

International Conference on the Management of Spent Fuel from Nuclear Power Reactors 2019: Learning from the Past, Enabling the Future



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SPENT FUEL MANAGEMENT CONSIDERATIONS FOR ACCIDENT TOLERANT FUELS

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The accident at the Fukushima-Daiichi plant in Japan in 2011 highlighted vulnerabilities in the current zirconium (Zr) alloy clad uranium dioxide (UO₂) fuel to an extended loss of cooling. Improving the resilience of the fuel and cladding is considered a high priority for the nuclear industry and has resulted in significant research into the development of so-called Accident Tolerant Fuels (ATF). ATF are widely expected to be deployed in the near future in existing and future Light Water Reactors (LWRs). Post discharge management and dispositioning of spent ATF is a topic that must be addressed in order to demonstrate responsible management of the fuel cycle and yet has received little attention to date. In this review the spent fuel management considerations of several leading ATF fuel and cladding concepts are assessed against current LWR fuels. The concepts include coated Zr alloys, advanced iron alloys and silicon carbide composite claddings and advanced UO₂ and high uranium density fuels. Technical challenges regarding each different material are highlighted; particularly focusing on reactivity and durability in water. Recommendations are made where variations of current storage procedures are likely to be required.

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Country or International Organization

United Kingdom of Great Britain and Northern Ireland

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