Risk-Informed Performance-Based Application of Container/Canister Corrosion in Nuclear Waste Management

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ABSTRACT

Engineered barrier systems play an important role in any geologic repository designed for permanent disposal of nuclear waste, whether in unsaturated or saturated environments. The engineered barrier system may consist of a container, canister, waste form (such as spent nuclear fuel or high-level waste reprocessed into glass), and backfill. This paper discusses the corrosion behavior of the container or canister, with respect to the radionuclide release characteristics and consequent dose to the public. The release of radionuclides from the engineered barrier system is often rate-controlled by the container and canister failure rate, dissolution (or other degradation) rate of the waste form, or diffusion (or other transport) rate of the radionuclides through the failed container/canister/backfill design. A risk assessment identifies the topics that dominate dose to the public. Those topics may differ for unsaturated to saturated environments. Examples of such topics in the container (or canister) corrosion include long-term behavior of a passive film, general corrosion rate, initiation time and extent of localized corrosion and stress corrosion cracking in passive and non-passive metals. This presentation describes how the information can be used, in conjunction with appropriate uncertainty analyses, in a safety assessment.

Disclaimer

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