OCT 06 1994

Mr. Richard A. Milner, Acting Director
Office of Program Management and Integration
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

SUBJECT: STATE OF NEVADA CONCERN ON PNEUMATIC PATHWAYS

Dear Mr. Milner:

In a letter dated August 10, 1994, from Stephan Brocoum (DOE) to Joseph Holonich (NRC), the DOE replied to a letter from Joseph Holonich (NRC) to Dwight Shelor (DOE) dated June 21, 1994. In this letter, the NRC asked for information on the State of Nevada's concern about characterizing pneumatic pathways. The NRC has been investigating the State's issue to determine if data significant to the characterization of the repository would be irretrievably lost by construction of the Exploratory Studies Facility (ESF). The NRC has been concerned with two main aspects of the question: (1) how important is this type of pneumatic (air pressure) data to a determination of site performance, and (2) if the data is important, is there a plan to collect this data before it can be compromised by the ESF? Having reviewed the DOE response, the NRC recognizes that the DOE plans to collect pneumatic data undisturbed by construction of the ESF. However, the DOE response is inadequate for the NRC to reach a decision regarding these two questions, because the NRC needs a description of the conceptual models of air flow through Yucca Mountain which were used to develop the Accelerated Surface-Based Plan. In addition, the NRC needs a discussion of how the DOE will determine if (1) the Paintbrush nonwelded unit over the site, (2) the Topopah Spring unit outcrop in Solitario Canyon, and (3) the Solitario Canyon fault are pneumatic barriers.

In DOE's response, it was stated that the Accelerated Surface-Based Testing Plan was developed by the DOE to address the concern that an opportunity to characterize undisturbed pneumatic conditions would be missed, should a long-term monitoring program not be implemented prior to start-up of the tunnel boring machine (TBM) and subsequent excavation of the North Ramp. It was stated that this plan will also provide the baseline measurements necessary to determine impacts of the TBM excavation on the gaseous flow system.

It is the NRC staff's understanding that under the accelerated testing plan, one winter's season of pneumatic pressure data along the North Ramp from holes NRG-6 and NRG-7 will be collected prior to the approach of the TBM in early March of 1995. Hole NRG-6 has been drilled into the top of the Topopah Spring unit and hole NRG-7 has been drilled into the top of the Calico Hills unit. In addition, along the southern portion of the main drift, one winter's season of pneumatic pressure data will be collected from four holes (UZ-7, UZ-7a, SD-12 and SD-7) prior to the approach of the TBM, in early March of 1996. These four boreholes will be drilled from the surface to the water table.

As stated in the NRC letter dated June 21, 1994, it was the understanding of the NRC staff that the State of Nevada proposes that large scale tests are needed to adequately characterize the mountain with respect to the possible existence of flow barriers. These are tests that would reflect the bulk pneumatic properties of large volumes of rock. The State of Nevada proposes that air pressure data be obtained from units above, below, and in the Paintbrush nonwelded unit, in the areas of interest (i.e., Yucca Mountain and Solitario Canyon). Further, the pressure data should be collected long enough to record pressure changes during periods when weather conditions are causing significant air pressure changes over the site. This would allow a large volume of rock to experience significant pressure changes, so that air pressures in and on either side of a potential flow barrier can be monitored for changes. It is our understanding that the State of Nevada is concerned that excavation of the ESF below the Paintbrush nonwelded unit could make it impossible to use this technique. It is also our understanding that the State of Nevada is concerned that excavation of the ESF below the Paintbrush nonwelded unit could make it impossible to use differences in gas chemistry above and below potential pneumatic barriers to determine if they exist. It is feared that the ESF could "short circuit" the influence of the potential Paintbrush nonwelded unit barrier by causing large scale pressure and air chemistry changes below the Paintbrush nonwelded unit. Furthermore, the State of Nevada has identified three locations which warrant investigation, because of their potential to act as pneumatic barriers. These areas are (1) the Paintbrush nonwelded unit overlying the Topopah Spring welded unit, (2) the Topopah Spring welded unit outcrop in Solitario Canyon, and (3) the Solitario Canyon fault in Solitario Canyon.

Open Item Question 1 of Site Characterization Progress Reports 6 & 7 expressed the NRC staff's interest in interference by the ESF on gas chemistry sampling. In a letter to Ronald A. Milner (DOE) from Margaret V. Federline (NRC) dated September 26, 1994, the NRC closed this open item. As a result, the remaining discussion is strictly directed to the gas flow (air pressure) aspects of the State of Nevada's pneumatic pathway concern.

The description of the accelerated testing plan demonstrates that the DOE does have a plan to collect some pneumatic pressure data from units above, below,

and in the Paintbrush nonwelded unit prior to the approach of the TBM. However, the response is not complete in its explanation of how the collection of this data will address the State of Nevada's concern. What seems to be missing, is a description of the hypothesis (conceptual model) of air flow and pneumatic air flow through Yucca Mountain that was used to design the pneumatic testing program. For example, by proposing to monitor the effects on gas pressure changes as the ESF approaches, it is implied that pneumatic pressure changes caused by the ESF will happen slowly. This seems to be at odds with the State of Nevada's pneumatic pathway concern, which appears to imply that large scale ESF induced pneumatic pressure effects would rapidly influence large amounts of rock beneath the Paintbrush nonwelded unit. Furthermore, if ESF pneumatic pressure effects take months or years to move significant distances into the rock, this implies that more time is available to collect undisturbed data. However, it also implies that long term air pressure changes over the site (a winter period) may not have any effect on pressure changes at depth. This in turn would mean monitoring long-term pressure changes may not be effective in defining pneumatic barriers at depth. Therefore, a description of the conceptual models that were used to design the pneumatic pathway testing program is needed to determine if the testing program is based on reasonable interpretations of the physical system.

The response also states that "DOE believes that the coverage provided through a combination of different tests, some over several seasons, will provide adequate information to calibrate the gaseous phase submodel of the unsaturated zone site-scale model as described in Study Plan 8.3.1.2.2.9 (Site Unsaturated Zone Modeling and Synthesis). However, while the plan does provide some information on testing procedures and identifies hole locations in Enclosure 4 of the response, it does not describe how the data collected from these holes will be relevant to the pneumatic pathway concern. An explanation of how collection of these data will help determine if the Paintbrush nonwelded unit over the site, the Topopah Spring unit outcrop in Solitario Canyon, and the Solitario Canyon fault are pneumatic barriers is needed.

To summarize, the NRC recognizes that the DOE plans to collect pneumatic data undisturbed by construction of the ESF. However, as we asked in our communication dated June 21, 1994, the DOE has yet to explain how the DOE program will address the State of Nevada's concern. Therefore, the NRC needs a description of the conceptual models of air flow through Yucca Mountain which were used to develop the Accelerated Surface Based Plan. In addition, a discussion of how the DOE's characterization plan will determine if (1) the Paintbrush nonwelded unit over the site, (2) the Topopah Spring unit outcrop in Solitario Canyon, and (3) the Solitario Canyon fault are pneumatic barriers is needed.

If you have any questions regarding this letter or would like to discuss this concern further, please contact William Ford, of my staff. Mr. Ford can be reached at (301) 415-6630.

Sincerely,

Margaret Federline, Chief
Performance Assessment and Hydrology Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

cc: R. Loux, State of Nevada
T. J. Hickey, Nevada Legislative Committee
J. Meder, Nevada Legislative Counsel Bureau
R. Nelson, YMPO
M. Murphy, Nye County, NV
M. Baughman, Lincoln County, NV
D. Bechtel, Clark County, NV
D. Weigel, GAO
P. Niedzielski-Eichner, Nye County, NV
B. Mettam, Inyo County, CA
V. Poe, Mineral County, NV
F. Mariani, White Pine County, NV
R. Williams, Lander County, NV
L. Fiorenzi, Eureka County, NV
J. Hoffman, Esmeralda County, NV
C. Schank, Churchill County, NV
L. Bradshaw, Nye County, NV
W. Barnard, NWTRB
R. Holden, NCAI
E. Lowery, NIEC

If you have any questions regarding this letter or would like to discuss this concern further, please contact William Ford, of my staff. Mr. Ford can be reached at (301) 415-6630.

Sincerely,

Margaret Federline, Chief
Performance Assessment and Hydrology Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

cc: R. Loux, State of Nevada
T. J. Hickey, Nevada Legislative Committee
J. Meder, Nevada Legislative Counsel Bureau
R. Nelson, YMPO
M. Murphy, Nye County, NV
M. Baughman, Lincoln County, NV
D. Bechtel, Clark County, NV
D. Weigel, GAO
P. Niedzielski-Eichner, Nye County, NV
B. Mettam, Inyo County, CA
V. Poe, Mineral County, NV
F. Mariani, White Pine County, NV
R. Williams, Lander County, NV
L. Fiorenzi, Eureka County, NV
J. Hoffman, Esmeralda County, NV
C. Schank, Churchill County, NV
L. Bradshaw, Nye County, NV
W. Barnard, NWTRB
R. Holden, NCAI
E. Lowery, NIEC

DISTRIBUTION: Central File DWM r/f LLS JGreeves
MBell JSurmeier JHolonich PUBLIC NMSS r/f
J.Bradbury V.Colten-Bradley PAHB r/f
Yucca Mt. Project Manager

S:\DWM\PAHB\WHF\PPC9.WHF

OFC	PAHB	E	PAHB	E	PAHB	
NAME	WFord/ras		DBrooks		MFederline	
DATE	10/07/94		10/05/94		10/ /94	

OFFICIAL RECORD COPY