



[FRONT PAGE](#) / [MEDIA](#) / [GLOSSARY](#)

## Glossary

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### B

**BWR:** Boiling Water Reactor A reactor type in which the primary coolant boils in the reactor, resulting in the steam transferring energy directly from the reactor to the turbine. The Olkiluoto power plant reactors Olkiluoto 1 (OL1) and Olkiluoto 2 (OL2) are of the BWR type.

**Bentonite:** Type of natural swelling clay which has been generated through the transformation of volcanic ash. The special property of bentonite ash is its expansion as a result of water absorption.

**Burn-up:** Power yield of nuclear fuel per mass unit of uranium. The most common unit for burn-up is megawatt-day per kilogram of uranium [MWd/kgU].

### C

**Conservatism:** In impact assessment, conservatism means overestimating harmful effects and underestimating beneficial effects. A conservative assessment is pessimistic and cautious.

**Controlled area:** An area that is subject to access control and separate work instructions due to reasons related to radiation protection. Those working in the controlled area must have a personal dosimeter, protective suit and plant shoes or shoe covers.

### D

**Decommissioning:** The final stage of a nuclear facility's life span in which the activated systems and structures are removed and transported for final disposal, the buildings are dismantled and the area is landscaped.

**Decontamination:** Partial or full removal of radioactive substances on an object, material or person by means of an appropriate physical, chemical or biological process.

**Disposal technology:** Disposal technology is used to develop areas of the final disposal principle with the aim of transforming the final disposal concept into a final disposal system. Technical solutions aimed at ensuring the functionality of the final disposal system and its subsystems.

## E

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**EIA:** Environmental impact assessment. The EIA procedure specified in the Act on Environmental Impact Assessment Procedure is an element in the assessment of the safety and environmental impacts of final disposal in relation to the pertinent decision in principle pursuant to the Nuclear Energy Act.

**EPR:** European Pressurised water Reactor. The type of the Olkiluoto 3 (OL3) nuclear power plant.

**Engineered barrier system, EBS:** Engineered barrier systems include canisters, bentonite buffers surrounding canisters and filled tunnels, shafts, drillholes and other barrier structures that limit the travel of radionuclides.

## F

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**FSAR:** Final Safety Analysis Report, which is appended to the operating licence application. See also PSAR.

**Final disposal area:** The full area that has been analysed to be suitable for final disposal.

**Final disposal concept:** A concept-level draft solution for the long-term isolation of spent nuclear fuel from the geosphere and biosphere. E.g. KBS-3V and KBS-3H.

**Final disposal panel:** An individual, separately-closable element of the final disposal space formed by the final disposal tunnels and the portion of the central tunnel that connects them.

**Final disposal system:** The system that executes the final disposal concept. It consists of a combination of technical and natural systems. The safety case documentation must include a description of the final disposal system: quantities of radioactive materials, waste packaging, buffer materials, filler materials, isolation and barrier structures, excavated spaces, geological, hydrogeological, hydrochemical, thermal and rock mechanical properties of the surrounding bedrock, and the natural environment of the final disposal location.

**Fuel assembly:** The fuel assembly consists of a fuel bundle and fuel channel.

**Fuel bundle:** The bundle of fuel rods with added end parts at the top and bottom.

**Fuel channel shell:** The shell surrounding a fuel bundle.

**Fuel rod/pin:** A gas-tight pipe containing fuel pellets manufactured from uranium dioxide powder through a process of sintering.

## H

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**Handling cell:** A room in the encapsulation plant where the fuel elements are lifted from the transport cask, dried and installed in the canister.

**Hydrogeochemical model:** A modelled description of the chemical properties of the Olkiluoto groundwater and the processes that affect them.

**Hydrological model:** A modelled description of the physical properties of the Olkiluoto groundwater as well as its conditions and flow.

## I

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**Intermediate-level waste:** Waste generated during the operation and maintenance of a nuclear facility. The ion exchange resins used to clean process water are an example of intermediate-level waste.

## K

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**KBS-3:** A final disposal principle developed in Sweden and based on a multi-barrier principle. The acronym KBS comes from the Swedish compound word Kärnbränslesäkerhet, and the number 3 signifies the version.

**KBS-3V:** Vertical deposition solution, i.e. a final disposal concept following the KBS-3 principle, in which the canisters are placed in vertical deposition holes drilled into the bedrock. The letter V refers to the word 'vertical'.

## L

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**Layout adaptation:** Involves adapting and modifying the layout to the construction location. Adaptation and design of the layout are closely connected, which is why a distinction between them is not always possible.

**Low-level waste:** Waste generated during the operation and maintenance of a nuclear facility. Low-level waste includes used protective equipment and devices removed from the process.

## M

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**Monitoring:** Continuous or regular measurement of the radioactive or other parameters in the geosphere and biosphere, or determining the status of the final disposal system.

**Multi-barrier principle:** The implementation of final disposal in such a way that the radionuclides must penetrate multiple separate and consecutive barriers to break out of the waste package or component (e.g. canister) and contaminate nature.

## N

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**Nuclear facility:** The term refers to facilities used to produce nuclear energy (incl. research reactors), facilities intended for the large-scale final disposal of nuclear waste, and facilities used for the large-scale production, use, handling or storage of nuclear materials or nuclear waste.

**Nuclear material:** Nuclear materials and other substances, equipment, systems, data materials and agreements relevant to the non-proliferation of nuclear weapons, Nuclear Energy Act 2(1)(5) and 2(2)(1).

**Nuclear material (source material/special fissionable material):** The special fissionable materials and source materials suitable for generating nuclear energy, such as uranium, thorium and plutonium (Nuclear Energy Act, Section 3(2)).

**Nuclear waste:** Nuclear waste can be spent nuclear fuel, low or intermediate level waste or other nuclear material that cannot be reused by means of current methods.

**Nuclear waste facility:** The term refers to a nuclear facility used for the encapsulation of nuclear fuel or processing of other nuclear waste for final disposal, and to the final disposal facility for spent nuclear fuel or other nuclear waste. According to the current plans, Posiva will have two nuclear waste facilities.

## O

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**ONKALO®:** ONKALO® was originally constructed as an underground research space. Currently, the name ONKALO refers to the entirety of the final disposal facility. ONKALO® is a registered trademark.

**Operational waste:** Low and intermediate level waste generated during the operation and maintenance of a nuclear facility.

## P

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**PSAR:** Preliminary Safety Analysis Report. A document containing information about the facility's general design and implementation principles, a system-level description of the facility, safety analyses and an environmental impact report.

**PWR:** Pressurised Water Reactor. A light-water reactor type in which the primary coolant is maintained at a high pressure to prevent boiling, and the energy is transferred by means of water from the reactor to separate vaporisers.

## R

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**Radiation dose:** Radiation energy absorbed into the human body or a medium per unit of mass. The term usually refers to the effective dose for the whole body.

**Radioactive material:** A material in which the atomic nuclei decay by themselves over time, emitting ionising radiation. The term is also used to refer to mixtures containing radioactive material.

**Radionuclide:** A radioactive nuclide that transforms into another nuclide on its own, emitting ionising radiation in the process.

**Release barrier:** A component of the final disposal system intended to prevent the travel of radionuclides in the final disposal system. In a final disposal facility observing the multi-barrier principle, the release barrier is one of the facility's subsystems (e.g. canister, bentonite buffer or bedrock). The release barrier can also be referred to as an emission barrier. Also see the section on engineered barrier systems.

**Repository:** Spaces intended for the final disposal of waste packages – i.e. deposition tunnels and holes.

**Residual heat/decay heat:** The reactor's residual energy production following shutdown, or the thermal power produced by spent nuclear fuel removed from the reactor. The reason for the residual heat is that the fission products formed in the uranium fuel continue to decay and release energy.

## S

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**SKB:** Svensk Kärnbränslehantering AB. The Swedish Nuclear and Waste Management Company, SKB.

**STUK:** Radiation and Nuclear Safety Authority Finland. STUK is the Finnish safety authority that lays down requirements on the use of radiation and nuclear energy and monitors compliance with them. STUK studies radiation and its effects, assesses radiation risks and monitors the radiation safety of the living environment.

**Safeguards:** Nuclear material safeguards. Safeguarding measures to ensure that nuclear materials are used for peaceful purposes only.

**Safety case:** The term refers to all technological and scientific materials, analyses, observations, trials, tests and other proof used to justify the safety of final disposal and the reliability of the safety assessments. Posiva's safety case document is attached to the preliminary and final safety analysis report (PSAR and FSAR).

**Safety concept/strategy:** A conceptual idea and justifications indicating the limit values and compliant technical solutions that will ensure safe final disposal. In Posiva's case, this means an account of and justifications for the sufficient safety of final disposal in crystalline bedrock using the KBS-3 final disposal concept.

**Safety function:** The roles of primary release barriers (canister, bentonite buffer, deposition tunnel backfill, bedrock, barrier structures) in safe final disposal.

**Sievert, Sv:** Unit for an equivalent and effective dose. A value that indicates the statistical harmful effects of radiation (a radiation dose) on the human body. An equivalent dose is the product of the absorbed dose and radiation quality factor.

**Surface contamination:** Occurrence of radioactive substances on the surfaces of objects or structures.

**Swelling clay:** A naturally-occurring type of clay with a special characteristic that makes it expand upon water absorption (e.g. bentonite). Plans have been made to use swelling clay as a buffer material in the multi-barrier arrangement between the canister and bedrock, and as an element in the filler material for the repository spaces.

## T

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**Transport cask:** A purpose-built radiation-protected cask used to transport and store nuclear fuel. In addition to the radiation protection, the cask provides chemical, mechanical and thermal shielding during transport, handling and storage. The term transfer cask can also be used.

## U

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**Uncontrolled area:** An area or building section of the nuclear facility which requires no access monitoring for reasons related to radiation protection. Working in the area does not require protective equipment or a personal dosimeter.

**Uranium:** Element with the atomic number 92. Isotopes of uranium are used as fuel for nuclear reactors. In terms of nuclear fuel, the most important are the fissile isotopes of uranium, incl. U-233, U-235 and stable U-238. U-235 and U-238 occur in natural uranium.

## V

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**Vehicle access tunnel:** A driveway (ramp) from ground level to the final disposal depth at an inclination of 1:10.

## W

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**WWER reactor:** An originally Soviet (currently Russian) type of pressurised water reactor. The LO1 and LO2 reactors of the Loviisa power plant are of the WWER type.

## Y

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**YVL Guide:** An official procedure published by the Radiation and Nuclear Safety Authority, describing the requirement level of radiation and nuclear safety control. The safety requirements concerning the use of nuclear energy are described in the YVL Guides.

Posiva Oy is the leading  
final disposal operator  
in the world, preparing to start in 2020's the final disposal for  
spent nuclear fuel in the ONKALO® facility excavated deep  
in the bedrock.

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- ▶ Career
- ▶ Media
- ▶ Partners

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- ▶ Safety
- ▶ Encapsulation plant
- ▶ ONKALO
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