

## **Appendix A. Glossary**

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**accuracy**—The closeness of the result of a measurement to the true value of the quantity.

**aliquot**—The quantity of a sample being used for analysis.

**alkalinity**—The capacity of an aqueous solution to neutralize an acid. Alkalinity measurements are important in determining the sensitivity of a body of water to acid inputs such as acidic pollution from rainfall or wastewater.

**alpha particle**—A positively charged particle emitted from the nucleus of an atom; it has the same charge and mass as that of a helium nucleus (two protons and two neutrons).

**ambient air**—The surrounding atmosphere as it exists around people, plants, and structures.

**analyte**—A constituent or parameter that is being analyzed.

**analytical detection limit**—The lowest reasonably accurate concentration of an analyte that can be detected; this value varies depending on the method, instrument, and dilution used.

**anion**—A negatively charged ion.

**aquifer**—A saturated, permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients.

**aquitard**—A geologic unit that inhibits the flow of water.

**beta particle**—A negatively charged particle emitted from the nucleus of an atom. It has a mass and charge equal to those of an electron.

**biota**—The animal and plant life of a particular region considered as a total ecological entity.

**blank**—A control sample that is identical, in principle, to the sample of interest, except that the substance being analyzed is absent. In such cases, the measured value or signal for the substance being analyzed is believed to be a result of artifacts. Under certain circumstances, that value may be subtracted from the measured value to give a net result reflecting the amount of the substance in the sample. The US Environmental Protection Agency (EPA) does not permit the subtraction of blank results in EPA-regulated analyses.

**calibration**—Determination of variance from a standard of accuracy of a measuring instrument to ascertain necessary correction factors.

**CERCLA-reportable release**—A release to the environment that exceeds reportable quantities as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

**chemical oxygen demand**—Indicates the quantity of oxidizable materials present in water and varies with water composition, concentrations of reagent, temperature, period of contact, and other factors.

**closure**—Specifically, closure of a hazardous waste management facility under Resource Conservation and Recovery Act (RCRA) requirements.

**compliance**—Fulfillment of applicable requirements of a plan or schedule ordered or approved by government authority.

**concentration**—The amount of a substance contained in a unit volume or mass of a sample.

**conductivity**—A measure of water's capacity to convey an electric current. This property is related to the total concentration of the ionized substances in water and the temperature at which the measurement is made.

**confluence**—The point at which two or more streams meet; the point where a tributary joins the main stream.

**contamination**—Deposition of unwanted material on the surfaces of structures, areas, objects, or personnel.

**cosmic radiation**—Ionizing radiation with very high energies, originating outside the earth's atmosphere. Cosmic radiation is one source contributing to natural background radiation.

**count**—A measure of the radiation from an object or device; the signal that announces an ionization event within a counter.

**curie (Ci)**—A unit of radioactivity. One curie is defined as  $3.7 \times 10^{10}$  (37 billion) disintegrations per second. Several fractions and multiples of the curie are commonly used:

**kilocurie (kCi)**— $10^3$  Ci, one thousand curies;  $3.7 \times 10^{13}$  disintegrations per second.

**millicurie (mCi)**— $10^{-3}$  Ci, one-thousandth of a curie;  $3.7 \times 10^7$  disintegrations per second.

**microcurie ( $\mu$ Ci)**— $10^{-6}$  Ci, one-millionth of a curie;  $3.7 \times 10^4$  disintegrations per second.

**picocurie (pCi)**— $10^{-12}$  Ci, one-trillionth of a curie; 0.037 disintegrations per second.

**daughter**—A nuclide formed by the radioactive decay of a parent nuclide.

**decay, radioactive**—The spontaneous transformation of one radionuclide into a different radioactive or nonradioactive nuclide, or into a different energy state of the same radionuclide.

**dense nonaqueous phase liquid (DNAPL)**—The liquid phase of chlorinated organic solvents. These liquids are denser than water and include commonly used industrial compounds such as tetrachloroethene and trichloroethene.

**derived concentration guide (DCG)**—The concentration of a radionuclide in air or water that, under conditions of continuous exposure for 1 year by one exposure mode (i.e., ingestion of water, submersion in air, or inhalation), would result in either an effective dose equivalent of 0.1 rem (1 mSv) or a dose equivalent of 5 rem (50 mSv) to any tissue, including skin and lens of the eye. The guides for radionuclides in air and water are given in DOE O 5400.5.

**derived concentration standard (DCS)**—Quantities used in the design and conduct of radiological environmental protection programs at US Department of Energy facilities and sites. These quantities represent the concentration of a given radionuclide in either water or air that results in a member of the public receiving a 1 mSv (100 mrem) effective dose following continuous exposure for 1 year for each of the following pathways: ingestion of water, submersion in air, and inhalation.

**disintegration, nuclear**—A spontaneous nuclear transformation (radioactivity) characterized by the emission of energy and/or mass from the nucleus of an atom.

**dissolved oxygen**—A measurement of the amount of gaseous oxygen in an aqueous solution. Adequate dissolved oxygen is necessary for good water quality.

**dose**—A general term for absorbed dose, equivalent dose, or effective dose.

**absorbed dose**—The average energy imparted by ionizing radiation to the matter in a volume element per unit mass of irradiated material. The absorbed dose is expressed in units of rad (or gray) (1 rad = 0.01 gray).

**collective dose/collective effective dose**—The sum of the total effective dose to all persons in a specified population received in a specified period of time. It can be approximated by the sum of the average effective dose for a given subgroup  $i$ , and  $N_i$  is the number of individuals in this subgroup. Collective dose is expressed in units of person-rem (or person-sievert).

**effective dose (E or ED)**—The summation of the products of the equivalent dose (HT) received by specified tissues or organs of the body and the appropriate tissue weighting factor (wT). It includes the dose from radiation sources internal and/or external to the body. The effective dose is expressed in units of rems (or sieverts).

**equivalent dose (HT)**—The product of average absorbed dose (DT,R) in rad (or gray) in a tissue or organ (T) and a radiation (R) weighting factor (wR).

**dosimetry**—Measurement and calculation of radiation doses from exposure to ionizing radiation.

**drinking water standard (DWS)**—Federal primary drinking water standards, both proposed and final, as set forth by the US Environmental Protection Agency.

**duplicate samples**—Two or more samples collected simultaneously into separate containers.

**effluent**—A liquid or gaseous waste discharge to the environment.

**effluent monitoring**—The collection and analysis of samples or measurements of liquid and gaseous effluents for purposes of characterizing and quantifying the release of contaminants, assessing radiation exposures of members of the public, and demonstrating compliance with applicable standards.

**energy intensity**—Energy consumption per square foot of building space, including industrial or laboratory facilities [EO 13514, Section 19(f)].

**Environmental Management**—A US Department of Energy program that directs the assessment and cleanup of its sites (remediation) and facilities contaminated with waste as a result of nuclear-related activities.

**exposure (radiation)**—The incidence of radiation on living or inanimate material by accident or intent. Background exposure is the exposure to natural background ionizing radiation. Occupational exposure is the exposure to ionizing radiation that takes place during a person's working hours. Population exposure is the exposure to the total number of persons who inhabit an area.

**external radiation**—Exposure to ionizing radiation when the radiation source is located outside the body.

**flux**—A flow or discharge of a substance (in units of mass, radioactivity, etc.) per unit of time.

**gamma ray**—High-energy, short-wavelength electromagnetic radiation emitted from the nucleus of an excited atom. Gamma rays are identical to x-rays except for the source of the emission.

**grab sample**—A sample collected instantaneously with a glass or plastic bottle placed below the water surface to collect surface water samples (also called dip samples).

**greenhouse gas (GHG)**—Gas that traps heat in the atmosphere. The four major greenhouse gases are carbon dioxide, methane, nitrous oxide, and fluorinated gases.

**groundwater**—The water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations.

**hardness**—Water hardness is caused by polyvalent metallic ions dissolved in water. In fresh water, these are mainly calcium and magnesium, although other metals such as iron, strontium, and manganese may contribute to hardness.

**hectare**—A metric unit of area equal to 10,000 square meters or 2.47 acres.

**hydrology**—The science dealing with the properties, distribution, and circulation of natural water systems.

**internal radiation**—Internal radiation occurs when radionuclides enter the body by ingestion of foods, milk, and water, and by inhalation. Radon is the major contributor to the annual dose equivalent for internal radionuclides.

**ion**—An atom or compound that carries an electrical charge.

**irradiation**—Exposure to radiation.

**isotopes**—Forms of an element having the same number of protons in their nuclei but differing in the number of neutrons.

**Leadership in Energy and Environmental Design (LEED)**—A suite of rating systems for the design, construction, operation, and maintenance of green buildings, homes, and neighborhoods. LEED is intended to help building owners and operators find and implement ways to be environmentally responsible and resource-efficient.

**maximally exposed individual (MEI)**—A hypothetical individual who, because of proximity, activities, or living habits, could potentially receive the maximum possible dose of radiation from a given event or process.

**microbes**—Microscopic organisms.

**migration**—The transfer or movement of a material through the air, soil, or groundwater.

**millirem (mrem)**—The dose equivalent that is one one-thousandth of a rem.

**milliroentgen (mR)**—A measure of x-ray or gamma radiation. The unit is one-thousandth of a roentgen.

**minimum detectable activity (MDA)**—The smallest activity of a radionuclide that can be distinguished in a sample by a given measurement system at a preselected counting time and at a given confidence level.

**monitoring**—A process whereby the quantity and quality of factors that can affect the environment and/or human health are measured periodically to regulate and control potential impacts.

**natural radiation**—Radiation arising from cosmic and other naturally occurring radionuclide sources (such as radon) present in the environment.

**nuclide**—An atom specified by its atomic weight, atomic number, and energy state. A radionuclide is a radioactive nuclide.

**outfall**—The point of conveyance (e.g., drain or pipe) of wastewater or other effluents into a ditch, pond, or river.

**ozone**—A gas made up of three oxygen atoms that occurs both in earth's upper atmosphere and at ground level. Ozone can be "good" or "bad" for human health and the environment, depending on its location in the atmosphere. Ozone acts as a protective layer high above the earth, but it can be harmful to breathe.

**parts per billion (ppb)**—A unit measure of concentration equivalent to the weight/volume ratio expressed as micrograms per liter or nanograms per milliliter and micrograms per kg.

**parts per million (ppm)**—A unit measure of concentration equivalent to the weight/volume ratio expressed as milligrams per liter or milligrams per kg.

**person-rem**—Collective dose to a population group. For example, a dose of 1 rem to 10 individuals results in a collective dose of 10 person-rem.

**pH**—A measure of the hydrogen ion concentration in an aqueous solution. Acidic solutions have a pH from 0 through <7, basic solutions have a pH > 7, and neutral solutions have a pH = 7.

**precision**—The degree to which repeated measurements under unchanged conditions show the same results (also called reproducibility or repeatability).

**quality assurance (QA)**—Any action in environmental monitoring to ensure the reliability of monitoring and measurement data.

**quality control (QC)**—The routine application of procedures within environmental monitoring to obtain the required standards of performance in monitoring and measurement processes.

**rad**—The unit of absorbed dose deposited in a volume of material.

**radioactivity**—The spontaneous emission of radiation, generally alpha or beta particles or gamma rays, from the nucleus of an unstable isotope.

**radioisotopes**—Radioactive isotopes.

**radionuclide**—An unstable nuclide capable of spontaneous transformation into other nuclides by changing its nuclear configuration or energy level. This transformation is accompanied by the emission of photons or particles.

**reclamation**—Recovery of wasteland, desert, etc. by ditching, filling, draining, or planting.

**reference material**—A material or substance with one or more properties that is sufficiently well established and is used to calibrate an apparatus, to assess a measurement method, or to assign values to materials.

**release**—Any discharge to the environment. “Environment” is broadly defined as any water, land, or ambient air.

**rem**—The unit of dose equivalent (absorbed dose in rads  $\times$  the radiation quality factor). Dose equivalent is frequently reported in units of millirem (mrem), which is one one-thousandth of a rem.

**remediation**—The correction of a problem. On the Oak Ridge Reservation remediation efforts focus on the safe cleanup of the environmental legacy resulting from research activities and weapons production over the past 5 decades.

**remedial investigation/feasibility study (RI/FS)**—An in-depth study designed to gather data needed to determine the nature and extent of contamination at a Superfund site; establish site cleanup criteria; identify preliminary alternatives for remedial action; and support technical and cost analyses of alternatives. The remedial investigation is usually done with the feasibility study. Together they are usually referred to as the “RI/FS.”

**roentgen**—A unit of radiation exposure equal to the quantity of ionizing radiation that will produce one electrostatic unit of electricity in one cubic centimeter of dry air at 0°C and standard atmospheric pressure. One roentgen equals  $2.58 \times 10^{-4}$  coulombs per kilogram of air. [Note: A coulomb is a unit of electric charge—the SI (International System of Units) unit of electric charge equal to the amount of charge transported by a current of one ampere in one second.]

**sensitivity**—The capability of a methodology or an instrument to discriminate among samples with differing concentrations or containing varying amounts of analyte.

**sievert (Sv)**—The SI (International System of Units) unit of dose equivalent; 1 Sv = 100 rem.

**spike**—The addition of a known amount of reference material containing the analyte of interest to a blank sample.

**spiked sample**—A sample to which a known amount of some substance has been added.

**stable**—Not radioactive or not easily decomposed or otherwise modified chemically.

**stack**—A vertical pipe or flue designed to exhaust airborne gases and suspended particulate matter.

**standard reference material (SRM)**—A reference material distributed and certified by the National Institute of Standards and Technology.

**storm water runoff**—**Stormwater runoff** is rainfall that flows over the ground surface.

**stratospheric ozone**—The stratosphere or “good” ozone layer extends upward from about 6 to 30 miles above the earth’s surface and protects the earth from the sun’s harmful ultraviolet rays.

**substrate**—The substance, base, surface, or medium in which an organism lives and grows.

**Superfund**—The Superfund Amendments and Reauthorization Act amended the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1986. CERCLA, the federal government’s program to clean up the nation’s uncontrolled hazardous waste, is now commonly known as Superfund.

**surface water**—All water on the surface of the earth, as distinguished from groundwater.

**terrestrial radiation**—Ionizing radiation emitted from radioactive materials, primarily potassium-40, thorium, and uranium, in the earth’s soils. Terrestrial radiation contributes to natural background radiation.

**total activity**—The total number of atoms of a radioactive substance that decay per unit of time.

**total dissolved solids**—Dissolved solids and total dissolved solids are terms generally associated with freshwater systems; they consist of inorganic salts, small amounts of organic matter, and dissolved materials.

**transect**—A line across an area being studied. The line is composed of points where specific measurements or samples are taken.

**transuranic (or transuranium)**—Of or relating to elements with higher atomic weights than uranium; all 13 known transuranic elements are radioactive and are produced artificially.

**transuranic waste**—Solid radioactive waste containing primarily alpha-emitting elements heavier than uranium.

**trip blank**—A sample container of deionized water that is transported to a sampling location, treated as a sample, and sent to the laboratory for analysis; trip blanks are used to check for contamination resulting from transport, shipping, and site conditions.

**turbidity**—A measure of the concentration of sediment or suspended particles in solution.

**volatile organic compounds**—Organic chemicals that have a high vapor pressure at ordinary conditions. They include both human-produced and naturally occurring chemical compounds and are used in many industrial processes. Common examples include trichloroethane, tetrachloroethene, and trichloroethene.

**watershed**—The region draining into a river, river system, or body of water.

**wetlands**—Lowland areas, such as a marshes or swamps, sufficiently inundated or saturated by surface water or groundwater to support aquatic vegetation or plants adapted for life in saturated soils. Wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

**wind rose**—A diagram in which statistical information concerning direction and speed of the wind at a location is summarized.