



**AGENCY FOR NUCLEAR PROJECTS
NUCLEAR WASTE PROJECT OFFICE**

Capitol Complex
Carson City, Nevada 89710
(702) 885-3744

September 2, 1988

Mr. Tom Nicholson
Chairman
INTRAVAL Validation Oversight and
Integration Committee
c/o U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Washington, DC 20555

Dear Mr. Nicholson:

The State of Nevada has been attending the INTRAVAL workshops and meetings as an observer. Based on our participation to date, we would like to offer the following comments. Some of the comments, we realize, are outside the authority of INTRAVAL. These comments are more appropriately brought to the attention of the U.S. Nuclear Regulatory Commission. As such, a copy of this letter has also been sent to Bob Browning, Director, Division of High-Level Waste Management. We have attempted to separate the comments along the lines of authority, but this separation is difficult since the NRC role is intertwined in both aspects.

INTRAVAL Directed Comments

At the recent unsaturated zone test case meeting (July 19-21, 1988), three unsaturated zone problems were discussed: The Las Cruces Trench Experiment, the Apache Leap Tuff Site, and the G-Tunnel Site.

The Las Cruces experiment seems well-posed, -funded and-directed. We are encouraged by the attempts to model the site both deterministically and stochastically. This experiment should serve to expand our current understanding of porous unsaturated flow in unconsolidated materials.

The Apache Leap work also seems to be well-directed; however, modeling work has not advanced to the level of the Las Cruces project. We understand the NRC modeling discussed at the most recent meeting was preliminary, and should only be used as a first cut approximation. What we have learned through the NRC

8809120105 880902
PDR WASTE
WM-11 PDC

11
102.3
(0)-3965
WM-11 NH08

modeling and that of Todd Rasmussen at the University of Arizona, is when the system is modeled as porous matrix flow, water does not move very rapidly. Therefore, the VOIC and the NRC are encouraged to utilize this fractured tuff site to study fracture flow processes and modeling techniques.

Our concern is that if the Apache Leap study is not changed from a porous flow to a fracture flow emphasis, then all three unsaturated zone problems will essentially be a duplication of the modeling efforts. As our representative suggested at the meeting, modeling the Apache Leap pneumatic tracer tests would provide some information about fracture flow behavior in the unsaturated zone. The test data for this modeling are currently available. This approach would provide some much needed insight into gas phase transport as well as being potentially useful for understanding fluid flow characteristics of fractures at the Yucca Mountain candidate repository site. Later, liquid phase fracture experiments may become feasible.

The G-Tunnel experiment by the USGS was not particularly well received at the workshop due to a variety of problems, such as:

- inability to predict optimum packer and instrument placement
- inability to accurately measure the source term for heat
- no instrumentation outside the boreholes to measure pulses (heat or water)

We are compelled to comment on this experiment because of its potential to be used as a surrogate to the Yucca Mountain flow field. The USGS made it clear at the meeting that this experiment will assist them in verifying their concept of unsaturated zone flow at Yucca Mountain (i.e., only matrix flow occurs). We believe this oversteps the purpose of the INTRAVAL effort. If validation is achieved for this experiment, it must be clearly understood by all parties that only the experiment itself has been validated - not the USGS or DOE conceptual model of the Yucca Mountain flow field.

We believe the experiment should be revised in order to provide useful knowledge about unsaturated zone flow. Several suggestions were made at the workshop but all were rejected by the USGS. The reasons for the rejections appear to be programmatic problems for the USGS, DOE and NRC to resolve. We will elaborate on these concerns in the next section. Let us simply say, that in its present experimental set-up, it is doubtful validation of the G-Tunnel experiment can be achieved.

NRC Directed Comments

To expand on the G-Tunnel discussion started above, there seems to be two primary issues associated with this experiment. First, in its current form, it will only be useful to support justification of drilling with air vs. fluids at Yucca Mountain for unsaturated zone holes. Second, the QA process, which the USGS has applied to this experiment, does not allow changes to be easily made.

Based on previous modeling and drilling results to date, the answer to the first issue is obvious. The USGS should not drill with water because it will remain in the matrix and distort geophysical logging results. If that were the sole use for data generated in this experiment, we would not have a major concern. However, it is not the sole use. The experiment is being used to predict long term recovery and flow field conditions, and to help validate models of the unsaturated zone at Yucca Mountain. Since the end use will have a great deal of importance, it is our opinion that the experiment should be redesigned to produce meaningful results. Failure to restructure this experiment could lead to erroneous conclusions regarding the Yucca Mountain flow field. For example, this test will involve introducing water into one borehole and monitoring in another. If the important fractures are not within the proposed packer locations in the monitoring hole, water flow in the fractures may not be detected. We feel such a situation is quite possible in this test since there is no mechanism planned by which to confidently identify the important fractures in the monitoring hole for the purposes of selecting the packed off intervals. If the test is allowed to continue as currently planned, the USGS may come to the erroneous conclusion that fracture flow is not occurring, and, therefore, not important; when in reality, they may simply miss the important fractures and not test real in-situ conditions. The ramifications of this on the overall performance assessment at Yucca Mountain are enormous.

Additionally, the QA program imposed must be examined in light of the following questions:

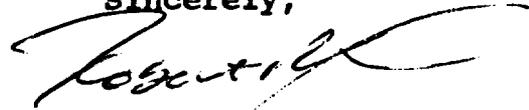
1. If the answer to the drilling question is known, then why do we have to spend money on this experiment? Why is the experience and knowledge of the USGS and other program participants not adequate to answer this question?
2. More importantly, is the Site Characterization program going to be inadequate because the QA program in place does not allow the needed flexibility in experimental design? By its very nature,

some flexibility is needed when installing these experiments to make adjustments for unforeseen field conditions. Such experiments will not provide data usable in licensing, but will only provide data by which to design a Yucca Mountain data gathering program. The need for a rigid QA program for these experiments is questioned.

In summary, we urge the VOIC and the NRC to:

1. Stress the concept of validation of the G-Tunnel experiment, not the indirect validation of the current USGS conceptual model of the Yucca Mountain flow field.
2. Restructure the Apache Leap experiment to emphasize fracture vs. matrix flow by concentrating on the pneumatic tracer test data.
3. Encourage the USGS to restructure the G-Tunnel experiment.
4. Examine the Quality Assurance program as to flexibility with respect to the G-Tunnel experiment.

Sincerely,



Robert R. Loux
Executive Director

RRL/CAJ/sjc

cc: Bob Browning, US NRC
Division of High-Level Waste Management

Kjell Andersson, Secretary
INTRAVAL