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Hydrogeology • Mineral Resources Waste Management • Geological Engineering • Mine Hydrology

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Mr. Jeff Pohle
Division of Waste Management
Mail Stop 623-SS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: NTS

Dear Jeff:

We have performed calculations on the flux through Yucca Mountain under Subtask 1.3 as we had discussed in Silver Spring on June 20. These calculations indicate that if a uniform flux is assumed with the various values of conductivity reported by Peters et al. (1985) the calculated tensions vary from about zero to 3,000 meters. A table of calculated values is enclosed. This range is not realistic because water would flow from areas of low tensions to areas of high tensions (capillary pressure gradient). Thus, more water would flow through the high conductivity regions than through the low conductivity regions. In addition, the pressure distribution would tend to become uniform in a horizontal plane, but the flux would not be uniform.

The overall result of the above analysis is that we believe any discussion of whether the flux is 0.5 mm/yr or 1 mm/yr probably is irrelevant. The calculations indicate also that a dependable travel time analysis probably will have to await the results of a fairly extensive, two-dimensional flow simulation. In order to incorporate the effect of the distribution of material hydraulic properties (capillary pressure-degree of saturation-relative conductivity) in the simulation, it would be necessary to select (from the distribution) the hydrogeologic properties for each element in the model. The properties of adjacent elements should be correlated spatially; therefore, a completely random selection process probably would not be appropriate. In addition, hydrogeologic properties of samples must be obtained from more than 2 boreholes to describe the three-dimensional distribution of hydraulic properties adequately.

We do not believe that the above discussion should be incorporated into our major comment on the FEA; however, it should be considered in the testing and characterization program as a defensible modification of and improvement to the USGS conceptual model.

Sincerely,

George Bloomsburg /s/

George Bloomsburg

GB:sl

enclosure

CALCULATED FLUX AND TENSION VALUES
YUCCA MOUNTAIN

Values of all hydraulic properties of the Topopah Springs unit (boreholes G4 and GU3) were obtained from the report by Peters et.al. (1984). The equations relating degree of saturation, relative conductivity and soil moisture tension used in the calculations are attributed to Mualem (1976) but were presented by Peters et.al.(1984).

Sample No.	K (saturated, mm/yr)	Tension (m at flux = .5mm/yr)	Flux (mm/yr at tension = 200m)	(at ten.= 20m)
G4-4	.027	0	.00004	.0044
G4-5	.63	2	.00451	.23
G4-24	1.23	30	.00594	.685
G4-6	.60	8.3	.0276	.407
G4-1f	.224	0	.0102	.164
G4-7	<.41	0	.101	.356
G4-2f	2.71	189	.446	2.42
G4-8	14.2	287	1.026	8.75
G4-9	.095	0	.028	.078
G4-3f	1.04	14.6	.0005	.343
GU3-9	.0473	0	.00016	.0123
GU3-10	.473	0	.259	.473
GU3-11	.0473	0	.0048	.040
GU3-12	100.9	3000	.753	83.5
GU3-13	9145.	-	28.9	9026.
GU3-14	8515.	-	2.08	7851.
GU3-15	820.	-	.109	38.9
GU3-16	2491.	-	.603	2490.

The tension was not calculated for the last 4 samples but would have been larger than that for sample GU3-12. Zero values of tension would indicate that the matrix is saturated and there is the possibility of fracture flow.