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**ASSESSMENT OF SPENT NUCLEAR FUEL CONDITIONS AT POTENTIAL YUCCA MOUNTAIN REPOSITORY FROM LOADING, TRANSPORTATION AND STORAGE**

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The condition of commercial spent nuclear fuel (CSNF) received at the potential Yucca Mountain repository may affect both (i) safety associated with the construction and operation of the preclosure facilities and (ii) postclosure performance after emplacement of waste packages in the repository drifts to isolate high-level waste. The condition of CSNF at the time of disposal is determined by various conditions associated with reactor operation, and handling, storage and transportation of CSNF. The Department of Energy's preclosure safety analysis is expected to consider both normal and accident conditions during the facility operation. The postclosure performance assessment of the potential repository considers both nominal and disruptive (e.g., seismicity and volcanism) scenarios. This paper will summarize issues related to the CSNF conditions germane to the compliance assessments of the preclosure safety and the postclosure performance. The issues evaluated and discussed include: (i) pin-holes and hairline-cracks, (ii) the pellet matrix oxidation of the defective cladding with pin-holes and hairline-cracks, and (iii) the rim zone of high burn-up CSNF. Pin-holes and hairline-cracks on the CSNF could propagate during loading, transportation and storage from potential hydride embrittlement or vibrational stress, primarily for high burnup CSNF. The potential for enhanced cladding defects should be characterized because these defects could provide release paths for radionuclides. This characterization is particularly needed, if the CSNF is loaded at the reactor site in a multi-purpose canister for transportation, storage and/or disposal. The pellet matrix oxidation of the defective cladding should also be characterized. The oxidation will potentially result in respirable particles if the bare defective cladding is handled. In addition, the rim zone of the high burnup CSNF matrix of the pellet could be ruptured during loading, transportation and storage. The ruptured rim zone should be characterized as it could accelerate radionuclide releases during postclosure period. These issues should be considered in the preclosure safety analysis and the postclosure performance assessment.

Note: The NRC staff views expressed herein are preliminary and do not constitute a final judgment or determination of the matters addressed or of the acceptability of a license application for a geological repository at Yucca Mountain. This presentation is also an independent product of the CNWRA and does not necessarily reflect the views or regulatory position of the NRC.