Contribution ID: **122** Type: **Oral**

Perspective on Thermal Creep and Hydride Re-orientation for Dry Storage and Transportation Applications

Tuesday, 25 June 2019 17:10 (20 minutes)

Two potential cladding degradation mechanisms have been the focus of regulatory authorities'reviews when evaluating applications for storage and transportation of spent nuclear fuel under dry, inert atmosphere conditions: thermal creep and hydride re-orientation. A review of the thermal creep mechanisms in the low and high stress regions and their dependence on applied stress, as supported by experimental work, leads to the conclusion that creep failure is highly unlikely for internally pressurized spent fuel rods. Through a process of elimination, the formation of radial hydrides can be assessed to be minor or completely eliminated for several types of BWR and PWR claddings; claddings that would benefit from additional investigations include RX and pRX PWR claddings when hydride dissolution upon heating occurs in a temperature range sufficiently high for complete hydride dissolution, but too low for any significant radiation damage annealing.

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Session Classification: Session 2.4

Track Classification: Track 2: Spent Fuel and High Level Waste storage and subsequent transportability