the energy and

intensity of rainstorms, averaged over a specified number of years. Also referred to as the “R factor.”

Residence time The amount of time that a solute, particle, organism, or other entity spends within a given **environmental medium**.

Response variable The dependent parameter (for example, chemical concentration) whose magnitude is estimated from quantitative relations with other, independent parameters (**explanatory variables**) using statistical relations such as regression models.

Rill irrigation Water management method that employs a series of parallel surface ditches to distribute water to crops.

S

Saturated zone The region in the **subsurface** in which all the interstices or voids are filled with water under a pressure exceeding that of the atmosphere.

Seasonal Kendall test A statistical method that corrects for possible seasonal patterns in a given variable to detect temporal trends in the parameter (or lack thereof) over a period of years.

Seasonal pulse Temporary increase in the concentration of one or more compounds in surface water or ground water that commonly occurs at a particular time of the year—for example, the substantial increases in the concentrations of corn **herbicides** typically observed in streams of the **Corn Belt** in the spring.

Simulation model A mathematical model used to predict the combined effects and (or) consequences of one or more processes of interest by reproducing these effects using mathematical relations and (or) numerical techniques, typically through the use of computer programs.

Soil erodibility A parameter in the **Universal Soil Loss Equation** that quantifies the ease with which a given soil may be carried away by water and which is based on a number of soil characteristics such as soil texture (that is, the percentages of different size fractions such as sand, silt, and clay), organic-matter content, permeability, and structure. Also referred to as the “K factor.”

Soil organic carbon-water partition coefficient (K_{oc}) A measure of the partitioning of a compound that is anticipated to occur between soil and water when the two phases are in contact. This parameter is quantified as the ratio between the concentrations of the compound in the soil (normalized to the organic carbon content of the soil) and in the aqueous solution at equilibrium. The K_{oc} provides an indication of the extent of **sorption** of a compound to natural organic matter in the **hydrologic system** and, by extension, an inverse measure of the **mobility** of the compound in water within the **subsurface**.

Sorption The retention, through binding or association, of a solute ion or molecule by a solid.

Source water A stream, lake, other surface-water body, or aquifer from which water is drawn for human use.

Spatial extrapolation The use of statistical or other models to predict the value of a parameter (for example, the concentration of a chemical compound) in a location where it has not been measured.

Statistical model A model used to represent the effects of one or more processes of interest by quantitative, probabilistic relations (such as regressions) between one or more **explanatory variables** and a particular **response variable**.

Statistical significance The likelihood (commonly expressed as a probability, *p*) that the result of a statistical test may have occurred solely by chance. Observations associated with *p* values of 0.05 or less (a “95 percent or greater confidence level”) are typically deemed to be “statistically significant,” and thus, are unlikely to have occurred solely by chance.

Study Unit A major **hydrologic system** of the United States, geographically defined by surface- or ground-water features, in which NAWQA sampling studies are focused. The NAWQA studies during the first decade of assessments examined 51 Study Units.

Subsurface The region of earth materials beneath the land surface that encompasses the soil, **unsaturated**, and **saturated zones**.

Subsurface tile-drain systems Perforated pipes that are buried in the ground to reduce the water content of poorly drained soils and divert shallow ground water to nearby streams.

Surface runoff The flow of water over the land surface, usually in response to intense rainfall or snowmelt events, irrigation, or rainfall on saturated soils, snow, or impervious surfaces (such as pavement).

T

Target organism An organism that an **active ingredient** of a pesticide is designed to control or kill.

Technical DDT A commercial DDT formulation that commonly contained approximately 80 percent *p,p'*-DDT, approximately 20 percent *o,p'*-DDT, and small amounts of *o,o'*-DDT, *m,p'*-DDT, *p,p'*-DDD, and other **manufacturing by-products**.

Technical mixture A formulation of a commercial chemical product that usually contains minor amounts of **manufacturing by-products** or other compounds in addition to the compound of interest (such as the **active ingredient** in a pesticide product).

Termiticide Pesticides that are used to kill termites, usually in buildings and other structures.

Time-weighted 95th percentile concentration The concentration of a given compound that is exceeded 5 percent of the time, or about 18 days per year (generally not consecutive).

Tolerance level The maximum permissible concentration of a pesticide or pesticide **degradate** allowed in or on foods or

animal feed, for the protection of human health. (Also referred to as a “maximum pesticide residue level.”)

Total chlordane concentration The sum of the concentrations of multiple compounds derived from commercial chlordane formulations (including components of the original product and **degradates**) that might be present in an environmental sample. For NAWQA bed-sediment and fish-tissue analyses, this consisted of the *cis* and *trans* **isomers** of both chlordane and nonachlor, as well as the chlordane **degradate** oxychlordane. For the chemical analyses of lake sediment cores by Van Metre and Mahler (2005), only *cis*-chlordane, *trans*-chlordane and *trans*-nonachlor were included.

Total DDT concentration The sum of the concentrations of all compounds of interest derived from DDT that might be present in an environmental sample. For NAWQA bed-sediment and fish-tissue analyses, this consisted of the *p,p'* and *o,p'* **isomers** of DDT, DDD, and DDE. For the chemical analyses of lake sediment cores by Van Metre and Mahler (2005), only the *p,p'* isomers of DDT, DDD, and DDE were included.

Total detection frequency The percentage of samples in which any of the analytes of interest are measured at any concentration without correcting to a **common detection level**.

Toxicity The degree to which the presence of a chemical substance at a particular concentration in a given **environmental medium** may be harmful to the health of humans and other organisms that come in contact with that medium.

Toxicity value A quantitative measure of the dose-response relationship observed in a test of the physiological effect of a particular chemical on a specific organism. Examples include LC_{50} and NOAEC values.

Transformation The conversion of one compound to another through either abiotic or biotic processes.

Transformation product See **degradate**.

Triazine herbicides A group of pesticides—all sharing a six-membered aromatic ring consisting of three nitrogen atoms and three carbon atoms in an alternating sequence (a “symmetrical triazine ring”)—used primarily for weed control on corn, sorghum, cotton, sugarcane, orchards, fallow land, sod, rights-of-way, lawns, golf courses, and Christmas tree farms.

Tritium unit (TU) A measure of the concentration of tritium (^3H), equal to 1 ^3H atom in 10^{18} atoms of hydrogen (H), or 3.24 picocuries per liter (pCi/L).

U

Undeveloped stream A stream draining a watershed with 25 percent or less of agricultural land and 5 percent or less of urban land.

Unique mixture A combination of two or more specific compounds detected in an environmental sample, regardless of whether other compounds are detected in the same sample.

Universal Soil Loss Equation An empirical equation developed by the U.S. Department of Agriculture to predict the

average amount of soil lost from a given location per year through wind and water erosion. The equation employs a variety of parameters related to rainfall, soil properties, and topography as **explanatory variables**.

Unsaturated zone The **subsurface** region of earth materials above the **water table** in which the pore spaces may contain a combination of air and water.

Urban stream A stream draining a watershed with more than 5 percent of residential, commercial, transportation, urban recreational areas, and (or) industrial land, and 25 percent or less of agricultural land.

Use intensity The total quantity of a pesticide applied over a specified area, expressed in terms of the amount applied per unit area.

V

Volatilize To move spontaneously from a liquid or dissolved state to a gaseous state.

W

Water table The point below the land surface at which ground water is first encountered and below which the earth is saturated.

Water-quality benchmark A threshold value above which the concentration of a specific chemical in a particular **environmental medium** may have adverse effects on human health, aquatic life, or fish-eating wildlife, and below which there is a low likelihood of such effects (see also **aquatic-life benchmark**, **human-health benchmark**, and **wildlife benchmark**).

Watershed The land area that drains into a particular stream, river, lake, estuary, or coastal zone.

Wildlife benchmark A threshold value above which the concentration of a chemical in water or fish tissue may have adverse effects on fish-eating wildlife.