

# Glossary of Radiation Terms

Activation	The process of making a radioisotope by bombarding a stable element with neutrons, protons, or other types of radiation.
Agreement State	A state that has signed an agreement with the Nuclear Regulatory Commission under which the state regulates the use of by-product, source and small quantities of special nuclear material within that state.
Air sampling	The collection of samples to detect the presence of, and/or to measure the quantity of volatile or solid radioactive material, non-radioactive particulate matter, or various chemical pollutants in the air.
Airborne radioactivity area	A room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations that: (1) Exceed the derived air concentration limits, or (2) Would result in an individual present in the area without respiratory protection exceeding, during the hours the individual is present in the area, 0.6 percent of the annual limit on intake or 12 derived air concentration-hours.
ALARA	Acronym for "As Low As Reasonably Achievable," means making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as practical, consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.
Alpha particle	A positively charged particle ejected spontaneously from the nuclei of some radioactive elements. It is identical to a helium nucleus that has a mass number of 4 and an electric charge of +2. It has low penetrating power and a short range (a few centimeters in air). The most energetic alpha particle will generally fail to penetrate the dead layers of cells covering the skin and can be easily stopped by a sheet of paper. Alpha particles represent much more of a health risk when emitted by radionuclides deposited inside the body

Annual limit on intake (ALI)	The derived limit for the permissible amount of radioactive material taken into the body of an adult radiation worker by inhalation or ingestion in a year. The ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in either a committed effective dose equivalent of 5 rems (0.05 sievert) or a committed dose equivalent of 50 rems (0.5 sievert) to any individual organ or tissue.
Atom	The smallest particle of an element that cannot be divided or broken up by chemical means. It consists of a central core of protons and neutrons, called the nucleus. Electrons revolve in orbits in the region surrounding the nucleus.
Atomic energy	Energy released in nuclear reactions. Of particular interest is the energy released when a neutron initiates the breaking up or fissioning of an atom's nucleus into smaller pieces (fission), or when two nuclei are joined together under millions of degrees of heat (fusion). It is more correctly called nuclear energy.
Atomic Energy Commission	Federal agency created in 1946 to manage the development, use, and control of nuclear energy for military and civilian applications. Abolished by the Energy Reorganization Act of 1974 and succeeded by the Energy Research and Development Administration (now part of the U. S. Department of Energy) and the U. S. Nuclear Regulatory Commission.
Atomic number	The number of positively charged protons in the nucleus of an atom.
Attenuation	The process by which the number of particles or photons entering a body of matter is reduced by absorption and scattering.
Background radiation	Radiation from cosmic sources; naturally occurring radioactive materials, including radon (except as a decay product of source or special nuclear material) and global fallout as it exists in the environment from the testing of nuclear explosive devices. It does not include radiation from source, byproduct, or special nuclear materials regulated by the Nuclear Regulatory Commission. The typically quoted average individual exposure from background radiation is 360 millirems per year.

Becquerel (Bq)	The unit of radioactive decay equal to 1 disintegration per second. The Becquerel is the basic unit of radioactivity used in the international system of radiation units, referred to as the “SI” units. 37 billion ( $3.7 \times 10^{10}$ ) becquerels = 1 curie (Ci).
Beta particle	A charged particle emitted from a nucleus during radioactive decay, with a mass equal to 1/1837 that of a proton. A negatively charged beta particle is identical to an electron. A positively charged beta particle is called a positron. Exposure to large amounts of beta radiation from external sources may cause skin burns (erythema). Beta emitters can also be harmful if they enter the body. Beta particles may be stopped by thin sheets of metal or plastic.
Bioassay	The determination of kinds, quantities or concentrations, and in some cases, the locations, of radioactive material in the human body, whether by direct measurement (in vivo counting) or by analysis and evaluation of materials excreted or removed (in vitro) from the human body.
Biological half-life	The time required for a biological system, such as that of a human, to eliminate, by natural processes, half of the amount of a substance (such as a radioactive material) that has entered it.
Byproduct	Byproduct is (1) any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or using special nuclear material (as in a reactor); and (2) the tailings or wastes produced by the extraction or concentration of uranium or thorium from ore.
Chain reaction	A reaction that is self-sustaining. In a fission chain reaction, the nucleus of a fissionable atom (see definition for fissionable material below) absorbs a neutron and fissions (i.e., breaks apart), releasing additional neutrons. These, in turn, can be absorbed by other fissionable nuclei, releasing still more neutrons. A fission chain reaction is self-sustaining when the number of neutrons released in a given time equals or exceeds the number of neutrons lost by absorption in nonfissionable material or by escape from the system.
Charged particle	An ion. An elementary particle carrying a positive or negative electric charge.
Collective dose	The sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.

Committed dose equivalent	The dose to a specific organ or tissue that is received from an intake of radioactive material by an individual over a specified time after the intake. For radiation protection purposes, the specified time is to the age of 70, which is normally taken to be 50 years for a radiation worker and 70 years for a member of the general public.
Committed effective dose equivalent	The committed dose equivalent for a given organ multiplied by a weighting factor (see the definition of Weighting Factor below).
Compact	A group of two or more States formed to dispose of low-level radioactive waste on a regional basis. Forty-two States have formed nine compacts.
Contamination	Undesired radioactive material that is deposited on the surface of or inside structures, areas, objects or people.
Cosmic radiation	Penetrating ionizing radiation, both particulate and electromagnetic, that originates in outer space. Secondary cosmic rays, formed by interactions in the earth's atmosphere, account for about 45 to 50 millirem of the 300 millirem or natural background radiation that an average member of the U. S. public receives in a year.
Counter	A general designation applied to radiation detection instruments or survey meters that detect and measure radiation. The signal that indicates an ionization event has been detected is called a count.
Critical organ	That part of the body that is most susceptible to radiation damage resulting from the specific exposure conditions under consideration, taking into account the dose the various parts of the body receive under the exposure conditions.
Cumulative dose	The total dose resulting from repeated exposures of ionizing radiation to the same portion of the body, or to the whole body, over a period of time.
Curie (Ci)	The original unit used to express the decay rate of a sample of radioactive material. The curie is equal to that quantity of radioactive material in which the number of atoms decaying per second is equal to 37 billion ( $3.7 \times 10^{10}$ ). It was based on the rate of decay of atoms within one gram of radium. It is named for Marie and Pierre Curie, who discovered radium in 1898. The Curie is the basic unit of radioactivity used in the system of radiation units in the U. S., referred to as "tradiational" units.

Decay products (Also called Daughter products)	Nuclides that are formed by the radioactive decay of parent radionuclides. In the case of radium-226, for example, nine successive different radioactive decay products are formed in what is called a “decay chain.” The chain ends with the formation of lead-206, which is a stable nuclide.
Decay, radioactive	The decrease in the amount of any radioactive material with the passage of time due to the spontaneous emission from the atomic nuclei of either alpha or beta particles, often accompanied by gamma radiation.
Declared pregnant woman	A woman who is also a radiation worker and has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.
Decommission	The process of closing down a facility followed by reducing the residual quantities of radioactive material to a level that permits the release of the property for unrestricted use.
Decontamination	The reduction or removal of contaminating radioactive material from a structure, area, object, or person. Decontamination may be accomplished by: (1) treating the surface to remove or decrease the contamination, or (2) letting the material stand to permit the quantity of radioactive material decrease as a result of radioactive decay.
Depleted uranium	Uranium having a percentage of uranium-235 smaller than the 0.7 percent found in natural uranium. It is obtained from spent (used) fuel elements or as byproduct tails, or residues, from uranium isotope separation.
Derived air concentration (DAC)	The concentration of radioactive material in air which will result in an annual limit of intake if an individual breaths that air for a year. For a radiation worker, it is assumed air is breathed for 2000 hours in one year in the workplace.
Detector	A material or device that is sensitive to radiation and can produce a response signal suitable for measurement or analysis. A radiation detection instrument.

Deterministic effect	Health effects, the severity of which varies with the dose and for which a threshold is believed to exist. Deterministic effects generally result from the receipt of a relatively high dose over a short period of time. Skin erythema (reddening) and radiation-induced cataract formation is an example of a deterministic effect (formerly called a non-stochastic effect).
Dose	A general term used to refer to the effect on a material which is exposed to radiation. It is used to refer either to the amount of energy absorbed by a material exposed to radiation (see Dose, absorbed below) or to the potential biological effect in tissue exposed to radiation (see Dose, equivalent below).
Dose, absorbed	The amount of energy deposited in any substance by ionizing radiation per unit mass of the substance. It is expressed numerically in rads (traditional units) or grays (SI units).
Dose, equivalent	The product of absorbed dose in tissue multiplied by a quality factor, and then sometimes multiplied by other necessary modifying factors, to account for the potential for a biological effect resulting from the absorbed dose. (See Quality Factor below). It is expressed numerically in rems (traditional units) or sieverts (SI units).
Dosimeter	A small portable instrument (such as a film badge, thermoluminescent or pocket dosimeter) for measuring and recording the total accumulated dose of ionizing radiation.
Dosimetry	The theory and application of the principles and techniques involved in the measurement and recording of ionizing radiation doses.
Dose rate	The radiation dose delivered per unit time.
Effective half-life	The time required for the amount of a radionuclide deposited in a living organism to be diminished 50% as a result of the combined action of radioactive decay and biological elimination.
Electromagnetic radiation	A traveling wave motion resulting from changing electric or magnetic fields. Familiar types of electromagnetic radiation range from x rays (and gamma rays) of short wavelength, through the ultraviolet, visible, and infrared regions, to radar and radio waves of relatively long wave length. Only the higher energy (higher frequency/shorter wavelength) forms of electromagnetic radiation are ionizing. Radiation in the lower energy ranges, such as visible, infrared, radar, and radio waves, are non-ionizing.

Electron	An elementary particle with a negative charge and a mass 1/1837 that of the proton. Electrons surround the positively charged of the atom.
Element	One of the known chemical substances that cannot be broken down further without changing its chemical properties. Some examples include, hydrogen, nitrogen, gold, lead, and uranium. See the periodic table of elements.
Exposure	A general term used loosely to express what a person receives as a result of being exposed to ionizing radiation.
External radiation	The situation in which the source of exposure is external to, that is, outside the body.
Extremities	The hands, forearms, elbows, feet, knee, leg below the knee, and ankles (permissible radiation exposures in these regions are generally greater than in the whole body because they contain less blood forming organs and have smaller volumes for energy absorption).
Film badge	Photographic film used for measurement of ionizing radiation exposure for personnel monitoring purposes. The film badge may contain two or three films of differing sensitivities, and it may also contain a filter that shields part of the film from certain types of radiation.
Fissile material	Although sometimes used as a synonym for fissionable material, this term has acquired a more restricted meaning. Namely, any material fissionable by thermal (slow) neutrons. The three primary fissile materials are uranium-233, uranium-235, and plutonium-239.
Fission (fissioning)	The splitting of the nucleus of an atom (generally of a heavy element) into at least two other nuclei and the release of a relatively large amount of energy. Two or three neutrons are usually released during this type of transformation.
Fission gases	Those fission products that exist in the gaseous state. In nuclear power reactors, this includes primarily the noble gases, such as krypton and xenon.
Fission products	The nuclei (fission fragments) formed by the fission of heavy elements, plus the nuclides formed by the subsequent decay products of the radioactive fission fragments.
Fissionable material	Commonly used as a synonym for fissile material, the meaning of this term has been extended to include material that can be fissioned by fast neutrons, such as uranium-238.

Fusion reaction	A reaction in which at least one heavier, more stable nucleus is produced by the combination of two lighter, less stable nuclei. Reactions of this type are responsible for enormous releases of energy, for example, the heat from the sun.
Gamma radiation	High-energy, short wavelength, electromagnetic radiation emitted from the nucleus of an atom. Gamma radiation frequently accompanies the emission of alpha and beta particles and always accompanies fission. Gamma rays are very penetrating and are best stopped or shielded by dense materials, such as lead or uranium. Gamma rays are similar to x rays.
Gaseous Diffusion Plant	A facility where uranium hexafluoride gas is filtered, uranium-235 is separated from uranium-238, increasing the percentage of uranium-235. The process requires enormous amounts of electric power.
Geiger-Mueller counter	A radiation detection and measuring instrument. It consists of a gas-filled tube containing electrodes, between which there is an electrical voltage, but no current flowing. When ionizing radiation passes through and ionizes the gas within the tube, a short, intense pulse of current passes from the negative electrode to the positive electrode and is measured or counted. The number of pulses per second is an indication of the rate at which ionizing events are occurring within the tube. It was named for Hans Geiger and W. Mueller, who invented it in the 1920s. It is sometimes called simply a Geiger counter or a G-M counter, and is the most commonly used portable radiation instrument.
Gray (Gy)	The new international system (SI) unit of radiation dose expressed in terms of absorbed energy per unit mass of tissue. The gray is the unit of absorbed dose and has replaced the rad. 1 gray = 1 Joule/kilogram and also equals 100 rad.
Half-life	The time in which one half of the atoms of a particular radioactive substance disintegrates into another nuclear form. Measured half-lives vary from millionths of a second to billions of years. Also called physical or radiological half-life
Half-life, biological	The time required for the body to eliminate, by biological processes, one half of the material originally taken in.

Half-life, effective	The time required for a radionuclide contained in a biological system, such as a human or an animal, to reduce its activity by one-half as a combined result of radioactive decay and biological elimination.
Health physics	The science concerned with the recognition, evaluation, and control of health hazards to permit the safe use and application of ionizing radiation.
High-enriched uranium	Uranium enriched to 20 percent or greater in the isotope uranium-235.
High-level waste	High-level radioactive waste (HLW) means (1) irradiated (spent) reactor fuel; (2) liquid waste resulting from the operation of the first cycle solvent extraction system, and the concentrated wastes from subsequent extraction cycles, in a facility for reprocessing irradiated reactor fuel; and (3) solids into which such liquid wastes have been converted. HLW is primarily in the form of spent fuel discharged from commercial nuclear power reactors. It also includes some reprocessed HLW from defense activities, and a small quantity of reprocessed commercial HLW.
High Radiation Area	Any area with dose rates greater than 100 millirems (1 millisievert) in one hour 30 centimeters from the source or from any surface through which the ionizing radiation penetrates. Areas at licensee facilities must be posted as "high radiation areas" and access into these areas is maintained under strict control.
Isotope	One of two or more atoms with the same number of protons, but different numbers of neutrons in their nuclei. Thus, carbon-12, carbon-13, and carbon-14 are isotopes of the element, carbon, the numbers denoting the mass number of each isotope. Isotopes have very nearly the same chemical properties, but often have different physical properties. For example, carbon-12 and carbon-13 are stable; carbon-14 is unstable, that is, it is radioactive.
Kilo-	A prefix that multiplies a basic unit by 1,000 or $10^3$ .
Low-level waste	Low-level radioactive waste (LLW) is a general term for a wide range of wastes. Industries, hospitals and medical, educational, or research institutions; private or government laboratories; and nuclear fuel cycle facilities (e.g., nuclear power reactors and fuel fabrication plants) using radioactive materials generate low-level wastes as part of their normal operations. These wastes are generated in many physical and chemical forms and levels of contamination.

Mega-	A prefix that multiplies a basic unit by 1,000,000 or $10^6$ .
Megacurie	One million ( $10^6$ ) curies.
Micro-	A prefix that divides a basic unit into one million parts ( $10^{-6}$ ).
Microcurie	One millionth ( $10^{-6}$ ) of a curie.
Mill tailings	Naturally radioactive residue from the processing of uranium ore into yellowcake in a mill. Although the milling process recovers about 93 percent of the uranium, the residues, or tailings, contain several naturally-occurring radioactive elements, including uranium, thorium, radium, polonium, and radon.
Milli-	A prefix that divides a basic unit by 1,000.
Millirem	One thousandth of a rem. ( $1 \text{ mrem} = 10^{-3} \text{ rem}$ )
Molecule	A group of atoms held together by chemical forces. A molecule is the smallest unit of a compound that can exist by itself and retain all of its chemical properties.
Nano-	A prefix that divides a basic unit by one billion ( $10^{-9}$ ).
Nanocurie	One billionth ( $10^{-9}$ ) of a curie.
Natural uranium	Uranium as found in nature. It contains about 0.7 percent uranium-235, 99.3 percent uranium-238, and a trace of uranium-234.
Neutron	An uncharged elementary particle with a mass slightly greater than that of the proton, and found in the nucleus of every atom heavier than hydrogen.
Neutron capture	The process in which an atomic nucleus absorbs or captures a neutron.
Noble gas	A gaseous chemical element that does not readily enter into chemical combination with other elements. An inert gas. Examples are helium, argon, krypton, xenon and radon.
Non-stochastic effect	Health effects, the severity of which vary with the dose and for which a threshold is believed to exist. Non-stochastic effects generally result from the receipt of a relatively high dose over a short period of time. Skin erythema (reddening) and radiation-induced cataract formation is an example of a non-stochastic effect. This term has been replaced with Deterministic Effect.

Nuclear energy	The energy liberated by a nuclear reaction (fission or fusion) or by radioactive decay.
Nuclear force	A powerful short-ranged attractive force that holds together the particles inside an atomic nucleus.
Nuclear power plant	An electrical generating facility using a nuclear reactor as its power (heat) source.
Nucleus	The small, central, positively charged central core of an atom. Except for the nucleus of ordinary (light) hydrogen, which has a single proton, all atomic nuclei contain both protons and neutrons. The number of protons determines the total positive charge, or atomic number, which in turn determines the chemical element that a given atom represents. That is to say, all atoms of a given chemical element have the same number of protons in their nuclei. The total number of neutrons and protons is called the mass number.
Nuclide	A general term that refers to any known isotope, either stable or unstable, of any element. Whereas a single element can have isotopes, when referring to the isotopes of more than one element, the proper term is nuclide. A radionuclide is an unstable nuclide.
Parent	A radionuclide that upon radioactive decay or disintegration yields a specific nuclide (the decay product or daughter).
Periodic Table	An arrangement of chemical elements in order of increasing atomic number. Elements of similar properties are placed one under the other, yielding groups or families of elements. Within each group, there is a variation of chemical and physical properties, but in general, there is a similarity of chemical behavior within each group. See an online periodic table.
Personnel monitoring	The use of portable survey meters to determine the presence or amount of radioactive contamination on an individual, or the use of a dosimeter to determine an individual's radiation dose.
Photon	A quantum (or packet) of energy emitted in the form of electromagnetic radiation. Gamma rays and x rays are examples of photons.
Pico-	A prefix that divides a basic unit by one trillion ( $10^{-12}$ ).
Picocurie	One trillionth ( $10^{-12}$ ) of a curie.

Plutonium (Pu)	A heavy, radioactive, man-made metallic element with atomic number 94. Its most important isotope is fissile plutonium-239, which is produced by neutron irradiation of uranium-238, followed by a two-step decay. It exists in only trace amounts in nature.
Pocket dosimeter	A small ionization detection instrument worn by an individual that directly measures the ionizing radiation exposure.
Proportional counter	A radiation instrument in which an electronic detection system receives pulses that are proportional to the number of ions formed in a gas-filled tube by ionizing radiation.
Proton	An elementary nuclear particle located in the nucleus of an atom. The proton has a single positive electric charge.
Quality factor	The factor by which the absorbed dose (rad or gray) must be multiplied to obtain a quantity that expresses, on a common scale for all ionizing radiation, the biological damage (rem or sievert) to the exposed tissue. It is used because some types of radiation, such as alpha particles, are more biologically damaging to live tissue than other types of radiation when the absorbed dose from both is equal. The term, quality factor, has now been replaced by “radiation weighting factor” in the latest system of recommendations for radiation protection.
Rad	The original unit developed for expressing absorbed dose, which is the amount of energy from any type of ionizing radiation (e.g., alpha, beta, gamma, neutrons, etc.) deposited in any medium (e.g., water, tissue, air). A dose of one rad is equivalent to the absorption of 100 ergs (a small but measurable amount of energy) per gram of absorbing tissue. The rad has been replaced by the Gray in the SI system of units (100 rad = 1 gray).
Radiation, nuclear	Particles (alpha, beta, neutrons) or photons(gamma) emitted from the nucleus of unstable radioactive atoms as a result of radioactive decay.
Radiation area	Any area with radiation levels greater than 5 millirems (0.05 millisievert) in one hour at 30 centimeters from the source or from any surface through which the radiation penetrates.
Radiation detection instrument	A device that detects and displays the characteristics of ionizing radiation.

Radiation sickness (syndrome)	The complex of symptoms characterizing the disease known as radiation injury, resulting from excessive exposure (greater than 200 rads or 2 gray) of the whole body (or large part) to ionizing radiation. The earliest of these symptoms are nausea, fatigue, vomiting, and diarrhea, which may be followed by loss of hair (epilation), hemorrhage, inflammation of the mouth and throat, and general loss of energy. In severe cases, where the radiation exposure has been approximately 1,000 rad (10 gray) or more, death may occur within two to four weeks.
Radiation source	Usually a sealed source of radiation used in teletherapy and industrial radiography, as a power source for batteries (as in use in space craft), or in various types of industrial gauges. Machines, such as accelerators and radioisotope generators, and natural radionuclides may be considered sources.
Radiation standards	Dose and dose rate limits, permissible concentrations, rules for handling, regulations for transportation, regulations for industrial control of radiation, and control of radioactive material established by legislative or regulatory means for the safe use and application of ionizing radiation.
Radiation warning symbol	An officially prescribed symbol (a magenta or black trefoil) on a yellow background that must be displayed where certain quantities of radioactive materials are present or where certain doses of radiation could be received.
Radiation Weighting Factor	The factor by which the absorbed dose (rad or gray) must be multiplied to obtain a quantity that expresses, on a common scale for all ionizing radiation, the biological damage (rem or sievert) to the exposed tissue. It is used because some types of radiation, such as alpha particles, are more biologically damaging to live tissue than other types of radiation when the absorbed dose from both is equal. This replaces the term quality factor in the latest system of recommendations for radiation protection.
Radioactive contamination	Deposition of radioactive material in any place where it is not wanted.

Radioactive series	A succession of nuclides, each of which transforms by radioactive disintegration into the next until a stable nuclide results. The first member is called the parent, the intermediate members are called decay (or daughter) products, and the final stable member is called the end product.
Radioactivity	The process of undergoing the transformation of an unstable nucleus by the spontaneous emission of radiation, generally alpha or beta particles, often accompanied by gamma rays, from the nucleus of an unstable radionuclide. Often used also to express the rate at which radioactive material emits radiation. Measured in units of becquerels in the SI system of units or Curies in the traditional system of units.
Radiography	The making of a shadow image on photographic film by the action of ionizing radiation.
Radioisotope	An unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation. Approximately 5,000 natural and artificial radioisotopes have been identified.
Radiological survey	The evaluation of the radiation hazards accompanying the production, use, or existence of radioactive materials under a specific set of conditions. Such evaluation customarily includes a physical survey of the disposition of materials and equipment, measurements or estimates of the levels of radiation that may be involved, and a sufficient knowledge of processes affecting these materials to predict hazards resulting from expected or possible changes in materials or equipment.
Radiology	That branch of medicine dealing with the diagnostic and therapeutic applications of radiant energy, including x-rays and radioisotopes.
Radionuclide	A radioisotope.
Radiosensitivity	The relative susceptibility of cells, tissues, organs, organisms, or other substances to the injurious action of radiation.
Radium (Ra)	A radioactive metallic element with atomic number 88. As found in nature, the most common isotope has a mass number of 226. It occurs in minute quantities associated with uranium in pitchblende, camotite, and other minerals.
Radon (Rn)	A radioactive element that is one of the heaviest gases known. Its atomic number is 86. It is a daughter of radium and thorium.

Reference man	A person assumed to have the anatomical and physiological characteristics of an average individual. These assumed characteristics are used in calculations assessing internal dose (also may be called "Standard Man").
rem	(Roentgen Equivalent Man) - a unit in the traditional system of units that measures the effects of ionizing radiation on humans.
Scattered radiation	Radiation that, during its passage through a substance, has been changed in direction. It may also have been modified by a decrease in energy. It is one form of secondary radiation.
Scintillation detector	The combination of phosphor, photomultiplier tube and associated electronic circuits for counting light emissions produced in the phosphor by ionizing radiation.
Sealed source	Any special nuclear material or byproduct encased in a capsule designed to prevent leakage or escape of the material.
Shielding	Any material or obstruction that absorbs radiation and thus tends to protect personnel or materials from the effects of ionizing radiation.
Sievert (Sv)	The international system (SI) unit for dose equivalent equal to 1 Joule/kilogram. The sievert has replaced the rem. One sievert is equivalent to 100 rem.
Somatic effects of radiation	Effects of radiation limited to the exposed individual, as distinguished from genetic effects which may affect subsequent unexposed generations.
Source material	Uranium or thorium, or any combination thereof, in any physical or chemical form or ores which contain by weight one-twentieth of one percent (0.05%) or more of: (1) uranium, (2) thorium or (3) any combination thereof. Source material does not include special nuclear material.
Special nuclear material	Includes plutonium, uranium-233, or uranium enriched in the isotopes uranium-233 or uranium-235.
Stable isotope	An isotope that does not undergo radioactive decay.
Stochastic effects	Effects that occur by chance, and which may occur without a threshold level of dose, whose probability is proportional to the dose and whose severity is independent of the dose. In the context of radiation protection, the main stochastic effect is cancer.

Survey meter	Any portable radiation detection instrument especially adapted for inspecting an area or individual to establish the existence and amount of radioactive material present.
Terrestrial radiation	The portion of the natural background radiation that is emitted by naturally occurring radioactive materials, such as uranium, thorium, and radon in the earth.
Thermoluminescent dosimeter	A small device used to measure the radiation dose by measuring the amount of light emitted from a crystal in the detector when the crystal is heated after being exposed to the radiation.
Tritium	A radioactive isotope of hydrogen. Tritium contains one proton and two neutrons in its nucleus. Because it is chemically identical to the natural hydrogen atoms present in water, tritium can easily be taken into the body by ingestion. It decays by beta emission and has a radioactive half-life of about 12.5 years.
Ultraviolet	Electromagnetic radiation with a wavelength ranging from violet within the visible spectrum to low energy x rays.
Unstable isotope	A radioactive isotope.
Uranium	A radioactive element with the atomic number 92 and, as found in natural ores, an atomic weight of approximately 238. The two principal natural isotopes are uranium-235 (0.7 percent of natural uranium), which is fissile, and uranium-238 (99.3 percent of natural uranium), which is fissionable by fast neutrons. Natural uranium also includes a minute amount of uranium-234.
Uranium fuel fabrication facility	A facility that (1) manufactures reactor fuel containing uranium for any of the following (i) preparation of fuel materials; (ii) formation of fuel materials into desired shapes; (iii) application of protective cladding; (iv) recovery of scrap material; and (v) storage associated with such operations; or (2) conducts research and development activities.
Uranium hexafluoride production facility	A facility that receives natural uranium in the form of ore concentrate; enriches it, either by gaseous diffusion or gas centrifuge methods; and converts it into uranium hexafluoride (UF <sub>6</sub> ).

Waste, radioactive	Solid, liquid, and gaseous materials from nuclear operations that are radioactive or become radioactive and for which there is no further use. Wastes are generally classified as high-level (having radioactivity concentrations of hundreds of thousands of curies per gallon or foot), low-level (in the range of 1 microcurie per gallon or foot), or intermediate level (between these extremes).
Weighting factor ( $W_T$ )	A multiplier that is used for converting the equivalent dose to a specific organ or tissue into what is called the "effective dose." The goal of this process was to develop a method for expressing the dose to a portion of the body in terms of an equivalent dose to the whole body that would carry with it an equivalent risk in terms of the associated fatal cancer probability. It applies only to the stochastic effects of radiation.
Well-logging	A technique used in oil and gas exploration to help predict the commercial viability of new or existing wells. It involves lowering a well-logging tool, including a sealed source of radioactive material, into a well on a wire. This device sends data on the well's underground characteristics to the surface, where it is plotted on a chart.
Whole-body counter	A device used to identify and measure the radioactive material in the body of human beings and animals. It typically uses heavy shielding to keep out background radiation and ultrasensitive radiation detectors and electronic counting equipment.
Whole-body exposure	An exposure of the body to radiation, in which the entire body, rather than an isolated part, is irradiated. Where a radioisotope is uniformly distributed throughout the body tissues, rather than being concentrated in certain parts, the irradiation can be considered as whole-body exposure.
Wipe sample	A sample made for the purpose of determining the presence of removable radioactive contamination on a surface. It is done by wiping, with slight pressure, a piece of soft filter paper over a representative type of surface area. It is also known as a "swipe or smear" sample.
X rays	Penetrating electromagnetic radiation having a range of wavelengths (energies) that are similar to those of gamma photons. X rays are usually produced by excitation of the electron field around certain nuclei. Although once formed, there is no difference in x rays and gamma photons, however, there is a difference in their origin. X rays are produced by shifts in the electrons between the rings outside the nucleus of an atom whereas gamma photons are produced by reactions within the nucleus of an atom