

MEMORANDUM TO: Joe Hunich, Chief
High Level Waste & Uranium Recovery Branch

**FROM: John Austin, Chief
Performance Assessment & Hydrology Branch**

**SUBJECT: TECHNICAL REVIEW OF THE SITE CHARACTERIZATION
PROGRESS REPORT #10 (DWM 95069)**

As requested, the Hydrologic Transport Section and the Performance Assessment and Health Physics Section have each conducted a technical review of the Site Characterization Progress Report #10. The concerns identified in the reviews have been combined into a single set of comments and questions.

GENERAL COMMENTS

The Branch, as indicated in its review of Site Characterization Progress Report #9, continues to have concerns about the utility of the site characterization progress reports to provide the integrated information needed to evaluate ongoing efforts to identify and resolve potential licensing issues.

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NEW OPEN ITEMS

This PAHB review was concluded with the identification of a few new open items, including 1 comment and 2 questions. The comment concerns the Proposed Program Approach. The current status of this issue has probably evolved since the period covered in the progress report, October 1, 1993 - March 31, 1994; therefore, the comment may not need to be established as an open item. The comment and questions are attached.

Attachment: As stated

CONTACT: J. Bradbury, PAHB/DWM
J. Firth, PAHB/DWM

TICKET: DWM 95069

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PDR

MEMORANDUM TO: Joe Monich, Chief
High Level Waste & Uranium Recovery Branch

March 3, 1995

FROM: John Austin, Chief
Performance Assessment & Hydrology Branch

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NAME	JBradbury/cj		JRFirth		DJBrooks		NAEisenberg		JHAustin	
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MEMORANDUM TO: Joe H. Unich, Chief
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Section 1.3.1 Office of Civilian Radioactive Waste Management Proposed Program Approach

COMMENT

The changes that are made in site characterization activities due to the proposed program approach (pp. 1-3) should be clearly indicated as such within future site characterization progress reports.

BASIS

The development of the proposed program approach will create changes in the schedule and the scope of site characterization activities. The proposed program approach is likely to change the quantity of data that is available for supporting a license application. Although the information required to adequately support a license application will depend upon several factors, including the extent to which credit for site features is to be taken and the manner in which such claims are to be made. The changes associated with the adoption of the proposed program approach could have implications related to the quality of a license application. These implications may arise from the combined effect of one or more decisions on the required amounts of supporting data. It is important for the NRC to be able to evaluate the overall impact of the PPA on site characterization activities to facilitate the communication of NRC staff concerns to DOE through prelicensing interactions.

RECOMMENDATION

The changes that are made in site characterization activities, due to the proposed program approach, should be clearly indicated as such within future site characterization progress reports. This should include rationales for any added or deleted investigations, studies or activities.

TECHNICAL REVIEW OF THE SITE CHARACTERIZATION PROGRESS REPORT #10

Section 2.2.1.7 Study 8.3.1.2.2.2. - Characterization of Percolation in the Unsaturated Zone-Surface-Based Study

QUESTION

How stratified is the composition of water in the saturated zone at Yucca Mountain?

BASIS

The Progress Report #10, covering the period October 1, 1993, to March 31, 1994, states that it is planned that UZ-14 will be drilled to a depth of 9.1m below the water table (pp. 2.2-17).

Instead, as presented by A. Yang at the ACNW Workshop on Groundwater Age Dating on October 21, 1994, the borehole had to be drilled approximately 240' below the water table before water began to fill the hole. The water level rose in the hole until it reached the expected water-table elevation.

The composition of water in the hole may not be the same as the composition of water at the water table (i.e., water in open interconnected fractures at the SWL).

It is not clear to the NRC staff how common are situations like that encountered in UZ-14.

RECOMMENDATION

The DOE should explain how it intends to interpret water composition data that may not be representative of water at the groundwater table.

Section 2.2.1.16 Study 8.3.1.2.3.3—Saturated-Zone Hydrologic System Synthesis and Modeling
Section 2.7.6.3 Performance Assessment Activity 1.1.3.1—Development of Mathematical Models of the Scenario Classes

QUESTION

How, and to what extent, are alternative conceptual models to be used in the design process, in site characterization decisions, and in future performance assessments?

BASIS

At the time of a license application, there may be unresolved issues related to the choice of appropriate conceptual models. The sensitivity of performance assessments to the choice of conceptual models is sufficient to ensure that any unresolved issues could contribute to residual uncertainty in the performance of the proposed repository. The existence of these unresolved issues is likely to persist until the license application, since there may be insufficient evidence to eliminate many postulated alternate conceptual models due to limitations in time, resources, and the ability to obtain definitive data. Hence, there may be a range of reasonable conceptual models that could be used to describe different aspects of the disposal system and that warrant consideration when programmatic decisions are made prior to the license application and when the repository's performance is evaluated.

There is evidence that programmatic decisions are being based upon preferred conceptual models. The influence of conceptual model choices on assessments of repository performance should be recognized when making programmatic decisions. For example, calculations related to the impact of thermal loading upon the behavior of the repository have relied upon Equivalent Continuum Models. Programmatic decisions are being made on the basis of these modeling results. While computational difficulties may have driven this decision to rely upon Equivalent Continuum Models, consideration of the possible impacts on repository behavior, given other conceptual models, should be included in these decisions. There appears to be no evidence in this Progress Report that DOE is, currently, consistently using alternate conceptual models in making its programmatic decisions.

The progress report appears to indicate that, contrary to its need to consider alternative conceptual models when making programmatic decisions, DOE is limiting its consideration of these models. For example, it is indicated that the weeps model and the composite-porosity model are going to be combined into a unified flow model. It is not clear that the composite-porosity model and the weeps model will be retained as alternative conceptual models after the combined numerical model is developed. Also, while several conceptual models for the large hydraulic gradient north of Yucca Mountain have been discussed, it appears that only a single numerical model is going to be developed for the flow system.

The proposed program approach is expected to rely upon "bounding" analyses. "Bounding" analyses should be supported by evaluations of the degree of conservatism contained within the analysis. For example, there were significant differences in the cumulative releases calculated using the weeps model and the composite-porosity model (TSPA-93). It is stated that both the weeps model and

the composite-porosity model are idealized constructions and that an accurate flow description may fall between these two ideals (TSPA-93). It may not be possible, for example, to demonstrate that the overall performance of the repository system can be "bounded" when either of the idealized unsaturated-zone flow models (i.e., weeps or composite-porosity) is assumed. It may be then be necessary to consider a range of plausible conceptual models that could be applied to the flow including, for example, flow models that fall between the idealized weeps and composite-porosity models to demonstrate that the performance has been "bounded."

RECOMMENDATION

Alternate conceptual models should be considered when design decisions are being made.

DOE should clarify its approach to the development of alternate conceptual models.

DOE should clarify the methodology that it will apply to incorporate uncertainty due to conceptual models in its programmatic decisions and its assessments of repository performance.

"Bounding" analyses should be evaluated using a range of alternate conceptual models and should address the degree of conservatism or "bounding" contained within the analysis.

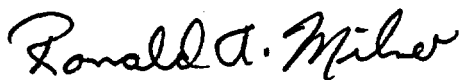
REFERENCES

SAND93-2675, Total-System Performance Assessment for Yucca Mountain-SNL Second Iteration (TSPA-1993), Wilson, Michael L. et. al., 1994.

None of the changes addressed by the above revisions diminish the Office of Civilian Radioactive Waste Management's commitments previously accepted by the U.S. Nuclear Regulatory Commission.

If you have any questions regarding this transmittal, please contact Sheila Long at 202-586-1447 or Franklin B. Smith at (702) 794-7212.

Sincerely,



Ronald A. Milner, Director
Office of Program Management and
Integration
Office of Civilian Radioactive
Waste Management

Enclosures:

1. Revision 1, QARD
2. Revision 2, QARD

cc: w\enclosures

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