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Dr. M. S. Nataraja  
Engineering Branch  
Division of Waste Management  
U.S. Nuclear Regulatory Commission  
7915 Eastern Avenue  
Silver Spring, MD 20910

Dear Dr. Nataraja:

Enclosed are reports on Paul Davis' trip to the 17th International Congress of the Association of Hydrogeologists January 7-10, 1985 and Krishan Wahi's trips to Silver Spring in January.

Sincerely,



Evaristo J. Bonano  
Waste Management System Division  
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Paul Davis attended the 17th International Congress of the Association of Hydrogeologists held in Tucson, Arizona from January 7-10, 1985. The subject of the congress was: Hydrologic Investigations in Rocks of Low Permeability. Most of the work in this area is related to high-level nuclear waste disposal.

Presentations dealt mainly with hydrologic investigations. However several thermal-hydrological-mechanical studies were presented. These dealt mainly with fractured rock. All of the presentations will be published in the congress proceedings. The following is a brief summary of the thermal-hydrological-mechanical studies.

Raven and others presented a field study of ground-water flow in fractured gneiss. An important result of this study was that they found the commonly used parallel-plate model of fracture flow to be inappropriate for conditions at the site they studied. Variations from the parallel plate model were also shown by Makurat in his work on the effect of shear displacement on the permeability of natural joints. Probably the most enlightening work on fracture flow was presented by Dr. Neretnieks. By injecting tracers into fractures that intersect a mine opening and then monitoring their movement to the opening, he demonstrated that not all fractures were involved in transport and that channeling of the tracers occurs

within a given fracture. Previous modeling has generally assumed that all fractures and all parts of a fracture are involved in flow and transport. Therefore, new models need to be developed to describe the phenomena observed by Neretnieks.

Coupled effects of pressure response and rock deformation were the subject of two presentations. Sterrett demonstrated that the pressure response during a hydrologic test was affected by salt creep within the tested borehole. Tsang also noted that rock deformation can affect hydrologic test results. However, his work dealt with fractured crystalline rock.

During the concluding panel discussion, an interesting idea with regard to future thermal-hydrologic tests was presented. Dr. Paul Witherspoon suggested that site characterization of proposed nuclear-waste storage facilities should include a tunnel around the edge of the proposed repository. This tunnel would be used to perform insitu hydrologic and thermal-hydrologic tests. Dr. Witherspoon believed this is necessary to adequately describe the spatial variability of parameters and to provide a means for large scale in situ tests.

At NRC's request, Krishan Wahi travelled to Silver Spring, Maryland twice during the month of January to assist in the review of Draft Environmental Assessment Documents for the salt sites. The first trip was on January 14 through 18, and the second on January 28 through February 1, 1985.

The first trip consisted of working meetings with the NRC staff and other consultants on detailed comments relating to the rock characteristics, rock mechanics and design issues of a repository. These comments followed a format prescribed by the NRC. A few comments were also written on the performance assessment analysis presented by the DOE. On January 18, preliminary discussions took place on the nature of the major comments and plans and assignments were made for the next two weeks. Although a majority of K. Wahi's detailed comments were specific to the Vacherie Dome Site, many were equally applicable to the other dome sites. Some detailed comments applied to all the salt sites since DOE's analyses were common in many aspects.

In the second trip the major comments addressing NRC's concerns from the rock characteristics and the design and construction perspectives were discussed and prepared. Each

consultant was assigned the responsibility of preparing one or two core comments which could be developed into major site-specific comments. Comments were written on the following issues:

1. Assumption of homogeneity of host rock
2. Impact of repository induced loadings
3. Retrievability
4. Consideration of shaft sealing
5. Extent of the disturbed zone
6. Alternate repository design concept

There were no disagreements with DOE's findings regarding qualifying and disqualifying conditions. A reversal was recommended with respect to the finding of a certain favorable condition. For numerous other findings regarding favorable and potentially adverse conditions, a general "toning down" was recommended. In other words, it was felt that the available data were not sufficient to warrant the level of confidence implied in several of the findings. Final sets of detailed and major comments were submitted to J. Pearring of the NRC staff at the end of the meeting.