August 10, 2006

Mr. Mark H. Williams, Director
Regulatory Authority Office
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1551 Hillshire Drive
North Las Vegas, NV 89134-6321

SUBJECT: TRANSPORT, AGING AND DISPOSAL CANISTER FOR SPENT NUCLEAR FUEL MANAGEMENT

Dear Mr. Williams:

The U.S. Department of Energy (DOE) has proposed using a Transport, Aging, and Disposal (TAD) canister as its primary container for commercial spent nuclear fuel (CSNF) at the proposed high-level waste repository at Yucca Mountain, Nevada. As has been discussed at several public meetings, DOE is currently developing performance specifications and, ultimately, designs for the proposed TAD canister and revisions to proposed surface facilities. DOE has indicated that its TAD performance specifications will be provided to commercial vendors in the near future. This letter provides comments from the U. S. Nuclear Regulatory Commission (NRC) staff on regulatory criteria and other possible areas of consideration for the development of TAD canister designs and performance specifications.

The first area concerns how the TAD canister might meet the NRC safety requirements for all its proposed functions in transportation, possible interim storage at a reactor or other NRC - licensed site, and aging and disposal in a geologic repository. As you are aware, the proposed TAD system will involve separate reviews under 10 CFR Part 71 for the approval of a transportation cask, under 10 CFR Part 72 for approval of a storage cask, and under 10 CFR Part 63 for approval of an aging cask and as part of the engineered barrier system for geologic disposal. Additionally, it may involve review of reactor licensing activities under 10 CFR Part 50, for potential loading and handling of TAD canisters at reactor facilities.

The enclosure provides a high-level summary of some of the regulations that may be relevant to the TAD canister concept. Because multiple regulatory approvals are involved, it is important to identify crosscutting issues early in the regulatory process. This is important given the projected timing of applications for approval of TAD-based storage and transportation casks relative to DOE's proposed submittal date of June 2008, for a proposed Yucca Mountain License Application.

Our current understanding is that DOE's planning is based on the assumption that a TAD canister will be certified for storage and transportation prior to completion of the NRC staff's review of the performance assessment under 10 CFR Part 63. DOE should recognize the fundamental difference in the risk-informed, performance-based criteria of Part 63 from the

technical and safety requirements of 10 CFR Parts 71 and 72, which have been used many times to approve shipping and storage casks. Early identification and resolution of crosscutting issues is key to reducing possible regulatory risk to the applicant.

The second area of consideration concerns the treatment of specific technical aspects of a TAD canister within the performance assessment under 10 CFR Part 63. These aspects could be addressed in the TAD canister performance specifications currently being developed by DOE.

1. The materials used in the canister and its internals may affect the in-package chemistry, which, in turn, could affect the CSNF dissolution rate and the solubility limits of radionuclides to be considered in the performance assessment for the postclosure period. For example, corrosion of materials could affect the in-package pH, possibly increasing the CSNF dissolution rate and the solubility limits. As another example, corrosion of carbon steel could promote colloid formation, facilitating radionuclide release and transport.

2. Assessment of the continued integrity of cladding on CSNF may be less straightforward in a TAD canister than in the previous fuel-handling approach that DOE was considering. For example, in the performance assessment in DOE's "Environmental Impact Statement," the CSNF cladding plays an important role in the postclosure performance. If DOE continues with this approach, a means to determine the state of the cladding may be necessary, especially for high-burnup CSNF. Possible performance credit for cladding could also bear on the compatibility of thermal limits for Parts 71, 72, and 63, with respect to the potential for cladding embrittlement.

3. As currently understood, DOE's approach for criticality control during the postclosure period of the repository is to screen out a criticality event based on burnup credit for actinides and fission products, fixed neutron absorbers, geometry control, and limiting moderation. These may also drive the TAD canister design. For example, the proposed neutron-absorber materials (e.g., Ni-Cr-Mo-Gd alloy) may degrade by thermal aging or corrosion during the long postclosure period. Cladding degradation by embrittlement and basket degradation may alter other bases for the criticality control used in the previous fuel-handling approach.

4. DOE has acknowledged that the use of a TAD canister will significantly impact preclosure operations. The intended safety function of the TAD canister, its place in preclosure event sequences, and its possible classification as an important-to-safety system based on the potential preclosure event sequences are examples of how a TAD would be considered within the preclosure safety analysis (PCSA). As discussed recently at our PCSA Technical Exchange on May 16-17, 2006, reference reliability information for relevant structures, systems, and components is needed to categorize event sequences and to perform the PCSA.

The third area of consideration concerns Quality Assurance (QA), which is an important part of 10 CFR Parts 50, 63, 71, and 72 . For TAD canister use at a geologic repository, under the provisions of the NRC-approved DOE Part 63, Subpart G, QA program, DOE needs to implement QA requirements consistent with the safety significance of the TAD canisters and their internal materials and components (e.g., CSNF cladding). The need and methods for assurance or verification of TAD canister components and material compliance with the DOE specifications and CSNF Waste Acceptance Criteria are also important. These include the QA

program processes and methods for requiring and implementing technical and QA program requirements for the entities that provide and load the TAD canisters, and the DOE QA program oversight, verification, and receipt inspection.

In summary, NRC will evaluate DOE's proposed TAD system under the applicable regulations for each function of the TAD. The staff plans to discuss these and other topics related to the TAD canister approach, in the interest of early consideration of crosscutting regulatory issues, at our upcoming Technical Exchange.

If you have any question regarding this matter, please contact Dr. Mahendra Shah at (301) 415-8537, or by e-mail, at mjs3@nrc.gov or Marissa Bailey at (301) 415-7198, or by e-mail at mgb@nrc.gov.

Sincerely,

/RA/

Lawrence E. Kokajko, Deputy Director
Division of High-Level Waste Repository Safety
Office of Nuclear Material Safety
and Safeguards

Enclosure: NRC Regulatory Criteria
Applicable to a Transportation,
Aging and Disposal Canister

cc: See attached list.

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specifications and CSNF Waste Acceptance Criteria are also important. These include the QA program processes and methods for requiring and implementing technical and QA program requirements for the entities that provide and load the TAD canisters, and the DOE QA program oversight, verification, and receipt inspection.

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Sincerely,

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Lawrence E. Kokajko, Deputy Director
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