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Challenges in developing the basic design of the KBS-3 system into a qualified and industrially viable operation

The programmes for final disposal of spent nuclear fuel are similar in Sweden and Finland, and there has been extensive cooperation between the waste management organisations in the two countries over the years. Since both programmes now enter a stage of final design and implementation this cooperation will be deepened, aiming when possible for the same technical design.

The repositories in Sweden and Finland will be constructed according to the KBS-3 method. While a technically feasible reference design and layout is presented, detailed designs adapted to an industrialised process designed to fulfilling specific requirements on quality, cost and efficiency need still be developed. Also the repository layout needs to be adapted to the local conditions found when constructing the repository at depth.

The repository design must be such that it results in a safe repository. For these reason, and in accordance with regulations, both SKB and Posiva have developed design requirements and other conditions and presented these to the designer. However, the formulation of what requirements shall be put on design such that it meets long term safety is not trivial. Safety Assessment, usually studies a few specific designs, and would generally not say if there are other designs that may also lead to safety. It is also easy to formulate rules that would lead to safety, but are impossible to implement and verify. The design requirements developed typically concern specification on what mechanical loads the barriers must withstand, restrictions on the composition of barrier materials or acceptance criteria for the various underground excavations.

Essentially the detailed technical design need to be completed in time for the detailed design of the planned facilities in the KBS-3 repository system, i.e. the encapsulation plant, the facility for buffer and backfill bentonite component production and the underground repository. However, technology development support will also be needed during implementation and start operation of these facilities. A technology development plan spanning the time from now until the license to start operation has been developed. This plan aims for a common holistic view and understanding of what is needed to reach the target operating facilities and identifies the various development efforts needed in relation to the program plan for nuclear fuel program with regard to the time and resources.

Country/ int. organization

Sweden and Finland

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