Project No. 20-1402-661
Book No. 284 TITLE TEF

From Page No. Sept 1, 1998

Run with thermal load 14.88 W/m³ had peak temps around 40C at 50 yrs & cooling by 100yr. Discuss w/ Ron & determined that the areal loading is average over the 14 m x 1 m area of column.

Revised heat load

$$\left(\frac{85\ MTU}{acre}\right)\left(\frac{1020W}{MTU}\right)\left(\frac{acre}{43560ft^2}\right)\left(\frac{ft}{.3048m}\right)^2\left(\frac{14m^2}{(1.49m^2)(1.44m)}\right) = 139.8\ \frac{W}{m^3}$$

Input file with the revised heat source data (facing page) Table 1C.7 which produced results on following pages.

~dhughson/multiflo/inputbak/multi.12

Results of location of 100°C isotherm and liquid saturation in matrix compare nicely to results of Buscheck for case 3 (shown on page 53 for comparison)

Apparently I have acomphished what I set out to do on page 3 Aug 4, 1998.

To Page No.

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	9/2/98

TITLE TEF
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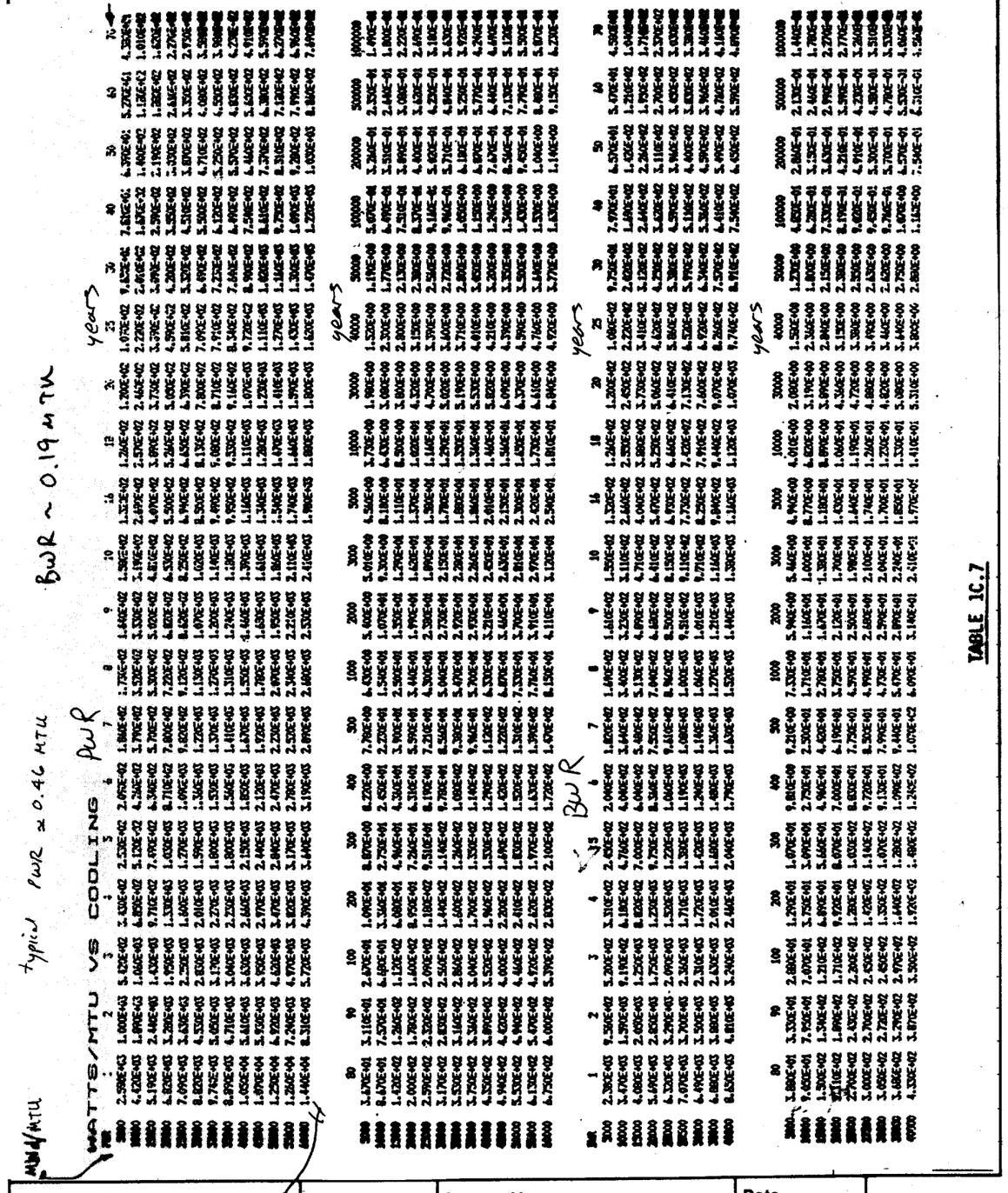

TABLE 1C.7

MTU/MTU

typical PWR ≈ 0.46 MTU

BWR ~ 0.19 MTU

PWR

BWR

years

DR	1	2	3	4	5	6	7	8	9	10	16	18	20	25	30	40	50	60	70
5000	2.598E+03	1.000E+03	5.420E+02	3.430E+02	2.530E+02	2.050E+02	1.860E+02	1.730E+02	1.640E+02	1.580E+02	1.320E+02	1.260E+02	1.200E+02	1.070E+02	9.650E+01	7.810E+01	6.390E+01	5.270E+01	4.350E+01
10000	4.420E+03	1.890E+03	1.060E+03	6.850E+02	5.120E+02	4.260E+02	3.790E+02	3.520E+02	3.330E+02	3.190E+02	2.690E+02	2.570E+02	2.460E+02	2.220E+02	2.010E+02	1.670E+02	1.400E+02	1.180E+02	1.010E+02
15000	5.190E+03	2.440E+03	1.430E+03	9.710E+02	7.490E+02	6.340E+02	5.700E+02	5.300E+02	5.020E+02	4.810E+02	4.070E+02	3.890E+02	3.730E+02	3.390E+02	3.090E+02	2.590E+02	2.190E+02	1.880E+02	1.620E+02
20000	6.820E+03	3.280E+03	1.950E+03	1.330E+03	1.030E+03	8.710E+02	7.800E+02	7.220E+02	6.820E+02	6.530E+02	5.500E+02	5.260E+02	5.050E+02	4.590E+02	4.200E+02	3.550E+02	3.030E+02	2.610E+02	2.270E+02
25000	7.090E+03	3.630E+03	2.250E+03	1.600E+03	1.270E+03	1.090E+03	9.820E+02	9.120E+02	8.620E+02	8.250E+02	6.940E+02	6.650E+02	6.390E+02	5.810E+02	5.320E+02	4.510E+02	3.870E+02	3.350E+02	2.950E+02
30000	8.820E+03	4.530E+03	2.830E+03	2.010E+03	1.590E+03	1.360E+03	1.220E+03	1.130E+03	1.070E+03	1.020E+03	8.590E+02	8.130E+02	7.800E+02	7.090E+02	6.490E+02	5.500E+02	4.710E+02	4.080E+02	3.590E+02
35000	9.740E+03	5.050E+03	3.170E+03	2.270E+03	1.800E+03	1.530E+03	1.370E+03	1.270E+03	1.200E+03	1.140E+03	9.490E+02	9.080E+02	8.710E+02	7.910E+02	7.230E+02	6.120E+02	5.250E+02	4.550E+02	3.980E+02
40000	8.890E+03	4.710E+03	3.040E+03	2.230E+03	1.800E+03	1.560E+03	1.410E+03	1.310E+03	1.240E+03	1.180E+03	9.950E+02	9.530E+02	9.160E+02	8.340E+02	7.640E+02	6.490E+02	5.570E+02	4.830E+02	4.230E+02
45000	1.050E+04	5.610E+03	3.630E+03	2.660E+03	2.150E+03	1.850E+03	1.670E+03	1.550E+03	1.460E+03	1.390E+03	1.160E+03	1.110E+03	1.070E+03	9.720E+02	8.900E+02	7.540E+02	6.460E+02	5.620E+02	4.910E+02
50000	1.090E+04	5.930E+03	3.950E+03	2.970E+03	2.440E+03	2.120E+03	1.920E+03	1.780E+03	1.680E+03	1.610E+03	1.340E+03	1.280E+03	1.230E+03	1.110E+03	1.020E+03	8.610E+02	7.370E+02	6.380E+02	5.590E+02
55000	1.250E+04	6.920E+03	4.620E+03	3.470E+03	2.840E+03	2.470E+03	2.230E+03	2.070E+03	1.950E+03	1.860E+03	1.540E+03	1.470E+03	1.410E+03	1.270E+03	1.160E+03	9.750E+02	8.310E+02	7.180E+02	6.270E+02
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DR	80	90	100	200	300	400	500	1000	2000	3000	5000	10000	20000	30000	40000	50000	100000	200000	500000	1000000
5000	3.670E+01	3.110E+01	2.670E+01	1.090E+01	8.870E+00	8.220E+00	7.780E+00	6.430E+00	5.400E+00	5.010E+00	4.560E+00	3.730E+00	1.980E+00	1.520E+00	1.190E+00	5.670E+01	3.260E+01	2.350E+01	1.490E+01
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30000	3.000E+02	2.700E+02	2.450E+02	1.420E+02	1.140E+02	9.720E+01	8.500E+01	4.990E+01	2.680E+01	2.100E+01	1.740E+01	1.260E+01	4.880E+00	3.490E+00	2.630E+00	9.450E+01	5.300E+01	4.580E+01	3.510E+01
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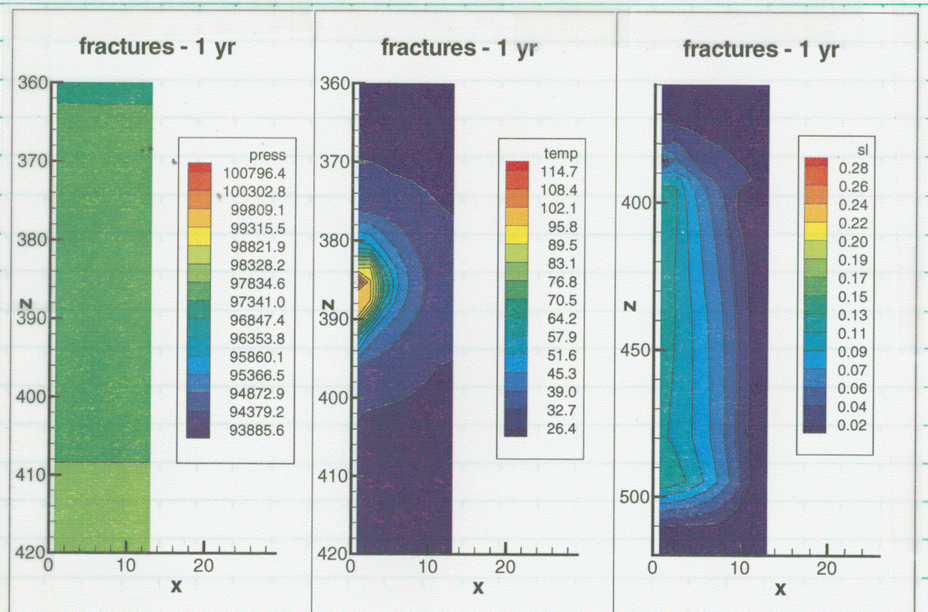

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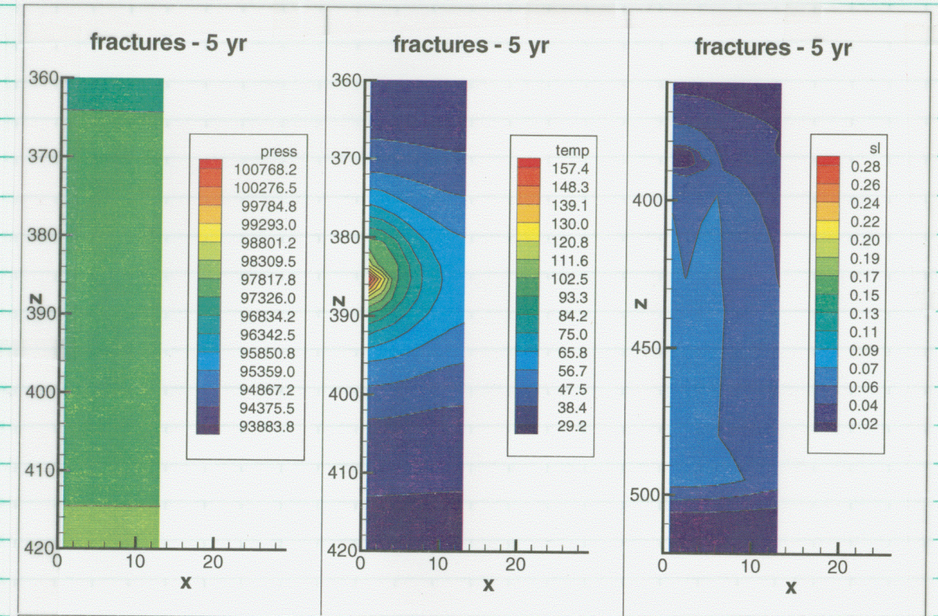

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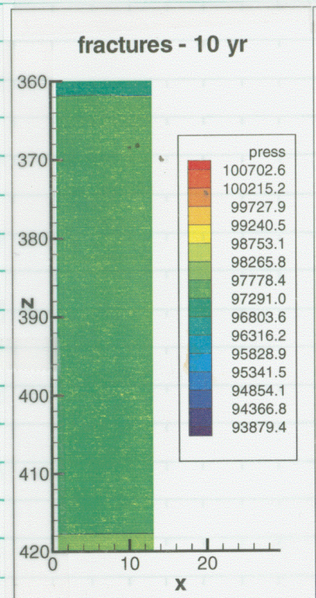

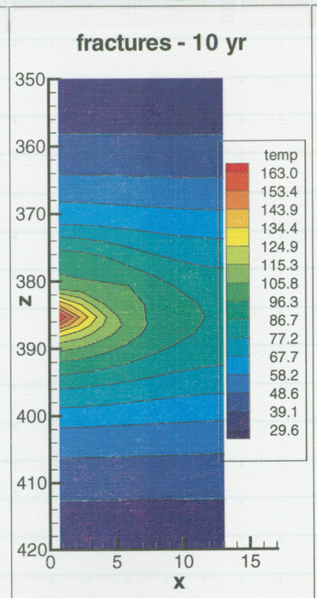

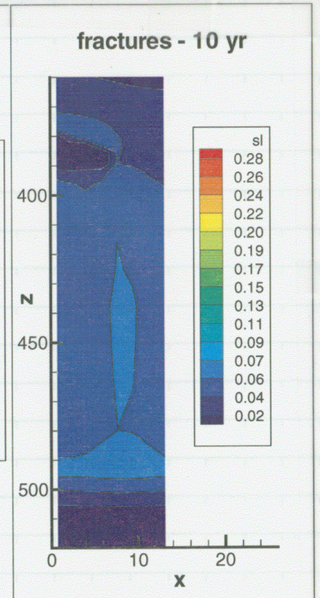

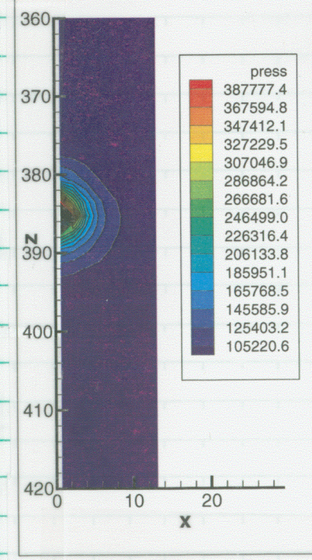

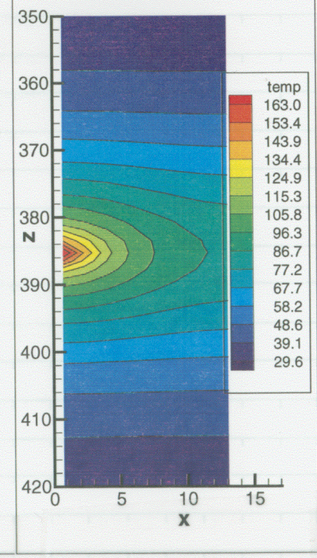

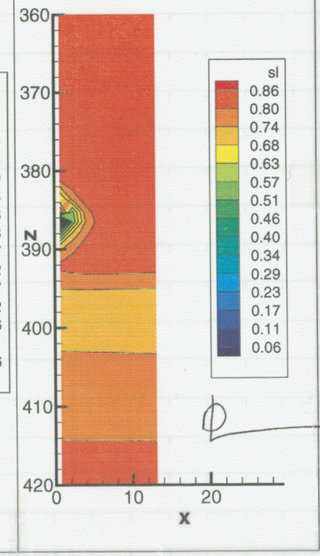

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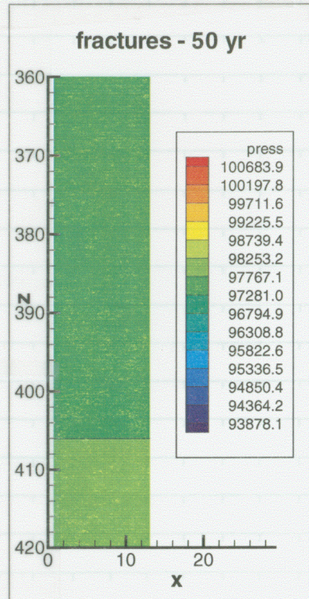

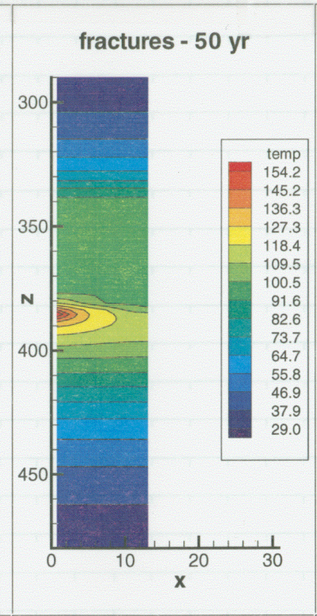

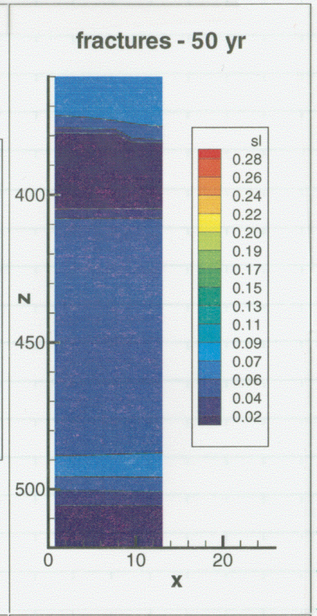

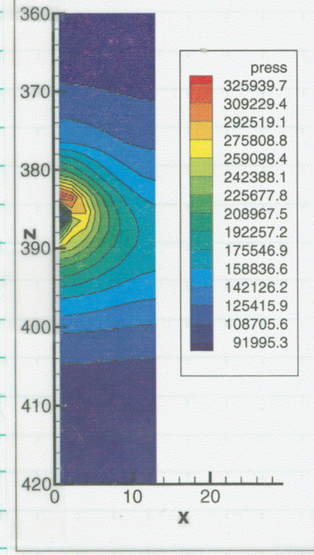

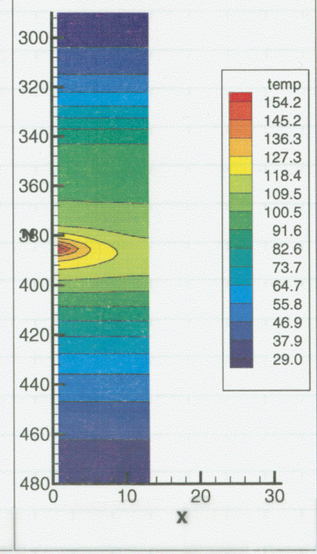

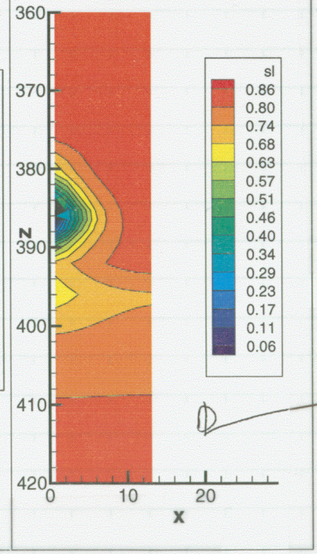

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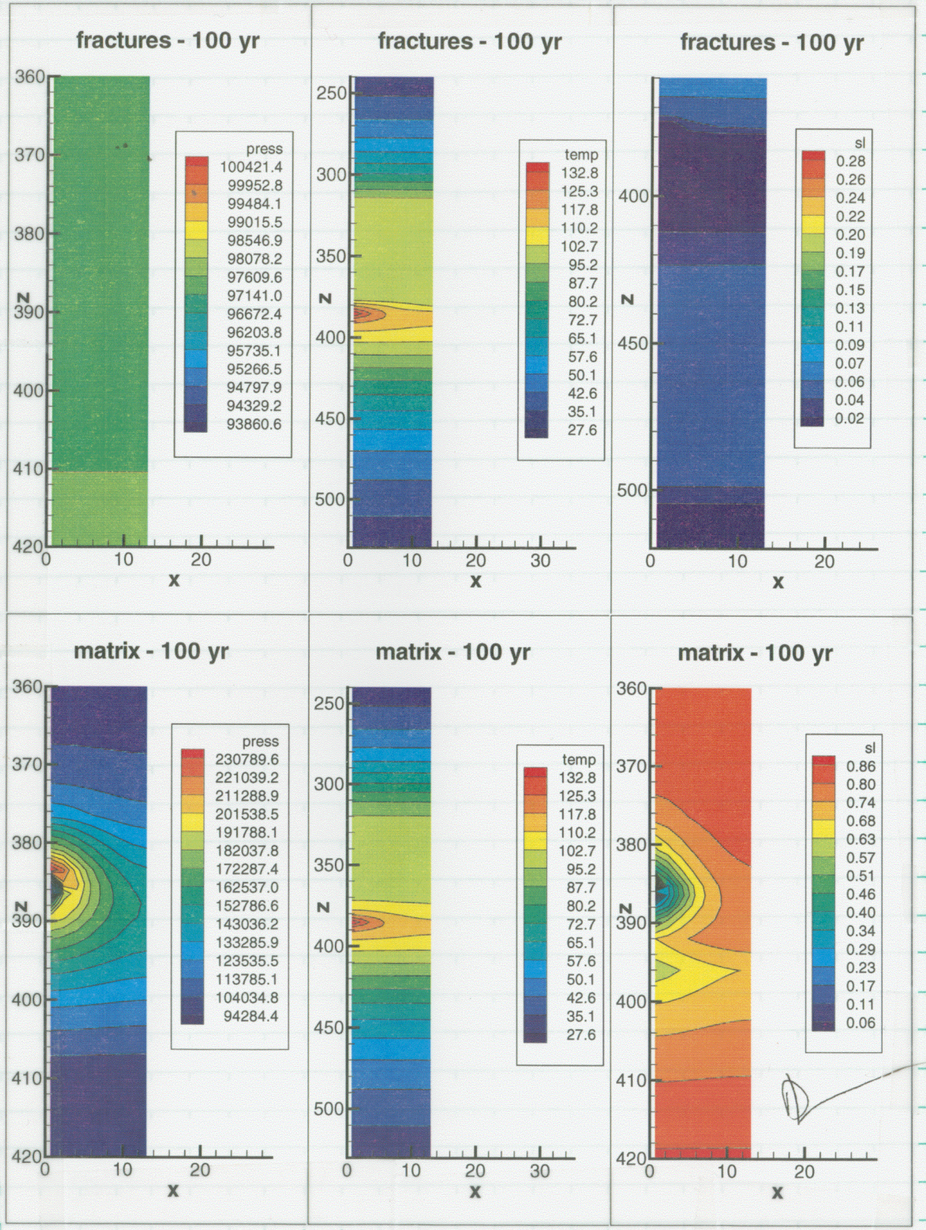

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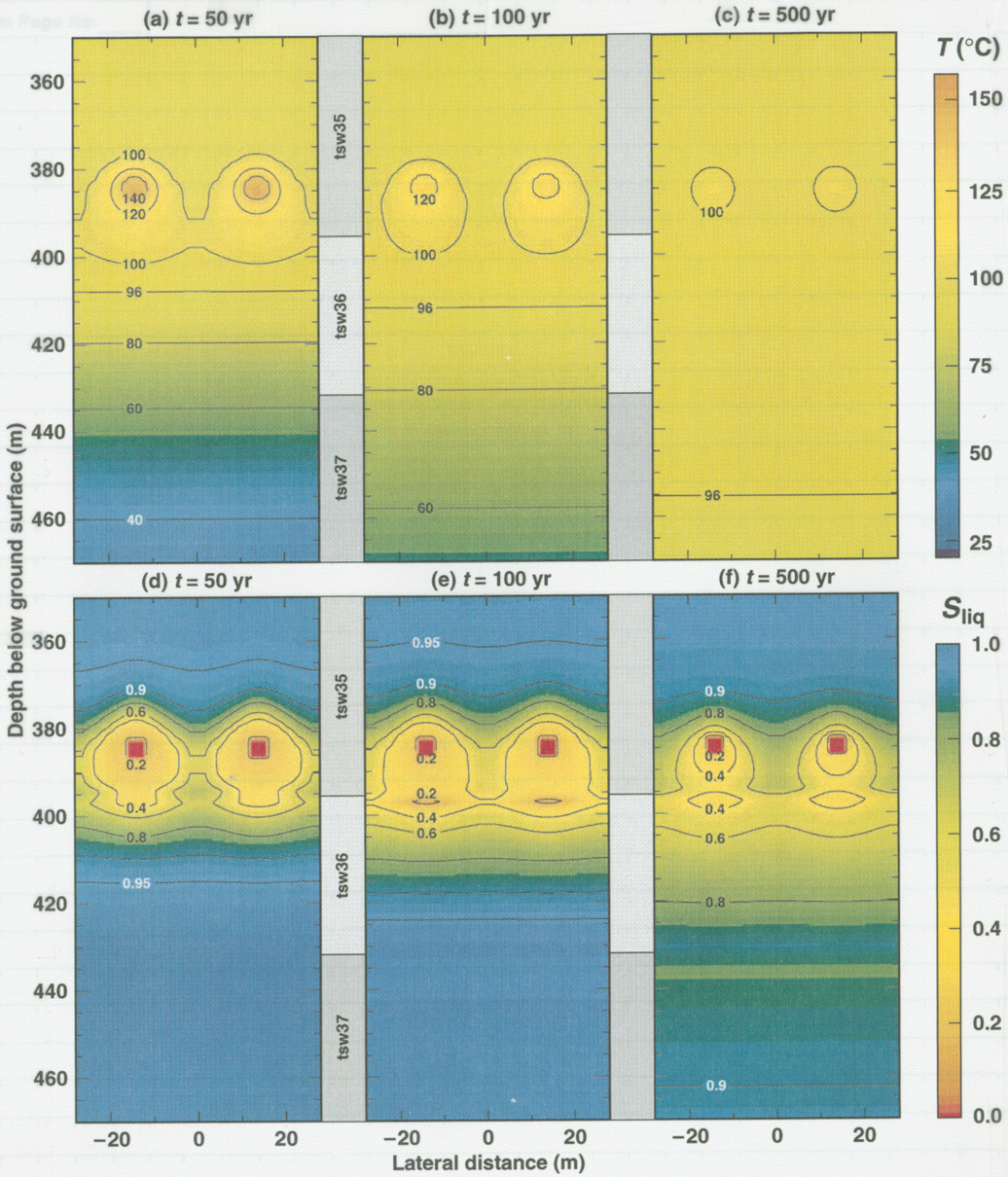

Figure 3-17. Temperature T distributions at (a) 50 yr, (b) 100 yr, and (c) 500 yr, and liquid-phase saturation S_{liq} distributions at (d) 50 yr, (e) 100 yr, and (f) 500 yr plotted in a vertical (x–z) plane transverse to the drift for Case 3, which assumes the point-load design, the 12/97 "modified-TH" hydrologic-parameter set, and a percolation flux of 16.0 mm/yr

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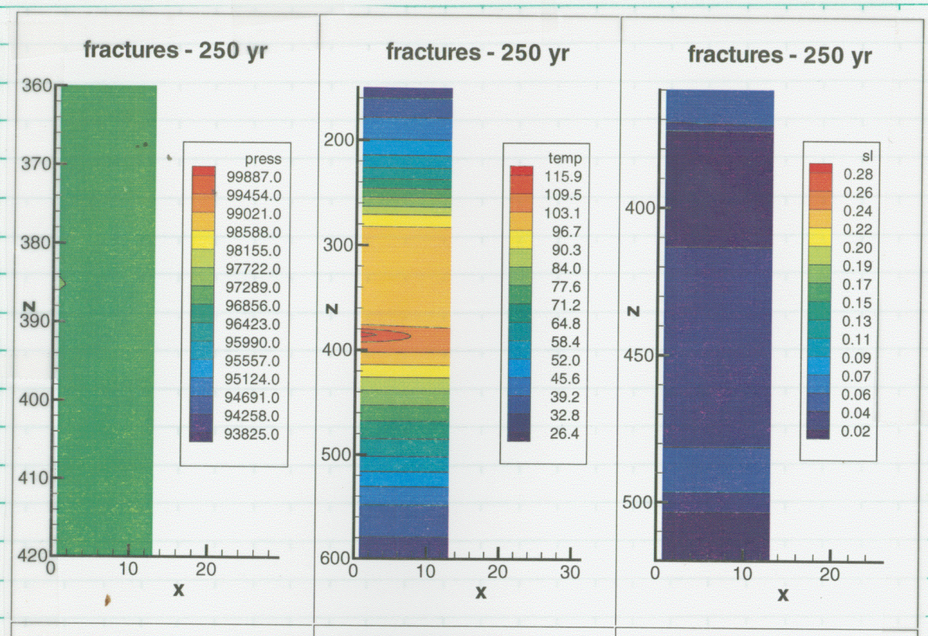

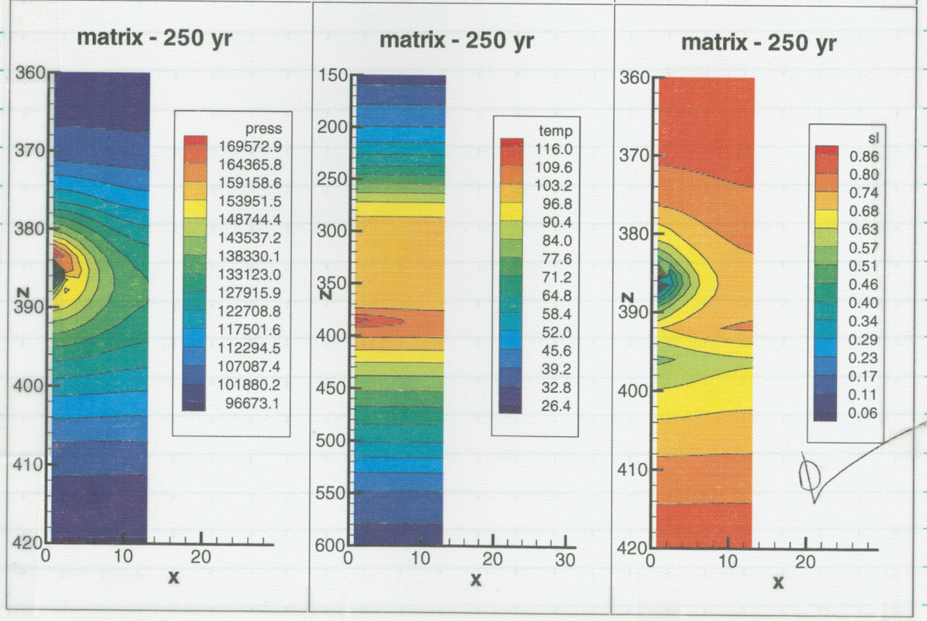

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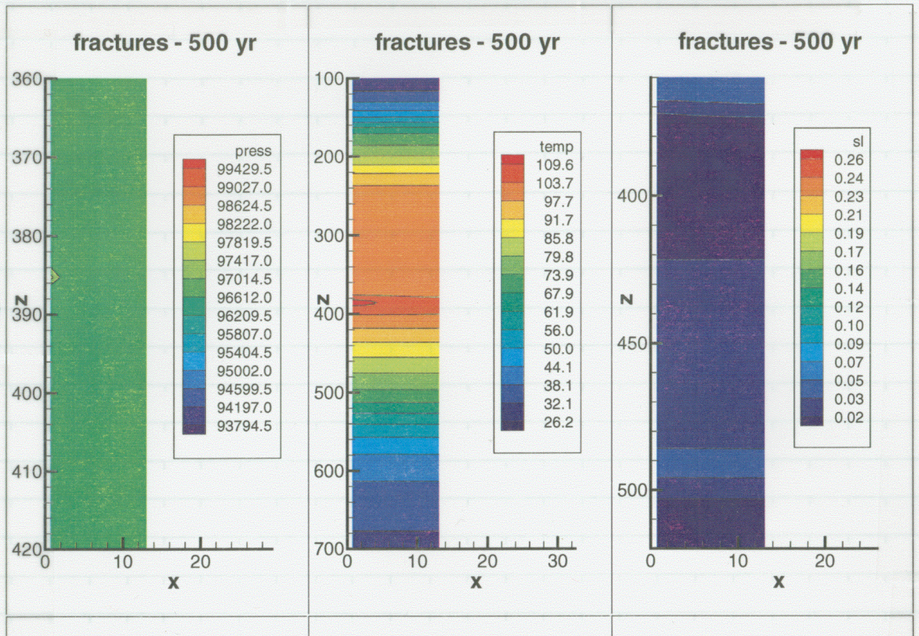

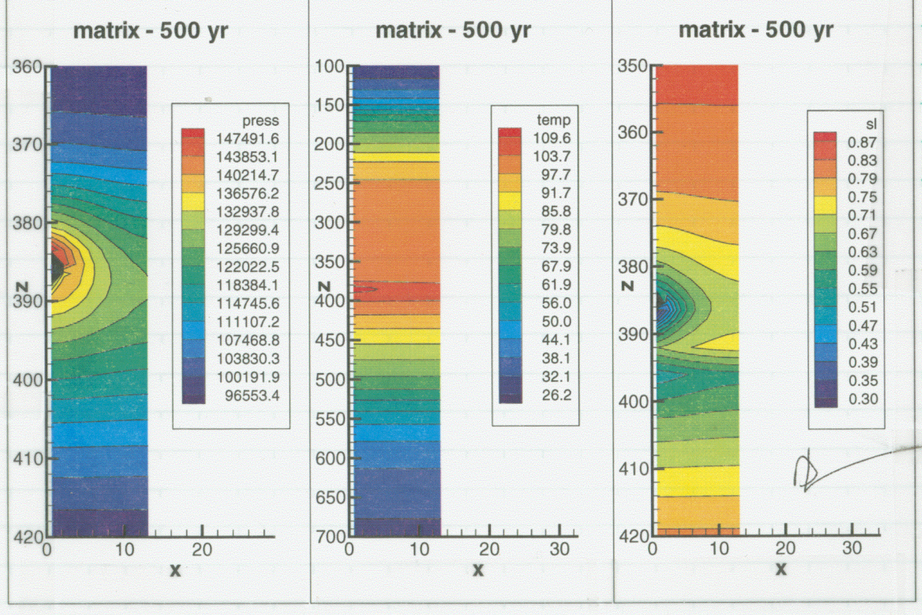

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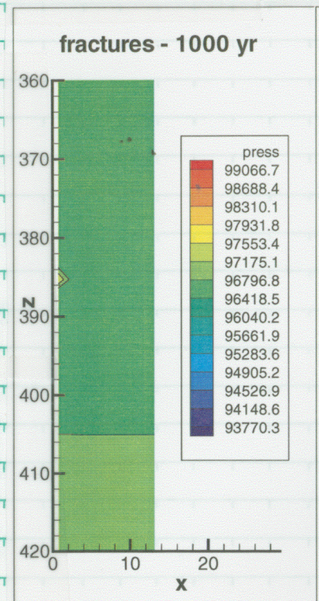

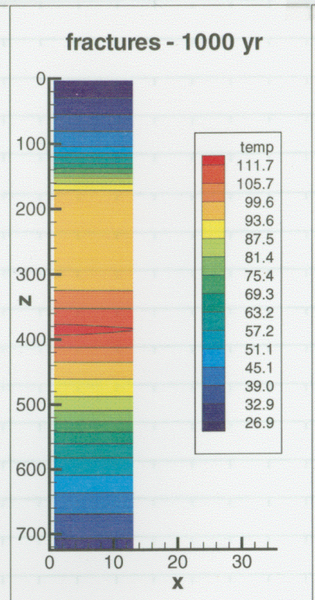

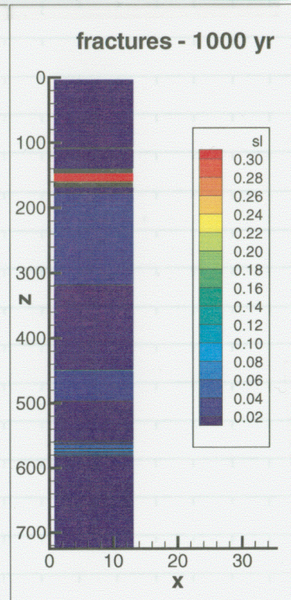

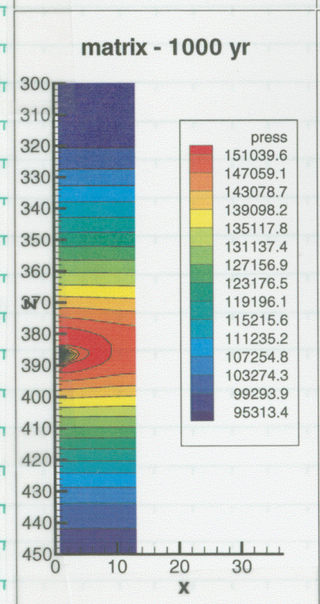

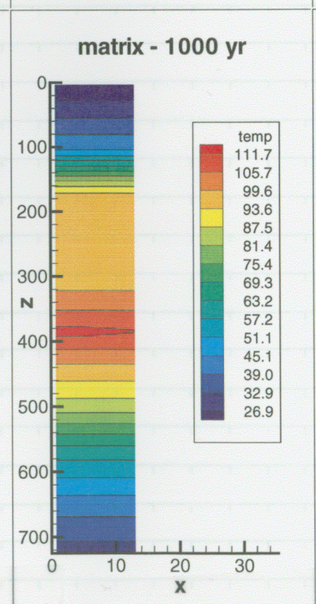

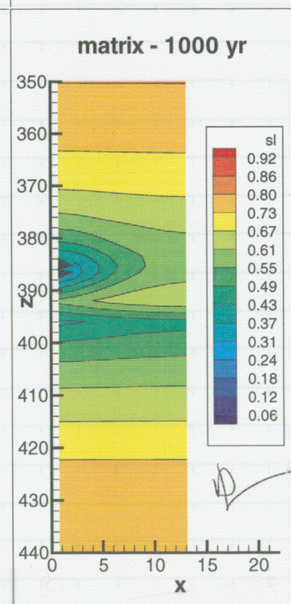

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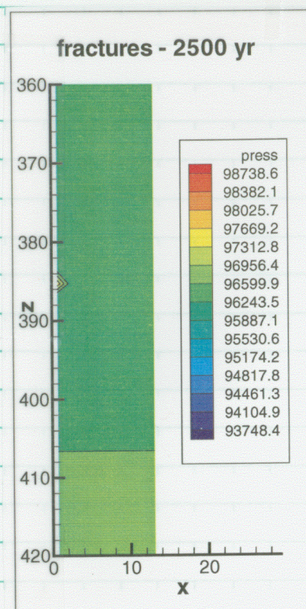

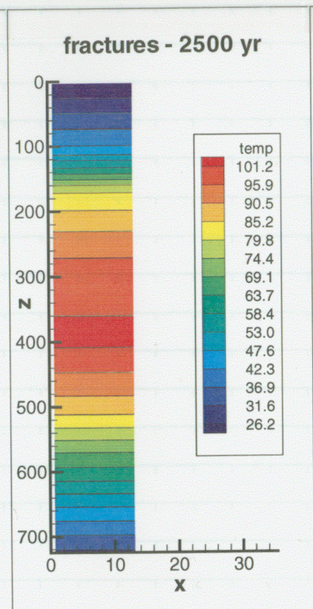

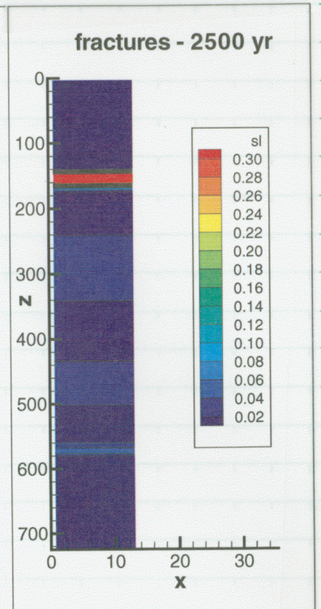

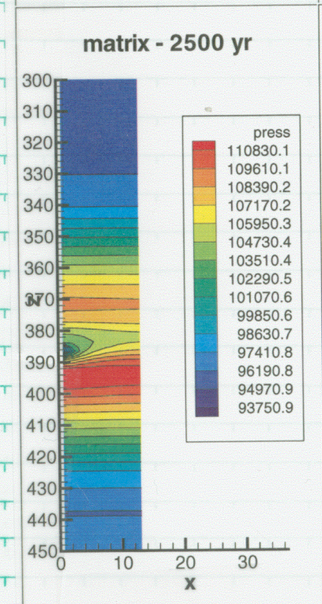

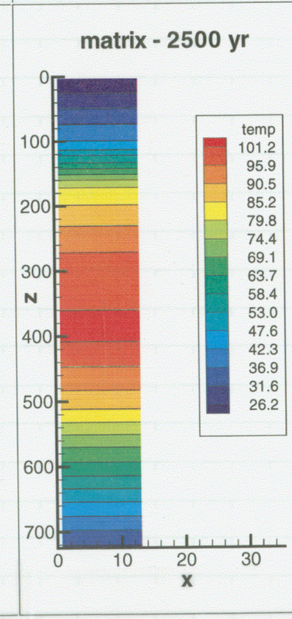

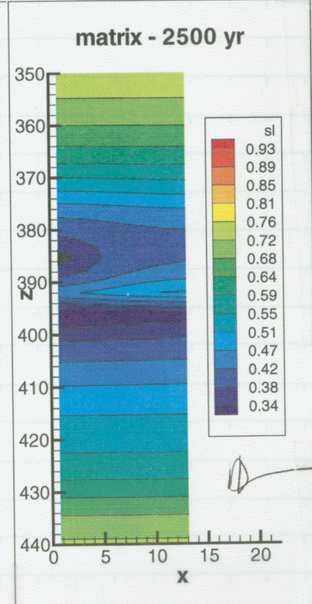

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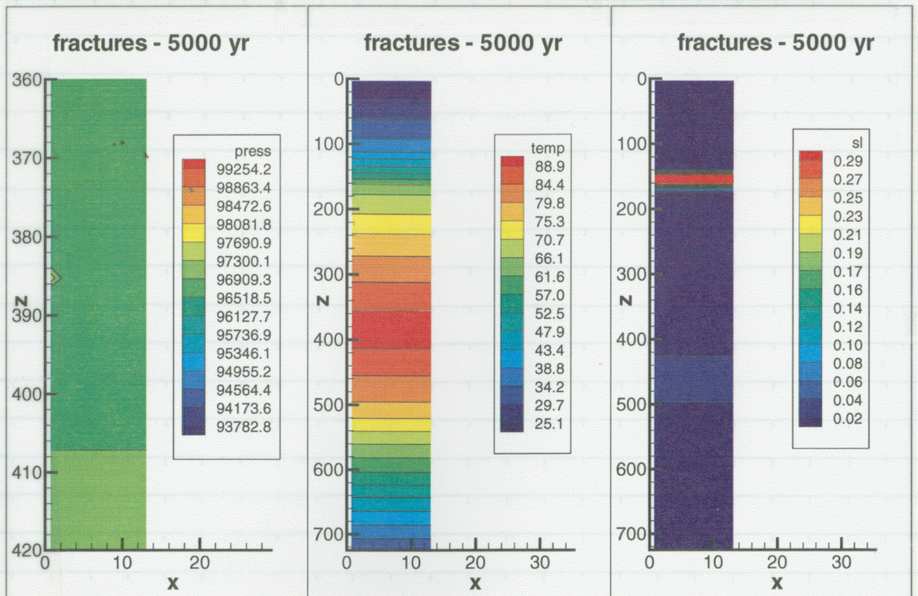

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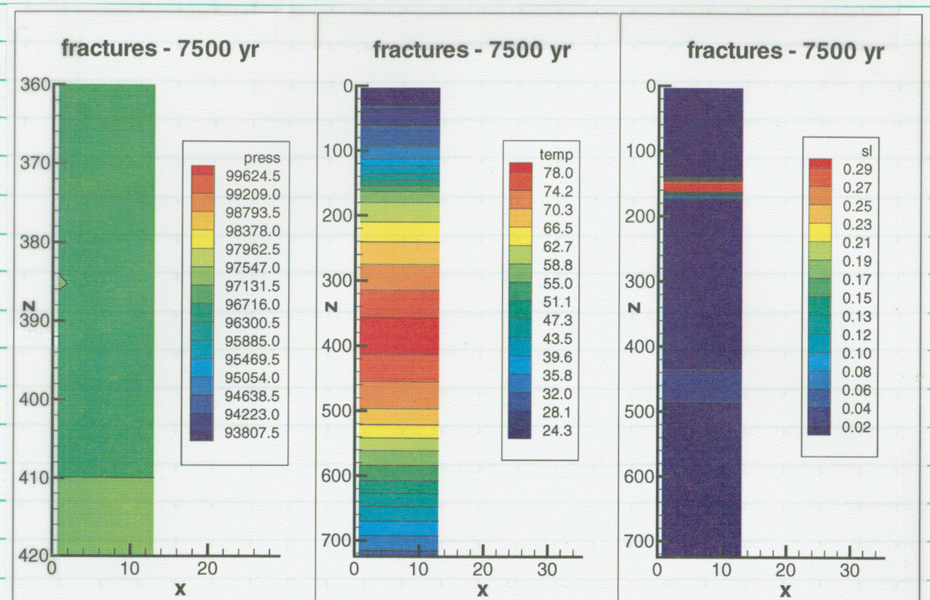

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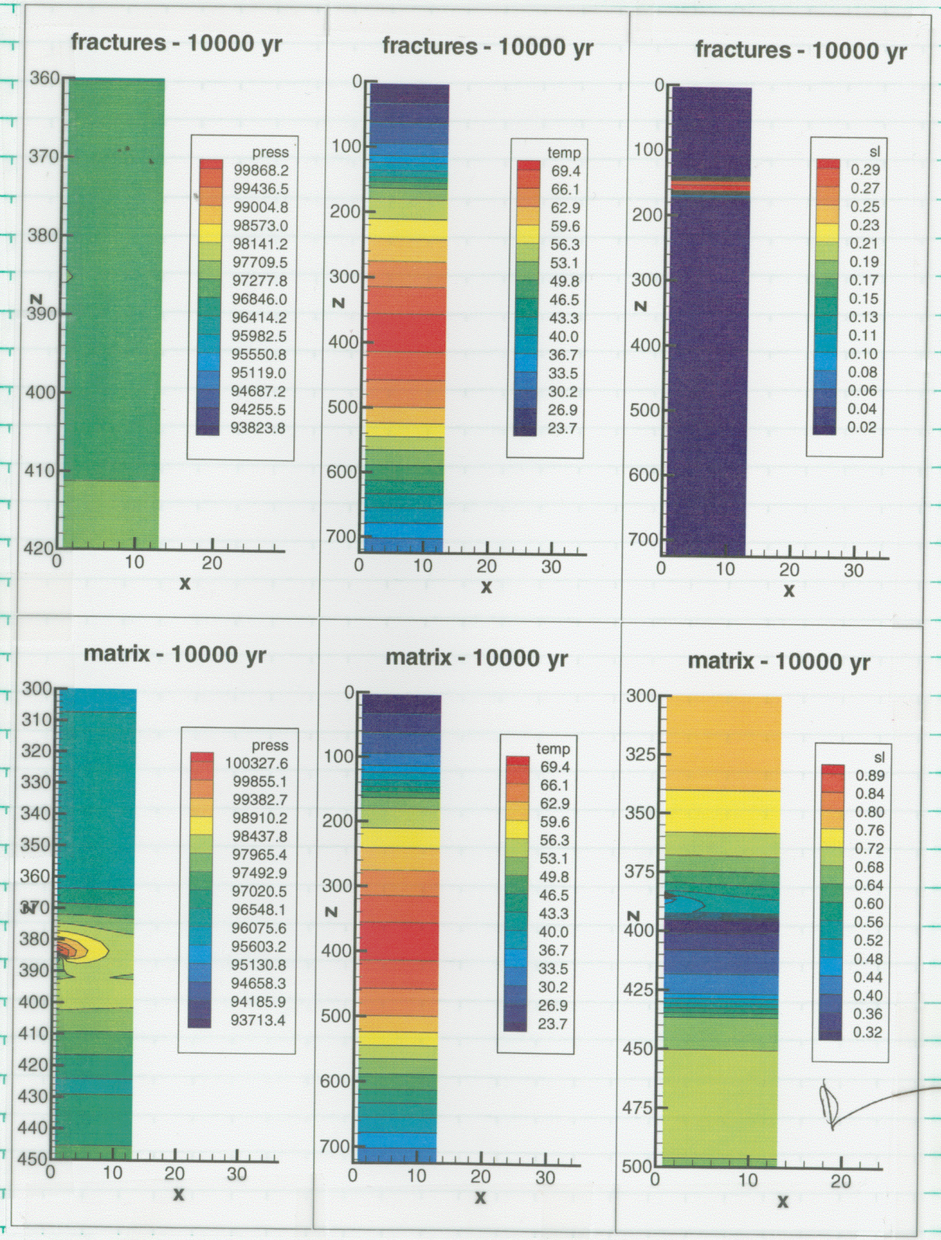

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the 2D drift-scale surface to water table modeling has arrived at a conclusion in that I reasonably reproduced the results of Buscheck (ref pg 3).

This section following is concerned with Carbon balance ref.

Codell, R.B. and W.M. Murphy
Geochemical model for ^{14}C transport in unsaturated rock, Proceedings of the 3rd International Conference High Level Radioactive Waste Management Vol 2, 1992 p 1959 – 1965

What I am interested in looking at is $CaCO_3$ precipitation in fractures due to thermal alteration. The model of Codell and Murphy predicts Calcite deposition in the altered zone but is relatively simple.

To start I am going to try to reproduce their results using Multiflo 1.2β Lichtner & Seth 1998

The model can then be extended to predict thermal and hydrologic rock property alterations in the near-field altered zone.

This work is in association with Bill Murphy under account # 20-1402-561 and has direct consequences for the TEF. Thermal rock property alteration is a subject of interest to Ron Green (TEF 20-1402-661) and myself.

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