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Safeguards by Design at the Encapsulation Plant in Finland

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Finland has launched a spent fuel disposition project to encapsulate all of its spent fuel assemblies and confine the disposal canisters in a deep geological repository. The construction of the underground premises started several years ago with the drilling, blasting and reinforcement of tunnels and shafts to ensure the safe deep underground construction and disposal techniques in the repository, while the design of the encapsulation plant (EP) enters the licensing phase preliminary to its construction. The spent fuel assemblies, which have been safeguarded for decades at the nuclear power plants, are going to be transported to the EP, loaded into copper canisters and stored in underground tunnels where they become inaccessible after backfilling. Safeguards measures are needed to ensure that final spent fuel verification is performed before its encapsulation and that no nuclear material is diverted during the process. This is an opportunity for the inspectorates to have the infrastructure necessary for the safeguards equipment incorporated in the design of the encapsulation plant before licensing for construction occurs.

The peculiarity of this project is that it is going to run for more than a century. Therefore, significant changes are to be expected in the technical capabilities available for implementing safeguards (e.g. verification techniques and instruments), as well as in the process itself, e.g. redesign for the encapsulation of future fuel types. For these reasons a high degree of flexibility is required in order to be able to shift to different solutions at a later stage while minimizing the interference with the licensing process and facility operations. This paper describes the process leading to the definition of the technical requirements by IAEA and Euratom to be incorporated in the facility's design.

Country or International Organization

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