

RADIOLOGICAL EMERGENCY MANAGEMENT GLOSSARY

Acute Exposure: Radiation exposure of short duration.

ALARA: Acronym for keeping radiation exposure "As Low As Reasonably Achievable."
Radioactive material users apply this concept in minimizing occupational and public exposure.

Alpha Particle: A positively charged particle ejected spontaneously from the nuclei of some radioactive elements. It is equal in mass and charge to a helium nucleus and has low penetrating power and short range. The most energetic alpha particle from radioactive decay will generally fail to penetrate the skin. Alphas are hazardous when an alpha-emitting nuclide is introduced into the body.

Atom: The smallest particle of an element that cannot be divided or broken up by chemical means. It consists of a central core called the nucleus which contains protons and neutrons. Electrons revolve in orbits in the region surrounding the nucleus.

Becquerel (Bq): The radioactivity unit of the international system of units. One becquerel equals one nuclear disintegration per second.

Beta Particle: A charged particle emitted from a nucleus during radioactive decay. The beta particle, with a mass equal to 1/1837 that of a proton, is similar to an electron. Large amounts of beta radiation may cause skin burns, and beta emitters are harmful if they enter the body. Beta particles from radioactive decay are easily stopped by a thin sheet of metal or plastic.

Blast Effect: A pulse of air in which the pressure increases sharply at the front, accompanied by winds, propagated from an explosion.

Boiling Water Reactor (BWR): A type of reactor system which allows water to boil directly in the reactor core to produce steam for the turbine generator.

Central Nervous System: The body's organ system that originates, sends, and receives electrical signals to control movement and action. Acute exposures of over 2,200 R cause death within hours by damage to this organ system.

Charge: The electrical characteristic of atomic particles. Positive charge is the opposite of negative charge. Neutral charge is the absence of charge.

Chronic Exposure: Radiation exposure occurring over long periods of time.

Containment: A structure found at nuclear power plants designed to contain any radioactive materials that may be released from the nuclear reactor fuel and cooling systems.

Contamination: Radioactive material spread on surfaces where it is not supposed to be.

Control Rod: A rod made of neutron absorbing material which, when inserted into a nuclear reactor, reduces the number of free neutrons available to cause the uranium atoms to fission.

Cooling Tower: A heat exchanger used to cool the water used to condense exhaust steam exiting the turbines of a power plant. Cooling towers transfer exhaust heat into the air instead of into a body of water.

Curie (Ci): The unit of radioactivity equal to 3.7×10^{10} disintegrations per second or 3.7×10^{10} becquerel.

Decay Heat: The heat generated by the radioactive decay of fission products.

Defense-in-Depth: The nuclear power plant design basis used to ensure maximum protection of the environment from an inadvertent release of fission products.

Deposition: Physical settling or placing of radioactive material onto a surface. Fallout may be deposited on surfaces. Material ingested or inhaled by an individual may be deposited in the lungs or other organs.

Dose: A general term denoting the quantity of radiation or energy absorbed. Dose may refer to absorbed dose, the amount of energy deposited per unit mass, or to equivalent dose, the absorbed dose adjusted for the relative biological effect of the type of radiation being measured.

Dose Rate: The radiation dose delivered per unit time.

Dosimeter: A portable device that measures total radiation dose received.

Electron: A small, negatively charged particle typically found surrounding an atom's nucleus.

Element: One of the approximately 107 known chemical substance that cannot be broken down further without changing its chemical properties. Some examples include hydrogen, nitrogen, gold, lead and uranium.

Emergency: An event which inflicts or threatens to inflict serious damage to property or people.

Energy Yield: The total effective energy released in a nuclear explosion.

Explosion: The rapid release of a large amount of energy within a limited space.

Exposure: A measurement of the total amount of radiation to which an individual is exposed related to the ionization produced in air by x-ray or gamma radiation. Similar to "dose."

Fallout: See "Radioactive Fallout."

Fission: The splitting of an atom resulting in the release of neutrons, energy, and two or more smaller atoms.

Fission Product: An atom produced through the splitting (fissioning) of a larger atom.

Fuel Assembly: A number of nuclear fuel rods grouped together.

Fuel Cladding: A long metal tube encasing the nuclear fuel rod. Cladding designed to prevent fission products which migrate from the nuclear fuel from escaping to the primary coolant system.

Fuel Pellet: A cylindrical pellet of nuclear fuel typically consisting of uranium dioxide.

Fuel Rod: A stack of cylindrical fuel pellets encased in fuel cladding.

Gamma Rays: High-energy, short wavelength electromagnetic radiation emitted from the nucleus. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best stopped or shielded against by dense materials such as lead or uranium. Gamma rays are similar to X rays, but are usually more energetic .

Gray (Gy): The absorbed radiation dose unit of the international system of units. One gray equals 100 rad.

Half-Life: The time in which half the atoms of a particular radioactive material disintegrate to another nuclear form. Measured half-lives vary from millionths of a second to billions of years. See "Radioactive Decay."

Ingestion: The term used when radioactive materials are taken into the body through the mouth, such as by eating or drinking. Also applies when breathing results in the inhaled materials being swallowed.

Inhalation: The term used when radioactive materials are taken into the lungs by breathing.

Initial Nuclear Radiation: Nuclear radiation emitted from the fireball and the cloud column during the first minute after a nuclear explosion.

Ionization: The process of adding one or more electrons to, or removing one or more electrons from, atoms or molecules, thereby creating ions. High temperatures, electrical discharges, or nuclear radiations are possible causes of ionization.

Kilo: The prefix used to designate one thousand.

Kiloton: An explosive force equivalent to that of 1,000 tons (907,000 kg) of TNT.

Label: A standard device or sign attached to the outside of a package of radioactive materials to identify the radiological hazards associated with it.

Mega: The prefix used to designate one million.

Megaton: An explosive force equivalent to that of 1,000,000 tons (907,000,000 kg) of TNT.

Meltdown: The melting of nuclear fuel.

Micro: The prefix used to designate one one-millionth.

Milli: The prefix used to designate one one-thousandth.

Neutron: A small particle possessing no electrical charge typically found within an atom's nucleus. Neutrons released by fission may strike nuclear fuel atoms causing additional fissions.

Nucleus: That part of an atom where neutrons and protons are located and in which the positive electrical charge and most of its mass is concentrated.

Nuclide: A general term applicable to all atomic forms of the elements. Nuclides are characterized by the number of protons and neutrons in the nucleus. There are 279 stable nuclides and about 500 unstable nuclides.

Particle: As related to nuclear radiation, a particle is a subatomic piece of matter with characteristic mass and charge. See "Alpha Particle," "Beta Particle," and "Neutron."

Placard: A standard device or sign attached to the outside of a vehicle to identify the hazards associated with the cargo.

Plume: An airborne cloud of radioactive gases or particles released from a nuclear power plant.

Pressurized Water Reactor (PWR): A type of reactor system which maintains cooling water at a very high pressure which prevents water from boiling in the reactor core during normal operation. Heat from the reactor is transferred to another system of water in a steam generator to provide steam for generating electricity.

Primary Coolant System: The combination of mechanical and electrical components which work together to maintain control of and cool the reactor.

Proton: A small particle typically found within an atom's nucleus which possesses a positive electrical charge.

Rad: An acronym for Radiation Absorbed Dose.

Radiation: The propagation of energy through space or through matter in the form of waves (e.g., electromagnetic waves) or particles (e.g., alpha, beta, or neutron radiation).

Radiation Absorbed Dose: The basic unit of dose of ionizing radiation. A dose of one rad means the absorption of 100 ergs of radiation energy per gram of absorbing material.

Radiation Sickness: The complex of symptoms resulting from excessive exposure of most of the body to ionizing radiation. The earliest visible 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 relatively large, death may occur within two to four weeks. Those who survive 6 weeks after the receipt of a single large dose of radiation will generally recover.

Radiation Survey Instrument: A portable battery-powered device used to detect and measure the dose rate at the spot where the instrument is held.

Radioactive Decay: The decrease in the amount of any radioactive material with the passage of time due to the spontaneous emission of alpha, beta, or gamma radiation from the nucleus.

Radioactive Fallout: Radioactive debris (including fission products) from a nuclear detonation, which is airborne or has been deposited on the earth.

Radioactive Material: Any material which spontaneously emits particulate or electromagnetic ionizing radiation.

Radioactivity: Spontaneous emission of alpha or beta particles or gamma radiation by unstable atoms.

Radionuclide: An unstable (radioactive) nuclide.

Range: As related to nuclear radiation, the typical distance which a type of radiation will travel before all of its energy is absorbed. The range of radiation may vary through different types of materials.

Reactor Cooling Water: The water which circulates through the primary cooling system of a nuclear power plant and provides cooling for the reactor core and core components.

Reactor Core: The heat source of a nuclear power plant consisting of a number of fuel assemblies grouped side-by-side.

Rem: An acronym for Roentgen Equivalent Mammal. The unit of dose of any type of ionizing radiation that produces the same biological effect as a unit of absorbed dose of ordinary X-rays.

Residual Nuclear Radiation: Nuclear radiation emitted from radioactive fallout which persists for some time following a nuclear explosion.

Roentgen (R): A unit of exposure to ionizing gamma radiation in air.

Shielding: Any material between a radiation source and a radiation receptor.

Shock Wave: See "Blast Effect."

Sievert (Sv): The radiation dose unit of the international system of units. One sievert equals 100 rem.

Specific Activity: The amount of radioactivity of a material per unit mass.

Steam Generator: The component used in a pressurized water reactor which transfers the heat generated in the primary system (by the reactor core) to the secondary cooling water and hence to the turbine.

Thermal Radiation: Electromagnetic radiation emitted from an explosion in the form of light and heat.

Thyroid Blocking Agent: A pill or liquid containing non-radioactive iodine which, when taken before or immediately after exposure to radioactive iodine, saturates the thyroid gland to prevent excessive uptake of radioactive iodine.

Time, Distance, Shielding: The three main ways to minimize exposure to radiation.

TNT: The flammable compound, trinitrotoluene, used as a high explosive.

Uranium: A type of atom used to fuel nuclear reactors due to its ability to undergo fission with a free neutron creating a nuclear chain reaction and resulting in heat.

X Rays: Penetrating electromagnetic radiation originating in the electron field of an atom. X-rays are similar in wavelength and frequency to gamma rays, which originate in the nucleus of an atom.

Yield: See "Energy Yield."