

**Summary of Statement to the Disposal Subcommittee of the  
Blue Ribbon Commission on America's Nuclear Future  
Dan Schultheisz, U.S. Environmental Protection Agency  
September 1, 2010**

**Performance Indicators:** The primary purpose of a geologic repository is to contain the waste and isolate it from the biosphere for extended periods of time. Potential indicators of performance include exposure of designated receptors to radionuclides (dose or risk), movement of radionuclides through the accessible environment (flux), and concentrations in environmental media. EPA's generally applicable standards (40 CFR part 191) and Yucca Mountain-specific standards (40 CFR part 197) have employed these approaches. A difficulty with flux and concentration indicators is that they are not directly related to impacts on humans.

**Compliance Period:** There is widespread agreement that projecting repository behavior becomes more uncertain and speculative as the time period covered by projections increases. This is most problematic for dose or risk standards for which a receptor must be defined. The repository should be expected to perform for periods during which human civilizations are likely to change significantly (e.g., in technology or medical advances), while at longer time periods even evolutionary changes may be contemplated. There are suggestions that more emphasis for far-future projections should be given to indicators that rely solely on the geologic processes and properties, as these may be considered more reliable and predictable than future human behavior.

**Performance Assessment:** Probabilistic performance assessment provides a valuable tool in evaluating the long-term performance of a geologic repository. However, in the face of increased uncertainty, it cannot provide absolute assurance that future performance will be within the established standards, so EPA has required a "reasonable expectation" that the standard will be met. This judgment includes qualitative (e.g., adequate conceptual understanding of the disposal system) and quantitative (e.g., appropriate parameter input values) factors. Performance assessments using "cautious, but reasonable" assumptions should provide a basis for regulatory judgments regarding the disposal system's capabilities; however, at longer time periods, this judgment may give more emphasis to qualitative aspects to counterbalance the increased uncertainty in, and lessened confidence in the meaning of, quantitative results.

**Retrievability:** The need to provide for retrievability of some (or all) of the waste for some period after it is emplaced in the repository reflects the amount of confidence placed in the repository, the operator, the regulator, and the decision to dispose of the waste. Retrievability may be seen as desirable to increase public confidence that steps can be taken to correct problems. It may be most important to avoid emplacing used fuel until it is determined that it is no longer a potential resource.

**International:** Only a relatively small number of countries have developed standards for disposal of spent fuel and high-level waste, and some of these are being revised. In general, the more common approach internationally has been to require strict quantitative projections of dose or risk for an initial period, with a more qualitative evaluation thereafter. In this view, projected dose or risk in the very long-term is seen as one indicator of safety, rather than as a determinant of safety.