

An Approach to Model Abstraction of Stress Corrosion Cracking in the Management of Spent Nuclear Fuel and High-Level Waste

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ABSTRACT (200 words limit)

Containers (and/or canisters) provide confinement of radionuclides in the management of spent nuclear fuel and high-level waste. Stress corrosion cracking (SCC) is an important failure mechanism when considering the adequacy of the container for radionuclide confinement. Fast SCC may result in the partial or total loss of confinement capacity of the container, if manufacturing is improper during construction or if the aging management program is ineffective. This paper reviews and assesses the current understanding of SCC for the model abstraction in confinement assessment. Specifically, the SCC modes considered include: (i) precursory step for SCC, such as pitting by initial corrosion or flaws formed during manufacturing; (ii) propagation of a single crack and its arrest; and (iii) potential maximum surface opening area of cracks. Passive metals (e.g., stainless steel) and non-passive metals (e.g., carbon steel) are assessed based on the current understanding of deterministic and probabilistic methods. Remediation approaches are also considered.

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