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Overview of Presentation to the Blue Ribbon Subcommittee on Transportation and Storage

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The U.S. Department of Energy, Office of Nuclear Energy (NE) is supporting the development of the technical basis to support the extension of long term storage of used nuclear fuel for up to 300 years with subsequent transportation. Current regulations allow for up to 60 years storage and provide limited guidance as to how to demonstrate fuel transportability after storage. This effort is designed to address safety and security issues that arise from very long term storage and subsequent transportation.

While existing licensed storage systems and past storage demonstration projects have demonstrated the safety and security of stored used fuel for decades, the data base is limited for extending technical arguments to centuries. Understanding of material degradation issues over these time frames must be quantified in order to establish reasonable assurance in the long term behavior of storage system materials. This is especially true of high burnup used fuel. The NE program is assessing these issues for the entire cask system; the fuel, cask internals, canister, overpack and pad. Preliminary technical issues that have been identified include hydride reorientation and embrittlement, corrosion, creep, stress corrosion cracking, and the effect that a marine (coastal) environment may have on external storage components. From a security standpoint, two issues directly related to long term storage are identified. First, the regulations apply a "self-protection" standard to used fuel that exempts it from having to meet Special Nuclear Material (SNM) physical protection category requirements because it has a high radiation field and it is not readily separable. For long term storage, average burnup used fuel will go below this radiation threshold in 100 years or so. Once below the threshold, the fuel may need to be protected according to the SNM categories based on the mass of SNM contained in the fuel. This may have significant impact on the way that storage facilities will need to be protected. Second, guidance from the NRC is that research on very long term storage should extend to 300 years. A question arises over these very long time frames on the ability to guarantee institutional control.

The NE program is divided into four distinct parts; 1) R&D Opportunities is focused on identification and prioritization of technical gaps that need to be addressed in order to develop the technical arguments for extended storage and transportation, 2) Security is addressing the security implications of extended storage and subsequent transportation, 3) Concept Evaluations is designed to integrate the R&D Opportunities work with the Security work and assess options for conducting the identified work, and 4) beginning in FY11, evaluation of transportation issues will be included in the overall assessment of the management of used fuel.

This program is fully integrated with the regulator and industry. In particular, DOE NE is represented on the EPRI Extended Storage Collaboration Program that is focused on developing the technical arguments for extended storage and subsequent transportation. This committee has representation from industry (EPRI, utilities, fuel and cask vendors), the NRC, and DOE laboratories working on the NE program. Identified R&D needs and associated priorities in the NE program will be subject to review by this committee. In addition, there is a strong emphasis in the committee in working with international organizations working on similar issues. Separately, NE has also issued six Advisory and Assistance Services (A&AS) contracts to private industry to provide crucial experience in scaling up technologies from laboratory-scale to industry-scale.

The NE program is organized to identify, prioritize, and develop the technical justifications associated with extended storage and transportation in a way that fully integrates the industry and regulator and provides a general consensus on the best way to conduct the research.