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## Spent nuclear fuel management after dry storage: fuel integrity and safe handling during fuel encapsulation

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In Switzerland, the spent nuclear fuel assemblies arising from the operation of the five NPPs are currently stored in pools at the NPP sites and, after a cooling period, are transferred to transport/storage casks which are then transported and stored in centralized dry interim storage facilities. The National Cooperative for the Disposal of Radioactive Waste (Nagra) has proposed deep geological disposal as the solution for the management of all radioactive waste. Pre-disposal activities, in particular for the spent fuel encapsulation facility and related unloading/loading and handling operations from the transport/storage casks into the final disposal canisters, are safety-relevant operations. Nagra therefore initiated several studies and RD&D activities aimed at assessing spent fuel mechanical performance, but also at developing concepts for handling of consequence scenarios. Concerning the RD&D program, the main objective of the investigations is to assess the response of spent fuel rods to mechanical stresses corresponding to normal conditions and accident scenarios by means of experiments on PWR spent fuel rod segments. The experimental campaign is conducted at JRC Karlsruhe, with the focus on the effect of hydrogen load, hydride distribution and pellet/cladding interaction on the cladding integrity. Other studies are currently under development to investigate the deterioration of the cladding properties resulting from Delayed Hydride Cracking (with Paul Scherrer Institute), as well as the deterioration of the FA structural material for long-term dry storage conditions (with Framatome GmbH). Furthermore, a conceptual study is under development to establish specific technical requirements for the encapsulation facility, focusing on fuel handling, retrieval and packaging operations. The main scope is to ensure the safe management of any damaged and degraded fuel and to implement measures for the mitigation of accident scenarios. Key aspects and main achievements of these ongoing programs are presented here.

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Yes

### Country or International Organization

Switzerland

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