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Nuclear Regulatory Commission
Division of Waste Isolation
7915 Eastern Avenue
Silver Springs, MD 20012

699-55

Att: Dr. R. Wright

RE: "Comparison of Model Studies - The Hanford Site"

Dear Bob:

I have read the above document with interest. I find it an excellent, detailed discussion of the differences between the RHO and PNL model studies of the basin hydraulics. A couple of points which the document does not make strongly, but which I think are important are as follows:

1) The study shows that the NRC has the capability to assess analytical offerings from DOE and to replicate these analyses. This capability is based partly upon having available the right tools, but more importantly upon having available the right staff, experienced in the use of these tools. I understand that Linda Lehman is leaving the NRC team. It is to be hoped that the NRC has both the mandate and the good fortune to hire a suitable replacement.

2) A major conclusion of the study is that assumptions about boundary conditions dominate the analyses of flow paths. I agree with the conclusion. I do not, however, fully agree with the recommendation drawn from it. The authors make a plea for "better data". I doubt that this is practical or necessary to resolve the lateral boundary condition question. Rather, I believe that when an arbitrary boundary is set (in this case on geologic and topographic rather than hydrogeologic grounds) then it is the duty of the person setting the boundary to select it such that the boundary location and assumptions

(F)(H)

(heads, flows) have no impact on the outcome of modelling. Thus, I believe that the recommendation in this case should be to modify the modelling, not the data collection. This should be done by analysing a very much larger area than the Pasco Basin. Note that PNL have done this, and have produced an eminently more believable model than the (admittedly preliminary) RHO model.

In addition, it is concluded that assumptions about the ratio of vertical to horizontal hydraulic conductivity dominate the flow path direction. This conclusion is, in fact, the same as the boundary conclusion: increasing the vertical permeability merely accentuates the impact of the upper boundary (free surface) over that of the lateral boundaries. In all cases, boundaries dominate in steady state analyses. However, the location of the free surface is not an arbitrary boundary, so changing the model doesn't help to reduce the influence of this boundary. Accordingly I heartily endorse the suggestion that much more needs to be known about the vertical permeability of this region.

3) Calibration clearly remains a problem. There is almost nothing to calibrate against--just some rather questionable head data bunched together in the topographical center of the Pasco Basin. The authors point out that the head data cannot be used to separate two dramatically different flow path results--one obviously "safe" from the point of veiw of nuclear waste disposal, the other obviously questionable. In the final analysis, it will be stable reliable pressure measurements at a range of depths and a network of points around the repository horizon (above and below) which will provide these calibration points. Again, this work provides, in my opinion, a strong justification for the requirement that any agency which seeks to license a repository must have this data.

I enjoyed reading this document. It is most heartening to see this kind of integrative work being done, particularly as it provides strong support for the evaluations which the NRC and its contractors have made before the detailed results were available.

I trust that this letter provides the review which you desired. If you have any questions, I will of course be glad to respond. I also attach a sheet of errata and comments about minor things which I noticed as I read the text, which may be of editorial value.

Yours sincerely,

GOLDER ASSOCIATES

Adrian Brown
Principal

AB:dal

cc: D. Pentz, Seattle

Attachment

TYPOGRAPHICAL AND OTHER MATTERS NOTICED

p. 18, last page, 2nd line "agricultural"

Figure 10, p. 20. Location of points to which heads are referenced is not clear.

Figure 11, p. 23.. Material below northwest and southeast corners is shown as under water table conditions. Is this right?

p. 26, 3rd para, 2nd line: 11 should be 1?

p. 33 & 34. The dramatic increase in T values in the Wanapum and Grand Ronde as one moves from the repository site to the east to the Colombia River came as a surprise. Does this explain some of the "anomalies" which occur in the core holes along the eastern stretch of the river?

fig. 23, p. 36. This is a plot of k_v, not k_v/k_h. The latter would have been more useful, although PNL probably didn't provide it.

p. 45, line 6. "most"

p. 46, figure 32. This figure might have benefited from more text comment.

p. 48, figure. 34. Ditto.

p. 50, second para, 6th line. I would disagree that the differences are "minor to moderate". They are poles apart philosophically.

Attachment A.

p. 19, 2nd para., 4th line. "is" and "in" should be reversed?