September 29, 2000

Dr. Stephan J. Brocoum, Assistant Manager
Licensing and Regulatory Compliance
U.S. Department of Energy
Yucca Mountain Site Characterization Office
P.O. Box 30307
North Las Vegas, NV 89036-0307

SUBJECT: ISSUE RESOLUTION STATUS REPORT (KEY TECHNICAL ISSUE: RADIONUCLIDE TRANSPORT, REVISION 2)

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. Revision 0 of this Issue Resolution Status Report (IRSR) on the Key Technical Issue (KTI) of Radionuclide Transport focused on defining acceptance criteria for staff use in reviewing the treatment of radionuclide transport through porous rock and alluvium in the U.S. Department of Energy's (DOE's) testing, modeling and performance assessment program areas (letter from C. W. Reamer to S. Brocoum dated December 25, 1998). Revision 1 focused on defining acceptance criteria for staff use in reviewing the treatment of radionuclide transport through fractured rock and nuclear criticality in the far field (letter dated September 30, 1999, from C. W. Reamer to S. Brocoum). Revision 2 (enclosure to this letter) updates the status of issue resolution based on information available to the staff prior to May 15, 2000. DOE models, abstractions, and analyses were assessed based on information provided in Revision 3 of DOE's Repository Safety Strategy, and the preliminary, draft, DOE Process Model Reports and Analysis and Model Reports that were available. Our review comments provide guidance on changes which we consider necessary such that an acceptable and high-quality license application can be prepared by DOE.

Consistent with NRC regulations on prelicensing consultations and a 1992 agreement with DOE, staff-level resolution can be achieved during prelicensing consultation. The purpose of issue resolution is to assure that sufficient information is available on an issue to enable the NRC to docket the license application. Resolution at the staff level does not preclude an issue being raised and considered during the licensing proceedings, nor does it prejudge what the NRC staff evaluation of that issue will be after its licensing review. Issues are "closed" if the DOE approach and available information acceptably address staff questions such that no information beyond what is currently available will likely be required for regulatory decision making at the time of initial license application. Issues are "closed-pending" if the NRC staff has confidence that the DOE proposed approach, together with the DOE agreement to provide the NRC with additional information (through specified testing, analysis, etc.) acceptably addresses the NRC's questions such that no information beyond that provided, or agreed to, will likely be required at time of initial license application. Issues are "open" if the NRC has identified questions regarding the DOE approach or information, and the DOE has not yet

acceptably addressed the questions or agreed to provide the necessary additional information in the license application. Pertinent additional information could raise new questions or comments regarding a previously "closed" issue.

Section 5 of the enclosed IRSR summarizes our independent pre-licensing review of some DOE documents supporting DOE's site recommendation. The staff recognizes the preliminary nature of the draft Analysis and Model Reports and Process Model Reports; specifically, they have not been accepted by DOE. Thus, the staff has not used the information contained in those draft documents to resolve any open subissues in this report. To aid the issue resolution process, however, the staff has reviewed and provided comments on the sufficiency of the information in the preliminary documents to address staff concerns. After a review of the final Process Model Reports or other documents that indicate DOE's acceptance of the information in the preliminary documents, the staff will consider whether it is appropriate to close the subissues or any portion of the subissues. We request that any technical exchange and management meeting to discuss issue resolution of the radionuclide transport KTI be scheduled no sooner than 90 days after the last Analysis and Model Report or Process Model Reports supporting the site recommendation is finalized and provided to NRC.

With respect to the subissue concerning radionuclide transport through porous rock, the NRC staff considers acceptable the approach adopted by Los Alamos to validate K_d values from batch tests for those radionuclides that could contribute to risk. At a minimum, this requires comparing the results of a dynamic crushed tuff column experiment with a static batch test involving the same materials. Although these tests have been performed involving some key radionuclides including plutonium, neptunium, and technetium (plus selenium in intact tuff), other radionuclides have yet to be tested, e.g., uranium. To close this subissue, DOE will need to provide technical bases for the retardation of radionuclides considered in performance assessment.

With regard to the subissue concerning radionuclide transport through alluvium, the NRC staff recognizes that work is in progress involving samples from Nye County Early Warning Drilling Program. The Alluvial Tracer Complex (ATC) tests may be particularly important in providing characterization information related to radionuclide transport. New batch sorption tests have been performed on alluvial material involving neptunium, technetium and iodine. However, the NRC staff notes that comparable column tests have not yet been performed to support the static tests.

For the subissue dealing with radionuclide transport through fractured rock, the NRC staff has included an acceptance criterion requiring a demonstration to predict tracer breakthrough curves. Whereas transport through porous material has been demonstrated for years to be predictable (if the required conditions are shown to be present), the same cannot be said for transport through fractured rock.

The criticality subissue (Radionuclide Transport subissue 4) is "closed-pending" resolution of open items concerning DOE's criticality analysis methodology raised in the NRC safety evaluation report and DOE documentation of the technical basis for screening of criticality Features, Events, and Processes in the performance assessment.

We did receive formal comments from you on Revision 1 of the Radionuclide Transport IRSR (letter dated March 22, 2000, from S. Brocoum to C.W. Reamer) and we would welcome your formal comments on Revision 2. We have addressed your comments on Revision 1 of the RT IRSR in this revision. We would like to note that we continue to have very successful interactions with DOE project personnel and appreciate the opportunity to attend the various performance assessment workshops. We welcome a dialogue on radionuclide transport at Yucca Mountain 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,
/ra/

Janet R. Schlueter, Acting Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: Issue Resolution Status Report (Key Technical Issue: Radionuclide Transport, Revision 2)

cc: See attached list

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Sincerely,

/RA/original signed 9/29/00

Janet R. Schlueter, Acting Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: Issue Resolution Status Report (Key Technical Issue: Evolution of the Near-field Environment, Revision 3)

cc: See attached list

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S. Brocoum

Letter to S. Brocoum from J. Schlueter dated: September 29, 2000

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