

Risk Insights Baseline Report: A Basis for Risk-Informed Decision Making in the U.S. Nuclear Regulatory Commission's High-Level Waste Repository Safety Program for the Proposed Yucca Mountain, Nevada 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 nuclear waste requires an NRC license. Part 63 under Title 10 of the U.S. Code of Federal Regulations (*i.e.*, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada") prescribes rules governing the licensing of the U.S. Department of Energy (DOE) proposed repository. The licensing regulations are risk-informed and performance-based, and require an estimation of risk of radiation exposure to the reasonably maximally-exposed individual as part of the performance objectives.

The NRC staff has compiled a set of system-level and detailed risk insights, related to postclosure performance of the potential geologic repository system at Yucca Mountain, in the "Risk Insights Baseline Report." The staff based these risk insights on its experience in independently conducting and reviewing performance assessments for a high-level waste repository at Yucca Mountain. The staff developed the risk insights baseline by synthesizing the results of total system performance assessments, subsystem analyses, and auxiliary calculations.

The "Risk Insights Baseline Report" includes a discussion of the quantitative technical bases for the insights and associated uncertainties. The staff developed a risk insights baseline that focussed on those features, events, and processes that staff views as most important to a potential repository system at Yucca Mountain. The staff rated the significance of the individual risk insights to assess the relative importance of staff activities. The risk insights were rated by considering the contribution to, or adverse effect on, the waste isolation capabilities of the repository system. The staff rated the significance of a risk insight as "high" if the feature, event, or process addressed by the insight could significantly affect the waste isolation capabilities of the repository system. The significance of a risk insight was rated as "medium" if there could be some effect. The significance was rated as "low" if there would likely be negligible effect. The effect on waste isolation was evaluated by considering potential effect on: The integrity of the waste package; the release of radionuclides from the waste form and waste package; and radionuclide transport through the geosphere and biosphere. The magnitude of the effects was quantified through performance assessment analyses.

The NRC staff is using the report to help prioritize its pre-licensing activities, focus staff resources, and support risk-informed project management and decision making. The staff expects to use the report together with the Yucca Mountain Review Plan to conduct a risk-informed review of a potential DOE License Application for a high-level waste repository at Yucca Mountain.

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 geologic repository at Yucca Mountain.