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M E M O R A N D U M

DATE: February 12, 2001
TO: Mal Murphy [malmurphy@home.com]
CC: Danielle Fife **[**dfife@nrff.com]
RE: **SATURATED ZONE FLOW & TRANSPORT AMR Reviews**
Seepage Calibration Model and Seepage Testing Data
MDL-NBS-HS-000004

Key items include:

1. **This entire AMR epitomizes the concerns I have previously raised regarding the UZ modeling. The Seepage Calibration Model (SCM) utilizes an erroneous single-continuum approach for both the fractures and matrix (p. 19, 5.2. items 1 & 2; p. 28, 5.3.5) that is highly sensitive to the grid, assumptions, etc.**

2. The SCM is overly simplified, and is loosely based on:
    a. Steady-state air-k measurements lasting 2 minutes each from slant holes above Niche 3650. Those computations ignore skin and storage, which may lead to erroneous permeability estimates.
    b. Comparison to cumulative seepage data from three sequential liquid release tests
    c. Comparison to "synthetic" seepage data from a more complex Discrete Fracture Model ("DFM"). In other words, the SCM model is "validated" by comparison to another model -- the DFM (see Fig. 10, p. 34).

3. They were not able to match the simulated liquid release events with the SCM, as may be seen on Fig. 8. Interesting quotes from various sections include (italics added for emphasis):

a. p. 32, Section 5.3.6, Paragraph 2. "An important result of this study is the finding that a relatively small value $1/\alpha$ is required to match the seepage data. *While the reference value used in the DFM is 5,000 Pa, the estimate for the FCM is approximately two orders of magnitude smaller. This discrepancy clearly indicates that the value and interpretation of $1/\alpha$ is strongly related to the conceptual model and its implementation.*"

b. p. 33, Section 5.3.6, 2nd full Paragraph. "*It should therefore be clear that the estimated $1/\alpha$ value not only depends on the conceptual model, but also on the discretization used in the numerical model.*"

c. p. 33, Section 5.3.6, 3rd full Paragraph. "*Consequently, model predictions and thus capillary strength parameters estimated by inverse modeling depend on grid resolution.*"

d. p. 64, Section 6.6, Top Paragraph. "*Extrapolations to other drift geometries and hydrogeologic units are not valid.*"

4. p. 40, Section 6.2.2.1, Paragraph 1. The SCM is based on testing done in "the middle non-lithophysal zone of the Topopah Spring Tuff in an area of relatively competent rock mass with low fracture density."