



Glossary

Alluvium - A general term for clay, silt, sand, gravel, or similar unconsolidated material deposited by a stream or other body of running water.

Aquifer - A permeable water-bearing unit of rock or sediment that yields water in a usable quantity to a well or spring.

Alpha Particle - A positively charged particle, identical to the nucleus of a helium-4 atom, consisting of two protons and two neutrons, emitted by uranium, daughter and heavier radionuclides. Though alpha particles cannot penetrate clothing, they are extremely damaging when taken internally.

Beta Particle - electron emitted in the radioactive decay of certain nuclides, such as strontium-90 and tritium. Beta particles can't penetrate heavy metal, but can cause skin cancer, and are harmful when taken internally.

Calcine - To heat (a substance) to a high temperature but below the melting or fusing point, causing loss of moisture, reduction or oxidation, and the decomposition of carbonates and other compounds.

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act. A federal law enacted in 1980 and amended in 1986 that governs the cleanup of hazardous, toxic, and radioactive substances. The Act and its amendments created a trust fund, commonly known as Superfund, to finance the investigation and cleanup of releases of hazardous substances. The 1986 amendments included provisions that require DOE and other federal agencies to clean up their facilities under Federal Facility agreements with EPA.

Cesium-137 (Cs) - Atomic number 55 with a half-life of 30 years. Its decay product, barium-137m, releases a high energy gamma ray. Recovered from high-level waste, cesium capsules are used in food irradiation devices.

Chelating Agents - Chemicals that strongly bond metals into chemical ring structures. Chelating agents are commonly used to facilitate decontamination of radioactive surfaces. Examples of chelating agents include EDTA (ethylenediamine tetraacetic acid), and TBP (Tributyl-n-phosphate).

Confining Unit (aquitards) - A rock or sediment unit of relatively low permeability that retards the movement of water in or out of adjacent aquifers.

Crib - Trenches filled with gravel and then covered with dirt. Typically waste is pumped into cribs via underground pipes.

Curie - A measure of the rate of radioactive decay. One curie is a large amount of radioactivity, equal to 37 billion radioactive disintegrations per second, which is the intensity of the radiation of 1 gram of radium.

D&D - Decontamination and Decommissioning

Depleted uranium (DU) - Uranium containing an abnormally low amount of the U-235 isotope, obtained from a gaseous diffusion plant where input uranium is separated into a product enriched in uranium 235 and depleted in uranium 235.

Downwinder - One who lives downwind of the Nevada Test Site. The term is now used in general for one who is downwind from a facility releasing radioactivity.

Dry cask storage - A method of storing radioactive waste in large, heavily shielded casks in engineered (man made) units. There are usually a number of casks stored in a single large concrete rack.

Fission - The splitting of a heavy nucleus into two approximately equal parts (which are nuclei of lighter elements); accompanied by the release of a relatively large amount of energy and generally two or more neutrons.

Fuel fabrication - Conversion of gaseous uranium into a solid form and fabricated into fuel rods for use in nuclear reactors.

Fuel Rod - Uranium fuel within a stainless steel tube used to drive a nuclear reactor.

Floodplain - The valley floor adjacent to a river, streambed or arroyo channel that may be inundated during high water.

French Drain - A dam-like barrier underground that stops the flow of contaminants in the groundwater. Groundwater will be pumped out of the ground to a nearby treatment building where collected VOCs will be destroyed and heavy metals and radioactive elements will be consolidated.

Gross Alpha - Total activity of all alpha-emitters measured in water or air

Half-Life - Time required for half of a radioactive substance to lose its activity. For example, in 29 years half of a given quantity of strontium-90 will decay away. In another 29 years only a quarter of the given quantity will remain. As a rule of thumb, ten half-lives are required for a substance to decay to "safe" levels.

Hazardous Life - The time required for a radioactive substance to become non-hazardous, defined here as the time for the radioactive concentration to reach 100 times maximum permissible concentration.

Hydrofracture - Hydraulic fractures are made by pumping fluids under great pressure down boreholes. Waste in cement form is then pumped into the enlarged fractures.

Hydrogeology - The branch of geology that deals with the occurrence, distribution, and effect of ground water.

Hydrology - The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Infiltration - The act or process of infiltrating, as if water into a porous substance, or of a fluid into the cells of an organ or part of the body.

Inflow - Sources of water flow into a groundwater system such as surface infiltration (recharge) or contributions from other sources.

High-level waste (HLW) - The waste product from reprocessing irradiated fuel or the irradiated fuel itself. Also called high-level radioactive waste.

Hydraulic conductivity - Takes into account the permeability of an aquifer, as well as the fluid being transmitted through the aquifer.

Krypton (Kr) - Atomic number 36. Krypton-85 is an inert gas and a beta-emitter with a half-life of 11 years.

Low-level waste (LLW) - Waste that contains radioactivity and is not classified as high-level waste, transuranic waste, spent nuclear fuel, or by-product material. Abbreviated LLW.

Maximum Permissible Concentration (MPC) - The amount of radioactive material in air, water, or food that would result in a dose of 100 millirems per year to the whole body, as given in Section II, Table B, of the Nuclear Regulatory Commission regulations, 10 CFR Part 20.

Microcurie - One millionth of a curie.

Millicurie (mCi) - One thousandth of one curie.

Mixed waste - Hazardous and radioactive waste mixed together.

Mixed low-level waste (MLLW) - Low-level waste determined to contain both a hazardous component subject to the Resource Conservation and Recovery Act (RCRA) and a radioactive component.

Nickel-63 (Ni) - Atomic number 28. Nickel-63 is a beta-emitter with a half-life of 100 years.

Nuclear Reactor - A device in which a controlled chain reaction is maintained, either for the purposes of experimentation, production of weapons grade fissionable material, or generation of electricity.

Permeability - Describes the ease or difficulty with which water passes through a given material. Permeable materials allow fluids to pass through readily, while less permeable materials inhibit the flow of fluids.

Perched aquifer - Groundwater separated from the underlying main body of ground water, or aquifer, by unsaturated rock.

Perched water - Water confined in a perched aquifer.

Percolate - To cause something to pass through a porous substance or small holes.

Picocurie (pCi) - One trillionth of a curie.

Pits/Triggers - Hollow plutonium spheres that ignite the powerful fusion explosion in a nuclear warhead.

Plutonium (Pu) - Atomic number 94. An element, made artificially, used to initiate a nuclear explosion.

Plutonium-238 - An alpha-emitter, with an 86-year half-life, used as a heat source in space satellites.

Plutonium-239 - Fissionable alpha-emitter with half-life 24,000 years, used to initiate a nuclear explosion.

Plutonium-240 - Non-fissionable alpha-emitter with half-life of 6,600 years; undesirable for chain reaction.

Plutonium-241 - Fissionable beta emitter with half-life 13 years.

Polychlorinated biphenyls (PCB) - A toxic chemical found in transformer oil.

Production Reactor - A nuclear reactor designed for turning one nuclide into another, usually natural uranium into plutonium, for the manufacture of nuclear weapons.

Porosity - The volume a rock or soil sample that consists of void space.

Radioactivity - Spontaneous emission of radiation due to changes in the nucleus of an atom.

RCRA - Resource Conservation and Recovery Act. A federal law enacted in 1976 to address the treatment, storage, and disposal of hazardous waste.

Reprocessing - The chemical process by which uranium and plutonium are separated from fission products for further use in new fuel fabrication or weapons production

Saltcrete - A mixture of concrete and radioactive waste residue from the vitrification process.

Springs - Places where groundwater seeps out at the land surface.

Strontium-90 - Atomic number 38. An intense beta emitter and major radionuclide in high-level waste. Half-life of 29 years.

Supernatant - Liquid radioactive waste, containing cesium primarily, lying above solids and sludge that have settled to the bottom of a high level waste tank.

Technetium-99 (Tc) - Atomic number 43. A beta-emitting fission product with a 210,000 year half-life. Found in gaseous diffusion plant piping.

Thorium (Th) - Atomic number 90. Thorium-230 has a half-life of 77,000 years. Thorium-232 has a half-life of 14 billion years. A daughter product in the uranium decay chain.

Trichloroethene/Trichloroethylene/TCE - A volatile organic compound widely used as an industrial degreaser and one of the most prevalent contaminants in the groundwater around DOE sites.

Tritium - A radioactive isotope of hydrogen with a nucleus of two neutrons and one proton. A beta emitter with a half-life of 12 years.

Uranium (U) - Atomic number 92. The heaviest natural element on the planet.

Uranium-233 - Half-life of 160,000 years. Uranium-233 is bred from thorium-232, and is fissionable.

Uranium-234 - Half-life 250,000 years.

Uranium-235 - Half-life 710 million years. About 0.7 percent of natural uranium is uranium-235. It and uranium-233 are fissionable.

Uranium-236 - Half-life of 25 million years. Created from uranium-235 by neutron bombardment.

Uranium-237 - Half-life 6.75 days.

Uranium-238 - Half-life 4.5 billion years, the predominant uranium isotope. Natural uranium is 99.3 percent uranium-238. Uranium-238 is converted to plutonium in nuclear reactors, by neutron bombardment.

Vadose Zone - Sometimes known as the saturated zone, this is the subsurface region that contains both air and water in soil and rock pores and extends down from the ground surface to the top of the water table.

Vitrification - Fusing radioactive waste into glass-like solids using heat and pressure. The resultant waste form is less soluble.

Volatile - Capable of becoming gaseous.

Volatile Organic Compounds (VOCs) - Compounds that have a high vapor pressure and low water solubility typically are industrial solvents, such as trichloroethylene and are common groundwater contaminants.

Water Table - The boundary between the unsaturated and the saturated zones.