

WM-AES
WM Record-File
D1021
NWCI

WM Project 10, 11, 16 NUCLEAR WASTE CONSULTANTS INC.
Docket No. _____ 8341 So. Sangre de Cristo Rd., Suite 14
Littleton, Colorado 80127
PDR (303) 973-7495
XLPDR (CB, N, S)

D1021 PDR-1
LPDR- Wm-10 (2)
Wm-11 (2)
Wm-16 (2)
see packet
in enclosure

Distribution:
X Pohle _____

(Return to WM, 623-SS)

August 11, 1987

gca

009/3.5/DBS.006
RS-NMS-85-009
Communication No. 190

WM DOCKET CONTROL
CENTER
AUG 17 09:32

U.S. Nuclear Regulatory Commission
Division of Waste Management
Geotechnical Branch
MS 623-SS
Washington, DC 20555

Attention: Mr. Jeff Pohle, Project Officer
Technical Assistance in Hydrogeology - Project B (RS-NMS-85-009)

Re: Subtask 3.5 Update Report: Numerical Evaluation of Conceptual Models

Dear Mr. Pohle:

Attached please find the record copy of the Subtask 3.5 Update Report:
Numerical Evaluation of Conceptual Models, prepared by Daniel B. Stephens and
Associates. The report includes the text of three technical reports:

- 9. Analysis of the importance of aquitard diffusion during transport by horizontal ground-water flow
- 10. Analysis of repository temperatures required for induced thermal ground-water convection
- 11. Confidence interval estimation of characteristic permeability.

The Staff has already received draft versions of Technical Reports 9 and 10 (NWC Communication No. 175). The reports have received technical and management review by Mark Logsdon of Nuclear Waste Consultants. Based on a telephone record of a conversation of August 3, 1987 between F. Ross (NRC) and J. Minier (DBS), no additional work will be performed on Technical Reports 9 and 10 unless further direction is provided by the NRC Project Officer.

The telephone record also indicated that Mr. Ross has reservations about the simplifying assumptions used in the confidence interval estimate, based on the Technical Description Summary presented by DBS (NWC Communication No. 172). As expressed in the telephone record, Mr. Ross is concerned that the proposed method would not adequately address the significance of fracture zones as high-permeability pathways that may be important for radionuclide transport.

8710230051 870811
PDR WMRES EECNWCI
D-1021 PDR

87478813 WM Project: WM-10, 11, 16 WM Record File:
PDR w/encl LPDR w/encl
(Return to WM, 623-SS)

H
D1021

4/31

NWC has several comments to make:

1. The stated objective of the Technical Report is to provide a simple statistical analysis of the variability in available permeability data for HSU B and HSU C. As is common in many types of statistical analysis, the descriptive statistics provide an estimate of a central measure of the data (e.g., a mean) and an estimate of the dispersion of the data (e.g., variance) that can be manipulated to calculate a confidence interval of some desired (or arbitrary) width. The assumptions and limitations of the DBS analysis are very clearly stated, and anyone familiar with basic statistical methods can identify both what was done and what the likely limits of the usefulness of the analysis may be.
2. The data analysis shows that for the case that the drill-stem tests are independent random samples of a population of permeabilities, the likely range of permeabilities is as follows:

Lower San Andres:	0.049 to 0.925 md
Wolfcamp:	0.319 to 1.112 md
Pennsylvanian:	0.352 to 1.429 md.

In discussing the results, DBS point out that, these very low permeabilities are such that for the case of unflawed geology there is a low probability that groundwater travel time would be less than 1,000 years, assuming the best available estimates for hydraulic head and porosity (see DBS Technical Reports 2-4). This result is a consequence of the simple form of Darcy's Equation.

3. However, these results do not mean (and the report does not state) that the DOE's case for a 1,000 year GWTT has been demonstrated at the Palo Duro Basin. NWC considers that the DBS analysis shows that based on the currently available data, there is a very small likelihood that additional data similar to the regional DST data

would substantially alter a regulatory decision on GWTT. That is, additional, regional-scale information on permeability of "typical" HSU B and C materials is not a true data need. This NWC conclusion is not significantly dependent on any of the assumptions of the statistical analysis, rather, the conclusion is a function of the data that are currently available and the low-permeability nature of intact materials that are geologically (and hydrogeologically) characteristic of HSU B and HSU C. A vertical drilling program to these depths and in these materials will test a relatively small volume of material that is characteristically of low permeability.

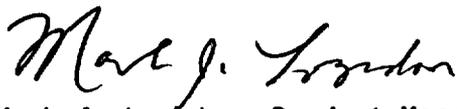
4. The conclusion that in the case of unflawed geology the Palo Duro Basin would provide for long groundwater travel times is neither new nor surprising. Since prelicensing direction by the Staff to DOE (and ultimately regulatory assessments of compliance by the Staff) must be based on technically defensible analyses of actual data, NWC considers that the DBS analysis provides a simple, but powerful demonstration of what can be done in the manner of Data Needs Assessments in a timeframe that is useful with respect to planning for DOE's Site Characterization Plans. NWC concurs with Mr. Ross that if there were hypothetical, continuous fracture zones with high permeability, there would be preferential pathways for radionuclide transport. However, the current database of permeability information strongly indicates that such zones are not characteristic of the materials tested and that additional such tests would be unlikely to discover such hypothetical zones. While it is outside the scope of this particular data analysis, the implications of the DBS assessment are potentially important to the Staff: additional data developed using the state-of-the-art DST technology for low permeability, aquitard materials is very unlikely to fulfill a programmatically important data need. Instead, what is needed are testing techniques, to be applied primarily within the controlled area, that are likely to be able to characterize "flaws" in the geology that would be reflected in highly transmissive zones that could provide access to the accessible environment.

NWC looks forward to review and comment by the NRC Staff not only of the DBS Technical Reports, but also of our analysis and conclusions on the nature of the DBS work.

August 11, 1987

Submission of this update report completes the contract deliverable for Subtask 3.5 of the current contract. If you have any questions about these Salt Technical Reports, please contact me immediately.

Respectfully submitted,
NUCLEAR WASTE CONSULTANTS, INC.



Mark J. Logsdon, Project Manager

Att: DBS Technical reports 9-11, Subtask 3.5 Semi-annual update report

cc: US NRC - Director, NMSS (ATTN PSB)
HLWM(ATTN Division Director)
Mary Little, Contract Administrator
HLTR (ATTN Branch Chief)
D. Chery, HLTR

cc: M. Galloway, TTI
L. Davfs, WWL

bc: J. Minier, DBS