



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

August 28, 1999

Dr. Stephan J. Brocoum  
Assistant Manager for Licensing  
U.S. Department of Energy  
Office of Civilian Radioactive Waste Management  
Yucca Mountain Site Characterization Office  
P.O. Box 30307  
North Las Vegas, Nevada 89036-0307

SUBJECT: ISSUE RESOLUTION STATUS REPORT (KEY TECHNICAL ISSUE:  
CONTAINER LIFE AND SOURCE TERM, REVISION 2)

Dear Dr. Brocoum:

The staff of the U.S. Nuclear Regulatory Commission (NRC) has developed a process for early resolution of technical issues at the staff level, which involves the preparation of Issue Resolution Status Reports (IRSRs) for the 10 Key Technical Issues (KTIs) most important to performance. Revision 1 of the IRSR on Container Life and Source Term (CLST) was issued on December 1, 1998. The U.S. Department of Energy (DOE) completed its Viability Assessment (VA) of a Repository at Yucca Mountain in December 1998. NRC has provided programmatic comments regarding the VA, and has updated the IRSRs to reflect more specific technical comments. The enclosed Revision 2 of the IRSR reflects CLST staff review of the VA, and covers work done by the staff and its contractor (Center for Nuclear Waste Regulatory Analyses) after the issuance of Revision 1.

Revision 0 focused on four subissues related to the adequacy of the engineered barrier subsystem (EBS) to provide long-term radionuclide containment and limited release at the proposed Yucca Mountain repository. The four subissues addressed included: (1) effects of corrosion on performance of engineered barriers; (2) effects of materials stability and mechanical failure on performance of engineered barriers; (3) effects of spent fuel (SF) degradation on performance of engineered barriers; and (4) effects of high-level waste (HLW) glass degradation on performance of engineered barriers. Revision 0 addressed acceptance criteria for Subissue 1 and status of resolution for one of its components, namely, the significance of dry oxidation of container materials during the early, dry period of repository performance. Revision 0 concluded that dry oxidation is not a significant failure mode or degradation process for container materials.

Two additional subissues were included in Revision 1: 1) criticality within the waste packages (WPs) (Subissue 5); and 2) alternate EBS design features (Subissue 6). Revision 1 included acceptance criteria for all subissues. Several components of the six subissues were resolved: 1) hydrogen embrittlement of the outer overpack; 2) the effect of humid air corrosion on the outer overpack; 3) thermal stability of the outer overpack; and 4) dry oxidation as a process for SNF degradation.

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Consistent with NRC regulations on preclicensing consultation and a 1992 agreement with DOE, staff-level issue resolution can be achieved during the preclicensing consultation period. However, such resolution at the staff level will not preclude the issue being raised and considered during the licensing proceedings. Issue resolution at the staff level during preclicensing is achieved when the staff has no further questions or comments (i.e., open items) at a selected point in time, regarding how DOE's program is addressing an issue. In some cases, resolution at the staff level may be limited to documenting a common understanding regarding differences in the staff's and DOE's points of view. Pertinent additional information could raise new questions or comments regarding a previously resolved issue.

In its letter of June 2, 1999, staff provided comments on the VA and promised more detailed comments in IRSR updates. The current revision (i.e., Revision 2) focuses on material submitted with the VA, and also considers projected design decisions associated with the planned Site Recommendation. Consideration of the projected design, i.e., the waste package with an outer overpack of Alloy-22, and an inner overpack of stainless steel, has allowed us to close some additional components of the six subissues. The components of the six subissues that are considered resolved with the issuance of Revision 2 include: 1) dry oxidation of carbon steel; 2) aqueous corrosion of carbon steel; 3) microbially influenced corrosion of carbon steel; 4) stress corrosion cracking of carbon steel; 5) galvanic coupling; 6) effect of colloids on release and transport (for SF and for HLW glass); and 7) ceramic coatings. All subissue components listed as resolved for Revisions 0 and 1 are still considered to be resolved.

DOE submitted its "Disposal Criticality Analysis Methodology Topical Report," in January 1999, after issuance of Revision 1. The Topical Report is currently under review, and the review is expected to be completed prior to issuance of Revision 3. Resolution of Subissue 5 will therefore be discussed in Revision 3.

Since publication of Revision 1 of the CLST IRSR, and issuance of the VA, there have been several interactions between DOE and NRC including an Appendix 7 on CLST. Although we did not receive formal comments from you on Revision 1 of the CLST IRSR, we did receive informal feedback at the Appendix 7 meeting and other interactions. We have addressed many of these informal comments in this IRSR, and plan an additional response specific to the Appendix 7 meeting, shortly. We would welcome your formal comments on Revision 2.

The enclosure should be viewed as a status report that provides the staff's most current views on the CLST KTI. The report is scheduled to be updated in the future as additional information becomes available. After DOE has had a chance to review this document and comment, as appropriate, we welcome a dialogue regarding it with DOE, the U.S. Nuclear Waste Technical Review Board, State of Nevada, and other interested parties. We would like to note that we have had very useful interactions with DOE project personnel on the testing of container materials and waste form, on modeling of radionuclide containment and release, and on disposal criticality issues. This IRSR should help facilitate the exchange of ideas between NRC and DOE, as well as provide DOE with an understanding of the criteria that NRC will be using to evaluate the information presented on this subject in DOE's Total System Performance Assessment-Viability Assessment and, ultimately, on DOE's license application.

If you have any questions about this letter, please contact Jennifer Davis of my staff at (301) 415-5874, or via Internet mail service (bjd1@nrc.gov).

Sincerely,

C. William Reamer, Chief  
High Level Waste and Performance  
Assessment Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

Enclosure: As stated

cc: See attached list

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