

Blue Ribbon Commission on America's Nuclear Future – Disposal Subcommittee Meeting – September 1, 2010
Panel 1 – What are the essential elements of technically credible, workable, and publicly acceptable regulations for disposal (in geologic repositories)?

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Introduction

One could argue that because generic versions of the NRC and EPA disposal regulations are still in force, they could be used as the U.S. undertakes the future repository program. However, it must be recognized that the technical advances and policy changes that have been reflected in the site-specific regulations would likely be required attributes or components of any new repository regulations. Thus, it is recommended that the NRC and EPA review and update the disposal regulations before other repository sites are considered. Moreover, the regulatory revisions need to address the entire fuel cycle and take account of realistic fuel cycle scenarios.

Questions

What should be the time frame for protection of public health and safety in disposal regulations?

There is no plausible basis for evaluating the behavior of future humans on the timescale of one million years. Moreover, it is not reasonable to regulate radiation doses beyond the time where uncertainties become too large to support rational decision-making. Therefore, a quantitative demonstration of compliance should be limited to a few to several thousands of years. There is precedent in U.S. and international regulations for a 10,000 year limit. In addition, given the long time periods over which some radioactive waste will remain hazardous, regulations should require a qualitative demonstration of a reasonable expectation that the disposal system will continue to function as intended for up to one million years.

How should compliance be demonstrated (including the role of performance assessment)?

The use of performance assessment, including a rigorous evaluation of feature, events, and processes, is a sound and defensible approach to compliance demonstration. This must be strongly underpinned by experiments and process models. Moreover, other and multiple lines of evidence should be required to support the safety case. The repository regulations should be performance-based, without specification of rigid criteria for subsystems of the repository. The relationship between and relative importance of the geologic and engineered barriers must be addressed explicitly and clearly.

Should there be requirements concerning retrievability?

Requirements for retrievability encompass safety and resource recovery. There are sound technical and public confidence reasons for maintaining retrievability requirements prior to repository closure. These requirements should be maintained, but be flexible enough to allow for a range of disposal concepts. Moreover, retrievability should not be a priority over long-term waste isolation in a repository.

What can be learned from international experience in developing and implementing HLW disposal regulations?

There is extensive international experience in assessment and development of disposal regulations, including IAEA and country-specific efforts. The U.S. should leverage that experience in development of a new set of regulations, particularly in the areas of adaptive management, compliance demonstration, level of protection, and time frame for protection.

Are regulatory changes needed to accommodate staged repository development concepts?

The current U.S. regulatory and statutory structure is consistent with at least some forms of staging. However, it would be advantageous for new legislation and regulations to explicitly recognize and facilitate staged development. Furthermore, it is important for new generic repository regulations to be crafted to ensure that appropriate interactions with the regulator can take place as an important part of a staged development process.

Would different regulations be required for disposal systems other than geologic repositories (e.g. deep boreholes)?

A flexible set of general regulations should be developed that are applicable to all disposal media and concepts. This approach will facilitate comparisons among alternatives, engender public confidence, and optimize the site screening, selection, and licensing process. Finally, U.S. experience suggests that the regulatory framework should be established prior to initiating a future repository development program, with top-level repository regulations established before siting guidelines and site evaluation criteria are developed.

Are there other regulatory issues (e.g. waste classification, dual regulation with RCRA) that should be reconsidered?

Revision to the waste classification system needs to be strongly considered to support future fuel cycles. Any such revision needs to occur soon since performance requirements for future repositories and decisions about waste processing, separations, and waste forms would depend upon the classification system. The NRC staff is now working on high-level waste regulations and the LLW classification issue, and DOE is undertaking a major review and revision of their order dealing with its own radioactive waste management activities. Also, the revised classification system contained in a new Safety Guide issued by the International Atomic Energy Agency should be considered. All of these efforts suggest a risk-based approach (rather than source-based) to waste classification would be most appropriate.