



**Regulatory Perspective:
Development of an Approach for Evaluating
the Long-Term Behavior of Materials Used in
Engineered Barriers for
Geological Disposal**

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Disclaimer

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Roles of an Engineered Barrier

- Intact waste packages prevent release
- Breached waste packages limit release (e.g., limiting water entering package or radionuclide release)
- Waste forms limit release (e.g., degradation of spent fuel)

Time Element for Engineered Barriers

- Waste packages remaining intact during thermal period when release rates might be larger (e.g., hundreds of years)
- Limited breaching of waste packages can reduce the release of long-lived radionuclides over tens to hundreds of thousands of years

Evaluation and Testing of Long-Term Behavior of Materials

- Models for material behavior are relied on, in part, because of the long-time periods for estimating performance
- Performance tests need to consider both materials and environmental conditions including: uncertainties, disruptive events, and the long performance period

Increasing Confidence in Model Development and Support

- Models and materials appropriate to application (e.g., environment, timeframes)
- Risk Informed Approach (e.g., key processes and potentially deleterious conditions included, and conservative and simple representations considered)
- Uncertainties considered (e.g., probabilistic approaches)

Model Support

- What can't be done (e.g., 10,000 year test) does not invalidate the support that can be obtained
- Common guidance and standards for development testing improves credibility (e.g., attribute tests, characterization tests, accelerated tests, service condition tests, analogs)