

Risk Insights for Use in the U.S. Nuclear Regulatory Commission's Program for the Proposed Yucca Mountain Repository

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The U.S. Nuclear Regulatory Commission (NRC) has directed its staff to carry out risk-informed, performance-based regulatory programs. Disposal of high-level radioactive waste requires a NRC license. The governing regulations are contained in Part 63 under Title 10 of the U.S. Code of Federal Regulations ("Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada"). The governing regulations require an estimation of risk of radiation exposure to the reasonably maximally exposed individual as part of the performance objectives. The post-closure performance objectives also require that the geologic repository include multiple barriers consisting of both natural barriers and an engineered barrier system. Prior to making its licensing decision, the NRC will determine whether the U.S. Department of Energy (DOE) has demonstrated compliance with the performance objectives.

The NRC staff have developed risk insights, the results and findings from risk assessments, to support a risk-informed and performance-based regulatory program during both the pre-licensing and potential licensing phases. The insights provide a system-level perspective on the relative significance of features, events and processes judged relative to the dose-based performance criteria and uncertainties. The NRC staff identified the insights based on review of and experience with total system performance assessments, subsystem analyses, and auxiliary calculations. The staff judged significance by evaluating the impact on current risk estimates and uncertainties in the risk estimates, taking into account the performance of multiple barriers (i.e., defense-in-depth). Generally, high-risk significance during the post-closure period is associated with features, events, and processes that could significantly affect a large number of waste packages, releases from the waste package or the transport of radionuclides through the geosphere.

The NRC staff views expressed herein are preliminary and do not constitute a final judgement or determination of the matters addressed or of the acceptability of a license application for a geologic repository at Yucca Mountain.