



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

March 13, 1998

Dr. Stephan 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 )

Dear Dr. Brocoum:

As you know, the staff of the U.S. Nuclear Regulatory Commission has developed a program for early resolution of technical issues at the staff level. In the past, staff-level issue resolution has been achieved by responding to the U.S. Department of Energy's (DOE's) proposed closure of NRC open items, or through response to topical reports. The new process for early resolution has been demonstrated through our release, on June 30, 1997, of a pilot issue resolution status report (IRSR) on climate change and associated effects.

This IRSR, [Container Life and Source Term (CLST)] focuses on four subissues related to the adequacy of the engineered barrier system (EBS) to provide long-term radionuclide containment and limited release at the proposed Yucca Mountain (YM) repository. As presently conceived, containment and limited release are provided by the container and waste form as the primary engineered barriers. The four subissues address effects of corrosion, effects of materials stability and mechanical failure, effects of spent fuel degradation, and effects of glass degradation on the performance of the engineered barriers. These are important subissues that must be addressed to estimate the overall performance of a proposed repository at YM. DOE's Repository Safety Strategy (1998) poses the following hypotheses for a double-walled waste package design: (i) heat produced by emplaced waste will reduce relative humidity at the waste package surface; (ii) corrosion rates are very low at low relative humidity; (iii) double-walled packages will significantly increase containment times due to protection of the inner barrier by the outer barrier; (iv) engineered enhancements can extend the long period of containment of the inner barrier; (v) containment time will be sufficient to prevent oxidation of spent fuel during the thermal period; (vi) the amount of water that contacts waste can be limited; (vii) release rate of soluble radionuclides will be controlled by slow dissolution of the waste form; and (viii) release rate of actinides will be controlled by solubility limits rather than by colloidal stability.

This version of the CLST IRSR addresses a component of the subissue on the effects of corrosion. It focusses on the significance of dry oxidation of container materials during the

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early, dry period of repository performance, when thermal output from the containers is sufficiently high that free water cannot persist on the containers and the relative humidity is below levels where humid air corrosion can occur. Other components of the subissue on corrosion are likely to be considerably more important in terms of container and repository performance, but these could not be addressed in fiscal year 1997.

Consistent with NRC regulations on preclicensing consultations 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 would 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 point in time, regarding how the DOE program is addressing an issue. There may be some cases where resolution at the staff level may be limited to documenting a common understanding regarding differences in NRC and DOE points of view. Pertinent additional information could raise new questions or comments regarding a previously resolved issue. The enclosed IRSR summarizes an independent, pre-licensing review of the significance of dry oxidation as an important degradation process for container materials during the early, dry period of repository performance. The staff concludes that dry oxidation is not a significant failure mode or degradation process for container materials.

As discussed in the IRSR, staff has also identified two open items (Comment 85 and Question 49 in "NRC Staff Site Characterization Analysis of the Department of Energy's Site Characterization Plan, Yucca Mountain Site, Nevada," NUREG-1347, August 1989) on dry oxidation that are resolved at the staff level. Other items from the staff's Site Characterization Analysis will remain open pending future staff review and updates to this IRSR.

Finally, the enclosure should be viewed as a status report that provides the staff's most current views on the adequacy of EBS design for long-term containment and limited release at the YM repository. The report will be updated late in fiscal year 1998 to address other subissues. We welcome a dialogue on this subject with DOE, the U.S. Nuclear Waste Technical Review Board, State of Nevada, and other interested parties. If you have any questions, please contact Mr. Kien Chang of my staff at (301) 415-6612, or via Internet mail service (kcc@nrc.gov).

Sincerely, 

N. King Stablein, Acting Chief  
Engineering and Geosciences Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

Enclosure: As stated  
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early, dry period of repository performance, when thermal output from the containers is sufficiently high that free water cannot persist on the containers and the relative humidity is below levels where humid air corrosion can occur. Other components of the subissue on corrosion are likely to be considerably more important in terms of container and repository performance, but these could not be addressed in fiscal year 1997.

Consistent with 10 CFR Part 60 requirements and a 1992 agreement with DOE, staff-level issue resolution can be achieved during the precicensing consultation period. However, such resolution at the staff level would not preclude the issue being raised and considered during the licensing proceedings. Issue resolution at the staff level during precicensing is achieved when the staff has no further questions or comments (i.e., open items) at a point in time, regarding how the DOE program is addressing an issue. There may be some cases where resolution at the staff level may be limited to documenting a common understanding regarding differences in NRC and DOE points of view. Pertinent additional information could raise new questions or comments regarding a previously resolved issue. The enclosed IRSR summarizes an independent, pre-licensing review of the significance of dry oxidation as an important degradation process for container materials during the early, dry period of repository performance. The staff concludes that dry oxidation is not a significant failure mode or degradation process for container materials.

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Newton K. Stablein, Acting Chief  
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