

## **GLOSSARY**

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Atom	A particle of matter indivisible by chemical means -- the fundamental building block of the chemical elements.
Atomic number	The place occupied by an element in the Periodic Table of Elements. It is determined by the number of protons in the nucleus of an atom.
Blanket	A layer of uranium-238 or thorium-232, placed around the core of the reactor.
Boiling water reactor (BWR)	A light water reactor in which ordinary water, used both as a moderator and a coolant, is converted to high-pressure steam which flows through the turbine.
Breeder reactor	A reactor that produces more fissile fuel than it consumes. The new fissile material is created in the blanket by capture of neutrons from fission, a process known as breeding.
Burn-up	A measure of reactor fuel consumption. It is expressed as the amount of energy produced per unit weight of fuel in the reactor.
Candu	A reactor of Canadian design, which uses natural uranium as fuel and heavy water as moderator and coolant.
Centrifuge isotope separation	An enrichment process in which lighter isotopes are separated from heavier ones by means of ultra-high-speed centrifuges.
Chain reaction	A reaction that stimulates its own repetition. In a fission chain reaction, a fissionable nucleus absorbs a neutron and undergoes fission, releasing additional neutrons. These in turn can be absorbed by other fissile 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 non-fissile material or by escape from the system.
Cladding	The material (zirconium alloy or stainless steel) in which the fuel elements in a reactor are sheathed.
Control rod	A rod, plate, or tube containing a material that readily absorbs neutrons, used to control the power of a nuclear reactor. By absorbing neutrons, a control rod prevents the neutrons from causing further fission.

Conversion ratio	The ratio of the number of atoms of new fissile material produced in a reactor to the number of atoms of fissile fuel consumed.
Coolant	A substance circulated through a nuclear reactor to remove or transfer heat. Common coolants are light or heavy water, carbon dioxide and liquid sodium.
Core	The central portion of a nuclear reactor containing the fuel elements and usually the moderator, but not the reflector.
Critical mass	The smallest mass of fissile material that will support a self-sustaining chain reaction under stated conditions.
Criticality	The state of a nuclear reactor or weapon when it is sustaining a chain reaction.
Denaturing	The mixing of a fissile nuclide with an isotopic non-fissile nuclide so as to render the former unsuitable for nuclear weapons.
Deuterium (D or $^2\text{H}$ )	An isotope of hydrogen whose nucleus contains one neutron and one proton and is therefore about twice as heavy as the nucleus of normal hydrogen.
Doubling time	The time required for a breeder reactor to produce as much fissile material as the amount usually contained in its core plus the amount in its fuel cycle (fabrication, reprocessing, and so on).
Electron	An elementary particle with a single negative electrical charge. It is a constituent of all atoms.
Enrichment	A process by which the relative abundances of the isotopes of a given element are altered, thus producing a form of the element enriched in one particular isotope.
Fast breeder reactor	A reactor that operates with fast neutrons and produces more fissile material than it consumes.
Fissile material	A material fissionable by neutrons of all energies, especially thermal neutrons: for example, uranium-235 and plutonium-239.
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 one or more neutrons. Fission can occur spontaneously, but usually is caused by absorption of neutrons.

Fuel	Fissile material used or usable to produce energy in a reactor. Also applied to a mixture, such as natural uranium, in which only part of the atoms are fissile, if the mixture can be made to sustain a chain reaction.
Fuel cycle	The series of steps involved in preparation and disposal of fuel for nuclear power reactors. It includes mining, refining the ore, fabrication of fuel elements, their use in a reactor, chemical processing to recover the fissile material remaining in the spent fuel, re-enrichment of the fuel material, and refabrication into new fuel elements.
Fuel element	A rod, tube, plate, or other mechanical shape or form into which nuclear fuel is fabricated for use in a reactor.
Fuel reprocessing	The chemical processing of spent reactor fuel to recover the unused fissile material.
Fusion	The formation of a heavier nucleus from lighter ones (such as hydrogen isotopes), with the attendant release of energy.
Gaseous diffusion	A method of isotopic separation based on the fact that gas atoms or molecules with different masses will diffuse through a porous barrier (or membrane) at different rates. The method is used to separate uranium-235 from uranium-238.
Graphite	A form of pure carbon, used as a moderator in nuclear reactors.
Half-life	The time in which half of the atoms in a given amount of a specific radioactive substance disintegrate.
Heavy water	Water in which the ordinary hydrogen is replaced by deuterium.
Heavy water moderated reactor	A reactor that uses heavy water as its moderator. Heavy water is an excellent moderator and thus permits the use of natural uranium as a fuel.
Isotopes	Nuclides of the same chemical element but different atomic weight, that is with the same number of protons but different numbers of neutrons.
Jet nozzle enrichment method	Process of uranium enrichment based on pressure diffusion in a gaseous mixture of uranium hexafluoride and an additional light gas flowing at high speed through a nozzle along curved walls.

<b>Laser</b>	A device to produce a powerful beam of coherent monochromatic light.
<b>Laser enrichment method</b>	An isotope separation technique, in which uranium-235 atoms are selectively excited or ionized by lasers.
<b>Light water reactor (LWR)</b>	A reactor using slightly enriched uranium as fuel and ordinary water both as moderator and coolant.
<b>Load factor</b>	The ratio of energy actually produced to that which would have been produced in a given time had the reactor operated continuously at the rated capacity.
<b>London Club/ London Suppliers Club</b>	The group of countries which export nuclear facilities and which meet from time to time to devise guidelines for the supply of such facilities and materials.
<b>Magnox reactor</b>	An early version of the AGR, using natural uranium as fuel.
<b>Material unaccounted for (MUF)</b>	The difference in the amount of a fissile material entering a facility and that coming out. It is an indicator of the inherent uncertainty in fissile inventories.
<b>Megawatt electric (MW(e))</b>	The amount of power, in megawatts, generated by a reactor in the form of electricity.
<b>Megawatt thermal (MW(th))</b>	The amount of power, in megawatts, generated by a reactor in the form of heat.
<b>Moderator</b>	A material, such as ordinary water, heavy water, or graphite used in a reactor to slow down fast neutrons to thermal energies.
<b>Natural uranium</b>	Uranium as found in nature, containing 0.7 per cent of U-235, 99.3 per cent of U-238, and a trace of U-234.
<b>Neutron</b>	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.
<b>Non-weapon grade material</b>	A material containing fissile nuclides but at a concentration so low as to make it unsuitable for nuclear weapons.
<b>Nuclear energy</b>	The energy liberated by a nuclear reaction (fission or fusion) or by radioactive decay.

Nuclear power plant	Any device or assembly that converts nuclear energy into useful power. In such a plant, heat produced by a reactor is used to produce steam to drive a turbine that in turn drives an electricity generator.
Nuclear reactor	A device in which a fission chain reaction can be initiated, maintained, and controlled. Its essential component is a core with fissile fuel. It usually has a moderator, a reflector, shielding, coolant, and control mechanisms.
Nuclear waste	The radioactive products of fission and other nuclear processes in a reactor.
Nuclear weapons	A collective term for atomic (fission) bombs and hydrogen (thermonuclear) bombs. Any weapon based on a nuclear explosive.
Once-through cycle	A nuclear fuel cycle in which the spent fuel elements are not reprocessed for the purpose of recovering the fissile materials uranium-235 and plutonium-239.
Plutonium(Pu)	A radioactive, man-made, metallic element with atomic number 94. Its most important isotope is fissile plutonium-239, produced by neutron irradiation of uranium-238. It is used for reactor fuel and in weapons.
Pressurized water reactor (PWR)	A light water reactor in which the water serving a moderator and coolant is prevented from boiling by high pressure. It has a secondary circuit to produce steam to drive the turbine.
Radioactive decay	The gradual decrease in radioactivity of a radioactive substance due to nuclear disintegration, and its transformation into a different element. Also called radioactive disintegration.
Radioactivity	The spontaneous decay or disintegration of an unstable atomic nucleus.
Radioisotope	Radionuclide -- any nuclide which undergoes radioactive decay.
Separative work unit (SWU)	A measure of the work required to separate uranium isotopes in the enrichment process. It is used to describe the capacity of an enrichment plant.
Spent fuel element	Fuel element that has been removed from a reactor after several years of generating power.
Spiking	Methods of making plutonium less suitable for a nuclear explosive, or less accessible to diverters, by mixing it with other radioactive substances.

Tail assay	The percentage of uranium-235 left in the depleted uranium after passing through the enrichment plant.
Tailings	The uranium ore left after the extraction of the uranium in the milling plant.
Tamper	A material used to reflect the neutrons which would otherwise escape from the fuel assembly.
Thermal efficiency	The percentage of the total thermal energy that is converted into electrical energy in a nuclear power plant.
Thermal neutron	A neutron in thermal equilibrium with its surrounding medium. Thermal neutrons are those that have been slowed down by a moderator to an average speed of about 2200 metres per second (at room temperature) from the much higher initial speeds they had when expelled by fission.
Thermal reactor	A reactor in which thermal neutrons are used to produce fission.
Thorium (Th)	A naturally radioactive element with atomic number 90. The isotope thorium-232 can be transmuted to fissile uranium-233 by neutron irradiation.
Tritium (T or $^3\text{H}$ )	A radioactive isotope of hydrogen with two neutrons and one proton in the nucleus.
Uranium	See natural uranium
Weapon-grade material	A material with a sufficiently high concentration of the nuclides uranium-233, or uranium-235, or plutonium-239, to make it suitable for a nuclear weapon.
Yellowcake	A uranium compound consisting mainly of uranium oxide.