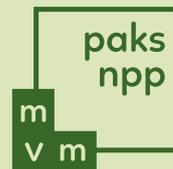




The most frequently used  
nuclear and technological terms



**Active core:** that volume of the reactor, where the chain reaction takes place.

**Base load power plant:** a highly utilized, continuously operating power plant providing a definitive amount of power for the electrical grid. A typical example is a nuclear power plant with low operating costs.

**Alpha-radiation:** highly ionizing radiation with a very short range (a few inches (cm) in air). Alpha radiation is in fact a flux of Helium nuclei travelling at high speed.

**Nuclear power plant:** a facility generating electricity (or more rarely thermal energy) by means of one or several nuclear reactors.

**Nucleus:** the “central” part of an atom, where the major part of the mass of the atom concentrates. Nuclei consist of protons and neutrons.

**Nuclear reactor:** a power generating equipment, wherein by controlled chain reaction a nuclear fission takes place. The generated power in form of heat energy is removed from the reactor by the coolant. The main types of nuclear reactors are: pressurized water, boiling water, heavy water and gas-cooled reactors.

**Refuelling machine:** a high precision, computer controlled equipment, used to move fuel assemblies from one place to another without manual handling.

**Beta-radiation:** a form of radiation with a fairly short range (but still longer than alpha-radiation) made up of high-speed electrons.

**Unit simulator:** a computer based equipment, used for simulation of time-based operation of a nuclear power plant unit. It has great significance in training the operating personnel.

**Unit control room:** working place for the personnel operating the reactor unit. Provides information to the operative personnel on the characteristics of technology processes, condition of technological and safety systems. Duties of staff working there include continuous monitoring of equipment operability and operational capabilities, termination of emergencies and the mitigation of the consequences.

**Peak load power plant:** a power plant providing power for the peak demand periods, therefore it is usually operated only for short periods of time. Power plants capable for such purpose are, for example, prompt start gas turbines or pumped-storage hydroelectric power stations.

**Decontamination:** the removal of radioactive materials from the surfaces of contaminated

equipment, floors, walls, tools or from the human body in order to reduce the effect of radiation impact.

**Dose:** the total amount of the absorbed ionizing radiation.

**Dose limit:** the maximum dose value set by law that a person may receive per unit time or under certain conditions. The annual limit of dose for persons working at radiation workplaces shall not exceed 50 mSv. The dose restraint voluntarily accepted by Paks NPP is 20 mSv/year.

**Half-life:** that period of time within the amount and - as a result - the activity of an isotope is halved due to radioactive decay. The half-life of different isotopes can vary from a fraction of a second to billions of years.

**Enrichment:** a complex and power-demanding process which increases the ratio of the uranium-235 isotope - which is present in only a very small percentage (0.7 %) in natural uranium. Most reactor types can only be operated with enriched uranium. (The fresh fuel of the reactors in Paks is enriched to 3.8-4.2 %.)

**Effective dose:** a rate of radiation considering not only the physical rate of the radiation but also its biological hazard as well. Its unit is mSv (millisievert).

**Electron:** an elementary particle with negative charge, having the mass approximately 1/2000 of a proton or a neutron. These particles are orbiting around the nucleus.

**Spent fuel:** Nuclear fuel, used in the nuclear reactors for 3-5 years, not suitable for further power generation economically. For its storage within the reactor hall the so-called spent fuel pool is used, a cooled tank with water containing boron. The spent fuel is stored in there for approximately 5 years, then it is transferred to the interim storage for spent fuel facility under monitored conditions.

**Occupational radiation exposure:** the amount of dose that workers receive in the course of their work.

**Fusion:** See Nuclear fusion!

**Fuel assembly, bundle:** the fuel rods containing the uranium fuel pellets are grouped together into assemblies and fuel is handled (moved) in these units.

**Gamma-radiation:** a high energy electromagnetic radiation with high penetration capability. The gamma radiation originates from different processes that take place in the nucleus.

**Fission:** See Nuclear fission!

**Fission products:** Generally two medium weight nuclei created by the fission of a heavy nucleus.

**Fission elements:** the nucleus of chemical elements which are capable of fission.

**Ionizing radiation:** a radiation that is capable of creating ions inside a substance when penetrating into it. The most important types of ionizing radiation are: alpha, beta, gamma, X-ray and neutron radiation.

**Isotope:** the isotopes of an element are its atoms with the same number of protons but different number of neutrons. Chemically, there is no difference between these atoms. The elements in nature are usually mixtures of their different isotopes.

**Burnup:** the process during which the number of uranium-235 isotopes is decreasing in the reactor fuel due to extensive fission. It does not mean chemical burning.

**Used fuel:** See Spent fuel!

**Condenser-cooling water:** water that circulates in the condenser pipes and cools the steam having performed work and leaving the turbines. It may originate from a river, sea, cooling lake or reservoir.

**Containment:** a hermetically pressurized structure incorporating the nuclear reactor, its directly linked elements and system components. Its function is to prevent or limit the release of radioactive materials into the environment during normal operations, anticipated operational events and design basis accidents. The containment of Paks NPP has a reinforced concrete box design.

**Environmental control:** its aim is to prove that under normal conditions the dose rate affecting public does not exceed authority dose limits and in nuclear emergency situations promptly forecasts the radiation exposure to facilitate the timely and effective implementation of protective measures. Since the installation of the power plant in 1982 different authorities carry out environmental control in coordinated manner within a 30 km radius, which is primarily based on the measurements of the environmental monitoring stations and samples taken from the environment.

**Slow neutron - fast neutron:** during the fission process fast neutrons are created. In order to initiate new fissions more effectively they need to be slowed down. This can be achieved by collisions in the moderating medium (the moderator at Paks NPP is water). Moderator is needed as only slow neutrons are capable to sustain the chain reaction.

**Localization (Bubbling) tower:** part of the containment, a passive pressure release system of the hermetic area. It contains water in high volume pools which condenses the steam released in case of primary circuit cooling loop rupture, thus preventing the escalation of pressure higher than acceptable.

**Nucleus energy:** energy that is released during reactions in the nucleus or nucleus transformations.

**Nuclear fusion (fusion):** a process, in course of which several light nuclei collide, forming heavier nuclei while releasing energy. This process accounts for the energy of the Sun and the hydrogen bomb.

**Nuclear fission:** separation of a heavy nucleus into two such fragments that have nearly identical mass. This process is usually accompanied by neutron radiation, gamma radiation, more rarely by the release of charged nucleus fragments. Fission is usually induced by a neutron that penetrates into the nucleus, but with very low probability, it may also occur spontaneously.

**Load following power plant:** load following power plants follow the fluctuation of energy demand by adjusting the power output. In Hungarian power system this task is usually performed by conventional thermal power plants.

**Moderator:** See Slow neutron - fast neutron!

**International Nuclear and Radiological Event Scale (INES):** a seven-grade international scale introduced by the International Atomic Energy Agency, ensuring unambiguous communication towards the media and the public regarding events, that took place at a nuclear power plant or other nuclear facilities. The scale defines 3 levels of incidents (anomaly, incident, serious incident) and 4 levels of accidents (accident with local consequences, accident with wider consequences, serious accident, major accident).

**Neutron:** a particle that has a mass equivalent of a proton, but with no charge, the second component of the nucleus besides proton.

**Nuclear chain reaction:** a series of reactions, within which reactions themselves create the conditions necessary for further reactions. In the nuclear power generation the fission chain reaction is of utmost importance, in course of which the neutrons generated during fission initiate further fissions.

**Nuclear fuel:** a material (usually uranium) capable for fission chain reaction, used as fuel for nuclear reactors, following appropriate technical alterations.

**Pressurized water reactor:** a reactor, in which the cooling medium of the primary circuit is

under such a pressure, where the water will not boil in spite of the high temperature (at Paks ~300 °C).

**Self-sustaining nuclear chain reaction:** such a nuclear chain reaction, in course of which the average number of the resulting reactions evoked by one reaction equals to one, thus the process sustains itself. From point of view of nuclear power generation the self-sustaining fission chain reaction is crucial

**Spent fuel pool:** See Used fuel!

**Primary circuit:** a system-group including the nuclear reactor, the circulating loops and pumps, the heat exchanger pipes of the steam generators and the pressurizer. Its main task is the nuclear-based steam generation, maintaining the definitive pressure and temperature conditions, and to prevent the release of the coolant into the environment.

**Proton:** a stable atomic particle with positive charge, a constitutive component of the nucleus.

**Radioactive materials:** materials containing nuclei capable to decay, therefore these materials emitting radiation permanently. These might be natural or artificial radioactive materials. Their decrease in amount and thus in intensity is characterized by their half-life.

**Radioactive decay:** such a spontaneous transformation of a nucleus, in course of which the unstable isotope releases a particle, energy or both to achieve a more stable status.

**Radioactive waste:** radioactive remnants of nuclear power utilization which can not be further utilized. By state of matter these wastes might be solid and liquid; by activity can be classified as low, medium or high level waste.

**Radioactivity:** the effort of unstable isotopes to achieve more stable condition by emission of particle and/or energy. The result of the process is often a new isotope or chemical element.

**Reactor hall:** an area containing a specified group of systems, equipment, and instruments required for the operation and maintenance of the nuclear reactor.

**X-ray:** an electromagnetic radiation which originates from processes in internal electron orbits of heavy atoms. It has a lot shorter wavelength (therefore higher energy) than visible light which is a product of processes in external orbits.

**Radiation accident:** such an extraordinary event related to the use of radioactive materials or ionizing radiation sources during which

operating personnel or other persons present in the vicinity receive radiation exposure exceeding the defined dose limits.

**Radiation sickness:** sickness resulting from extensive radiation exposure affecting the whole body or a greater part of it.

**Radiation infection:** it is a misleading expression, frequently used by the media. The expression of infection is incomprehensible in relation to the effects of radiation. Instead the following expressions may be used: “suffered radiation exposure”, “received high dose of radiation”, “was contaminated with radioactive material”.

**Radiation source:** an equipment or material emitting or capable of emitting ionizing radiation.

**Radiation gate monitor:** equipment designed to detect radioactive contamination on the hands, feet and clothing of persons. If the set values are exceeded the gate blocks trespassing while a light and sound alarm is activated.

**Radiation protection:** measures to counteract the adverse effects of ionizing radiation on humans.

**Control rod, Absorber assembly:** a rod (or assemblies in the case of the reactors at Paks), which contains neutron absorbing material, usu-

ally boron, raised or lowered in the active core of the reactor in order to modify the number of neutrons and thus the number of fissions, as a result the energy generation of the reactor.

**Secondary circuit:** a system-group including the feed-water side of the steam generator, the main steam system, the high and low pressure elements of the turbine, the condenser and the feed-water system. Its main task is to transform the energy of the steam into rotating movement energy, which will be the driving force of the turbines and the generator.

**Natural background radiation:** an ionizing radiation, present everywhere in nature and it is independent from any human activity. The most significant sources are the earth’s crust and the outer space.

**Natural uranium:** uranium with an isotope composition as found in nature. The overwhelming majority of natural uranium is uranium-238, and it contains only 0.7 % of uranium-235 suitable for nuclear energy production.

**Turbine hall:** a building containing a specified group of systems, equipment, and instruments required for the operation and maintenance of the turbine machine-groups.

**Refuelling:** replacement of spent fuel by fresh fuel in a reactor.

**Public Information and  
Visitor Centre  
Contact information:**

Telephone:

+36 75 508 833,

+36 75 507 432

E-mail:

uzemlatogatas@npp.hu

# Come, see, and understand!

**Opening times:**

Monday-Friday

**8.00–15.00 hours**

Saturday

**9.00–13.00 hours**



**MVM Paks Nuclear Power Plant Plc.**

Address: 7031 Paks, P.O.B. 71, Lot No: 8803/17

Central switchboard and fax:

+36 75 505 000; +36 1 355-1332

Website: [www.atomeromu.hu](http://www.atomeromu.hu)

Facebook:

[www.facebook.com/paksiatomeromu](http://www.facebook.com/paksiatomeromu)

