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MEMORANDUM TO: Margaret V. Federline, Chief
PAHB/DWM/NMSS

FROM: David Brooks, Section Leader
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Hydrologic Transport Section
PAHB/DWM/NMSS

SUBJECT: TRIP REPORT ON THE MEETING OF THE HG&G PANEL OF THE
NWTRB ON GROUNDWATER TRAVEL TIME AND FLUID FLOW
PATHWAYS

The Hydrology and Geochemistry Panel of the Nuclear Waste Technical Review Board met in Las Vegas on September 12 and 13, 1994, to discuss the following:

- Regulatory background of the groundwater travel time requirements of both 10 CFR Part 60 and 10 CFR Part 960
- DOE's general approach to demonstrate compliance with groundwater travel time requirements
- Status of site-characterization work supporting performance assessment and groundwater travel time

The meeting agenda is attached. The following are technical highlights of the meeting.

- In two presentations (by Dr. Duguid and Dr. Barnard), DOE outlined the general calculational approach and more specific technical implementation of groundwater travel time analyses. These presentations likely will form the basis of presentations to be given at the upcoming technical exchange on groundwater travel time planned for the week of November 28, 1994. Copies of the handouts of these presentations have been provided to appropriate staff.
- DOE indicated that groundwater travel time analyses will be accomplished in an iterative manner. Preliminary results should be available in mid CY95, a first iteration in late CY96 and the final iteration in late CY97.
- DOE's presentations did not indicate either a need or technical basis for establishing a discrete value of groundwater travel time

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to be used to determine compliance with regulatory requirements. Their approach appears to focus on evaluating the significance of travel times less than 1,000 years in the context of overall system performance. We have indicated to DOE previously that NRC regulations call for a determination of GWT "...along the fastest path of likely radionuclide travel from the disturbed zone to the accessible environment..." and that this calls for a compliance determination to be made based on a discrete value as opposed to a distribution (letter from J. Holonich, NRC to R. Milner, DOE dated August 23, 1994). We will elicit DOE's views on this subject at the upcoming technical exchange during the week of November 28, 1994.

- Richard Luckey (USGS) provided information on progress in saturated zone studies. This presentation provided some indication of what work, identified in the SCP, cannot be accomplished in time for the site suitability decision. What will not be available for the site suitability decision, with respect to the saturated zone, includes: 1) a good understanding of the role of faults; 2) full understanding of fracture/matrix flow at the site; 3) full characterization of the "large hydraulic gradient"; 4) transport properties throughout the site; and 5) good understanding of the carbonate aquifer. Similar information with respect to the unsaturated zone was not provided. It is our understanding that DOE will further address this topic at the upcoming ACNW meeting to be held in Las Vegas on October 19-20, 1994.

Copies of meeting handouts are available upon request.

Attachments:
As stated

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UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
1100 Wilson Boulevard, Suite 910
Arlington, VA 22209

Agenda

HIG&G Panel Meeting
Ground-Water Travel Time (GWTT)
and
Fluid-Flow Pathways

Holiday Inn Crowne Plaza
4255 South Paradise Road
Las Vegas, Nevada 89109
(702) 369-4400
Fax: (702) 369-3770

September 12-13, 1994

Monday, September 12, 1994

1:00 P.M. Welcome and opening remarks
Donald Langmuir
Nuclear Waste Technical Review Board (NWTRB)

REGULATORY BACKGROUND

1:10 P.M. Session introduction
Patrick Domenico, NWTRB

1:15 P.M. Review of the history and intent of 10 CFR 60 GWTT
criterion
Michael Bell
Nuclear Regulatory Commission

1:45 P.M. Review of the regulatory background of 10 CFR 960
Stephan Brocoum
Department of Energy (DOE)

2:15 P.M. Review of the regulatory background and history:
Stakeholder viewpoint
Mal Murphy
Nye County, Nevada

Telephone: 703-235-4473 Fax: 703-235-4495

Monday, September 12 — continued

2:45 P.M. BREAK (15 minutes)

PROPOSED PROGRAM APPROACH TO GWTT: CONCEPTUAL PROBLEMS

3:00 P.M. Program overview of GWTT assessment
Claudia Newbury, DOE

3:15 P.M. Interpretation of regulations and calculational philosophy
• *Purpose and objectives*
• *Regulations and their implications (Parts 60 and 960)*
• *Philosophical approach*
Lester Berkowitz
Management and Operating Contractor (M&O) —
TRW Environmental Safety Systems, Inc. (TRW)

3:45 P.M. Calculational approach
• *Specific considerations (why a distribution)*
• *General approach (transport processes considered)*
• *Determination of the disturbed zone*
• *Calculation of unsaturated and saturated zone travel times*
• *Role of deterministic and stochastic models*
• *Determining the significance of groundwater travel times less than 1000 years*
James Duguid
M&O — INTERA

4:45 P.M. Implementation of approach - an illustration
• *Conceptual implementation*
• *Use of process models*
• *Unsaturated zone example*
• *Discussion of site scale-model and data feeds*
• *Example of site scale-model results and their use*
Ralston Barnard
Sandia National Laboratories (SNL)

5:25 P.M. Discussion, questions, and comments
Board, presenters, and audience

5:55 P.M. Recess until Tuesday

Tuesday, September 13, 1994

- 8:30 A.M. Reconvene and session introduction
Patrick Domenico, NWTRB
- 8:35 A.M. Alternative criteria to GWTT on the geologic subsystem
• Problems with current criterion
• Criteria for a new criterion
• Example of how a criterion could be set for Yucca mountain
Paul Kaplan, SNL
- 9:05 A.M. Comments from the state of Nevada
Carl Johnson
Nuclear Waste Projects Office
- 9:35 A.M. BREAK (15 minutes)
- 9:50 A.M. Round-table discussion: GWTT related issues.
• Would an alternative criterion be preferable? What could it be based on?
• Do complex mathematical models with uncertain parameters serve a useful function in assessing the geologic subsystem performance? When do they, and when do they not?
• What is the significance of travel times less than 1,000 years on repository performance?
• Is there agreement on the definition of the disturbed zone? On which processes should be included in the computation?
• Lessons learned from past attempts at struggling with the GWTT criterion
Board members, presenters, and audience

STATUS OF SITE-CHARACTERIZATION WORK SUPPORTING
PERFORMANCE ASSESSMENT (PA) AND GWTT

- 11:10 A.M. Site-characterization approach and ties to performance assessment (PA) and GWTT
• PA paradox and its resolution
• Key data needs
Dwight Hoxie
U.S. Geological Survey (USGS)

Tuesday, September 13 — continued

- 11:45 A.M. LUNCH (1 hour and 15 minutes)
- 1:00 P.M. Progress in unsaturated zone studies
- *Summary of infiltration studies*
 - *Simulation of Pagany Wash*
 - *Isotopic evidence for shallow and deep fracture flow*
 - *UZ16 Air-permeability testing*
 - *Summary of gas isotope/gas circulation model*
 - *Perched water studies*
 - *Saturated-unsaturated zone interactions*
- Edward Kwickless, USGS
- 2:15 P.M. Progress in saturated zone studies
- *Recent progress on regional flow model*
 - *Plans for site flow model*
 - *New concepts on saturated zone flow system*
 - *Plans for new saturated zone data collection*
 - *Contributions to performance assessment and technical site suitability*
- Richard Luckey, USGS
- 3:00 P.M. BREAK (15 minutes)
- 3:15 P.M. Round-table discussion: Key gaps in hydrologic data for site characterization. What are they and will there be time to fill them?
- *Key hydrologic tests/exploration in the ESF*
 - *Characterizing the fast pathways: isotopic data, etc.*
 - *Pneumatic pathways issue: where do we stand today?*
 - *What do we need to know about the Calico Hills?*
- Board members, presenters, and audience
- 5:00 P.M. General comments from the audience
- 5:15 P.M. Closing remarks and adjournment
- Donald Langmuir, NWTRB