



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

December 23, 1998

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:
RADIONUCLIDE TRANSPORT, REVISION 0)**

Dear Dr. Brocoum:

As you know, the staff of the U.S. Nuclear Regulatory Commission (NRC) has developed a program for early resolution of technical issues at the staff level. The NRC staff has identified Radionuclide Transport as a Key Technical Issue (KTI) because of its importance to repository performance and the uncertainty associated with estimating the rate of radionuclide migration through the complex geologic setting of Yucca Mountain. This is the first Issue Resolution Status Report (IRSR) on the KTI of Radionuclide Transport. This report focuses on developing acceptance criteria for evaluating radionuclide transport through porous rock and alluvium. It also identifies two additional subissues: (1) radionuclide transport through fractured rock; and (2) nuclear criticality in the farfield. The acceptance criteria for these additional subissues are expected to be included in the revision to this report, scheduled for release at the end of FY99. The KTI addressed by this report is related to various elements of the U.S. Department of Energy's (DOE's) Repository Safety Strategy: (1) Hypothesis No. 13, "Physical properties of both engineered and natural barriers will reduce radionuclide concentrations during transport;" (2) Hypothesis No. 14, "Chemical properties of both the engineered and natural barriers will reduce radionuclide concentrations during transport;" and (3) Hypothesis No. 15, "Contaminants in the lower volume flow percolating down to the water table will be diluted by the higher volume flow in the aquifer." The recognition by both NRC and DOE of this issue's (radionuclide transport) potential to affect repository performance indicates the importance of resolving it.

Consistent with NRC regulations on preclicensing consultations and a 1993 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 the resolution at the staff level may be limited to documenting a common understanding regarding differences in NRC and DOE points of view. Further, pertinent additional information could raise new questions or comments regarding a previously resolved issue.

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Sections 4 and 5 of the enclosed IRSR summarize an independent pre-licensing review and analysis of radionuclide transport through porous rock and alluvium. The staff considers Subissue 1, Radionuclide Transport through Porous Rock, has been resolved for certain radionuclides but not for others. Some of the radionuclides for which this subissue is not resolved may be important to performance. The NRC staff finds that the approach adopted by Los Alamos National Laboratory to determine minimum K_d values is reasonable. By performing batch sorption tests using site-specific materials, followed by confirmatory tests to establish the validity of the assumptions needed for the constant K_d approach, and then selecting the minimum K_d from all the tests, an acceptable value can be obtained. The staff considers that the status of Subissue 2, Radionuclide Transport through Alluvium, is closely tied to that of Subissue 1. However, additional uncertainty results from the very limited information collected to date on the mineralogy, groundwater chemistry, and physical flow systems of the alluvium. The NRC staff expects that with future characterization of the alluvium, similarities between the mineralogy and groundwater chemistry of porous rock and the alluvium will permit application of the results of laboratory tests to both media. Resolution of this subissue, therefore, will await the geologic and hydrologic information to be collected.

The enclosure should be viewed as a status report that provides the staff's most current views on issues related to radionuclide transport affecting the repository at Yucca Mountain. NRC plans to update this report later in FY99 to reflect progress on all of the subissues. We welcome a dialogue on the potential effects of the radionuclide transport on the repository with DOE, the U.S. Nuclear Waste Technical Review Board, State of Nevada, and other interested parties. If you have any questions about this letter, please contact John Bradbury of my staff at (301) 415-6597, or via internet mail service (jwb@nrc.gov).

Sincerely,



C. William Reamer, Acting Chief
Engineering and Geosciences Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: See attached list