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## Development of long-term safety requirements for an alternative design variant (KBS-3H) for spent fuel disposal

In 2012, Posiva Oy submitted a construction licence for a spent fuel disposal facility to be constructed at Olkiluoto, Finland. A safety case (TURVA-2012) was compiled to support the licence application. The disposal concept is based on the KBS-3V method, where the spent fuel canisters are emplaced individually in vertical deposition holes. Posiva Oy is also studying, in collaboration with its Swedish counterpart SKB, an alternative design variant, KBS-3H, where the canisters are emplaced horizontally in 100–300 m long deposition drifts. In order to compare these two alternatives, a safety case is being produced for the KBS-3H design. The main objective is to determine whether KBS-3H can be shown to fulfil the long-term safety requirements with the same level of confidence as for KBS-3V. To this end, long-term safety related requirements specific to the KBS-3H design are being defined following Posiva's requirements management system (VAHA). VAHA includes five levels of requirements spanning from legal and stakeholders' requirements (level 1) to safety functions for the individual barriers (level 2), performance targets (level 3), design requirements (level 4) and finally design specifications (level 5).

The level 1 requirements, since they stem from laws and regulations, are identical for both designs. At lower levels, the differences in the designs have an increasing effect on the details of the requirements and design specifications. The set of release barriers is partly different in the two designs, as are the types and dimensions of the emplacement areas and their construction methods. The development of the KBS-3H-specific requirements starts by defining the barriers of the KBS-3H system and assigning safety functions for the individual barriers. The safety functions will then give rise to performance targets, and subsequently to the more detailed requirements and specifications at lower levels. The safety case for KBS-3H will then evaluate whether the horizontal design fulfils these requirements.

The requirement definition includes interesting aspects related to the fact that KBS-3H is being developed since decades in parallel to the reference design KBS-3V and it includes several novel solutions and unique components not included in KBS-3V. The iteration among requirements formulation, safety assessment and design development is particularly visible in this project.

### Country/ int. organization

Finland

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