



Glossary of Technical Terms

Looking for a word or term that's not here? Send an e-mail to N/A with the term(s) you would like to see added to the Glossary.

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[yield](#)

The energy released by a nuclear explosion.

[WVDP](#)

West Valley Demonstration Plant, the name of the vitrification plant for high-level radioactive wastes at West Valley, New York.

[tritium](#)

A radioactive isotope of hydrogen whose nucleus contains one proton and two neutrons.

[TNT equivalent](#)

The weight of TNT which would release the same amount of energy as a particular nuclear explosion. One ton of TNT releases approximately 1.2 billion calories (that is, 5.1 kilojoules per gram). Nuclear explosions are usually measured in kilotons (KT) or megatons (MT).

[ton](#)

A metric ton is 1,000 kilograms. This is approximately 2,200 pounds, and very nearly equal to a British ton (2,240 pounds). The U.S. ton is 2,000 pounds.

[thermonuclear weapon](#)

A nuclear weapon that gets a large part of its explosive power from fusion reactions.

[sub-critical reactor](#)

A nuclear reactor that is configured to operate with an external source of neutrons to supplement internally generated neutrons to maintain the chain reaction.

[spontaneous fission](#)

The spontaneous splitting of the nucleus into two new nuclei, generally with the emission of one or more neutrons and the release of energy.

[sievert](#)

A unit of equivalent absorbed dose equal to 100 rems.

[specific activity](#)

A measure of the radioactivity of a unit weight (generally one gram) of material.

[source term](#)

The amount of a specific pollutant emitted or discharged to a particular medium, such as the air or water, from a particular source.

[solubility](#)

The ability to dissolve in water. For instance, the less soluble a given amount of material, the more difficult it is for the body to remove it. An insoluble material inhaled into the lungs for example would have more time to do damage to the lungs.

[roentgen](#)

A unit of gamma radiation measured by the amount of ionization in air. In non-bony biological tissue 1 roentgen delivers a dose approximately equal to 1 rad.

[reprocessing](#)

The chemical separation of irradiated nuclear fuel into uranium, plutonium, and fission products.

[rem](#)

A unit of equivalent absorbed dose of radiation, taking account of the relative biological effectiveness of the particular radiation. The dose in rems is the dose in rads multiplied by the RBE.

[relative risk](#)

The ratio of disease incidence (or mortality) in an exposed population to that in an unexposed population.

[relative biological effectiveness \(RBE\)](#)

A factor that is used to express the relative amount of biological change caused by a unit of energy deposited by a particular type of ionizing radiation into a specific part of the body. The RBE is complex and organ-specific. Due to its complexity, a simple parameter, called the quality factor, is



applied to different [...]

[radionuclide](#)

any radioactive isotope.

[radioactivity](#)

The spontaneous discharge of radiation from atomic nuclei. This is usually in the form of beta or alpha radiation, together with gamma radiation. Beta or alpha emission results in transformation of the atom into a different element, changing the atomic number by +1 or -2 respectively.

[rad](#)

A unit of absorbed dose of radiation defined as deposition of 100 ergs of energy per gram of tissue. It amounts to approximately one ionization per cubic micron.

[proton](#)

An elementary particle with a positive electric charge and a mass that is given the value 1 on the scale of atomic weights.

[positron](#)

An elementary particle with a positive electric charge, but in other respects identical with an electron.

[plutonium](#)

A highly toxic, heavy, radioactive metallic element. There are 15 isotopes of plutonium, of which only five are produced in significant quantities: plutonium-238, -239, -240, -241, and -242. Plutonium-239 is the most important plutonium isotope as it is fissile and is used in nuclear weapons and some reactors. On the other hand, plutonium-240 is unsuitable [...]

[photon](#)

The indivisible unit, or quantum, of electro-magnetic radiation. The energy of the photons determines the nature of the radiation, from radio waves at the lowest energy levels, up through infra-red, visible, and ultra-violet light, to X-or gamma-rays, which have energy high enough to ionize atoms.

[pathway analysis](#)

An analysis of the ways in which toxic or radioactive substances can reach human beings from a factory, place, or process in which they are made, used, stored or dumped via air, water, soil, the food chain, or some combination of these pathways.

[nucleus](#)

The nucleus of an atom is the central core that comprises almost all the weight of the atom. All atomic nuclei (except H-1, which has a single proton) contain both protons and neutrons.

[neutron](#)

An elementary particle slightly heavier than a proton, with no electric charge. Free neutrons are unstable, decaying into protons and electrons with a half-life of about 12 minutes.

[Neutral atoms](#)

Atoms that bear no net electrical charge because their negative and positive charges (electrons and protons, respectively) are exactly balanced. At temperatures such as those occurring on Earth, atoms of elements are neutral.

[NPT](#)

The nuclear Non-Proliferation Treaty.

[MOX](#)

A fuel composed of a mixture of plutonium dioxide and uranium dioxide.

[mill tailings](#)

A slurry of about 40 percent solids (including radioactive particles and chemically hazardous



metals) and 60 percent liquid, primarily water.

[micron](#)

One one-millionth of a meter.

[metric ton](#)

1,000 kilograms or about 2,204 pounds. The usual U.S. ton measurement, called a short ton, is 2,000 pounds.

[mass number](#)

The sum of the number of protons and the number of neutrons in a nucleus.(symbolized A)

[linear energy transfer \(LET\)](#)

Refers to the rate of energy transfer (and thus damage) per unit at distance travelled. For example, alpha is high-LET radiation, while photons and electrons are low-LET radiation.

[low-level radioactive waste](#)

A catch-all category of waste defined by U.S. law as all wastes that are not in other categories such as “high-level” waste and mill tailings; radioactivity of “low-level” wastes varies widely and includes both short- and long-lived isotopes.

[LEU](#)

Low enriched uranium.

[light water reactor](#)

The most common type of nuclear reactor in the world. Uses light water (ordinary water) as a moderator (to slow down neutrons in the reactor) and a coolant. Light water reactors are built in two variants: pressurized water reactors and boiling water reactors.

[kiloton \(KT\)](#)

In the context of nuclear weapons, this term, which means 1,000 tons, is always used as a measure of explosive power. It is equal to the explosive power of 1,000 tons of TNT.

[isotope](#)

Atoms of the same element that have the same number of protons (and hence the same chemical properties), but a different number of neutrons, and therefore, different atomic weights.

[ionize](#)

To strip one or more electrons from an atom or to break up a neutral molecule, thus leaving the parts as electrically charged particles.

[internal radiation dose](#)

The dose to the organs of the body from radioactive material that has entered the body through inhalation, ingestion, or through cuts and wounds. It may consist of any combination of alpha, beta, and gamma radiation caused by incorporated radioactive material. Internal dose also includes indirect ionization cause by neutrons traversing the body.

[induced radioactivity](#)

Radioactivity produced in any material as a result of nuclear reactions, especially by absorption of neutrons.

[HEU](#)

Highly enriched uranium.

[half-life](#)

The time in which half the atoms of a radioactive substance will have disintegrated, leaving half the original amount. Half of the residue will disintegrate in another equal period of time.

[gray](#)

A unit of absorbed radiation dose equal to 100 rads.

[gamma radiation](#)



High energy electromagnetic waves released during radioactive decay that can ionize atoms and split chemical bonds. Gamma rays are similar to X-rays, the latter term being applied usually to electromagnetic waves generated by electron accelerators, as for instance in medical equipment. Gamma, the third letter of the Greek alphabet, is written as γ .

[fusion](#)

The combining of two nuclei to form a heavier one. Fusion of the isotopes of light elements such as hydrogen or lithium gives a large release of energy.

[fission product](#)

Any isotope created by the fission of a heavy element. Fission products are usually radioactive.

[fission](#)

The splitting of the nucleus of an element into fragments. Heavy elements such as uranium or plutonium release energy when fissioned.

[fissile material](#)

A material consisting of atoms whose nuclei can be split when irradiated with low energy (ideally, zero energy) neutrons. Well-known examples are plutonium-239 and uranium-235.

[fast reactor](#)

A reactor that is designed to use fast neutrons for sustaining the nuclear chain reaction. Fast reactors can be used to produce more fissile material than they consume.

[external radiation dose](#)

The dose from sources of radiation located outside the body. This is most often from gamma rays, though beta rays can contribute to dose in the skin and other relatively superficial tissues.

[electron](#)

An elementary particle carrying one unit of negative electric charge. Its mass is 1/1837th that of a proton.

[effective dose equivalent \(EDE\)](#)

An equivalent dose to the whole body, calculated by multiplying the dose to a particular organ (or collection of organs) by a factor that allows a rough representation of equivalent whole body dose and hence the risk of radiogenic cancer.

[DWPF](#)

Defense Waste Processing Facility, the name of the vitrification plant for high-level radioactive wastes at the Savannah River Site.

[dose reconstruction](#)

Estimating exposure by considering emissions, environmental measurements, and routes of exposure.

[dose limit](#)

Regulatory limit set on the amount of radiation that an individual may receive from artificial sources (excluding medical sources). Worker limits are set higher than general population limits.

[depleted uranium](#)

A by-product of uranium enrichment, the most common chemical form of which is depleted uranium hexafluoride (DUF₆). Natural uranium is composed of three isotopes: uranium-238 (99.284 percent); uranium-235 (0.711 percent); and uranium-234 (0.005 percent), all of which are radioactive. The purpose of uranium enrichment is to concentrate uranium-235, the fissile isotope, in one stream. The [...]

[decommissioning](#)

Decontamination and dismantlement of retired, contaminated facilities and removal and/or disposal of the resulting wastes.



[decay correction](#)

The amount by which the calculated radioactivity (for example, of a release of radioisotopes) must be reduced after a period of time, to allow for its radioactive decay during that time.

[curie](#)

Unit of radioactivity equal to the radioactivity of 1 gram of radium -226. It is equal to 37 billion disintegrations per second.

[critical mass](#)

The amount of a fissile substance that will allow a self-sustaining chain reaction. The amount depends both on the properties of the fissile element and on the shape of the mass.

[calorie](#)

[cohort](#)

A group of individuals having a statistical factor (such as age) in common in a demographic or epidemiological study.

[burn-up](#)

The amount of energy that has been generated from a unit of nuclear fuel; usually measured in megawatt-days per metric ton of initial heavy metal.

[BTU](#)

British thermal unit. The amount of energy gained by a pound of water when its temperature is increased by one degree Fahrenheit.

[breeder reactor](#)

A reactor that is designed to produce more fissile material than it consumes; also sometimes called “fast reactor” since most breeder reactors use fast neutrons for sustaining the nuclear chain reaction.

[binding energy](#)

The energy that is required to separate the nucleons in a nucleus into separate, free particles.

[beta radiation](#)

Radiation consisting of beta particles, which are electrons or positrons (positively charged electrons), emitted by certain elements in the course of radioactive decay, at speeds approaching the speed of light. Beta, the second letter of the Greek alphabet, is written as β .

[calorie](#)

A unit of heat or energy sufficient to raise the temperature of 1 gram of water by 1 degree Celsius. In dietetics, the kilocalorie is the unit usually used, frequently called a “calorie,” omitting the prefix.

[beta particles](#)

Electrons or positrons (positively charged electrons) emitted by many elements in the course of radioactive decay.

[beta decay](#)

The emission of electrons or positrons (particles identical to electrons, but with a positive electrical charge) from the nucleus of an element in the process of radioactive decay of the element.

[becquerel](#)

A unit of radioactivity equal to one disintegration per second. It is an extremely small unit, equal to about 27 picocuries.

[atomic weight](#)

The nominal atomic weight of an isotope is given by the sum of the number of neutrons and



protons in each nucleus. The exact atomic weight differs fractionally from that whole number, because neutrons are slightly heavier than protons and the mass of the nucleus is also affected by the binding energy.

[atomic number](#)

(symbolized Z): The number of protons in a nucleus. It determines the chemical properties of an element.

[alpha particle](#)

The nuclei of a helium atom (with two neutrons and two protons each) that are discharged by radioactive decay of some heavy elements, including uranium-238, radium-226, and plutonium-239. Alpha, the first letter of the Greek alphabet, is written as α .

[alpha decay](#)

The emission of a nucleus of a helium atom from the nucleus of an element, generally of a heavy element, in the process of its radioactive decay.

[AEC](#)

Atomic Energy Commission, 1947-1974. Broken up in 1974 into the Energy Research and development administration (ERDA) and the Nuclear Regulatory Commission (NRC). ERDA later became the Department of Energy (DOE).

[ACRS](#)

Advisory Committee on Reactor Safeguards

[absorbed dose](#)

The amount of energy deposited in a unit weight of biological tissue. The units of absorbed dose are rad and gray.

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