HLWYM HEmails

From: John Bradbury
Sent: Monday, March 03, 2008 3:54 PM
To: LSNReviews
Subject: Fwd: UZ test Appendix 7 Planning Call with DOE
Attachments: TEXT.htm; UZ-FieldTestTopics_22Mar07.pdf

>>> John Bradbury 08/08/2007 1:36 PM >>>
Here's the telecon info.

>>> James Rubenstone 08/01/2007 3:43 PM >>>
Purpose: Confirrm with DOE staff the areas to be discussed at the August 22-23 Appendix 7 meeting on UZ tests, colloids in the UZ & SZ, thermal seepage, and fracture-informing results.

Outcome: DOE is prepared to respond to NRC questions at the Appendix 7

Process: Conference call with DOE. Bridge line is 702-295-3310 (DOE bridge; no passcode). The UZ test questions are the same as agreed on for our previous attempt this past April (attached). Other areas pick up on unaddressed topics from the July 11-12 Appendix 7, and from DOE's last response to KTI agreement SDS3.01 AIN.

Expected DOE staff participants in the Appendix 7 are Jim Houseworth, Ming Zhou, H H Liu, Rohit Salve (not sure), and Jens Birkholzer (by telephone for thermal seepage questions).

Randy, John--please make sure appropriate CNWRA staff are on this call.

Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 283

Mail Envelope Properties (86f86a47-864a-4090-bf2f-786beda33be0)

Subject: Fwd: UZ test Appendix 7 Planning Call with DOE
Sent Date: 3/3/2008 3:54:00 PM
Received Date: 3/3/2008 3:54:21 PM
From: John Bradbury

Created By: John.Bradbury@nrc.gov

Recipients:
"LSNReviews" <LSN.Reviews@nrc.gov>
Tracking Status: None

Post Office:

Files	**Size**	**Date & Time**
MESSAGE	969	3/3/2008 3:54:21 PM
TEXT.htm	1374	
UZ-FieldTestTopics_22Mar07.pdf	46919	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

>>> John Bradbury 08/08/2007 1:36 PM >>>
Here's the telecon info.

>>> James Rubenstone 08/01/2007 3:43 PM >>>
Purpose: Confirrm with DOE staff the areas to be discussed at the August 22-23 Appendix 7 meeting on UZ tests, colloids in the UZ & SZ, thermal seepage, and fracture-informing results.

Outcome: DOE is prepared to respond to NRC questions at the Appendix 7

Process: Conference call with DOE. Bridge line is 702-295-3310 (DOE bridge; no passcode). The UZ test questions are the same as agreed on for our previous attempt this past April (attached). Other areas pick up on unaddressed topics from the July 11-12 Appendix 7, and from DOE's last response to KTI agreement SDS3.01 AIN.

Expected DOE staff participants in the Appendix 7 are Jim Houseworth, Ming Zhou, H H Liu, Rohit Salve (not sure), and Jens Birkholzer (by telephone for thermal seepage questions).

Randy, John--please make sure appropriate CNWRA staff are on this call.

1. Matrix Diffusion

- Describe how the field test information is used in process level and TSPA models
  - Data and interpretations from Alcove 8/Niche 3 (journal articles & AMRs)
    - Are, or will, all available tests and measurements from A8/N3 (Fault Test, Large Plot Test, Tension Infiltrometer, Wetness Sensors) be contained in relevant AMRs? Some questions are:
      - Fault Test: Will effect of ventilation at ESF face outside bulkhead be included?
      - Large Plot: Indications of structural control influencing flow, and alternative conceptualizations (e.g., distribution of seepage flow in subplots, and, flow zones in Salve 2004)
      - Large Plot: Pre-Scrubbing or Post-Scrubbing; specifically, what is the interpretation, and why use one or the other?
      - Tension Infiltrometer bench tests: Do they support fracture hydraulic properties?
      - Large Plot Test: Clarify which geologic properties of the test site (injection unit; TSw33, upper lithophysal), the recovery unit (TSw34, middle non-lithophysal), and the fault that was tested, are most important in interpretation of test results. What geologic evidence supports the application of the test results beyond the test volume and to other faults?
    - How does DOE address the "long-term predictive capability" of the numerical model for sporadic infiltration events with particular reference to their combined numerical and experimental results from Stages 1 and 2 of the most recently reported information on the field experiments?
  - Alcove 6 injection and tracer tests
    - Do the field observations support alternative conceptualizations? (Salve 2002; and Hu et al. 2001, 2002)
  - Alcove 1 infiltration and tracer tests
    - Minimal amount of field data presented
    - Alternative conceptualization: Relationship of MINC parameterization to that of dual-permeability models
  - General questions for field tests and matrix diffusion processes:
    - What is relation between high-flow field tests and low-flow ambient case during postclosure?
    - Explain the basis for the factor of "45" in deriving the empirical diffusion coefficient? What is link between field observations, the factor of "45" for scaling effects.
    - For background, we would like to understand the three factors (and their relative importance) that determine the effective matrix diffusion coefficient: (i) active fracture model parameter, i.e., active fraction of the matrix-fracture interfacial area across which diffusion process takes place, (ii) capillary barrier effects of dry fractures (Seol, Liu, Bodvarsson, 2003, GRL), and (iii) the empirical factor of 45 (that accounts for scaling effects) in determining the effective matrix diffusion coefficient? Which of these three items/parameters dictates the importance of the matrix-diffusion contribution?
    - What is the effect of small-scale fractures in the matrix? Discuss the presence of small fractures noted in observations and their contribution to matrix diffusion.

        - Small fractures may increase the fracture-matrix interface area, and hence increase effective matrix diffusion
        - If intervening large fractures remain “dry,” how do small fractures contribute to matrix diffusion?
        - How is the artificial truncation of fracture abundance data (i.e., >1m length) accounted for in effective matrix area?
        - How does the existence of small-scale fractures affect the ‘importance’ of the matrix diffusion in their conceptual models and how this information was translated into their numerical models?
    - For processes contributing to matrix diffusion, are there field test data support for their relative contributions?
        - Confidence in effective diffusion coefficient values might be improved if field observations can provide insights on each of the contributing processes for matrix diffusion, especially since the tests are done at elevated flux conditions. The different processes lumped into effective matrix diffusion coefficient could be true diffusion, flow into dead-end fractures, alternative fracture pathways, advective flow from fractures into matrix. See also Zhu, Liu, Bodvarsson, and Molz, 2006 paper on “Multi-process matrix diffusion model” that accounts for the effects of (a) stagnant water and infillings, (b) degraded matrix zone, (c) intact matrix zone on the effective matrix diffusion process.
        - The Zhu, Liu, Bodvarsson, and Molz (2006) article, and other articles, appear to represent a different technical basis than in available AMRs – are AMRs being updated to reflect this basis, or does this represent alternative conceptual models?
  - Any other tests supporting a linkage of field data to model support or inputs (including niche dye tracer tests)
- Relationship of active fracture model (AFM) to matrix diffusion results
  - What field observation or additional model support is there for number of flowing fractures, linkage to AFM
  - What field observation or additional model support is there for matrix/fracture surface area (note linkage of AFM coefficient to matrix block size)
  - Contribution of advective flow between fracture and matrix to matrix diffusion
- TSPA--Describe TSPA model results to answer:
  - What fraction remains entirely in fracture throughout UZ?
  - Which rock layer(s) is matrix diffusion a significant contributor as a barrier?
  - What is radionuclide distribution in matrix of each, or selected layers, in the hydrostratigraphic column
  - Possible reasons matrix diffusion being important for UZ, but not for SZ
    - Are the implementations the same?
  - What fractions of matrix diffusion are due to diffusive and advective movement of radionuclides in each hydrostratigraphic unit?
  - When calculating flow fields, is AFM used uniformly for lithophysal and non-lithophysal rocks? for rock with microfractures as well as faults?
  - How can one tell the effect of adsorption in the matrix from that of matrix diffusion with TSPA's results? Any uncertainty/sensitivity analyses to determine the relative importance of each?

2. Seepage (No drift degradation Scenario, Ambient, ~< 50 C)

- Seepage support from small-scale injection tests
  - Anymore Systematic Testing in ECRB? Note, 4 locations total for Tptpll and Tptpmn used in calibration of seepage model
  - Alternative interpretation of tests, successive tests along a borehole
    - Indications that the results reflect characteristics of borehole intersection with fractures of different apertures and orientations
  - Effect of lithophysae or small-scale fractures
    - If quantity of lithophysae might effect seepage, note percentage varies in lithophysal units, and middle nonlithophysal also contains lithophysae
- Seepage support from large-scale injection tests
  - Flow zones: Alternative conceptualization suggested by Alcove 8/Niche 3
  - Structural control: Alternative conceptualization at Alcove 1 and Alcove8/Niche 3 (both fault and large-plot tests)
  - Effects of small faults and fracture zones on seepage distribution across footprint; quantity of faults and fracture zones
  - Are the characteristics of the fractures and faults in the test volumes representative of, or within the range of variability of, those characteristics elsewhere in the repository?
- Are there differences in large-scale and small-scale results, in relation field observations supporting the seepage model?
- Relation of DLS (fracture, fault, and lithophysae) to seepage results
  - Is spacing/quantity of seep points consistent with spacing/quantity of faults, fracture zone, or lithophysal zones (>25% lithophysae)?
  - Is seepage model consistent with intuitive effect of near-horizontal fractures on seepage? Seol et al 2006
- [Lesser Priority] Update on February 2005 seepage event in South Ramp
  - Activities focusing flow patterns on walls and fractures
- [Lesser Priority] Any update on Peña Blanca measurements in and above adits?

3. New Issue, Evaporation from Tiva Canyon

- What field observations support the quantitative estimate of “evaporative concentration” parameter? Were there field observations that prompted DOE to include this new process?
  - Chloride mass balance (CMB) in ECRB, ESF, and surface boreholes based on matrix pore water of varying ages?
  - Temperature profiles from “several” boreholes (out of 18, or 25); Are these consistent with CMB at same locations?
- Can diurnal variations (barometric pumping) or pressure drops from wind-direction based approaches be used to estimate potential evaporative concentration? Are there summer and winter differences? Are there measured flow data from paired boreholes in Tiva Canyon near Highway Ridge Road near crest being used? Where documented? (Ed Weeks in AGU Monograph).
- Are field observations of secondary mineralization consistent with evaporative concentration concept
  - Are there differences between the TCw and TSw? Why expected in one, but not the other?

- CMB requires piston flow and chemical equilibrium between matrix & fracture
  - Are the any observations of fracture water chemistry in UZ?
  - Does perched water reflect chemistry of fracture flow; if so, how does apparent chemical disequilibrium with matrix pore water occur?
- Are there observations or measurement of dried out zones where bedrock is exposed? What is the percent of the area covered by soils?

4. [Lesser Priority] Passive Test in ECRB

- Any updates on data collected and interpretations?
  - In Situ Field Testing Processes AMR
- Are measurements of water potential and saturation in the Passive Test, or ECRB and ESF in general, consistent with surface-borehole data? Only the latter apparently are used for the 3-D UZ mountain-scale UZ flow model calibration.
- How might the results be used to support or modify the seepage model or in-drift convection and condensation model?

5. [Least Priority] Open Technical Agreement, PTn Flow

- Spatial considerations, Lateral flow
  - What are the length scale for lateral flow resulting from Model A and B?
  - What field observations, ESF/ECRB or surface boreholes, were used to support numerical models?
    - DOE notes that heterogeneity can be inferred from 3D calibration (ensemble calibration using the borehole data); i.e., differences between the ensemble calibration the individual boreholes. How does this uncertainty relate to observed heterogeneity in samples from PTn and nature of contacts?
    - Identify the source documents that contains the descriptions of the PTn stratigraphy, and hydrologic and rock properties of the test volume used to support interpretation and extrapolation of the test results
- Temporal dampening of flow
  - Time scale of variation and changes to saturation are important
  - DOE choice for modeling, northern repository thickness not bounding