

Glossary

This list of glossary terms was compiled from existing EPA definitions and supplemented, where necessary, by additional terms and definitions. The wording of selected items may have been modified from the original in order to assist readers who are new to risk assessment more readily comprehend the underlying concept of the glossary entry. As such, these glossary definitions constitute neither official EPA policy nor preempt or in any way replace any existing legal definition required by statute or regulation.

A

Absorbed Dose – the amount of a substance that has penetrated the absorption barriers (e.g., skin, lung tissue, gastrointestinal tract) of an organism through either physical or biological processes.

Absorption - The process of taking in, as when a sponge takes up water. Chemicals can be absorbed through the skin into the bloodstream and then transported to other organs. Chemicals can also be absorbed into the bloodstream after breathing in or swallowing.

Absorption Barrier - Exchange barriers of the body that allow differential diffusion of various substances across a boundary. Examples of absorption barriers are the skin, lung tissue, and gastrointestinal tract wall.

Abiotic Degradation - Degradation via purely physical or chemical mechanisms. Examples include hydrolysis and photolysis.

Acceptable Risk - The likelihood of suffering disease or injury that will be tolerated by an individual, group, or society. The level of risk that is determined to be acceptable may depend on a variety of issues, including scientific data, social, economic, legal, and political factors, and on the perceived benefits arising from a chemical or process.

Accuracy - The measure of the correctness of data, as given by the difference between the measured value and the true or standard value.

Active Monitor - A type of personal exposure monitoring device that uses a small air pump to draw air through a filter, packed tube, or similar device.

Activity Patterns - A series of discrete events of varying time intervals describing information about an individual's lifestyle and routine. This information typically includes the locations visited, the amount of time spent in the locations, and a description of what the individual was doing in each location.

Acute Effect - Any toxic effect produced with a short period of time following an exposure, for example, minutes to a few days

Acute Exposure Limits - A variety of short-term exposure limits to hazardous substances, designed to be protective of human health. Published by different organizations, each limit has a different purpose and definition.

Acute Exposure - One dose (or exposure) or multiple doses (or exposures) occurring within a short time relative to the life of a person or other organism (e.g., approximately 24 hours or less for humans).

Actual Risk - The damage to life, health, property, and/or the environment that may occur as a result of exposure to a given hazard. Risk assessment attempts to estimate the likelihood of actual risk.

Additive Effect - The overall result of exposure to two or more chemicals, in which the resulting effect is equal to the sum of the independent effects of the chemicals. “Effects” or “Response Addition” is a method employed in EPA risk assessments of mixtures in which the components act or are presumed to act independently (without interaction).

Additive Dose - The overall result of exposure to two or more chemicals, when each chemical behaves as a concentration or dilution of the other chemicals in the mixture. The response of the combination is the response expected from the equivalent dose of an index chemical. The equivalent dose is the sum of component doses scaled by their toxic potency relative to the index chemical.

Adjusted Exposure Concentration - Also called a refined exposure concentration, an estimate of exposure concentration that has been refined, usually by application of an exposure model, to better understand how people in a particular location interact with contaminated media.

Administered Dose - The amount of a substance received by a test subject (human or animal) in determining dose-response relationships, especially through ingestion or inhalation.

Advection - In meteorology, the transfer of a property, such as heat or humidity, by motion within the atmosphere, usually in a predominantly horizontal direction. Thermal advection, for example, is the transport of heat by the wind. Advection is most often used to signify horizontal transport but can also apply to vertical movement. Large-scale horizontal advection of air is a characteristic of middle-latitude zones and leads to marked changes in temperature and humidity across boundaries separating air masses of differing origins.

Adverse Environmental Effect - Defined in the CAA section 112(a)(7) as “any significant and widespread adverse effect, which may reasonably be anticipated, to wildlife, aquatic life, or other natural resource, including adverse impacts on populations of endangered or threatened species or significant degradation of environmental quality over broad areas.”

Adverse Health Effect - A health effect from exposure to air contaminants that may range from relatively mild and temporary (e.g., eye or throat irritation, shortness of breath, or headaches) to permanent and serious conditions (e.g., birth defects, cancer or damage to lungs, nerves, liver, heart, or other organs), and which negatively affects an individual’s health or well-being, or reduces an individual’s ability to respond to an additional environmental challenge.

Affected (or Interested) Parties - Individuals and organizations potentially acted upon or affected by chemicals, radiation, or microbes in the environment or influenced favorably or adversely by proposed risk management actions and decisions.

Agent - A chemical, physical, or biological entity that may cause deleterious, beneficial, or no effects to an organism after the organism is exposed to it.

Aggregate exposure - The combined exposure of an individual (or defined population) to a specific agent or stressor via relevant routes, pathways, and sources.

Aggregate risk - The risk resulting from aggregate exposure to a single agent or stressor.

AirData - An EPA website (<http://www.epa.gov/air/data/info.html>) that provides access to yearly summaries of United States air pollution data, taken from EPA's air pollution databases. The data include all fifty states plus District of Columbia, Puerto Rico, and the U. S. Virgin Islands. AirData has information about where air pollution comes from (emissions) and how much pollution is in the air outside our homes and work places (monitoring).

Air Emissions - The release or discharge of a pollutant into the air.

Air Pressure (Atmospheric Pressure, Barometric Pressure) - The pressure experienced above the Earth's surface at a specific point as a result of the weight of the air column, extending to the outer limit or top of the atmosphere. Consequently, pressure declines exponentially with height, the rate of decrease being a function of the temperature of the atmosphere. Atmospheric pressure is generally measured, in meteorology, either in the SI unit hectopascals (hPa) or in the c.g.s. unit of the same size, the millibar (mb) using a mercury or aneroid barometer, or a barograph. In the U.S., surface atmosphere pressure is measured in inches of mercury (Hg).

Air Mass - A large volume of air with certain meteorological or polluted characteristics (e.g., a heat inversion or smogginess) while in one location. The characteristics can change as the air mass moves away.

Air Toxic - Any air pollutant that causes or may cause cancer, respiratory, cardiovascular, or developmental effects, reproductive dysfunctions, neurological disorders, heritable gene mutations, or other serious or irreversible chronic or acute health effects in humans. See [hazardous air pollutant](#).

Ambient Medium (e.g., Ambient Air) - Material surrounding or contacting an organism (e.g., outdoor air, indoor air, water, or soil), through which chemicals can reach an organism.

Ambient Water Quality Criteria (AWQC) - A ecological benchmark level for aquatic contaminants, published by EPA Office of Water, which is designed to protect 95 percent of all aquatic species in freshwater or marine environments. Criteria have been developed for both acute and chronic exposures, although for a limited number of chemicals.

Ample Margin of Safety - This term has regulatory significance in EPA's air toxics program. It was interpreted by the Agency in the 1989 notice of final benzene NESHAP (FR54:38044-38072), and reiterated in the 1990 amendments to the Clean Air Act (sections 112(f) and 112(c)).

AMTIC - Ambient Monitoring Technology Information Center. An EPA website that contains information and files on ambient air quality monitoring programs, details on monitoring methods, monitoring-related documents and articles, information on air quality trends and nonattainment areas, and federal regulations related to ambient air quality monitoring. [<http://www.epa.gov/ttn/amtic/>, 2003]

Analysis - The systematic application of specific theories and methods, including those from natural science, social science, engineering, decision science, logic, mathematics, and law, for the purpose of collecting and interpreting data and drawing conclusions about phenomena. It may be qualitative or quantitative. Its competence is typically judged by criteria developed within the fields of expertise from which the theories and methods come.

Analysis Plan - A plan that provides all the details of exactly how each part of the risk assessment will be performed. It usually describes in detail what analyses will be performed, how they will be performed, who will perform the work, schedules, resources, quality assurance/quality control requirements, and documentation requirements.

Animal Studies - Toxicity investigations using animals. Such studies may employ animals as surrogates for humans with the expectation that the results are pertinent to humans or for investigation of effects pertinent to animals (e.g., for ecological risk assessment).

Antagonistic Effect - The situation where exposure to two chemicals together has less effect than the sum of their independent effects.

AP-42 - A compilation of air pollutant emission factors. Volume I of the fifth edition addresses stationary point and area source emission factors. AP-42 is accessible on the Air CHIEF website (<http://www.epa.gov/ttn/chief/ap42/>) and is also included on the Air CHIEF CD-ROM.

Applied Dose - The amount of a substance in contact with an absorption boundary of an organism (e.g., skin, lung, gastrointestinal tract) and is available for absorption.

Area of Impact - The geographic area affected by a facility's emissions (also known as the zone of impact).

Area Source (legal sense) - A stationary source that emits less than 10 tons per year of a single hazardous air pollutant (HAP) or 25 tons per year of all HAPs combined.

Area Source (modeling sense) - An emission source in which releases are modeled as coming from a 2-dimensional surface. Emissions from the surface of a wastewater pond are, for example, often modeled as an area source.

Area Use Factor - For an animal, the ratio of its home range, breeding range, or feeding/foraging range to the area of contamination or the site area under investigation.

Assessment Endpoint - An explicit expression of the environmental value to be protected. An assessment endpoint includes both an ecological entity and specific attributes of that entity. For example, salmon are a valued ecological entity; reproduction and population maintenance (i.e., the attribute) form an assessment endpoint.

Assessment Questions - The questions asked during the planning/scoping phase of the risk assessment process to determine what the risk assessment will evaluate.

Atmospheric Stability (Stability) - the degree of resistance of a layer of air to vertical motion.

ATSDR (Agency for Toxic Substances and Disease Registry) - An Agency of the U.S. Department of Health and Human Services, whose goal is to serve the public by using the best science, taking responsive public health actions, and providing health information to prevent harmful exposures and diseases to toxic substances. Its website (www.atsdr.cdc.gov) includes information on hazardous substances [e.g., toxicological profiles, minimal risk levels (MRLs)], emergency response, measuring health effects, hazardous waste sites, education and training, publications, and special issues (e.g., Children Health).

Averaging Time - The time period over which something is averaged (e.g., exposure, measured concentration).

B

Background Levels - The concentration of a chemical already present in an environmental medium due to sources other than those under study. Two types of background levels may exist for chemical substances: (a) Naturally occurring levels of substances present in the environment, and (b) Anthropogenic concentrations of substances present in the environment due to human associated activities (e.g., automobiles, industries).

Background Source - Any source from which pollutants are released and contribute to the background level of a pollutant, such as volcano eruptions, windblown dust, or manmade source upwind of the study area.

Benchmark Dose - An exposure due to a dose of a substance associated with a specified low incidence of risk, generally in the range of 1% to 10%, of a health effect; or the dose associated with a specified measure or change of a biological effect.

Benthic Burial Rate (k_b) - Rate of the deposition of the sediment suspended in a surface water body column to the benthic sediment surface that becomes no longer available for resuspension in the water column, effectively becoming part of the sediment "sink."

Best Available Control Technology (BACT) - An emission limitation based on the maximum degree of emission reduction (considering energy, environmental, and economic impacts) achievable through application of production processes and available methods, systems, and techniques. BACT does not permit emissions in excess of those allowed under any applicable Clean Air Act provisions. Use of the BACT concept is allowable on a case by case basis for major new or modified emissions sources in attainment areas and applies to each regulated pollutant.

Best Professional Judgement - Utilizing knowledge based on education and experience to determine the best course of action during the course of performing a risk assessment project.

Bias - systematic error introduced into sampling or analysis by selecting or encouraging one outcome or answer over others.

Binational Toxics Strategy - A Canada-United States jointly-sponsored program that provides a framework for actions to reduce or eliminate persistent toxic substances, especially those which bioaccumulate, from the Great Lakes Basin.

Bioaccumulation - The net accumulation of a substance by an organism as a result of uptake from and or all routes of exposure (e.g., ingestion of food, intake of drinking water, direct contact, or inhalation).

Bioavailability - The ability to be absorbed and available to interact with the metabolic processes of an organism.

Bioaccumulation Factor (BAF) - The concentration of a substance in tissue of an organism divided by its concentration in an environmental medium in situations where the organism and its food are exposed (i.e., accounting for food chain exposure as well as direct chemical uptake). [EPA, 1999: Residual Risk Report to Congress. EPA453R99001.]

Bioassay - A test conducted in living organisms (*in vivo*) or with living cells (*in vitro*) to determine the hazard or potency of a chemical by its effect on animals, isolated tissues, or microorganisms. [Based on Air Risk Information Support Center, OAQPS, March 1989: Glossary of Terms Related to Health, Exposure, and Risk Assessment. EPA/450/3-88/016.]

Bioavailability - A measure of the degree to which a dose of a substance becomes physiologically available to the body tissues depending upon adsorption, distribution, metabolism and excretion rates. [Air Risk Information Support Center, OAQPS, March 1989: Glossary of Terms Related to Health, Exposure, and Risk Assessment. EPA/450/3-88/016.]

Bioconcentration - The net accumulation of a substance by an organism as a result of uptake directly from an environmental medium (e.g., net accumulation by an aquatic organism as a result of uptake directly from ambient water, through gill membranes or other external body surfaces).

Bioconcentration Factor (BCF) - The concentration of a substance in tissue of an organism divided by the concentration in an environmental medium (e.g., the concentration of a substance in an aquatic organism divided by the concentration in the ambient water, in situations where the organism is exposed through the water only).

Biological Medium - Any one of the major categories of material within an organism (blood, adipose tissue, breath), through which chemicals can move, be stored, or be biologically, physically, or chemically transformed.

Biological Monitoring - The measurement of chemicals in biological media (e.g., blood, urine, exhaled breath) to determine whether chemical exposure in humans, animals, or plants has occurred.

Biologically Effective Dose - The amount of chemical that reaches the cells or target site where an adverse effect may occur.

Biomagnification or Biological Magnification - The process whereby certain substances, such as pesticides or heavy metals, transfer up the food chain and increase in concentration. For example, a biomagnifying chemical deposited in rivers or lakes absorbs to algae, which are ingested by aquatic organisms, such as small fish, which are in turn eaten by larger fish, fish-

eating birds, terrestrial wildlife, or humans. The chemical tends to accumulate to higher concentration levels with each successive food chain level.

Biotic Degradation (Biodegradation) - Decomposition or metabolism of a substance into more elementary compounds by the action of organisms (e.g., bacteria, fungi).

Bounding Estimate - An estimate of exposure or risk that is higher or lower than that incurred by any person in the population. Bounding estimates are useful in developing statements that exposures or risks are within an estimated range.

Blue Book - The 1994 National Research Council (NRC) report entitled *Science and Judgement in Risk Assessment*.

Body Weight (Mass) - The weight or mass of an individual's body. It can apply to a human or an ecological receptor.

Breathing Zone - Air in the vicinity of an organism from which respired air is drawn. Personal monitors are often used to measure pollutants in the breathing zone.

Bright Line - Specific levels of risk or of exposure that are meant to provide a practical distinction between what is considered "safe" and what is not.

Building Downwash (Plume Downwash) - The interaction of a plume with a structure, such as a building, which causes the plume to fall to ground.

C

CalEPA (California Environmental Protection Agency) - An Agency within the California State government whose goal is to protect human health and the environment and to assure the coordinated deployment of State resources against the most serious environmental risks. There are six boards that address environmental issues, including air quality, pesticides, toxic substances, waste management, water control, and the Office of Environmental Health Hazard Assessment (OEHHA). Note that OEHHA is responsible for developing and providing state and local government agencies with toxicological and medical information relevant to decisions involving public health and is a good resource for such information.

Cancer - A group of related diseases characterized by group of diseases characterized by the uncontrolled growth of abnormal cells.

Cancer Incidence - The number of new cases of a disease diagnosed each year.

Cancer Risk Estimates - The probability of developing cancer from exposure to a chemical agent or a mixture of chemicals over a specified period of time. In quantitative terms, risk is expressed in values ranging from zero (representing an estimate that harm certainly will not occur) to one (representing an estimate that harm certainly will occur). The following are examples of how risk is commonly expressed: $1.E-04$ or 1×10^{-4} = a risk of 1 additional cancer in an exposed population of 10,000 people (i.e., 1/10,000); $1.E-5$ or 1×10^{-5} = 1/100,000; $1.E-6$ or 1×10^{-6} = 1/1,000,000.

Cancer Risk Evaluation Guides (CREGs) - Developed by ATSDR, the concentration of a chemical in air, soil or water that is expected to cause no more than one excess cancer in a million persons exposed over a lifetime. The CREG is a *comparison value* used to select contaminants of potential health concern and is based on the *cancer slope factor* (CSF).

Cancer Slope Factor (CSF) - An upper bound (approximating a 95% confidence limit) on the increased cancer risk from a lifetime exposure to an agent. This estimate, usually expressed in units of proportion (of a population) affected per mg/kg/day, is generally reserved for use in the low-dose region of the dose-response relationship; that is, for exposures corresponding to risks less than 1 in 100. This term is usually used to refer to oral slope factors (i.e., slope factors used for assessing ingestion exposure).

Carcinogen(ic) - An agent capable of inducing cancer.

Carcinogenesis - The origin or production of a benign or malignant tumor. The carcinogenic event modifies the genome and/or other molecular control mechanisms of the target cells, giving rise to a population of altered cells.

Census Bureau (Bureau of the Census) - A Bureau within the Department of Commerce, this is the country's preeminent statistical collection and dissemination agency of national demographic information. It publishes a wide variety of statistical data about people, housing, and the economy of the nation. The Census Bureau conducts approximately 200 annual surveys and conducts the decennial census of the United States population and housing and the quinquennial economic census and census of governments.

Census Block - An area bounded by visible and/or invisible features shown on Census Bureau maps. A block is the smallest geographic entity for which the Census Bureau collects and tabulates 100-percent decennial census data.

Census Tract - A small, relatively permanent statistical subdivision of a county or statistically equivalent entity, delineated for data presentation purposes by a local group of census data users or the geographic staff of a regional census center in accordance with Census Bureau guidelines. Designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions at the time they are established, census tracts generally contain between 1,000 and 8,000 people, with an optimum size of 4,000 people. Census tract boundaries are delineated with the intention of being stable over many decades, so they generally follow relatively permanent visible features. However, they may follow governmental unit boundaries and other invisible features in some instances; the boundary of a state or county (or statistically equivalent entity) is always a census tract boundary.

Census Tract (or Census Block) Internal Point - A set of geographic coordinates (latitude and longitude) that is located within a specified geographic entity such as a Census Tract or Census Block. For many Census Tracts or Blocks, this point represents the approximate center of the Census Tract or Block; for some, the shape of the entity or the presence of a body of water causes the central location to fall outside the Census Tract or Block or in water, in which case the point is relocated to land area within the Census Tract or Block. The geographic coordinates are shown in degrees to six decimal places in census products.

Chemical Abstracts Service Registry Number (CASRN) - A unique, chemical-specific number used in identifying a substance. The registry numbers are assigned by the Chemical Abstract Service, a division of the American Chemical Society. (Note that some mixtures of substances, such as mixtures of various forms of xylene, are also given CAS numbers.)

Chemicals of Potential Concern - Chemicals that may pose a threat to the populations within the study area. These are the chemicals which are carried through the risk assessment process.

Chemical Speciation - Detailed identification of the specific identities and forms of chemicals in a mixture.

Chemical Transformation - The change of one chemical into another.

Chronic Exposure - Continuous exposure, or multiple exposures, occurring over an extended period of time or a significant fraction of the animal's or the individual's lifetime.

Chronic Health Effects - An effect which occurs as a result of repeated or long term (chronic) exposures.

Coefficient of Variation (CV) - A dimensionless measure of dispersion, equal to the standard deviation divided by the mean, often expressed as a percentage.

Cohort - A group of people within a population that can be aggregated because the variation in a characteristic of interest (e.g., exposure, age, education level) within the group is much less than the group-to-group variation across the population.

Community - The persons associated with an area who may be directly affected by area pollution because they currently live in or near the area, or have lived in or near the area in the past (i.e., current or past residents), members of local action groups, local officials, tribal governments, health professionals, and local media. Other entities, such as local industry, may also consider themselves part of the community.

Comparative Risk Assessment - The process of comparing and ranking various types of risks to identify priorities and influence resource allocations.

Conceptual Model - A written description and/or a visual representation of actual or predicted relationships between humans or ecological entities and the chemicals or other stressors to which they may be exposed.

Conductivity (Conductance) - The ability of a material to carry and electrical current.

Confidence Interval - A range of values that has a specified probability (e.g., 95 percent) of containing the statistical parameter (i.e., a quantity such as a mean or variance that describes a statistical population) in question. The confidence limit refers to the upper or lower value of the range.

Coning - In pollution studies, emissions from a chimney stack under atmospheric conditions of near neutral stability such that concentrations of a pollutant at a given distance downwind from

the stack may be described by a normal or Gaussian distribution, being the same for both vertical and horizontal cross-sections perpendicular to the flow.

Consumption Rate - The average quantity of an item consumed or expended during a given time interval, expressed in quantities by the most appropriate unit of measurement per applicable stated basis.

Continuous Monitoring - The measurement of the air or water concentration of a specific contaminant on an uninterrupted, real-time basis by instrumental methods.

Control Technology/Measures - Equipment, processes or actions used to reduce air pollution at the source.

Convection - The transfer and mixing of heat by mass movement through a fluid (e.g., air or water). It is one of the major mechanisms for the transfer of heat within the atmosphere, together with conduction and radiation. The convection process is of major importance in the troposphere, transferring sensible heat and latent heat from the Earth's surface into the boundary layer, and by promoting the vertical exchange of air-mass properties (e.g., heat, water vapor, and momentum) throughout the depth of the troposphere. Convection is generally accepted to be vertical circulation, whereas advection is usually horizontal.

Cost-Benefit Analysis - An evaluation of the costs which would be incurred versus the overall benefits of a proposed action, such as the establishment of an acceptable exposure level of a pollutant.

Criteria Air Pollutant - One of six common air pollutants determined to be hazardous to human health and regulated under EPA's National Ambient Air Quality Standards (NAAQS). The six criteria air pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter. The term "criteria pollutants" derives from the requirement that EPA must describe the characteristics and potential health and welfare effects of these pollutants. It is on the basis of these criteria that standards are set or revised.

Critical Effect - The first adverse effect, or its known precursor, that occurs to the most sensitive species as the dose rate of an agent increases.

Cumulative Risk - The combined risk from aggregate exposures to multiple agents or stressors.

Cumulative Risk Assessment - An analysis, characterization, and possible quantification of the combined risks to health or the environment from multiple agents or stressors.

Cumulative Distribution Function (CDF) - The CDF is alternatively referred to in the literature as the distribution function, cumulative frequency function, or the cumulative probability function. The cumulative distribution function, $F(x)$, expresses the probability the random variable X assumes a value less than or equal to some value x , $F(x) = \text{Prob}(X \leq x)$. For continuous random variables, the cumulative distribution function is obtained from the probability density function by integration, or by summation in the case of discrete random variables.

Cumulative Risk Assessment - An analysis, characterization, and possible quantification of the combined risks to health or the environment from multiple agents or stressors.

D

Data Integrity - Refers to security (i.e., the protection of information from unauthorized access or revision) to ensure that the information is not compromised through corruption or falsification. Data integrity is one of the constituents of data quality.

Data Objectivity - A characteristic indicating whether information is being presented in an accurate, clear, complete, and unbiased manner, and as a matter of substance, is accurate, reliable, and unbiased. Data objectivity is one of the constituents of data quality.

Data Quality - The encompassing term regarding the quality of information used for analysis and/or dissemination. Utility, objectivity, and integrity are constituents of data quality.

Data Quality Objectives (DQOs) - Qualitative and quantitative statements derived from the DQO process that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support the decisions.

Data Quality Objectives Process - A systematic planning tool to facilitate the planning of environmental data collection activities. Data quality objectives are the qualitative and quantitative outputs from the DQO Process.

Data Utility - Refers to the usefulness of the information to the intended users. Data utility is one of the constituents of data quality.

Delivered Dose - The amount of the chemical available for interaction by any particular organ or cell.

Deposition (Wet and Dry) - The removal of airborne substances to available surfaces that occurs as a result of gravitational settling and diffusion, as well as electrophoresis and thermophoresis in the absence of active precipitation (Dry) or in the presence of active precipitation (Wet).

Deposition (Flux) - The removal of airborne substances from the air to available surfaces that occurs as a result of gravitational settling and diffusion, as well as electrophoresis and thermophoresis.

Dermal - Referring to the skin. Dermal absorption means absorption through the skin.

Dermal Exposure - Contact between a chemical and the skin. [EPA, 1997: Terms of Environment, <http://www.epa.gov/OCEPAt/terms/>.]

Detection Limit - The lowest concentration of a chemical that can reliably with analytical methods be distinguished from a zero concentration.

Deterministic - A methodology relying on point (i.e., exact) values as inputs to estimate risk; this obviates quantitative estimates of uncertainty and variability. Results are also presented as point values. Uncertainty and variability may be discussed qualitatively, or semi-quantitatively by multiple deterministic risk estimates.

Developmental Toxicity - The potential of an agent to cause abnormal development. Developmental toxicity generally occurs in a dose-related manner, may result from short-term exposure (including single exposure situations) or from longer term low-level exposure, may be produced by various routes of exposure, and the types of effects may vary depending on the timing of exposure because of a number of critical periods of development for various organs and functional systems. The four major manifestations of developmental toxicity are death, structural abnormality, altered growth, and functional deficit.

Dietary Composition - The fractions of different foods that constitute a given diet.

Differential Heating - The property of different surfaces which causes them to heat and cool at different rates.

Direct Exposure - Contact between a receptor and a chemical where the chemical is still in the medium to which it was originally released. For example, direct exposure occurs when a pollutant is released to the air and a person breathes that air.

Direct-read Monitor - Using a pump to draw the air sample through the detector, this type of air toxics monitoring device provides a direct reading of the pollutant measurement. The monitor may be designed as a table-top unit, for example, or it may be rack-mounted such as for use in an ambient air monitoring station.

Dispersion - Pollutant or concentration mixing due to turbulent physical processes.

Disease Cluster - An unusual number, real or perceived, of health events (i.e., reports of cancer) grouped together in time and location.

Dose - The amount of substance available for interaction with metabolic processes or biologically significant receptors after crossing the outer boundary of an organism. The potential dose is the amount ingested, inhaled, or applied to the skin. The applied dose is the amount of a substance presented to an absorption barrier and available for absorption (although not necessarily having yet crossed the outer boundary of the organism). The absorbed dose is the amount crossing a specific absorption barrier (e.g., the exchange boundaries of skin, lung, and digestive tract) through uptake processes. Internal dose is a more general term denoting the amount absorbed without respect to specific absorption barriers or exchange boundaries. The amount of the chemical available for interaction by any particular organ or cell is termed the delivered dose for that organ or cell.

Dose-Response Assessment - A determination of the relationship between the magnitude of an administered, applied, or internal dose and a specific biological response. Response can be expressed as measured or observed incidence, percent response in groups of subjects (or populations), or as the probability of occurrence within a population.

Dose-Response Curve - A graphical representation of the quantitative relationship between administered, applied, or internal dose of a chemical or agent, and a specific biological response to that chemical or agent.

Dust Resuspension - Involves the deposition of dust from the air and its subsequent resuspension or re-entrainment into the atmosphere.

E

Ecological Risk Assessment - The process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors.

Eddy - In the atmosphere, a distinct mass within a turbulent fluid that retains its identity and behaves differently for a short period within the general larger volume flow. An eddy thus ranges in size from microscale turbulence (1 cm for example) to many hundreds of kilometers in the form of frontal cyclones and anticyclones. The smallest scale eddies are critical in the process of, for example, heat and water vapor transfer from the Earth's surface into the air, while frontal cyclones transport heat toward the poles.

Emission Factor - The relationship between the amount of pollution produced and the amount of raw material processed or product produced. For example, an emission factor for a blast furnace making iron could be the number of pounds of particulates released per ton of raw materials used.

Emission Inventory - A listing, by source, of the amount of air pollutants discharged into the atmosphere in a particular place. Two of the more important publicly available emissions inventories for air toxics studies are the National Emissions Inventory (NEI) and the Toxics Release Inventory (TRI).

Emission Rate - The amount of a given substance discharged to the air per unit time, expressed as a fixed ratio (e.g., tons/yr).

Emissions Inventory Improvement Program (EIIP) - A jointly sponsored effort of the State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) and EPA, and is an outgrowth of the Standing Air Emissions Work Group (SAEWG). The goal of EIIP is to provide cost-effective, reliable inventories by: (1) Improving the quality of emissions information, and (2) Developing system(s) for collecting, calculating, and reporting emissions data. The goal is achieved by developing a set of “preferred and alternative methods” for all inventory associated tasks. This standardization improves the consistency of collected data and results in increased usefulness of emissions information.

Emissions Monitoring - The periodic or continuous physical surveillance or testing to determine the pollutant levels discharged into the atmosphere from sources such as smokestacks at industrial facilities and exhaust from motor vehicles, locomotives, or aircraft.

Emissions Tracking System (ETS) - This EPA system contains all emissions data submitted under various clean air market programs. Data from Continuous Emissions Monitoring Systems at utilities sends the emission data to the utility’s computer system, which then compiles the data for submission to EPA on a quarterly basis. At the end of each calendar year, EPA compares tons of emissions emitted with the allowance holdings of the utility unit to ensure that it is in compliance with the relevant program.

Endocrine Disruptor - Substances which interfere with endocrine system function.

Environmental Data - Any measurements or information that describe environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology. Environmental data include information collected directly from measurements, produced from models, and compiled from other sources such as data bases or the literature.

Environmental Media Evaluation Guides - Environmental Media Evaluation Guides (EMEGs) are concentrations of a contaminant in water, soil, or air that are unlikely to be associated with any appreciable risk of deleterious noncancer effects over a specified duration of exposure. EMEGs are derived from ATSDR minimal risk levels by factoring in default body weights and ingestion rates. Separate EMEGs are computed for acute (14 days), intermediate (15-364 days), and chronic (365 days) exposures.

Environmental Medium - Any one of the major categories of material found in the physical environment (e.g., surface water, ground water, soil, or air), and through which chemicals or pollutants can move.

Epidemiology - The study of disease patterns in human populations.

Epidemiologic Study, Case Study - A medical or epidemiologic evaluation of one person or a small group of people to gather information about specific health conditions and past exposures.

Epidemiologic Study, Descriptive - An evaluation of the amount and distribution of a disease in a specified population by person, place, and time.

Epidemiologic Study, Analytical - An evaluation of the association between exposure to hazardous substances and disease by testing scientific hypotheses.

Exposure - Contact made between a chemical, physical, or biological agent and the outer boundary of an organism.

Exposure Assessment - An identification and evaluation of a population exposed to a toxic agent, describing its composition and size, as well as the type, magnitude, frequency, route and duration of exposure.

Exposure Concentration - The concentration of a chemical in its transport or carrier medium (i.e., an environmental medium or contaminated food) at the point of contact.

Exposure Duration - The total time an individual is exposed to the chemical being evaluated or the length of time over which contact with the contaminant lasts.

Exposure Factors - Any of a variety of factors that relate to how an organism interacts with or is otherwise exposed to environmental pollutants (e.g., ingestion rate of contaminated fish). Such factors are used in the calculation of exposure to toxic chemicals.

Exposure Frequency - The number of occurrences in a given time frame (e.g., a lifetime) of contact or co-occurrence of a stressor with a receptor.

Exposure Investigation (in Public Health Assessment) - The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances.

Exposure Modeling - The mathematical equations simulating how people interact with chemicals in their environment.

Exposure Pathway - The course a chemical or physical agent takes from a source to an exposed organism. An exposure pathway includes a source and release from a source, an exposure point, and an exposure route. If the exposure point differs from the source, a transport/exposure medium (e.g., air) or media (in cases of intermedia transfer) also is included.

Exposure Profile - The exposure profile (ecological) identifies the receptors and describes the exposure pathways and intensity and spatial and temporal extent of exposure. It also describes the impact of variability and uncertainty on exposure estimates and reaches a conclusion about the likelihood that exposure will occur. The profile may be a written document or a module of a larger process model.

Exposure Route - The way a chemical enters an organism after contact (e.g., by ingestion, inhalation, dermal absorption).

Exposure Scenario - A set of conditions or assumptions about sources, exposure pathways, concentrations of toxic chemicals, and populations (numbers, characteristics and habits) which aid the investigator in evaluating and quantifying exposure in a given situation.

Exposure Unit (in Geographical Information System applications) - The geographical area in which a receptor moves and contacts the contaminated medium during the period of exposure.

F

Factor Information Retrieval System (FIRE) - A database management system containing EPA's recommended emission estimation factors for criteria and hazardous air pollutants. FIRE includes information about industries and their emitting processes, the chemicals emitted, and the emission factors themselves. FIRE allows easy access to criteria and hazardous air pollutant emission factors obtained from the Compilation of Air Pollutant Emission Factors (AP-42), Locating and Estimating (L&E) documents, and the retired AFSEF and XATEF documents.

Fate and Transport - A description of how a chemical is carried through and changes in the environment.

Fate and Transport Analysis - The general process used to assess and predict the movement and behavior of chemicals in the environment.

Fate and Transport Modeling - The mathematical equations simulating a physical system which are used to assess and predict the movement and behavior of chemicals in the environment.

Fence Line - Delineated property boundary of a facility.

Field Study - Scientific study made in the ambient air to collect information that can not be obtained in a laboratory.

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

Forage - (1) Edible parts of plants, other than separated grain, that can provide feed for grazing animals or can be harvested for feeding, including browse, and herbage. (2) To search for or to consume forage (of animals).

Fugitive Release - Emission of a chemical to the air that does not occur from a stack, vent, duct, pipe or other confined air stream (e.g., leaks from joints).

Fumigation - (1) The use of a chemical compound in a gaseous state, often to kill pests such as insects, nematodes, arachnids, rodents, weeds, and fungi in confined or inaccessible locations or in the field. (2) a pattern of plume dispersion produced when a convective boundary layer grows upward into a plume trapped in a stable layer. The elevated plume is suddenly brought downward to the ground, producing high surface concentrations.

Future Scenario - A scenario used in risk assessment to anticipate potential future exposures of individuals (e.g., a housing development could be built on currently vacant land).

G

Geographic Information Systems (GIS) - A computer program that allows layering of different types of spatial information (i.e., on a map) to provide a better understanding of the characteristics of a certain place.

Generally Available Control Technology (GACT) Standard - These standards are less stringent standards than the Maximum Available Control Technology (MACT) standards, and are allowed at the Administrator's discretion for area sources according to the 1990 Clean Air Act Amendments for area sources.

Grab Sample - A single sample collected at a particular time and place that represents the composition of the water, air, or soil only at that time and place.

Great Waters Pollutants of Concern - The toxic pollutants of concern to the Great Waters program are mercury; cadmium and lead (and their compounds); dioxins; furans; polycyclic organic matter; polychlorinated biphenyls (PCBs); and the pesticides chlordane, DDT/DDE, dieldrin, hexachlorobenzene, alpha-hexachlorocyclohexane, lindane and toxaphene. Nitrogen compounds such as nitrogen oxides and ammonia are also pollutants of concern.

Greenhouse Effect - Trapping and build-up of heat in the atmosphere (troposphere) near the earth's surface. Some of the heat flowing back toward space from the earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then re-radiated back toward the earth's surface. If the atmospheric concentrations of these greenhouse gases rise, the average temperature of the lower atmosphere will gradually increase.

Greenhouse Gas (GHG) - Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrochlorofluorocarbons (HCFCs), ozone (O₃), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

Guidelines (human health and ecological risk assessment) - Official documentation stating current U.S. EPA methodology in assessing risk of harm from environmental pollutants to human populations and ecological receptors.

H

Half-Life - The time required for a reaction or process to proceed such that half of the original amount of the substance of interest has reacted or undergone the process. Examples include: (1) the time required for a pollutant to degrade to one-half of its original concentration; (2) the time required for half of the atoms of a radioactive element to undergo self-transmutation or decay (half-life of radium is 1620 years); (3) the time required for elimination from the body to half a total dose.

Hazard - In a general sense, "hazard" is anything that has a potential to cause harm. In risk assessment, the likelihood of experiencing a noncancer health effect is called hazard (not risk).

Hazard Identification - The process of determining whether exposure to an agent can cause a particular adverse health effect (e.g., cancer, birth defect) and whether the adverse health effect is likely to occur in humans at environmentally relevant doses.

Hazard Index (HI) -The sum of more than one hazard quotient for multiple substances and/or multiple exposure pathways. The HI is calculated separately for chronic, subchronic, and shorter-term duration exposures.

Hazardous Air Pollutants (HAP) - Defined under the Clean Air Act as pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects. Currently, the Clean Air Act regulates 188 chemicals and chemical categories as HAPs.

Hazard Quotient (HQ) - The ratio of a single substance exposure level over a specified time period (e.g., chronic) to a reference value (e.g., an RfC) for that substance derived from a similar exposure period.

Health Effects Assessment Tables (HEAST) - An older listing of (usually) interim toxicity values for chemicals of interest to Superfund, the Resource Conservation and Recovery Act (RCRA), and the EPA in general. HEAST values are generally placed low on the hierarchy of Agency recommended toxicity data sources and the compilation will eventually be phased out altogether.

Health Endpoint - An observable or measurable biological event used as an index to determine when a deviation in the normal function of the human body occurs.

Health Outcome Data (in Public Health Assessment) - Community-specific health information such as morbidity and mortality data, birth statistics, medical records, tumor and disease registries, surveillance data, and previously conducted health studies that may be collected at the local, state, and national levels by governments, private health care organizations, and professional institutions and associations.

Health Outcomes Study (in Public Health Assessment) - An investigation of exposed persons designed to assist in identifying exposure or effects on public health. Health studies also define the health problems that require further inquiry by means of, for example, a health surveillance or epidemiologic study.

Health Education (in Public Health Assessment) - Programs designed with a community to help it know about health risks and how to reduce these risks.

Health Consultation (in Public Health Assessment) - A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical.

Henry's Law Constant - The ratio at equilibrium of the gas phase concentration to the liquid phase concentration of the gas.

High-End Exposure Estimate - A plausible estimate of individual exposure or dose for those persons at the upper end of an exposure or dose distribution, conceptually above the 90th percentile, but not higher than the individual in the population who has the highest exposure or dose.

Human Exposure Model (HEM) - An EPA model combining the Industrial Source Complex Short Term air dispersion model (ISCST) with a national set of meteorology files, U.S. census data, and a risk calculation component that can be used to estimate individual and population risks.

Hydrolysis - The decomposition of organic compounds by interaction with water.

I

Impervious Surface - A surface that cannot be penetrated by water (e.g., pavement).

Indirect Exposure Pathway - An indirect exposure pathway is one in which a receptor contacts a chemical in a medium that is different from the one to which the chemical was originally released (an example occurs with dioxin, which is emitted into the air, deposited on soil and accumulated in plants and animals which are then consumed by humans).

Individual Risk or Hazard - The risk or hazard to an individual in a population rather than to the population as a whole.

Indoor Source - Objects or places within buildings or other enclosed spaces that emit air pollutants.

Industrial Source Complex (ISC) Model - A steady-state Gaussian plume model which can be used to assess pollutant concentrations from a wide variety of sources associated with an industrial complex. This model can account for the following: settling and dry deposition of particles; downwash; point, area, line, and volume sources; plume rise as a function of downwind distance; separation of point sources; and limited terrain adjustment. ISC3 operates in both long-term (ISCLT) and short-term (ISCST) modes.

Influential Information - Scientific, financial, or statistical information that will have or does have a clear and substantial impact on important public policies or important private sector decisions.

Ingestion - Swallowing (such as eating or drinking).

Ingestion Exposure - Exposure to a chemical by swallowing it (such as eating or drinking).

Inhalation - Breathing.

Inhalation Exposure - Exposure to a chemical by breathing it in.

Inhalation Unit Risk (IUR) - The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of $1 \mu\text{g}/\text{m}^3$ in air. The interpretation of unit risk would be as follows: if unit risk = $2 \times 10^{-6} \mu\text{g}/\text{m}^3$, 2 excess tumors may develop per 1,000,000 people if exposed daily for a lifetime to a concentration of $1 \mu\text{g}$ of the chemical in 1m^3 of air.

Intake - The process by which a substance crosses the outer boundary of an organism without passing an absorption barrier, e.g., through ingestion or inhalation.

Intake Rate - Rate of inhalation, ingestion, and dermal contact depending on the route of exposure.

Integrated Risk Information System (IRIS) - An EPA database which contains information on human health effects that may result from exposure to various chemicals in the environment. IRIS was initially developed for EPA staff in response to a growing demand for consistent information on chemical substances for use in risk assessments, decision-making and regulatory activities. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences.

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.

Inversion - Subsidence Inversion - A temperature inversion that develops aloft as a result of air gradually sinking over a wide area and being warmed by adiabatic compression, usually associated with subtropical high pressure areas.

Inversion - Advection Inversion - Associated with the horizontal flow of warm air. Warm air moves over a cold surface, and the air nearest the surface cools, causing a surface-based inversion.

Inversion - Radiation Inversion - A thermally produced, surface-based inversion formed by rapid radiational cooling of the Earth's surface at night. It does not usually extend above the lower few hundred feet. Conditions which are favorable for this type of inversion are long nights, clear skies, dry air, little or no wind, and a cold or snow covered surface. It is also called a Nocturnal Inversion.

Iterative Process - Replication of a series of actions to produce successively better results, or to accommodate new and different critical information or scientific inferences.

Isopleths - A delineated line or area on a map that represent equal values of a variable.

L

Laboratory Studies - Research carried out in a laboratory (e.g., testing chemical substances, growing tissues in cultures, or performing microbiological, biochemical, hematological, microscopical, immunological, parasitological tests).

Leaching - The process by which soluble constituents are dissolved and filtered through the soil by a percolating fluid (usually rainwater).

Life Stage - A phase in the life cycle of an organism.

Line Source - A theoretical one-dimensional source from which releases may occur (e.g., roadways are often modeled as a one-dimensional line).

Lofting - In pollution studies, a pattern of flow that occurs when the top of a plume from a chimney stack disperses into slightly turbulent or neutral airflow conditions, while the lower part of the plume is prevented from dispersing down toward the surface by a stable boundary layer, especially at night. [Smith, J. [ed], 2001: The Facts on File Dictionary of Weather and Climate.]

Low-dose Extrapolation - An estimation of the dose-response relationship at doses less than the lowest dose studied experimentally.

Lowest Observed Adverse Effect Level (LOAEL) - The lowest exposure level in a study or group of studies at which there are statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group. Also referred to as lowest-effect level (LEL).

M

Major Source - Under the Clean Air Act, a stationary source that emits more than 10 tons or more per year of a single hazardous air pollutant (HAP) or 25 or more tons per year of all HAPs.

Margin of exposure (MOE) - The point of departure divided by the actual or projected environmental exposure of interest.

Mass-Balance Estimate - An estimate of release of a chemical based on, generally, a comparison of the amount of chemical in raw materials entering a process versus the amount of chemical going out in products.

Maximum Achievable Control Technology (MACT) - Under the Clean Air Act, a group of technology based standards, applicable to both major and some area sources of air toxics, that are aimed at reducing releases of air toxics to the environment. MACT standards are established on a source category by source category basis.

Maximum Exposed Individual (MEI) - The MEI represents the highest estimated risk to an exposed individual, regardless of whether people are expected to occupy that area.

Maximum Individual Risk (MIR) - An MIR represents the highest estimated risk to an exposed individual in areas that people are believed to occupy.

Metric (or Measure) of Exposure - The quantitative outcome of the exposure assessment. For air toxics risk assessments, personal air concentration (or adjusted exposure concentration) is the metric of exposure for the inhalation route of exposure and intake rate is the metric of exposure for the ingestion route of exposure.

Measurement - In air toxics assessment, a physical assessment (usually of the concentration of a pollutant) taken in an environmental or biological medium, normally with the intent of relating the measured value to the exposure of an organism.

Measurement Endpoint - A measurable ecological characteristic that is related to the valued characteristic chosen as the assessment endpoint. Also known as “measure of effect.”

Mechanical Turbulence - Random irregularities of fluid motion in air caused by buildings or other nonthermal, processes.

Mechanistic Model - A model that uses information about a chemical or other agent’s mechanism(s) of action – how it interacts with and harms the target organs – to predict the dose-response curve or other applications.

Media Concentrations - The amount of a given substance in a specific amount of environmental medium. For air, the concentration is usually given as micrograms (μg) of substance per cubic meter (m^3) of air; in water as μg of substance per L of water; and in soil as mg of substance per kg of soil.

Metabolism - Generally, the biochemical reactions by which energy is made available for the use of an organism. Metabolism includes all chemical transformations occurring in an organism from the time a substance enters, until it has been utilized and the waste products eliminated. In toxicology, metabolism of a toxicant consists of a series of chemical transformations that take place within an organism. A wide range of enzymes act on toxicants, that may increase water solubility, and facilitate elimination from the organism. In some cases, however, metabolites may be more toxic than their parent compound.

Meteorology - The science of the atmosphere, including weather.

Microcosm Studies - Studies of the effects of stressors on multiple species found in multiple media which are conducted in enclosed experimental systems.

Microscale Assessment - An air monitoring network designed to assess concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

Microenvironment - A small 3-dimensional space (e.g., an office, a room in a home) that can be treated as homogeneous (or well characterized) with regard to exposure concentration of a chemical.

Middle Scale Assessment - An air monitoring network designed to assess concentrations typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.

Minimal Risk Levels (MRL) - Derived by ATSDR, an MRL is defined as an estimate of daily human exposure to a substance that is likely to be without an appreciable risk of adverse effects (noncancer) over a specified duration of exposure. MRLs can be derived for acute, intermediate, and chronic duration exposures by the inhalation and oral routes.

Mixed (Mixing) Layer - In the atmosphere, that part of the turbulent boundary layer that is dominated by turbulent diffusion caused by eddies generated by friction with the surface and thermals arising from surface heat sources. Surface heating during the day and the absence of temperature inversions allow components of the air within the planetary boundary layer to exhibit mainly random vertical movements. Such movements may become more organized into gusts of wind and dust devils during the afternoon. Despite being random, the turbulent movements allow the transfer of atmospheric properties, such as heat, water vapor, momentum, and air pollutants, from the near surface up through the planetary boundary layer.

Mixing Height - The depth through which atmospheric pollutants are typically mixed by dispersive processes.

Mixtures - Any set of multiple chemical substances occurring together in an environmental medium.

Mobile Source Air Toxics - Air toxics that are emitted from non-stationary objects that release pollution. Mobile sources include cars, trucks, buses, planes, trains, motorcycles and gasoline-powered lawn mowers. Another example is a portable generator.

Model - A mathematical representation of a natural system intended to mimic the behavior of the real system, allowing description of empirical data, and predictions about untested states of the system.

Model Uncertainty - Uncertainty due to necessary simplification of real-world processes, mis-specification of the model structure, model misuse, or use of inappropriate surrogate variables or inputs.

Modeling - An investigative technique using a mathematical or physical representation of a system or theory that accounts for all or some of its known properties.

Modeling Node - In air quality modeling, the location where impacts are predicted.

Monitoring - Periodic or continuous physical surveillance or testing to determine pollutant levels in various environmental media or in humans, plants, and animals.

Monte Carlo Technique- A repeated random sampling from the distribution of values for each of the parameters in a generic exposure or risk equation to derive an estimate of the distribution of exposures or risks in the population.

Multipathway Assessment - An assessment that considers more than one exposure pathway. For example, evaluation of exposure through both inhalation and ingestion would be a multipathway assessment. Another example would be evaluation of ingestion of contaminated soil and ingestion of contaminated food.

Multipathway Exposure - When an organism is exposed to pollutants through more than one exposure pathway. One example would be exposure through both inhalation and ingestion. Another example would be ingestion of contaminated soil and ingestion of contaminated food.

Multipathway Risk - The risk resulting from exposure to pollutants through more than one pathway.

Multistage Model - A mathematical function used to extrapolate the probability of cancer from animal bioassay data, using the form:

$$P(d) = 1 - e^{-(q_0 + q_1d + q_2d^2 + \dots + q_kd^k)}$$

where:

- P(d) = probability of cancer from a continuous, lifetime exposure rate d;
- q_i = fitted dose coefficients of model; $i = 0, 1, \dots, k$; and
- k = number of stages selected through best fit of the model, no greater than one less than the number of available dose groups.

Mutagen - A chemical that causes a permanent genetic change in a cell other than that which occurs during normal growth.

Mutagenicity - The capacity of a chemical or physical agent to cause permanent genetic change in a cell other than that which occurs during normal growth.

N

National Ambient Air Quality Standards (NAAQS) - Maximum air pollutant standards that EPA has set under the Clean Air Act for attainment by each state. Standards are set for each of the criteria pollutants.

National Air Toxics Assessment (NATA) - EPA's ongoing comprehensive evaluation of air toxics in the U.S. Activities include expansion of air toxics monitoring, improving and periodically updating emission inventories, improving national- and local-scale modeling and risk characterization, continued research on health effects and exposures to both ambient and indoor air, and improvement of assessment tools.

National Emissions Inventory (NEI) - EPA's primary emissions inventory of HAPs.

National Emissions Standards for Hazardous Air Pollutants (NESHAPs) - Emissions standards set by EPA for hazardous air pollutants. Also commonly referred to as the MACT standards.

National Emissions Trends (NET) Database - The NET database is an emission inventory that contains data on stationary and mobile sources that emit criteria air pollutants and their precursors. The database also includes estimates of annual emissions of these pollutants from point, area, and mobile sources. The NET is developed every three years (e.g., 1996 and 1999) by EPA, and includes emission estimates for all 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands.

Natural Source - Non-manmade emission sources, including biological (biogenic sources such as plants) and geological sources (such as volcanoes), and windblown dust.

Neighborhood Scale Assessment - An air monitoring network designed to assess concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range.

Neurotoxicity - Ability to damage nervous system tissue or adversely effect nervous system function.

New Source Review - A Clean Air Act requirement that State Implementation Plans must include a permit review that applies to the construction and operation of new and modified stationary sources in nonattainment areas to ensure attainment of national ambient air quality standards.

New Source Performance Standards - Uniform national EPA air emission standards which limit the amount of pollution allowed from new sources or from modified existing sources.

Noncarcinogenic Effect - Any health effect other than cancer. Note that, while not all noncancer toxicants cause cancer, all carcinogens exhibit noncarcinogenic effects.

No Observable Adverse Effect Level (NOAEL) - An highest exposure level at which there are no statistically or biologically significant increases in the frequency or severity of adverse effect between the exposed population and its appropriate control; some effects may be produced at this level, but they are not considered adverse, nor precursors to adverse effects.

Nonpoint Source (NEI sense) - Diffuse pollution sources that are not assigned a single point of origin (e.g., multiple dry cleaners in a county which are only described in an inventory in the aggregate).

Nonroad Mobile Sources - Sources such as farm and construction equipment, gasoline-powered lawn and garden equipment, and power boats and outdoor motors that emit pollutants.

Non-Threshold Effect - An effect (usually an adverse health effect) for which there is no exposure level below which the effect is not expected to occur.

Non-Threshold Toxicant - A chemical for which there is no exposure level below which an adverse health outcome is not expected to occur. Such substances are considered to pose some risk of harm at any level of exposure.

Non Steady-state Model - A dynamic model; a mathematical formulation describing and simulating the physical behavior of a system or a process and its temporal variability.

North American Industry Classification System (NAICS) - NAICS replaced the Standard Industrial Classification (SIC) beginning in 1997. This industry-wide classification system has been designed as the index for statistical reporting of all economic activities of the U.S., Canada, and Mexico. NAICS industries are identified by a 6-digit code. The international NAICS agreement fixes only the first five digits of the code. The sixth digit, where used, identifies subdivisions of NAICS industries that accommodate user needs in individual countries.

O

Octanol/Water Partition Coefficient (K_{ow}) - The ratio of a chemical's solubility in n-octanol to its solubility in water at equilibrium. This measure is often used as an indication of a chemical's ability to bioconcentrate in organisms.

Office of Air and Radiation (OAR) - EPA's Office responsible for providing information about air pollution, clean air, air quality and radiation. OAR develops national programs, technical policies, and regulations for controlling air pollution and radiation exposure. OAR is concerned with pollution prevention, indoor and outdoor air quality, industrial air pollution, pollution from vehicles and engines, radon, acid rain, stratospheric ozone depletion, and radiation protection.

Office of Air Quality, Planning, and Standards (OAQPS) - An EPA Office within OAR whose primary mission is to preserve and improve air quality in the United States. As part of this goal, OAQPS monitors and reports on air quality, air toxics, and emissions. They also respond to visibility issues, as they relate to the level of air pollution. In addition, OAQPS is tasked by the EPA with providing technical information for professionals involved with monitoring and controlling air pollution, creating governmental policies, rules, and guidance (especially for stationary sources), and educating the public about air pollution and what can be done to control and prevent it.

OAQPS Toxicity Table - The EPA Office of Air and Radiation recommended default chronic toxicity values for hazardous air pollutants. They are generally appropriate for screening-level risk assessments, including assessments of select contaminants, exposure routes, or emission sources of potential concern, or to help set priorities for further research. For more complex, refined risk assessments developed to support regulatory decisions for single sources or substances, dose-response data may be evaluated in detail for each "risk driver" to incorporate appropriate new toxicological data. (<http://www.epa.gov/ttn/atw/toxsource/summary.html>)

Office of Radiation and Indoor Air (ORIA) - An EPA Office within OAR whose mission is to protect the public and the environment from the risks of radiation and indoor air pollution. The Office develops protection criteria, standards, and policies; works with other programs within EPA and other agencies to control radiation and indoor air pollution exposures; provides technical assistance to states through EPA's regional offices, and to other agencies having radiation and indoor air protection programs; directs an environmental radiation monitoring program; responds to radiological emergencies; and evaluates and assesses the overall risk and impact of radiation and indoor air pollution.

Office of Transportation and Air Quality (OTAQ) - An EPA Office within OAR whose mission is to reconcile the transportation sector with the environment by advancing clean fuels and technology, and working to promote more liveable communities. OTAQ is responsible for carrying out laws to control air pollution from motor vehicles, engines, and their fuels. Mobile sources include: cars and light trucks, large trucks and buses, farm and construction equipment, lawn and garden equipment, marine engines, aircraft, and locomotives.

Onroad Mobile Source - Any mobile source of air pollution such as cars, trucks, motorcycles, and buses that travels on roads and highways.

Open Pit Source - Large, open pits, such as surface coal mines and rock quarries.

Operating Permit Program - A program required by the Clean Air Act; requires existing industrial sources to obtain an "operating permit". The operating permit program is a national permitting system that consolidates all of the air pollution control requirements into a single, comprehensive "operating permit" that covers all aspects of a source's year-to-year air pollution activities.

P

Particle-bound - Reversibly absorbed or condensed onto the surface of particles.

Particulates/Particulate Matter (PM) - Solid particles or liquid droplets suspended or carried in the air.

Partitioning - The separation or division of a substance into two or more compartments. Environmental partitioning refers to the distribution of a chemical into various media (soil, air, water, and biota).

Partitioning Model - Models consisting of mathematical equations that estimate how chemicals will divide (i.e., partition) among abiotic and biotic media in a given environment based on chemical- and site- specific characteristics.

Passive Monitor - A type of air toxics monitor that collects airborne pollutants by absorption onto a reactive material (for example, sorbent tube, filter) for subsequent laboratory analysis. No pump is used to draw the air across the reactive material. This type of monitor is usually used for personal exposure monitoring or work space monitoring.

Pathway Specific Risk - The risk associated with exposure to a chemical agent or a mixture of chemicals via a specific pathway (e.g., inhalation of outdoor air).

Persistent, Bioaccumulative, and Toxic (PBT) Chemicals - Highly toxic, long-lasting substances that can build up in the food chain to levels that are harmful to human and ecosystem health. They are associated with a range of adverse health effects, including effects on the nervous system, reproductive and developmental problems, cancer, and genetic impacts.

Percentile - Any one of the points dividing a distribution of values into parts each of which contain 1/100 of the values. For example, the 75th percentile is a value such that 75 percent of the values are less than or equal to it.

Persistence - Refers to the length of time a compound stays in the environment, once introduced. A compound may persist for very short amounts of time (e.g., fractions of a second) or for long periods of time (e.g., hundreds of years).

Persistent Organic Pollutants (POPs) - Highly stable organic compounds used as pesticides or in industry. They are also generated unintentionally as the byproduct of combustion and industrial processes. POPs are a special problem because they persist in the environment, accumulate in the tissues of living organisms, and are toxic to humans and wildlife. POPs with these characteristics are typically semi-volatile, enabling them to move long distances and condense over colder regions of the earth. These properties lead to increased concern for the toxic effects that they can exert on a range of biota, in particular on top-of-the-food chain species, even at extremely low levels in the ambient environment.

Personal Air Monitoring Device - Unlike a passive air toxics monitor, this device uses a pump to draw the air sample through to measure exposure in the immediate vicinity of an individual. The air sample can be drawn across a reactive material (to be analyzed in a laboratory), or it can be drawn through a direct-read detector.

Personal Monitoring - A measurement collected from an individual's immediate environment using active or passive devices to collect the samples.

Pervious Surface - A surface that can be penetrated (usually in reference to water; e.g., crop land).

Pharmacodynamics - Process of interaction of pharmacologically active substances with target sites, and the biochemical and physiological consequences leading to therapeutic or adverse effects.

Pharmacokinetics - The study of the absorption, distribution, metabolism, and excretion of chemicals in living organisms and the genetic, nutritional, behavioral, and environmental factors that modify these parameters.

Photolysis - The breakdown of a material by sunlight; an important mechanism for the degradation of contaminants in air, surface water, and the terrestrial environment.

Physical Factors - Manmade and/or natural characteristics or features that influence the movement of pollutants in the environment (e.g., settling velocity, terrain effects).

Physiologically Based Pharmacokinetic (PBPK) Model - A computer model that describes what happens to a chemical in the body of a human or laboratory animal. It describes how the chemical gets into the body, where it goes in the body, how it is changed by the body, and how it leaves the body.

Piscivorous - A species feeding preferably on fish.

Planning and Scoping - The process of determining the purpose, scope, players, expected outcomes, analytical approach, schedule, deliverables, QA/QC, resources, and document requirements for the risk assessment.

Plume - The visible or measurable presence of a contaminant in the atmosphere, once released from a given point of origin (e.g., a plume of smoke from a forest fire).

Plume Height - The elevation to which a plume travels (i.e., the sum of the release height and plume rise).

Plume Rise - The height to which a plume rises in the atmosphere from the point of release.

Plume Transport - The movement of a plume through the atmosphere and across land and water features.

Plume Washout - The removal of a substance from the atmosphere via a precipitation event.

PM-10/PM-2.5. PM-10 or PM₁₀ refers to particles in the atmosphere with a diameter of less than ten or equal to 10 micrometers. PM-2.5 or PM_{2.5} refers to smaller particles in the air (i.e., less than or equal to 2.5 micrometers in diameter).

Point of Departure (PoD) - The dose-response point that marks the beginning of a low-dose extrapolation. This point can be the lower bound on dose for an estimated incidence or a change in response level from a dose-response model (BMD), or a NOAEL or LOAEL for an observed incidence, or change in level of response.

Point of Exposure - The location of potential contact between an organism and a chemical or physical agent.

Point of Release - Location of release to the environment.

Point Source (NEI sense) - A source of air pollution which can be physically located on a map.

Point Source (non-NEI sense) - A stack, vent, duct, pipe or other confined air stream from which chemicals may be released to the air.

Pollutant Release and Transfer Registries (PRTRs) - The international equivalent to the Toxics Release Inventory (TRI). PRTRs are data banks of recorded information of the releases

and transfers of toxic chemicals from industries, such as manufacturers, mining facilities, processors, or government-owned and operated facilities.

Population Risk or Hazard - Population risk refers to an estimate of the extent of harm for the population or population segment being addressed. It often refers to an analysis of the number of people living at a particular risk or hazard level.

Potential Risk - Estimated likelihood, or probability, of injury, disease, or death resulting from exposure to a potential environmental hazard.

Potential Dose - The amount of a compound contained in material swallowed, breathed, or applied to the skin.

Practical Quantitation Limit - The lowest level of quantitation that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

Precision - A measure of the reproducibility of a measured value under a given set of circumstances.

Present Scenario - Risk characterizations using present scenarios to estimate risks to individuals (or populations) that currently reside in areas where potential exposures may occur (e.g., using an existing population within some specified area).

Prevailing Wind - Direction from which the wind blows most frequently.

Prevention of Significant Deterioration (PSD) - An EPA program in which state and/or federal permits are required in order to restrict emissions from new or modified sources in places where air quality already meets or exceeds primary and secondary ambient air quality standards.

Primary Standard - A pollution limit based on health effects. Primary standards are set for criteria air pollutants.

Probabilistic - A type of statistical modeling approach used to assess the expected frequency and magnitude of a parameter by running repetitive simulations using statistically selected inputs for the determinants of that parameter (e.g., rainfall, pollutants, flows, temperature).

Probabilistic Risk Assessment/Analysis - Calculation and expression of health risks using multiple risk descriptors to provide the likelihood of various risk levels. Probabilistic risk results approximate a full range of possible outcomes and the likelihood of each, which often is presented as a frequency distribution graph, thus allowing uncertainty or variability to be expressed quantitatively.

Probability Density Function (PDF) - The PDF is alternatively referred to in the literature as the probability function or the frequency function. For continuous random variables, that is, the random variables which can assume any value within some defined range (either finite or infinite), the probability density function expresses the probability that the random variable falls within some very small interval. For discrete random variables, that is, random variables which can only assume certain isolated or fixed values, the term probability mass function (PMF) is preferred over the term probability density function. PMF expresses the probability that the random variable takes on a specific value.

Problem Formulation (in Ecological Risk Assessment) - The initial stage of a risk assessment where the purpose of the assessment is articulated, assessment endpoints and a conceptual model are developed, and a plan for analyzing and characterizing risk is determined.

Problem Statement - A statement of the perceived problem to be studied by the risk assessment. Problem statements often also include statements about how the problem is going to be studied.

Public Health Consultation (Public Health Assessment) - See health consultation.

Public Health Assessment (PHA) - An evaluation of hazardous substances, health outcomes, and community concerns at a hazardous waste site or other potential source of pollutants to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health.

Public Health Advisory (in Public Health Assessment) - A statement made by a regulatory agency that a release of hazardous substances or contamination by microbial pathogens poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

Public Health Hazard Category (in Public Health Assessment) - Statements about whether people could be harmed by conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. ATSDR's five public health hazard categories are no public health hazard, no apparent public health hazard, indeterminate public health hazard, public health hazard, and urgent public health hazard.

Q

Qualitative Uncertainty Estimate - A detailed examination, using qualitative information, of the systematic and random errors of a measurement or estimate.

Quality Assurance Project Plan - A document describing in comprehensive detail the necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria.

Quality Assurance - An integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.

Quality Control - The overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of its users. The aim is to provide data quality that is satisfactory, adequate, and dependable.

R

Random Variable - A quantity which can take on any number of values but whose exact value cannot be known before a direct observation is made. For example, the outcome of the toss of a pair of dice is a random variable, as is the height or weight of a person selected at random from a city phone book.

Receptor (modeling sense) - In fate/transport modeling, the location where impacts are predicted.

Receptor (non-modeling sense) - The entity which is exposed to an environmental stressor.

Red Book - 1983 NRC publication entitled *Risk Assessment in the Federal Government: Managing the Process*.

Reference Concentration (RfC) - An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Reference Dose (RfD) - An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Reference Media Evaluation Guides (RMEG) - A type of comparison value derived by ATSDR to protect the most sensitive populations. They do not consider carcinogenic effects, chemical interactions, multiple route exposure, or other media-specific routes of exposure, and are very conservative concentration values designed to protect sensitive members of the population.

Regional/National Scale Assessment - An air monitoring network designed to assess from tens to hundreds of kilometers, up to the entire nation.

Relative Potency Factor - The ratio of the toxic potency of a given chemical to that of an index chemical.

Release Parameters - The specific physical characteristics of the release (e.g., stack diameter, stack height, release flow rate, temperature).

Representativeness - The degree to which one or a few samples are characteristic of a larger population about which the analyst is attempting to make an inference.

Reproductive Toxicity - The occurrence of biologically adverse effects on the reproductive systems of females or males that may result from exposure to environmental agents. The toxicity may be expressed as alterations to the female or male reproductive organs, the related endocrine system, or pregnancy outcomes. The manifestation of such toxicity may include, but not be limited to, adverse effects on onset of puberty, gamete production and transport, reproductive cycle normality, sexual behavior, fertility, gestation, parturition, lactation, developmental toxicity, premature reproductive senescence, or modifications in other functions that are dependent on the integrity of the reproductive systems.

Residual Risk - The extent of health risk from air pollutants remaining after application of the Maximum Achievable Control Technology (MACT).

Resources - Money, time, equipment, and personnel available to perform the assessment.

Risk (in the context of human health) - The probability of injury, disease, or death from exposure to a chemical agent or a mixture of chemicals. In quantitative terms, risk is expressed in values ranging from zero (representing the certainty that harm will not occur) to one (representing the certainty that harm will occur). (Compare with hazard.)

Risk Assessor(s) - The person or group of people responsible for conducting a qualitative and quantitative evaluation of the risk posed to human health and/or the environment by environmental pollutants.

Risk Assessment - For air toxics, the scientific activity of evaluating the toxic properties of a chemical and the conditions of human or ecological exposure to it in order both to ascertain the likelihood that exposed humans or ecological receptors will be adversely affected, and to characterize the nature of the effects they may experience.

Risk Assessment Forum - A standing committee of senior EPA scientists which was established to promote Agency-wide consensus on difficult and controversial risk assessment issues and to ensure that this consensus is incorporated into appropriate Agency risk assessment guidance.

Risk Assessment Work Plan - A document that outlines the specific methods to be used to assess risk, and the protocol for presenting risk results. The risk assessment workplan may consist of one document or the compilation of several workplans that, together, constitute the overall risk assessment workplan.

Risk Characterization - The last phase of the risk assessment process in which the information from the toxicity and exposure assessment steps are integrated and an overall conclusion about risk is synthesized that is complete, informative and useful for decision-makers. In all cases, major issues and uncertainty and variability associated with determining the nature and extent of the risk should be identified and discussed. The risk characterization should be prepared in a manner that is clear, transparent, reasonable and consistent.

Risk Communication - The exchange of information about health or environmental risks among risk assessors and managers, the general public, news media, and other stakeholders.

Risk Management - The decision-making process that uses the results of risk assessment to produce a decision about environmental action. Risk management includes consideration of technical, scientific, social, economic, and political information.

Risk Manager(s) - The person or group responsible for evaluating and selecting alternative regulatory and non-regulatory responses to risk.

Root Uptake - The uptake of compounds available in the soil and their transfer to the above ground portions of the plant.

Route-to-Route Extrapolation - Calculations to estimate the dose-response relationship of an exposure route for which experimental data do not exist or are inadequate, and which are based on existing experimental data for other route(s) of exposure.

Runoff - That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into receiving waters.

S

Sample - A small portion of something designed to evaluate the nature or quality of the whole (for example, one or several samples of air used to evaluate air quality generally).

Sampling and Analysis Plan - An established set of procedures specifying how a sample is to be collected, handled, analyzed, and the data validated and reported.

Sampling Frequency - The time interval between the collection of successive samples.

Science Advisory Board (SAB) - A group of recognized, non-EPA experts who advise EPA on science and science policy.

Scenario Uncertainty - Uncertainty due to descriptive errors, aggregation errors, errors in professional judgment, or incomplete analysis.

SCREEN3 - An air dispersion model developed to obtain conservative estimates of air concentration for use in screening level assessments through the use of conservative algorithms and meteorology.

Screening-level Risk Assessment - A risk assessment performed with few data and many conservative assumptions to identify exposures that should be evaluated more carefully for potential risk.

Secondary Production/Pollutant - Formation of pollutants in the atmosphere by chemical transformation of precursor compounds.

Secondary Standard - A pollution limit based on environmental effects (e.g., damage to property, plants, visibility). Secondary standards are set for criteria air pollutants.

Sensitive Subgroups - Identifiable subsets of the general population that, due to differential exposure or susceptibility, are at greater risk than the general population to the toxic effects of a specific air pollutant (e.g., depending on the pollutant and the exposure circumstances, these may be groups such as subsistence fishers, infants, asthmatics, or the elderly).

Settling Velocity/Rate - The maximum speed at which a particle will fall in still air. It is a function of its size, density, and shape.

Silage - Stored vegetation used as feed for cattle.

Simulation - A representation of a problem, situation in mathematical terms, especially using a computer.

Soil Volumetric Water Content - The soil-water content expressed as the volume of water per unit bulk volume of soil.

Soil Dry Bulk Density - The mass of dry soil per unit bulk volume.

Soil Erosion - Detachment and movement of topsoil or soil material from the upper part of the soil profile, by the action of wind or running water, especially as a result of changes brought about by human activity, such as unsuitable or mismanaged agriculture.

Solar Radiation - Energy from the sun. Of importance to the climate system, solar radiation includes ultra-violet radiation, visible radiation, and infrared radiation.

Solubility - The amount of mass of a compound that will dissolve in a unit volume of solution. Aqueous solubility is the maximum concentration of a chemical that will dissolve in pure water at a reference temperature.

Source - Any place or object from which pollutants are released.

Source Category - A group of similar industrial processes or industries that are contributors to releases of hazardous air pollutants. The 1990 amendments to the Clean Air Act (CAA) requires that the EPA publish and regularly update a listing of all categories and subcategories of major and area sources that emit hazardous air pollutants.

Source Characterization - The detailed description of the source (e.g., location, source of pollutant releases, pollutants released, release parameters).

Spatial Variability - The magnitude of difference in contaminant concentrations in samples separated by a known distance.

SPECIATE - EPA's repository of Total Organic Compound (TOC) and Particulate Matter (PM) speciated profiles for a variety of sources for use in source apportionment studies. The profiles in the system are provided as a library of available profiles for source-receptor and source apportionment type models, such as Chemical Mass Balance 8 (CMB8).

Stable Conditions (in the Atmosphere) - Air with little or no tendency to rise, that is usually accompanied by clear dry weather. Stable air holds, instead of dispersing, pollutants. [National Weather Service, Southern Region Headquarters' Jetstream Weather School, <http://www.srh.weather.gov/jetstream/append/glossary.htm> and EPA, 1997: Terms of Environment, [http://www.epa.gov/OCEPAterms/.](http://www.epa.gov/OCEPAterms/)]

Stack - A chimney, smokestack, or vertical pipe that discharges used air.

Stack Release - The release of a chemical through a stack.

Stack Testing - The monitoring, by testing, of chemicals released from a stack.

Stakeholder(s) - Any organization, governmental entity, or individual that has a stake in or may be impacted by a given approach to environmental regulation, pollution prevention, energy conservation, etc.

Standard Industrial Classification (SIC) - A method of grouping industries with similar products or services and assigning codes to these groups.

Standard Operating Procedure (SOP) - A established set of written procedures adopted and used to guide the work of for a specific project. For example, an air monitoring study would include SOPs on sample collection and handling and SOPs on analytical requirements and data validation and reporting.

Standing Crop - The quantity of plant biomass in a given area, usually expressed as density (dry mass per unit area) or energy content per unit area.

Stationary Source - A source of pollution that is fixed in space.

Steady-state Model - Mathematical model of fate and transport that uses constant values of input variables to predict constant values of receiving media concentrations.

Stochastic - Involving or containing a random variable; involving probability or chance.

Stressor - Any physical, chemical, or biological entity that can induce adverse effects on ecosystems or human health.

Stressor-response Profile or Relationship (in Ecological Risk Assessment) - The product of characterization of ecological effects in the analysis phase of ecological risk assessment. The stressor-response profile/relationship summarizes the data on the effects of a stressor and the relationship of the data to the assessment endpoint.

Structure-activity Relationship (SAR) - Mathematical or qualitative expression of the relationships between biological activity or toxicity of a chemical to its chemical structure or substructure. Ideally, such relationships can be formulated as Quantitative Structure Activity Relationships (QSARs), in which some degree of predictive capability is present. [Air Risk Information Support Center, OAQPS, March 1989: Glossary of Terms Related to Health, Exposure, and Risk Assessment. EPA/450/3-88/016.]

Support Center for Regulatory Models (SCRAM) - An EPA website that is a source of information on atmospheric dispersion models (e.g., ISCST3, SCREEN 3, and ASPEN) that support regulatory programs required by the Clean Air Act. Documentation and guidance for these computerized models are a major feature of this website. This site also contains computer code, data, and technical documents that deal with mathematical modeling for the dispersion of air pollutants.

Synergistic Effect - A situation in which the overall effect of two chemicals acting together is greater than the simple sum of their individual effects.

T

Target Organ - The biological organ(s) most adversely affected by exposure to a chemical substance (e.g., the site of the critical effect).

Target Organ Specific Hazard Index (TOSHI) - The sum of hazard quotients for individual air toxics that affect the same organ/organ system or act by similar toxicologic processes

Temporal Variability - The difference in contaminant concentrations observed in samples taken at different times.

Teratogenesis - The introduction of nonhereditary birth defects in a developing fetus by exogenous factors such as physical or chemical agents acting in the womb to interfere with normal embryonic development.

Terrain Effects - The impact on the airflow as it passes over complex land features such as mountains.

Terrestrial Radiation - The total infrared radiation emitted by the earth and its atmosphere in the temperature range of approximately 200 to 300 Kelvin. Terrestrial radiation provides a major part of the potential energy changes necessary to drive the atmospheric wind system and is responsible for maintaining the surface air temperature within limits of livability.

Thermal Turbulence - Turbulent vertical motions that result from surface heating and the subsequent rising and sinking of air.

Threshold Dose/Threshold - The lowest dose of a chemical at which a specified measurable effect is observed and below which it is not observed.

Threshold Effect - An effect (usually an adverse health effect) for which there is an exposure level below which the effect is not expected to occur.

Threshold Toxicant - A chemical for which there is an exposure level below which an adverse health outcome is not expected to occur.

Tiered Analysis - An analysis arranged in layers/steps. Risk assessments/analyses are often conducted in consecutive layers/steps that begin with a reliance on conservative assumptions and little data (resulting in less certain, but generally conservative answers) and move to more study-area specific data and less reliance on assumptions (resulting in more realistic answers). The level of effort and resources also increases with the development of more realistic data.

Time-integrated Sample - Samples are collected over a period of time. Only the total pollutant collected is measured, and so only the average concentration during the sampling period can be determined.

Time-trend Study - Samples spaced in time to capture systematic temporal trends (e.g., a facility might change its production methods or products over time).

Time-weighted Sum of Exposures - Used in inhalation exposure modeling. Provides a total exposure from all different microenvironments in which a person spends time.

Toxic Air Pollutants - see hazardous air pollutant.

Toxicity - The degree to which a substance or mixture of substances can harm humans or environmental receptors.

Toxicity Assessment - Characterization of the toxicological properties and effects of a chemical, with special emphasis on establishment of dose-response characteristics.

Toxicity Test - Biological testing (usually with an cell system, invertebrate, fish, or small mammal) to determine the adverse effects of a compound.

Toxicology - The study of harmful interactions between chemicals and biological systems.

Toxic Release Inventory (TRI) - Annual database of releases to air, land, and water, and information on waste management in the United States of over 650 chemicals and chemical compounds. This data is collected under Section 313 of the Emergency Planning and Community Right to Know Act.

Trajectory - The track taken by a parcel of air as it moves within the atmosphere over a given period.

Transformation - The change of a chemical from one form to another.

Transparency - Conducting a risk assessment in such a manner that all of the scientific analyses, uncertainties, assumptions, and science policies which underlie the decisions made throughout the risk assessment are clearly stated (i.e., made readily apparent).

Turbulence - Irregular motion of the atmosphere, as indicated by gusts and lulls in the wind.

U

Uncertainty - Uncertainty represents a lack of knowledge about factors affecting exposure/toxicity assessments and risk characterization and can lead to inaccurate or biased estimates of risk and hazard. Some of the types of uncertainty include scenario uncertainty, parameter uncertainty, and model uncertainty.

Uncertainty analysis - A detailed examination of the systematic and random errors of a measurement or estimate (in this case a risk or hazard estimate); an analytical process to provide information regarding the uncertainty.

Uncertainty Factor (UF) - One of several, generally 10-fold factors, used in operationally deriving the RfD and RfC from experimental data. UFs are intended to account for (1) the variation in sensitivity among the members of the human population; (2) the uncertainty in extrapolating animal data to humans, i.e., interspecies variability; (3) the uncertainty in extrapolating from data obtained in a study with less-than-lifetime exposure to lifetime exposure, i.e., extrapolating from subchronic to chronic exposure; (4) the uncertainty in extrapolating from a LOAEL rather than from a NOAEL; and (5) the uncertainty associated with extrapolation from animal data when the data base is incomplete.

Universal Soil Loss Equation - An equation used to predict the average annual soil loss per unit area per year.

Unit Risk Estimate (URE) - The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of $1\mu\text{ g/L}$ in water, or $1\mu\text{g/m}^3$ in air. The interpretation of unit risk would be as follows: if the water unit risk = $2 \times 10^{-6}\mu\text{g/L}$, 2 excess tumors may develop per 1,000,000 people if exposed daily for a lifetime to $1\mu\text{g}$ of the chemical in 1 liter of drinking water.

Unstable Conditions (in the Atmosphere) - An atmospheric state in which warm air is below cold air. Since warm air naturally rises above cold air (due to warm air being less dense than cold air), vertical movement and mixing of air layers can occur.

Uptake - The process by which a substance crosses an absorption barrier and is absorbed into the body.

Urban Scale Assessment - An air monitoring network designed to assess the overall, citywide conditions with dimensions on the order of 4 to 50 kilometers. This scale would usually require more than one site for definition.

V

Vapor - The gas given off by substances that are solids or liquids at ordinary atmospheric pressure and temperatures.

Variability - Refers to the observed differences attributable to true heterogeneity or diversity in a population or exposure parameter. Examples include human physiological variation (e.g., natural variation in body weight, height, breathing rate, drinking water intake rate), weather variability, variation in soil types and differences in contaminant concentrations in the environment. Variability is usually not reducible by further measurement of study, but it can be better characterized.

Volatilization/Vapor Release - The conversion of a liquid or solid into vapors.

Volume Source - In air dispersion modeling, a three dimensional volume from which a release may occur (e.g., a gas station modeled as a box from which chemicals are emitted).

W

Watershed - The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.

Weight-of-Evidence (WOE) - A system for characterizing the extent to which the available data support the hypothesis that an agent causes an adverse health effect in humans. For example, under EPA's 1986 cancer risk assessment guidelines, the WOE was described by categories "A through E," Group A for known human carcinogens through Group E for agents with evidence of noncarcinogenicity. The approach outlined in EPA's proposed guidelines for carcinogen risk assessment (1996 and updates) considers all scientific information in determining whether and under what conditions an agent may cause cancer in humans, and provides a narrative approach to characterize carcinogenicity rather than categories.

White Book - 1996 Presidential Commission on Risk Assessment and Risk Management (CRARM) publication entitled *Risk Assessment and Risk Management in Regulatory Decision-Making*.

Wind Rose - A graphical display showing the frequency and strength of winds from different directions over some period of time.