

FEB 22 1994

MEMORANDUM FOR: Margaret Federline, Chief
Hydrology and Systems Performance Branch
Division of High Level Waste Management

FROM: William H. Ford, Hydrogeologist
Hydrologic Transport Section
Hydrology and Systems Performance Branch

SUBJECT: TRIP REPORT ON JANUARY 26 AND 27, 1994, SCIENTIFIC
ROUNDTABLE INTERACTION TITLED, "PROGRESSING FROM CONCEPTUAL
MODELS OF GAS CIRCULATION IN THE VADOSE ZONE TO CONFIDENT
CHARACTERIZATION"

I attended a scientific roundtable interaction, organized by Nye County titled, "Progressing From Conceptual Models of Gas Circulation in the Vadose Zone to Confident Characterization," in Las Vegas, Nevada from January 26 to 27, 1994. At this interaction I presented a description of NRC Open Items; Comment 123, Site Characterization Analysis and Question 1, Progress Reports 6 & 7. Both of these comments are concerned with test interference effects of the Exploratory Studies Facility (ESF).

This interaction was hosted by Nye County, to discuss the State of Nevada's pneumatic pathways concern with respect to construction of the ESF. The State's concern overlaps some of the NRC's concerns about ESF test interference, but differs, because it includes concerns about the collection of ambient (undisturbed by the ESF) air pressure and flow data.

From this meeting it became apparent that the pneumatic pathways concern contains two issues:

1. Characterization of air flow barriers in the mountain.
2. The role of the Topopah Springs Solitario Canyon outcrop and the Solitario Canyon Fault in gaseous flow through Yucca Mountain.

The State is concerned the PaintBrush nonwelded unit may function as a flow barrier to gaseous flow through Yucca Mountain. To define the pneumatic properties of the PaintBrush nonwelded unit, they feel ambient air pressure and flow data need to be collected above and below the PaintBrush nonwelded unit. If air pressure changes are detected above the PaintBrush nonwelded unit and no changes are detected below, this may indicate that the PaintBrush nonwelded unit functions as a barrier. Alternatively, if air pressure changes are detected above and below the PaintBrush nonwelded unit, the data would indicate that the PaintBrush nonwelded unit does not function as a barrier. However, the State is concerned that when the ESF penetrates below the PaintBrush nonwelded unit, it would be impossible to determine if air pressure changes below the PaintBrush nonwelded unit are from atmospheric changes at the land surface or from the ESF. Therefore, it would not be possible to determine if the PaintBrush nonwelded unit functions as a barrier. The State

is concerned about characterizing these type of barriers, because they feel that under a hot repository scenario, such barriers could keep the mountain from drying out.

Another concern, is the role of the Topopah Springs Solitario Canyon outcrop and the Solitario Canyon Fault in gaseous flow through Yucca Mountain. The State is concerned that ambient data are needed to determine if the Topopah Springs unit and the Solitario Canyon Fault is permeable or impermeable to air flow. It appears that the State is concerned about this issue either to improve gaseous flow models to be used to model radionuclide release or that the mountain may be prevented from drying.

The Department of Energy (DOE) intends to implement an accelerated testing program designed by the U.S. Geological Survey (USGS) to collect the needed information to address both the NRC and the States concerns before the data can be compromised by the ESF. The NRC staff is evaluating this accelerated program in light of it's ability to satisfy both NRC and State of Nevada concerns. The NRC is also consulting inside and outside experts to determine the seriousness of the State's concerns.

As support for the need to collect ambient data to characterize such barriers, the State of Nevada has suggested that the definition of ground water in 10CFR60 applies to all liquid, including vapor/gaseous water below the land surface. Therefore, NRC groundwater travel time regulations apply to liquid and gaseous movement of water. Meeting participants were informed by me, that it is the NRC staff's technical opinion the definition of ground water applies to liquid water and not to gaseous water. The audience was advised that gaseous release of radionuclides must be considered to address the EPA high level waste standard and is specifically addressed in 10CFR60 §122(c)(24). However, NRC staff will consider the state's views on this matter in the staff's current activities on groundwater travel time.

Nye County is going to publish a summary of the presentations and discussions from this interaction which will be sent to all participants. Should you have any questions on this interaction, I can be reached at (504-2506).

/s/

William H. Ford, Hydrogeologist
Hydrologic Transport Section
Hydrology and Systems Performance Branch

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**PROGRESSING FROM CONCEPTUAL MODELS OF GAS CIRCULATION
IN THE VADOSE ZONE TO CONFIDENT CHARACTERIZATION**

**A SCIENTIFIC ROUNDTABLE INTERACTION ON YUCCA MOUNTAIN PNEUMATIC CONTINUITY
Sponsored by the Yucca Mountain Affected Units of Local Government
January 26 and 27, 1993 - Thomas and Mack Center - Las Vegas, Nevada**

PRELIMINARY AGENDA

January 26th - Wednesday

12:30 pm I. INTRODUCTION

- | | |
|---|--|
| A. Welcome and Basis for Convening Workshop | Les Bradshaw (Nye County) |
| B. Workshop Organization and Ground Rules | Phil Niedzielski-Eichner - Facilitator |
| C. Gas Pathway Regulatory Considerations | Mal Murphy (Lane Powell Spears Lubersky) |

1:00 pm II. WHAT IS THE ISSUE?

- | | |
|--|--------------------------|
| A. State of Nevada | Carl Johnson |
| B. Nuclear Regulatory Commission | William Ford |
| C. Department of Energy/Yucca Mountain Project | Joe Dlugosz/Jean Younker |
| D. Radionuclides Transportable in Gas-Phase | [To Be Determined] |

2:15 pm III. WHAT IS GENERALLY KNOWN ABOUT GAS FLOW PHENOMENA AT YUCCA MOUNTAIN?

- A. Blowing Wells: Interpretations and Gas compositions
- B. Fracture density distribution: Evidence, Stratigraphy and Structure
- C. Thermal Signature of Moist Air Discharge at Land Surface

**Co-Convener: Marty Mifflin (Mifflin and Associates)
Mike Chornack (USGS)**

Panel: Larry Anna (USGS)	Charlie Peters (USGS)
Alan Flint (USGS)	Rick Spengler (USGS)
	Ed Weeks (USGS)

5:30 pm END OF FIRST DAY

January 27th - Thursday

8:30 am III. WHAT ARE NUMERICAL MODEL REQUIREMENTS

- A. Boundary Conditions and Parameter Requirements
- B. Pre and Post Emplacement Repository Modeling Requirements

Convener: Duane Chesnut (LLNL)

Panel: Bo Bodvarson (LBNL)	Ed Peterson (S-Cubed)
Tom Buscheck (LLNL)	George Zyvoloski (LANL)

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11:00 am **IV. FIELD DATA AND STRATEGIES NECESSARY FOR CHARACTERIZATION AND LICENSING**

A. Database Strategies/Methodologies

1. Existing gas composition/distribution (isotopic and geochemical datasets)
2. Natural gas discharge (thermal evidence)
3. Confined pneumatic system responses (open and closed well studies)
4. Repository scale boundary conditions (stratigraphic and structural controls)

B. Disturbed versus Undisturbed System Field Data Strategies

1. Repository scale testing
2. Local scale testing

Convener: Dave Cox (Advanced Resources International)

**Panel: Tom Buscheck (LLNL)
Joe Dlugosz (DOE)**

**Gary LeCain (USGS)
Marty Mifflin (Mifflin and Associates)
Ed Peterson (S-Cubed)**

12:00 pm **LUNCH**

1:30 pm **IV. FIELD DATA AND STRATEGIES NECESSARY FOR CHARACTERIZATION AND LICENSING (Con't)**

3:30 pm **V. SUMMARY IMPRESSIONS**

- A. What is Really Important to Know?
- B. What can be determined?
 1. Boundary Conditions?
 2. Natural Undisturbed Gas Distribution?
 3. Pneumatic Permeability/Effective Porosity?
- C. Will Pneumatic Continuity Data Important to Licensing Be Lost if Tunneling Proceeds as Currently Planned?
- D. What, if any, additional surface-based tests are needed?

Discussion Facilitator:

Phil Niedzielski-Eichner

Technical Issues Clarification:

Larry Ramspott (TRW)

Participants:

All Conveners, Panelists and Workshop Attendees

5:00 pm **END OF WORKSHOP**