Contribution ID: **96** Type: **ORAL**

Managing Aging Effects on Dry Cask Storage Systems for Extended Long-Term Storage and Transportation of Used Fuel

In the United States, there is currently no designated disposal site for used nuclear fuel, which raises the prospect of extended long-term storage (i.e., >60 years) and deferred transportation of used fuel at operating and decommissioned nuclear power plant sites. Under U.S. federal regulations contained in Title 10 of the Code of Federal Regulations 72.42, the initial license term for an independent spent fuel storage installation (ISFSI) must not exceed 40 years from the date of issuance. Licenses may be renewed by the U.S. Nuclear Regulatory Commission (NRC) at the expiration of the license term upon application by the licensee, for a period not to exceed 40 years. Applications for ISFSI license renewals must include (1) time-limited aging analyses that demonstrate that structures, systems, and components (SSCs) important to safety will continue to perform their intended function for the requested period of extended operation and (2) a description of the aging management program for management of issues associated with aging that could adversely affect SSCs important to safety. This paper highlights issues related to managing aging effects on dry cask storage systems and ISFSIs for extended long-term storage and subsequent transportation of used nuclear fuel. In particular, it focuses on aging management issues related to the confinement boundary of bolted- and welded-closure storage casks and canisters. These highlights were extracted largely from the 2014 report prepared by Argonne for the U.S. Department of Energy's Used Fuel Disposition Campaign for R&D on extended storage and transportation of used fuel. The paper will also include additional information on the update of guidance documents by the U.S. NRC on "Standard Review Plan for Renewal of Used Fuel Dry Cask Storage System License and Certificate of Compliance,"NUREG-1927, and by the U.S. Nuclear Energy Institute on "Industry Guidance for Operations-Based Aging Management,"NEI 14-03, which was submitted for NRC endorsement in September 2014 and includes the DOE/Argonne National Laboratory aging management report as a key reference. Finally, the paper will briefly discuss aging management needs for a Pilot Interim Storage Facility and beyond, as the used fuel may need to be stored and transported multiple times before final disposal at a mined repository or geological disposal facility.

Country/ int. organization

United States

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