



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
2300 Clarendon Boulevard, Suite 1300
Arlington, VA 22201

Agenda

Meeting of the Panel on Hydrogeology & Geochemistry Fracture Flow and Transport in Arid Regions

**Holiday Inn Crowne Plaza
San Francisco Airport
600 Airport Boulevard
Burlingame, CA 94010
Tel: (415) 340-8500
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June 26-27, 1995

Monday, June 26, 1995

1:00 P.M.

Welcome and opening remarks

Donald Langmuir

Nuclear Waste Technical Review Board (NWTRB)

WASTE ISOLATION IN ARID REGIONS

1:10 P.M.

Session introduction

Donald Langmuir, NWTRB

1:15 P.M.

Negev Desert experience

[Ronit Nativ](#)

Hebrew University of Jerusalem

1:45 P.M.

Questions/comments

1:55 P.M.

Experiences in other arid environments

[Bridget Scanlon](#)

Bureau of Economic Geology, University of Texas

- Controls on subsurface flow in an arid setting

2:25 P.M.

Questions/comments

2:35 P.M.

BREAK (15 minutes)

Monday, June 26 — continued

2:50 P.M.

Infiltration and initiation of fracture flow at Yucca Mountain

[Alan Flint](#)

United States Geological Survey

- Quantifying percolation flux

3:20 P.M.

Questions/comments

3:30 P.M.

Geochemical evidence of fracture flow in unsaturated tuff, Apache Leap, Arizona

[Gregg Davidson](#)

Department of Hydrology and Water Resources

University of Arizona

4:00 P.M.

Questions/comments

4:10 P.M.

BREAK (15 minutes)

4:25 P.M.

Round-table discussion of the day's topics

- What are the problems in characterizing "fast" flow in arid regions?
- What are the common features controlling transport in arid regions?
- What data are required to characterize/quantify this transport?
- What are the limitations of isotopic age data?

5:50 P.M.

Public comments

6:15 P.M.

Adjourn until 8:00 A.M. Tuesday

Tuesday, June 27

CRITICAL DATA NEEDS FOR MODELING FLOW AND TRANSPORT
IN FRACTURED UNSATURATED ROCKS

- 8:00 A.M.** **Reconvene and session introduction**
Patrick Domenico, NWTRB
- 8:10 A.M.** **Isotopic dating of ground water at Yucca Mountain**
[June Fabrika-Martin](#)
Los Alamos National Laboratory (LANL)
• What isotopic age data are telling us about transport at Yucca Mountain
• What we can expect to learn in the next few years
- 8:40 A.M. *Questions/comments*
- 8:50 A.M.** **Modeling of "fast" pathways: conceptual models and data needs**
[Bruce Robinson & Andy Wolfsberg](#), LANL
- 9:15 A.M. *Questions/comments*
- 9:20 A.M.** **Characteristics of flow and transport in highly heterogeneous media: a theoretical study**
[Yvonne Tsang](#)
Lawrence Berkeley Laboratory
• Channeling of flow — existence of "fast" pathways
• Spatial variability of breakthrough curves
- 9:50 A.M. *Questions/comments*
- 10:00 A.M.** **BREAK (15 minutes)**
- 10:15 A.M.** **Consequences of "fast" pathways for Yucca Mountain**
[Ralston Barnard](#)
Sandia National Laboratories
• Conceptual/numerical modeling of "fast" pathways flow and transport
- 10:35 A.M. *Questions/comments*

Tuesday, June 27 — continued

10:40 A.M.

Consequences of "fast" pathways for Yucca Mountain

[Robert Andrews](#), INTERA

Management & Operating Contractor

- Impact of "fast" pathways on total system performance

11:00 A.M.

Questions/comments

11:05 A.M.

BREAK (10 minutes)

11:15 A.M.

Round-table discussion of the day's topics • How can the "fast" pathways be characterized in a practical manner and in a reasonable amount of time?

- What are the crucial data needs?
- Are present conceptual models of flow and transport satisfactory?
- What do "fast" pathways imply about repository performance?

12:40 P.M.

Public comments

1:00 P.M.

Closing remarks and adjournment

Donald Langmuir, NWTRB

Goals of the HG&G Panel Meeting on Fracture Flow and Transport in Arid Regions

Historically, it has often been assumed that unsaturated zones in arid climates were potentially good sites for isolating waste. This was based on the "common" knowledge that matrix flow is generally very slow and that even though the rocks are often fractured, the fractures are dry most of the time. During periods of extreme precipitation, when water penetrated the alluvium and saturated the fractures, it was thought that the fracture-matrix interaction was strong and the water would quickly imbibe into the matrix. Thus, transport of contaminants through these zones would be primarily via the matrix and extremely slow. Significant fast transport through the fractures was considered unlikely. Recent evidence challenges this view.

The purpose of this meeting is to hear this recent evidence from experts who have studied transport in fractured rocks in arid climates from regions around the world. We are particularly interested in delineating the features or physical parameters that are common to all these regions and that control or influence the infiltration of water and the resultant transport. This meeting will address questions such as:

- Are present conceptual models of flow and transport adequate for modeling arid environments?
- Do we have sufficient understanding of the important parameters that control the transport processes in these types of environments?
- What measurement techniques can be used to characterize/quantify flow and transport in these environments (i.e. can the "fast" pathways be detected, predicted, and quantified as to their significance) and what are the limitations of these techniques?
- How do the existence and potential importance of "fast" pathways influence our views about the suitability of Yucca Mountain? How will ground-water travel time and total system performance assessment computations be affected by the site specific, isotopic age data that are and will be accumulated?