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## EARTH SCIENCES DIVISION



# STEADY FLOW MODEL USER'S GUIDE

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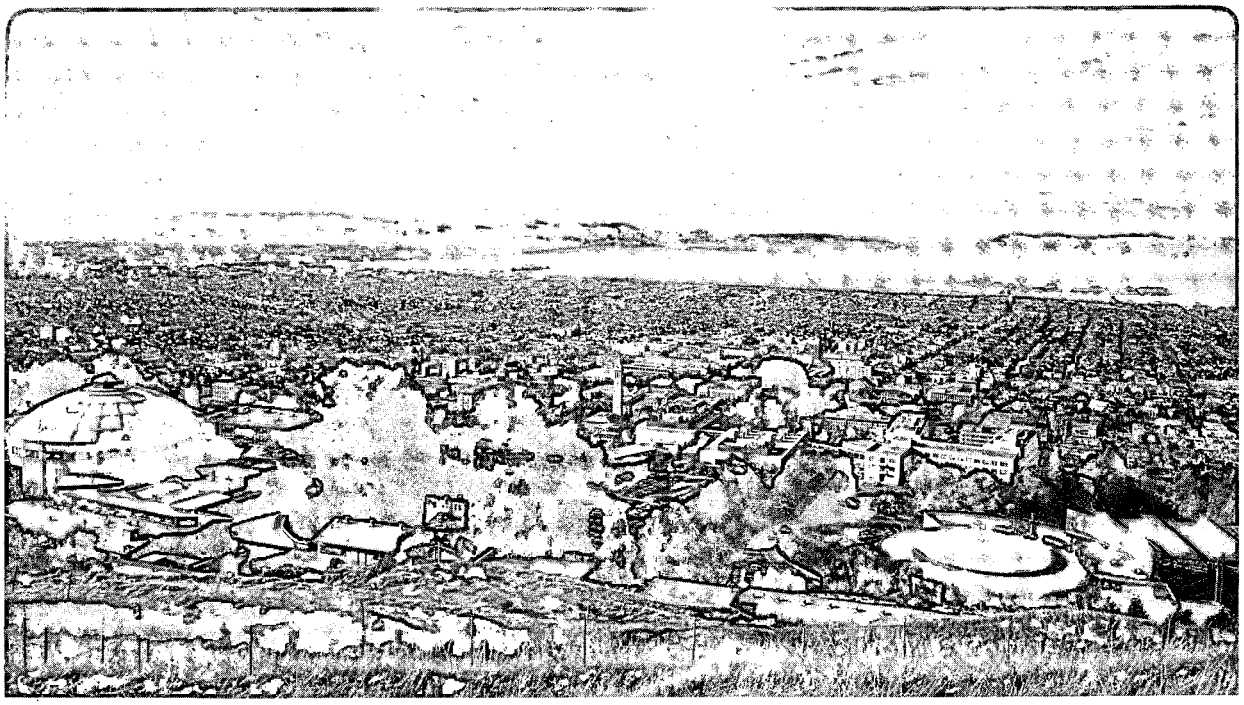
and J. Claesson

July 1984





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# STEADY FLOW MODEL USER'S GUIDE

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## Introduction

Sophisticated numerical models that solve the coupled mass and energy transport equations for nonisothermal fluid flow in a porous medium have been successfully used to match analytical results (Tsang et al., 1977) as well as field data (Tsang, Buscheck and Doughty, 1981; Papadopulos and Larson, 1978) for aquifer thermal energy storage (ATES) systems. Generally these models are expensive and time-consuming to use. Typically an ATES study is concerned primarily with energy balances and heat flows. Often the fluid flow field is simple and reaches steady-state rapidly. As an alternative for this sort of ATES problem the Steady Flow Model (SFM), a simplified but fast numerical model, has been developed (Hellstrom and Claesson, 1978; Doughty et al., 1982). Rather than solving the mass transport equation to obtain a fluid flow field that varies with time, a steady purely radial flow field is prescribed in the aquifer, and incorporated into the heat transport equation which is then solved numerically. Gravity is not considered, thus buoyancy flow (natural convection) is neglected. This is a reasonable assumption for ATES systems with low-permeability or vertically stratified aquifers, small temperature difference between injected and native waters, or short cycle duration.

While the radial flow assumption limits the range of ATES systems that can be studied using the SFM, it greatly simplifies use of this code. The preparation of input is quite simple compared to that for a sophisticated coupled mass and energy model, and the cost of running the SFM is far cheaper as well. Furthermore, the simple flow field allows use of a special calculational mesh that eliminates the numerical dispersion usually associated with the numerical solution of convection problems.

An application of the SFM is described in Doughty et al. (1982). The present report defines the problem considered, briefly outlines the algorithm used to solve it, then describes the input and output for the SFM.

Problem Description

The ATES system considered (Figure 1) consists of a single vertical injection/production well that fully penetrates a laterally infinite, horizontal aquifer of uniform thickness, H. Results are also applicable for a multiple-well system where well spacing is large enough so that the thermal behavior of individual wells is not significantly affected by neighboring wells. The requirement for non-interference is discussed in Tsang et al. (1978). Under the single-well idealization, there is radial symmetry with respect to the well. Furthermore, the aquifer is assumed to be homogeneous with bulk thermal conductivity $\lambda_a$, and bulk heat capacity per unit volume (solid plus fluid) $C_a$. It is bounded above and below by impermeable confining layers which may be of arbitrary thickness. The caprock and bedrock may be heterogeneous with spatially variable bulk thermal conductivity $\lambda_c$ and heat capacity per unit volume $C_c$. The heat capacity per unit volume of water is $C_w$. All material properties are assumed to be independent of time and temperature. Initially the entire system may be at uniform temperature, have a linear vertical temperature gradient, or have an arbitrary temperature distribution. Above the caprock the boundary temperature $T_{z1}$ may be constant or vary sinusoidally. Below the bedrock the temperature $T_{z2}$ is constant. Either cap or bedrock or both may be very thick so that the boundary temperature is never felt. Either or both may also be absent entirely, leaving boundary temperature directly adjacent to the aquifer.

The SFM considers an ATES cycle composed of injection, storage, production, and rest periods of duration $t_i$, $t_s$, $t_p$, and $t_r$, respectively. The injection and production periods must be of equal duration ($t_i = t_p$), but the storage and rest periods may be of different duration, or absent. The temperature of

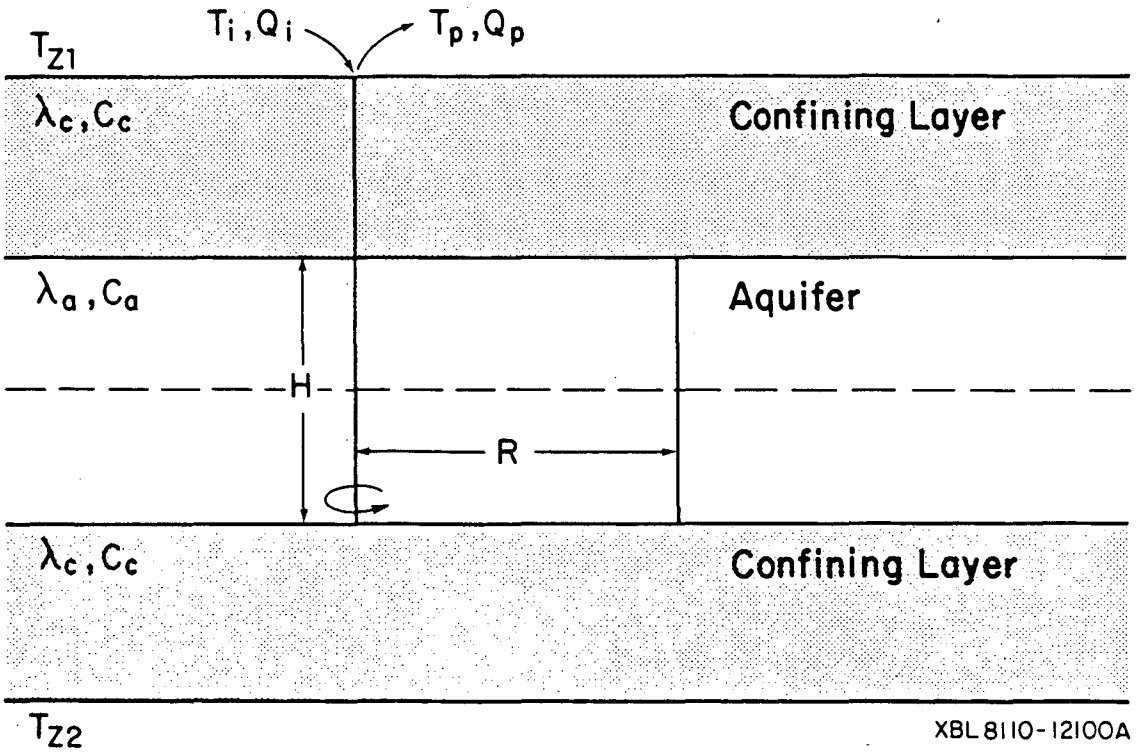


Figure 1. Schematic drawing of the ATES System modeled by the Steady Flow Model. For a symmetric problem only the top half of the system need be modeled, with the dashed line representing an insulated boundary.

the injected water is constant, $T_i$. The same constant flow rate, Q, is used during injection and production periods, so the injected and produced volumes are equal. In the aquifer fluid flow is purely radial.

At the end of the injection period, the volume of injected water is $V_w = Qt_i$. It is convenient to define another volume, the thermal volume $V \equiv (C_w/C_a)V_w$. The thermal volume is the cylindrical volume in the aquifer (solid plus fluid) which would have, at constant temperature $T_i$, a thermal energy equal to the total heat energy of the injected fluid. The thermal volume may be written as $V = \pi R^2 H$, thus defining R, the thermal radius:

$$R = \sqrt{\frac{V}{\pi H}} = \sqrt{\frac{C_w Q t_i}{C_a \pi H}} \qquad (1)$$

An essential result of the SFM calculation is the temperature, $T_p$, of the water extracted from the aquifer during the production period. The time-average of $T_p$ is proportional to the energy recovery factor, $\varepsilon$, which is defined as the ratio of the produced to injected energy when equal volumes of water have been injected into and produced from the aquifer. The energy content of the water is defined relative to a reference temperature, $T_0$. The recovery factor is given by:

$$\varepsilon = \frac{\int_{t_i + t_s}^{t_i + t_s + t_p} (C_w T_p - C_w T_0) Q \, dt}{\int_0^{t_i} (C_w T_i - C_w T_0) Q \, dt} \qquad (2)$$

This expression can be written more simply as:

$$\varepsilon = \frac{\bar{T}_p - T_0}{T_i - T_0} \qquad (3)$$

where $\bar{T}_p$ denotes the average temperature of the water extracted during the production period.

Numerical Formulation

In general, when numerically solving problems involving convection, a mesh-dependent numerical dispersion is introduced, which causes thermal front smearing. In many cases the numerical dispersion completely overshawdows the physical dispersion caused by conduction. The SFM avoids this effect by solving the energy equation explicitly, using a calculational mesh specifically designed for the problem being solved.

The mesh is constructed so that all the cells of a horizontal row have equal volume. Due to cylindrical symmetry, the radial dimension of the cells decreases as their radial distance to the axis of the system increases, as shown in Figure 2. There are $M_r$ cells between r = 0 and r = R, the thermal radius defined in (1). The radial dimension of an arbitrary cell, say the mth cell is $R_{m+1}-R_m$, where $R_m = \sqrt{(m-1)/M_r}\, R$. The volume of the mth cell, which is proportional to $R_{m+1}^2 - R_m^2$, is independent of m, thus all cells in a given row have equal volume. During the injection period, whenever time t is equal to $t_i/M_r$, $2t_i/M_r$, $3t_i/M_r$, ..., $t_i$, the temperature distribution in the aquifer is translated horizontally one cell away from the well (r = 0) and the injection temperature, $T_i$, is assigned to the first cell in each row. This translation every timestep, $t_i/M_r$, simulates a constant volumetric fluid flow rate at the well:

$$Q = \frac{C_a \pi R^2 H}{C_w t_i} \tag{4}$$

and a horizontal Darcy velocity:

$$v(r) = \frac{Q}{2\pi H r} \tag{5}$$

in the aquifer at radius r. When $t = t_i$, the temperature field has been translated $M_r$ times and the thermal front coincides with the thermal radius, R, if the vertical heat losses are not too large.

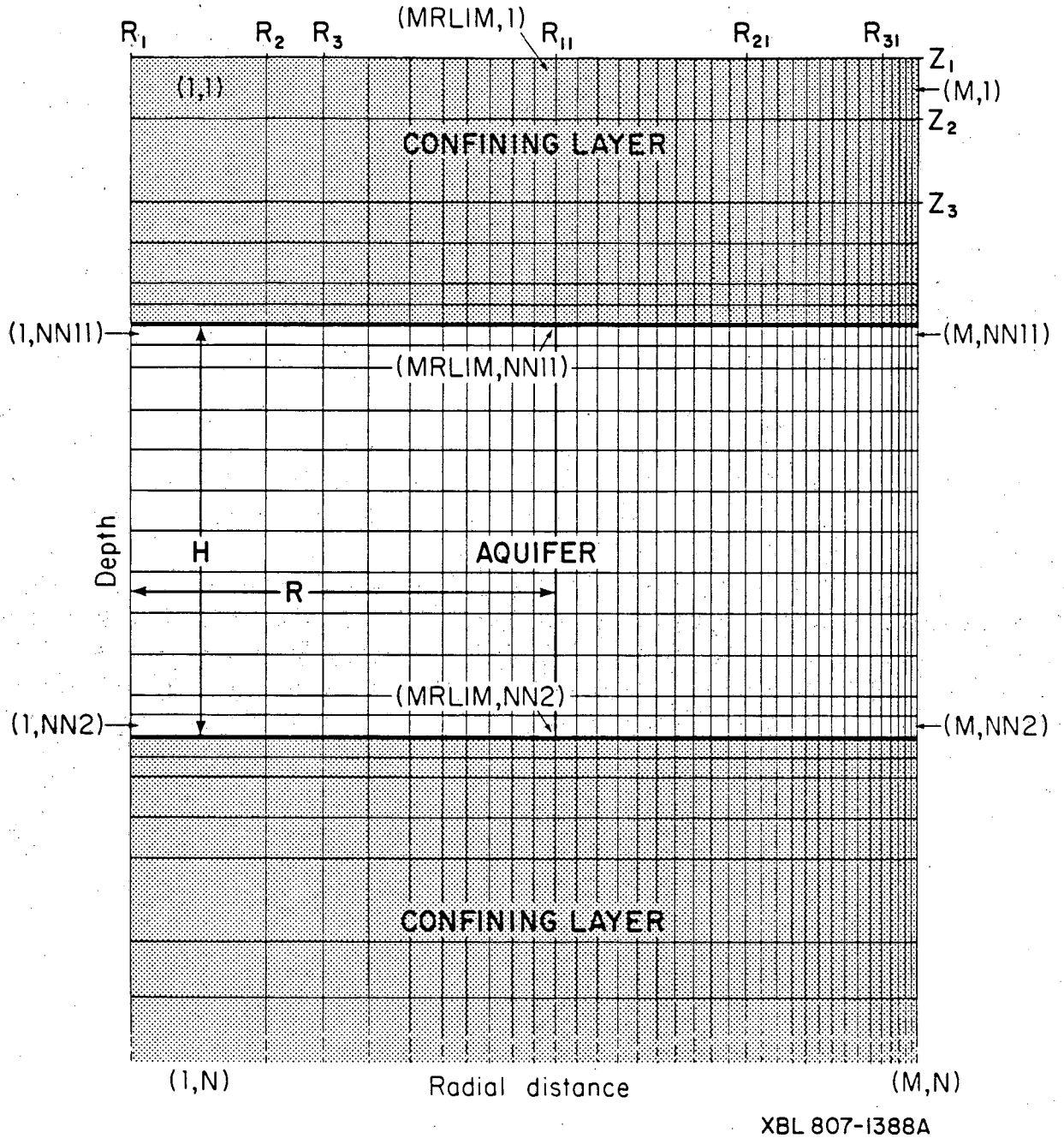


Figure 2. Scale drawing of a typical SFM mesh. The cell numbering scheme is illustrated by labeling selected (column, row) pairs.

Heat transfer by convection is accounted for by translation of the aquifer temperature field every time step $t_i/M_r$. Heat conduction is described by the ordinary heat equation:

$$C \frac{\delta T}{\delta t} = \nabla (\lambda \nabla T) = - \nabla \cdot \underline{q} \tag{6}$$

where $\underline{q}$ is heat flow per unit area. The integral form of equation 6 is solved numerically for each mesh cell during every timestep $\Delta t$. For cell (m,n), i.e., the cell in the mth column, and nth row:

$$\int_{V_{m,n}} C \frac{\delta T}{\delta t} \, dV = - \int_{V_{m,n}} \nabla \cdot \underline{q} \, dV = - \int_{A_{m,n}} \underline{q} \cdot \hat{n} \, dA \tag{7}$$

where the right-hand side describes the heat transfer to all neighboring cells. Using the explicit-finite-difference approximation equation 7 becomes:

$$C_{m,n} V_{m,n} \frac{(T_{m,n}(t + \Delta t) - T_{m,n}(t))}{\Delta t} = \tag{8}$$

$$q_r^{m,n} \; 2\pi R_m \, (z_{n+1} - z_n) - q_r^{m+1,n} \; 2\pi R_{m+1} \, (z_{n+1} - z_n)$$

$$+ \; q_z^{m,n} \, \pi \, (R_{m+1}^2 - R_m^2) \; - \; q_z^{m,n+1} \, \pi \, (R_{m+1}^2 - R_m^2)$$

where:

$$q_r^{m,n} = \frac{T_{m-1,n} - T_{m,n}}{\frac{R_m - R_{m-1}}{2\lambda_{m-1,n}} + \frac{R_{m+1} - R_m}{2\lambda_{m,n}}} \tag{9}$$

and

$$q_z^{m,n} = \frac{T_{m,n-1} - T_{m,n}}{\frac{z_n - z_{n-1}}{2\lambda_{m,n-1}} + \frac{z_{n+1} - z_n}{2\lambda_{m,n}}}$$

In the above equations, $C_{m,n}$, $T_{m,n}$, $\lambda_{m,n}$ and $q^{m,n}$ represent the average value of C, T, $\lambda$, and q, respectively, over the (m,n)th cell which has volume $V_{m,n}$. The time step $\Delta t$ is chosen so as to ensure numerical stability of the solution.

During the storage and rest periods no translation of the temperature field occurs and heat transfer is purely by conduction. During the production period, convection is treated as during the injection period. The length of the production period, $t_p$, is given as input ($t_p = t_i$). Every time interval $t_p/M_r$ the temperature distribution is shifted one cell toward the well, and the temperatures from the first cell in each row are averaged volumetrically to give the production temperature. Note that during each period the flow field is steady, either radially inward or outward, or zero; all transients are ignored.

Figure 3 shows the temperature distributions at various times during the first cycle as generated by the SFM with and without conduction to illustrate the superposition of conduction and convection. The SFM may be used for two types of problems: those with a horizontal plane of symmetry through the middle of the aquifer and those without. For "symmetric" problems, only the top half of the aquifer and upper confining layer need be modeled. The plane of symmetry is treated as an insulated boundary, so vertical heat flow at the lower edge of the bottom row of elements is zero. For asymmetric problems, for example those with a temperature gradient with depth, a seasonally variable surface boundary temperature, or cap and bed rocks with different properties, the vertical heat flow at the lower edge of the bottom row of elements is calculated using a constant boundary temperature, $T_{z2}$.

A typical mesh consists of about 1000 cells, with values of $M_r$ ranging from 10 to 40. The computer time required for a typical annual cycle is about 15 seconds on a CDC 7600 computer. A listing of the code is given in Appendix 3.

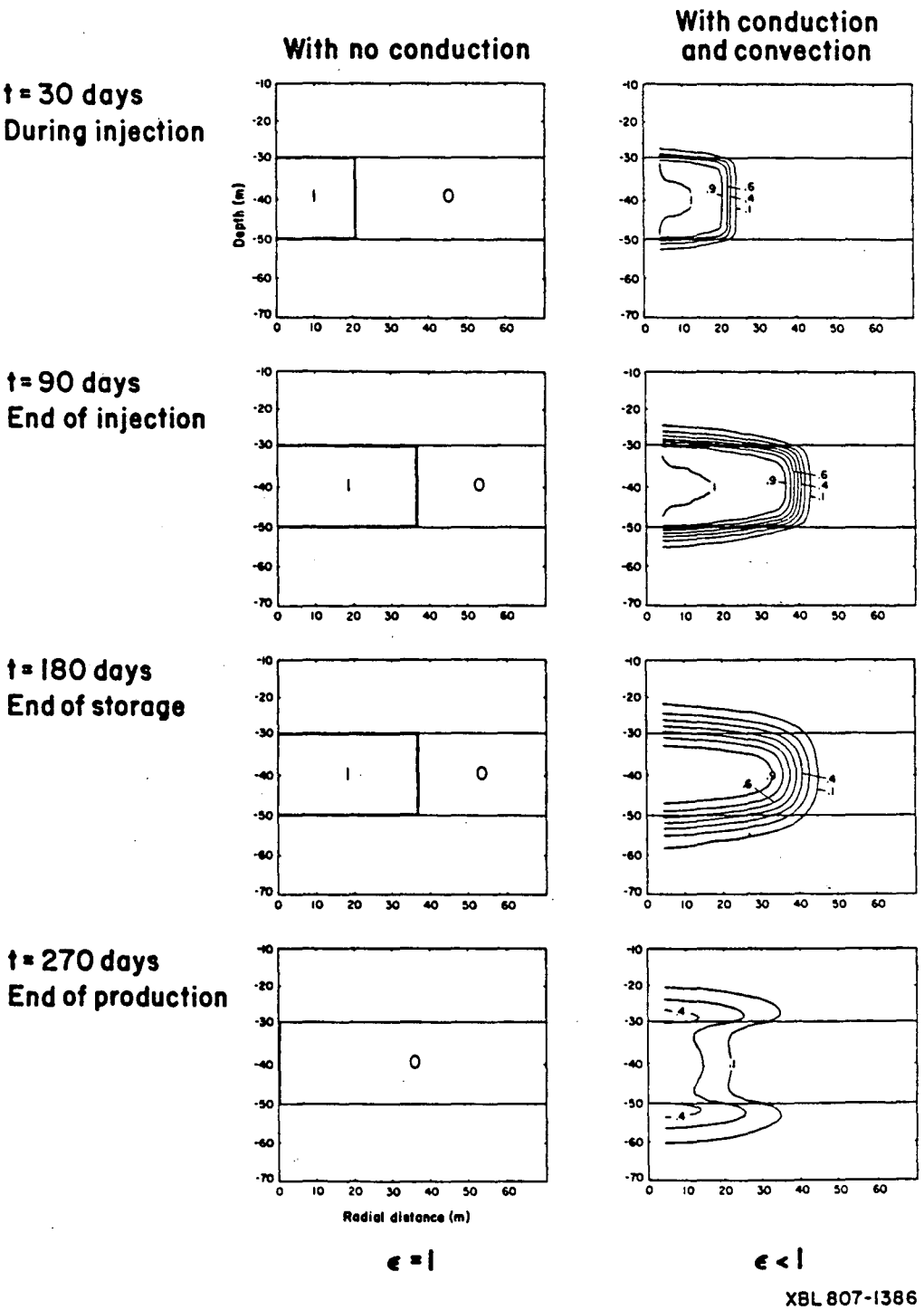


Figure 3. Dimensionless temperature distributions at various times during an injection-storage-production cycle, with and without conduction.

## INPUT

All input is read in LIST DIRECTED READ statements (free format). Multiple variables read in a single READ statement may be on the same line separated by commas, or on successive lines. Each READ statement is numbered below. A sample input deck is shown in Appendix 1.

1. NRUN — Number of runs

   NUT - flag = 0 do not print initial T, $\lambda$, C distributions
   = 1 do print initial T, $\lambda$, C distributions

   NPR - flag = 0 printout is 132 columns wide
   = 1 printout is 80 columns wide

Mesh definition - items 2-6 -- see Figure 2

2. M — First dimension of mesh (number of columns)

   N — Second dimension of mesh (number of rows)

3. NN11 — First aquifer row

   NN2 — Last aquifer row

   Note: for "symmetric" problems NN2=N

4. RLIM (m) — Thermal radius (R, defined in equation 1)

   MRLIM — Number of mesh columns between r=0 and RLIM (in text called $M_r$)

Vertical mesh spacing - items 5-6 -- see Figure 4

5. ZTOP — Z-coordinate of top of mesh (m)

   NANT — Total number of groups of equal-thickness rows

6. (NA(I),A(I),I = 1,NANT)

   NA(I) = Number of rows in Ith group

   A(I) = Thickness of each row in Ith group of rows (m)

   Note: $\sum_{I=1}^{NANT} NA(I) = N$

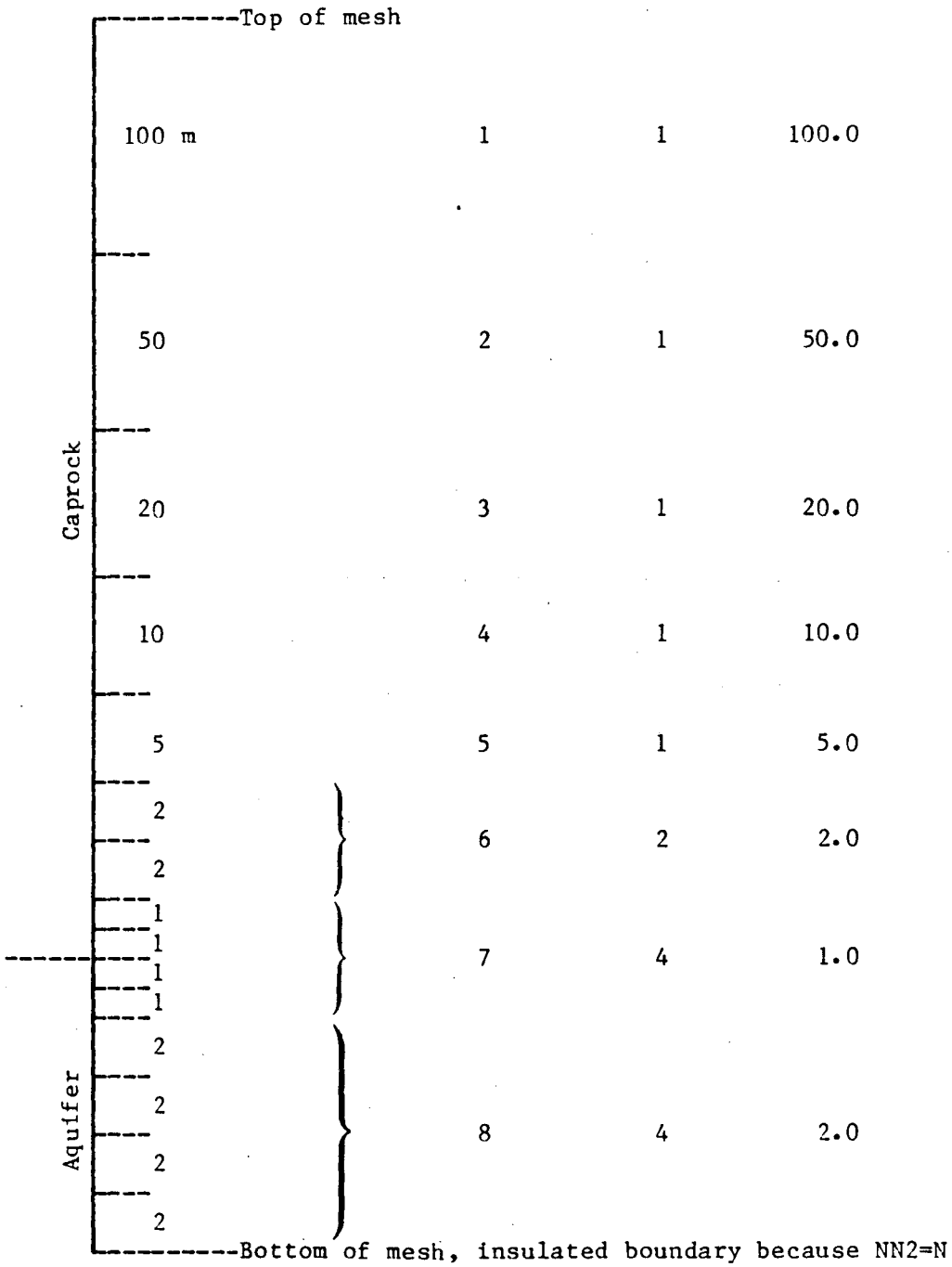


Figure 4. Sample vertical mesh spacing for a "symmetric" problem with NANT = 8.

Initial Conditions and Material Properties - items 7-9

7. VALUE — Default initial temperature T (°C), assigned to all cells except those described in item 9.

8. ITYP - flag for additional assignment of T values

= 1 all cells have T equal to VALUE, no additional assignments

= 11 all cells have T equal to VALUE, except for certain cells, described in item 9.

= 13 all cells have T equal to VALUE, except for certain blocks of cells, described in item 9.

If ITYP = 1 skip item 9

If ITYP = 11

9.1. NUMEX — Number of cells with different value of T

9.2. (I(K),J(K),VALUE(K),K=1,NUMEX)

I(K) - column of Kth cell

J(K) - row of Kth cell

VALUE(K) - value of T for Kth cell

If ITYP = 13

9.1 IBLOCK — Number of blocks of cells with different value of T

9.2 (IMIN(K),IMAX(K),JMIN(K),JMAX(K),VALUE(K),K=1,IBLOCK)

IMIN(K), IMAX(K), JMIN(K), JMAX(K) - definition of Kth block, I identifies columns, J identifies rows.

VALUE(K) - value of T for Kth block

Repeat items 7 through 9, substituting thermal conductivity RLAM (W/mK) (in text called $\lambda$) for initial temperature T.

Repeat items 7 through 9, substituting volumetric heat capacity C ($J/m^3K$) for initial temperature T. Note that all aquifer cells must have C equal to CO value read in item 12.

Linear initial temperature variation - items 10-11

10. ILIN - flag = 0 No linear initial temperature variation

= 1 Linear initial temperature variation defined in 11 (overrides T values read in INDATA; used as radial outer boundary condition)

11. Read if ILIN=1 only

| | |
|---|---|
| TSURF (°C) | Temperature at top of linear variation |
| TDEPTH (°C) | Temperature at bottom of linear variation |
| DEPTH (m) | Depth over which variation occurs |

12.

| | |
|---|---|
| CO ($J/m^3$ K) | Aquifer volumetric heat capacity (in text called $C_a$) |
| RAACAW($J/m^3$ K) | Water volumetric heat capacity (in text called $C_w$) |
| TBOUND(°C) | Temperature of water at lower boundary of mesh (In text called $T_{z2}$). If ILIN = 0, TBOUND is radial outer boundary condition also. |
| TREF (°C) | Reference temperature used in energy calculations (called $T_0$ in text) |

13. Upper boundary temperature

| | |
|---|---|
| T1 (°C) | Average value |
| T2 (°C) | Amplitude of sinusoidal variation |
| TIME1(s) | Phase |
| TAU (s) | Period of variation (default 31536000 s = 365 days) |

Note: $T_{z1} = T1 + T2 \sin(2\pi (t - TIME1)/TAU)$
For constant upper boundary temperature, set T2 = 0

14.

| | |
|---|---|
| NQM | Number of periods to simulate |
| IPER | Number of periods per cycle |

15. PERIOD (s) Length of period ($t_i = t_p$ = PERIOD, $t_s$ = L · PERIOD, $t_r$ = K · PERIOD, where L and K are integers or zero)

16. (VT(I),I=1,IPER) flag VT(I) describes Ith period as:

= 1. injection
= 0. rest or storage
= -1. production

17. (TIN(I),I=1,IPER) Injection temperature (°C), used for VT(I)=1., otherwise ignored (in text called $T_i$)

18. TA (s) Time interval between small printouts

TB (s) Time interval between big printouts

TIMEM (s) Maximum simulation time, overrides NQM if NQM·PERIOD > TIMEM

19. TIME (s) Starting time

Items 2 through 19 are repeated NRUN times.

## OUTPUT

Two output files are written by the SFM, STEADY.OUT and STEADY.BIN. An example of STEADY.OUT is shown in Appendix 2. It contains the following items:

1. Input data

1.1 NCHECK = 1 indicates that the mesh has been generated.

2 indicates that mass flow rates have been calculated.

3 indicates that midpoint coordinates of each mesh cell have been calculated.

1.2 Input parameters are listed. If NUT=1, initial temperature, thermal conductivity, and heat capacity distributions are printed.

## 2. Output data

2.1. Timestep information -- identifies the mesh cell which controls the conduction timestep.

2.2. At the start of each period the number of the period, NQ, the conduction timestep, DT, the number of conduction timesteps per convection timestep, ISTAB, and the fluid flow rate, FLOW, are given. For storage and rest periods, with no convection, ISTAB is not used.

2.3. At each small-printout interval the inlet or outlet temperature, and energy input and output so far are given.

2.4. At each big-printout interval the temperature field is printed as well.

2.5. At the end of each cycle an energy balance is printed, including the energy stored (energy in + energy out), and the recovery ratio ($\varepsilon$) for that cycle.

STEADY.BIN is a binary file containing temperature fields suitable for input to a plotting program. The following information is included, written in free format:

1. M, N, (RM(I), I = 1, M), (ZM(I), I = 1, N)
   The number of columns and rows in the mesh, and the radial and depth coordinates at which temperature is calculated.

At each big-printout interval:

2. TIME, ((T(II,JJ), II = 1,M), JJ = 1,N)
   The current time and temperature field.

Nomenclature

$A$ surface area of the (m,n)th mesh cell ($m^2$)

$C$ volumetric heat capacity $(\frac{J}{m^3 K})$

$C_a = \phi C_w + (1-\phi)C_r$ aquifer volumetric heat capacity $(\frac{J}{m^3 K})$

$H$ aquifer thickness (m)

$M_r$ number of mesh cells in each row between r = 0 and R

$q$ heat flow rate per unit area $(\frac{W}{m^2})$

$Q$ volumetric fluid flow rate $(\frac{m^3}{s})$

$r$ radial coordinate (m)

$R$ thermal radius (m)

$R_m = \sqrt{\frac{m-1}{M}}\, R$ distance to the inner edge of the mth column of mesh cells (m)

$t$ time (s)

$t_c = t_i + t_s + t_p + t_r$ length of one cycle, where $t_i$,$t_s$,$t_p$, and $t_r$ are length of injection, storage, production, and rest periods, respectively (s)

$\Delta t$ timestep for conduction (s)

$T$ temperature (K)

$T_0$ reference temperature (K)

$T_i$ injection temperature (K)

$T_p$ production temperature (K)

$\bar{T}_p$ production temperature averaged over production period (K)

$T_{z1}$ upper boundary temperature (K)

$T_{z2}$ lower boundary temperature (K)

$v = \frac{Q}{2\pi Hr}$ steady radial darcy velocity $(\frac{m}{s})$

Nomenclature

$V = \pi R^2 H = (C_w/C_a) V_w$ thermal volume ($m^3$)

$V_{m,n}$ volume of the (m,n)th mesh cell ($m^3$)

$V_w = Q\ t_i = Q\ t_p$ volume of water injected and produced ($m^3$)

$z$ vertical coordinate (m)

$z_n$ vertical distance from the top of the caprock to the top of the nth row of mesh cells (m)

$\varepsilon$ recovery factor, ratio of produced to injected energy, with energies measured relative to $T_0$.

$\lambda$ thermal conductivity ($\frac{W}{m\ K}$)

$\phi$ porosity

Subscripts

w water

r rock

a aquifer

c confining layer

m,n refers to the cell in the mth column and nth row of the mesh (also used as a superscript)

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## Appendix 1
Sample Problem Input

| READ Statement | Data Entry | Comments |
|---|---|---|
| 1. | 1,1,0 | NRUN, NUT, NPR |
| 2. | 34,15 | M,N |
| 3. | 10,15 | NN11,NN2 (N=NN2 for a "symmetric" problem) |
| 4. | 10., 12 | RLIM, MRLIM |
| 5. | 0.,8 | ZTOP, NANT |
| 6. | 1, 100., 1,50., 1,20. | (N(I), A(I), I=1, NANT) |
| 6. | 1,10., 1,5., 2,2., 4,1., 4,2. | |
| 7. | 20. | T initial conditions: all 20°C |
| 8. | 1 | |
| 7. | 2. | RLAM initial conditions: all 2. W/mK except one block (the aquifer) with 2.5 W/mK |
| 8. | 13 | |
| 9.1 | 1 | |
| 9.2 | 1, 34, 10, 15, 2.5 | |
| 7. | 2.6E+06 | C initial conditions: all 2.6 x $10^6$ J/$m^3$ K except one block (the aquifer) with 2.4 x $10^6$ J/$m^3$K (aquifer C equals CO read in 12 below) |
| 8. | 13 | |
| 9.1 | 1 | |
| 9.1 | 1, 34, 10, 15, 2.4E+06 | |
| 10. | 0 | ILIN (Since ILIN = 0, there is no item 11) |
| 12. | 2.4E+06,4.1E+06,20., 20. | CO, RAACAW, TBOUND, TREF |
| 13. | 20.,0.,0., 31536000. | T1, T2, TIME1, TAU |
| 14. | 12, 4 | NQM, IPER |

## Appendix 1
Sample Problem Input

| READ Statement | Data Entry | Comments |
|---|---|---|
| 15. | 7884000. | PERIOD (1/4 year) |
| 16. | 1.,0.,-1.,0. | (VT(I), I=1,IPER) (Injection, storage, production, and rest periods are of equal length.) |
| 17. | 100.,0.,0.,0. | (TIN(I),I=1, IPER) |
| 18. | 1596000.,7884000.,63080000. | TA,TB,TIMEM (TIMEM slightly greater than desired to allow for round-off errors) |
| 19. | 0. | START TIME |

```
====================
  STEADY FLOW MODEL
====================
 NCHECK=  1
 NCHECK=  2
 NCHECK=  3


--------------------
  INPUT PARAMETERS
--------------------

   MESH DEFINITION
   M=... 34     N=... 15
   NN11=... 10    NN2=... 15
   RLIM=  10.0   MRLIM= 12  AQUIFER THICKNESS=  10.0


 ILIN=... 0
 HEAT CAPACITY OF AQUIFER=0.240E+07
 HEAT CAPACITY OF WATER=0.410E+07
 TEMPERATURE AT BOUNDARY=.  20.000
 ENERGY BALANCE WITH T-REF=  20.0
 ATMOSPHERE TEMPERATURE FUNCTION
   AVERAGE=  20.0   AMPLITUDE=   0.0
   PHASE-TIME=          0.0 SEC.     PERIOD=  31536000.0 SEC.
 NUMBER OF PERIODS= 12   PERIODS PER CYCLE=  4
 TIME FOR ONE PERIOD 7884000.0 SEC.

 PERIOD           1         2         3         4
 TEMP.        100.0       0.0       0.0       0.0
 FLOW     0.233E-03 0.000E+00 -.233E-03 0.000E+00

 PRINTOUT INTERVALS  TA=   1296000.0  TB=   7884000.0
 START TIME=          0.0  END TIME=..     63080000.0


-------------------------------------------
 INITIAL CONDITIONS AND MATERIAL PROPERTIES
-------------------------------------------

  TEMP
 =====
                    RADIUS
  DEPTH    1.4   3.5   4.5   5.4   6.1   6.8   7.4   7.9   8.4   8.9   9.4   9.8  10.2  10.6  11.0  11.4  11.7
-------------------------------------------------------------------------------------------------------------
  50.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 125.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 160.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 175.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 182.50  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 186.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 188.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 189.50  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 190.50  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 191.50  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 192.50  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 194.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 196.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 198.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 200.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
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| DEPTH | RADIUS 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 182.50 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 186.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 188.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 189.50 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 190.50 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 191.50 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 192.50 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 194.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 196.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 198.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 200.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |

RLAM
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| DEPTH | RADIUS 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 125.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 160.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 175.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 182.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 186.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 188.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 189.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 190.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 191.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 192.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 194.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 196.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 198.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 200.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |

| DEPTH | RADIUS 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 125.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 160.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 175.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 182.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 186.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 188.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 189.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 190.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 191.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 192.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 194.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 196.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 198.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 200.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |

CAP

MULTIPLY BY 1.E6

| DEPTH | RADIUS 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 125.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 160.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 175.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 182.50 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 186.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 188.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 189.50 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 190.50 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 191.50 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 192.50 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 194.00 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 196.00 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 198.00 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 200.00 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |

| DEPTH | RADIUS 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 125.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 160.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 175.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 182.50 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 186.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 188.00 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 189.50 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 190.50 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| 191.50 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 192.50 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 194.00 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 196.00 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 198.00 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 200.00 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |

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      OUTPUT
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TIMESTEP-INFORMATION
--------------------
ICELL=... 34   JCELL=... 10   DTSTAB=...       9576.009
CIN(I,J)=... 0.159E-07
GFZ(I,J)    GFZ(I,J+1) GFR(I,J)    GFR(I+1,J)
0.582E+02   0.654E+02  0.104E+04   0.212E+04
R(I)         R(I+1)
0.166E+02    0.168E+02
Z(J)         Z(J+1)
0.191E+03    0.192E+03


-------------
  MAIN LOOP
-------------

-------------------------------------------------------------
 NQ=   1   DT=    9521.74   ISTAB=  69   FLOW=0.233E-03 M/S
-------------------------------------------------------------

 TIME=     1304479.4 SEC. @@@   15 DAYS  2.4 HOURS
 ENERGY IN=...0.5027E+11     ENERGY OUT=...0.0000E+00
 TEMP. IN=...100.0           TEMP. OUT=...  0.0

 TIME=     2599437.3 SEC. @@@   30 DAYS  2.1 HOURS
 ENERGY IN=...0.1508E+12     ENERGY OUT=...0.0000E+00
 TEMP. IN=...100.0           TEMP. OUT=...  0.0

 TIME=     3894395.3 SEC. @@@   45 DAYS  1.8 HOURS
 ENERGY IN=...0.2513E+12     ENERGY OUT=...0.0000E+00
 TEMP. IN=...100.0           TEMP. OUT=...  0.0

 TIME=     5189327.0 SEC. @@@   60 DAYS  1.5 HOURS
 ENERGY IN=...0.3519E+12     ENERGY OUT=...0.0000E+00
 TEMP. IN=...100.0           TEMP. OUT=...  0.0

 TIME=     6484251.0 SEC. @@@   75 DAYS  1.2 HOURS
 ENERGY IN=...0.4524E+12     ENERGY OUT=...0.0000E+00
 TEMP. IN=...100.0           TEMP. OUT=...  0.0

 TIME=     7779175.0 SEC. @@@   90 DAYS  0.9 HOURS
 ENERGY IN=...0.5529E+12     ENERGY OUT=...0.0000E+00
 TEMP. IN=...100.0           TEMP. OUT=...  0.0


-------------------------------------------------------------
 NQ=   2   DT=    9567.96   ISTAB=   1   FLOW=0.000E+00 M/S
-------------------------------------------------------------
```

TEMPERATURE @@@ TIME=... 7893479.5 SEC.

TEMP
=====

| DEPTH | RADIUS 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.01 | 20.01 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 182.50 | 20.44 | 20.32 | 20.25 | 20.20 | 20.16 | 20.12 | 20.10 | 20.08 | 20.06 | 20.05 | 20.04 | 20.03 | 20.02 | 20.02 | 20.01 | 20.01 | 20.01 |
| 186.00 | 25.25 | 23.96 | 23.21 | 22.60 | 22.11 | 21.71 | 21.38 | 21.11 | 20.89 | 20.72 | 20.57 | 20.46 | 20.36 | 20.29 | 20.23 | 20.18 | 20.14 |
| 188.00 | 36.02 | 32.60 | 30.50 | 28.75 | 27.27 | 26.03 | 24.98 | 24.09 | 23.36 | 22.75 | 22.24 | 21.82 | 21.47 | 21.19 | 20.96 | 20.77 | 20.62 |
| 189.50 | 55.59 | 49.33 | 45.22 | 41.65 | 38.52 | 35.76 | 33.36 | 31.26 | 29.45 | 27.90 | 26.57 | 25.45 | 24.50 | 23.71 | 23.04 | 22.49 | 22.03 |
| 190.50 | 72.92 | 64.87 | 59.31 | 54.39 | 49.95 | 45.94 | 42.35 | 39.14 | 36.30 | 33.82 | 31.65 | 29.78 | 28.18 | 26.81 | 25.65 | 24.68 | 23.85 |
| 191.50 | 99.72 | 88.48 | 80.13 | 73.83 | 68.01 | 62.58 | 57.52 | 52.84 | 48.55 | 44.66 | 41.18 | 38.09 | 35.37 | 33.00 | 30.94 | 29.18 | 27.67 |
| 192.50 | 99.99 | 95.85 | 89.43 | 83.67 | 77.87 | 72.13 | 66.55 | 61.20 | 56.18 | 51.54 | 47.30 | 43.48 | 40.08 | 37.09 | 34.47 | 32.19 | 30.24 |
| 194.00 | 100.00 | 99.23 | 96.30 | 92.32 | 87.45 | 82.02 | 76.31 | 70.54 | 64.91 | 59.54 | 54.53 | 49.93 | 45.77 | 42.06 | 38.78 | 35.91 | 33.42 |
| 196.00 | 100.00 | 99.77 | 98.31 | 95.58 | 91.67 | 86.85 | 81.45 | 75.75 | 70.00 | 64.38 | 59.03 | 54.05 | 49.49 | 45.37 | 41.69 | 38.45 | 35.62 |
| 198.00 | 100.00 | 99.84 | 98.73 | 96.40 | 92.86 | 88.34 | 83.13 | 77.53 | 71.80 | 66.15 | 60.72 | 55.62 | 50.93 | 46.67 | 42.86 | 39.48 | 36.52 |
| 200.00 | 100.00 | 99.86 | 98.81 | 96.59 | 93.15 | 88.72 | 83.58 | 78.03 | 72.32 | 66.66 | 61.22 | 56.10 | 51.37 | 47.07 | 43.22 | 39.80 | 36.80 |

| DEPTH | RADIUS 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 182.50 | 20.01 | 20.01 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 186.00 | 20.11 | 20.09 | 20.07 | 20.06 | 20.04 | 20.03 | 20.03 | 20.02 | 20.02 | 20.01 | 20.01 | 20.01 | 20.01 | 20.00 | 20.00 | 20.00 | 20.00 |
| 188.00 | 20.50 | 20.40 | 20.32 | 20.25 | 20.20 | 20.16 | 20.13 | 20.10 | 20.08 | 20.06 | 20.05 | 20.04 | 20.03 | 20.02 | 20.01 | 20.01 | 20.00 |
| 189.50 | 21.65 | 21.34 | 21.09 | 20.88 | 20.71 | 20.57 | 20.46 | 20.37 | 20.29 | 20.23 | 20.18 | 20.14 | 20.11 | 20.08 | 20.05 | 20.03 | 20.01 |
| 190.50 | 23.17 | 22.60 | 22.12 | 21.73 | 21.41 | 21.14 | 20.92 | 20.75 | 20.60 | 20.48 | 20.38 | 20.30 | 20.23 | 20.17 | 20.11 | 20.07 | 20.02 |
| 191.50 | 26.38 | 25.30 | 24.38 | 23.61 | 22.97 | 22.44 | 22.00 | 21.63 | 21.32 | 21.07 | 20.86 | 20.69 | 20.54 | 20.41 | 20.30 | 20.21 | 20.09 |
| 192.50 | 28.56 | 27.13 | 25.92 | 24.91 | 24.05 | 23.33 | 22.74 | 22.24 | 21.83 | 21.48 | 21.19 | 20.95 | 20.75 | 20.58 | 20.42 | 20.29 | 20.13 |
| 194.00 | 31.27 | 29.43 | 27.86 | 26.53 | 25.41 | 24.46 | 23.67 | 23.01 | 22.46 | 22.00 | 21.62 | 21.29 | 21.02 | 20.78 | 20.58 | 20.40 | 20.18 |
| 196.00 | 33.16 | 31.04 | 29.23 | 27.69 | 26.38 | 25.28 | 24.36 | 23.58 | 22.93 | 22.39 | 21.93 | 21.55 | 21.22 | 20.94 | 20.69 | 20.47 | 20.22 |
| 198.00 | 33.94 | 31.72 | 29.81 | 28.18 | 26.80 | 25.63 | 24.65 | 23.83 | 23.13 | 22.55 | 22.07 | 21.66 | 21.31 | 21.01 | 20.74 | 20.51 | 20.23 |
| 200.00 | 34.19 | 31.93 | 29.99 | 28.34 | 26.93 | 25.75 | 24.75 | 23.91 | 23.20 | 22.61 | 22.11 | 21.69 | 21.34 | 21.03 | 20.76 | 20.52 | 20.24 |

TIME= 7893479.5 SEC. @@@ 91 DAYS 8.6 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 9079911.0 SEC. @@@ 105 DAYS 2.2 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 10371591.0 SEC. @@@ 120 DAYS 1.0 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 11672839.0 SEC. @@@ 135 DAYS 2.5 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 12964519.0 SEC. @@@ 150 DAYS 1.3 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 14256199.0 SEC. @@@ 165 DAYS 0.1 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 15557447.0 SEC. @@@ 180 DAYS 1.5 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

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NQ= 3 DT= 9521.74 ISTAB= 69 FLOW=-.233E-03 M/S

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TEMPERATURE @@@ TIME=... 15777465.0 SEC.

TEMP
=====

| DEPTH | RADIUS 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.10 | 20.08 | 20.07 | 20.06 | 20.06 | 20.05 | 20.04 | 20.04 | 20.03 | 20.03 | 20.03 | 20.02 | 20.02 | 20.02 | 20.02 | 20.01 | 20.01 |
| 182.50 | 22.47 | 22.11 | 21.88 | 21.68 | 21.50 | 21.34 | 21.20 | 21.07 | 20.96 | 20.85 | 20.76 | 20.68 | 20.61 | 20.54 | 20.48 | 20.43 | 20.38 |
| 186.00 | 32.28 | 30.68 | 29.64 | 28.72 | 27.89 | 27.13 | 26.44 | 25.82 | 25.25 | 24.73 | 24.26 | 23.83 | 23.45 | 23.10 | 22.78 | 22.49 | 22.23 |
| 188.00 | 42.31 | 39.65 | 37.89 | 36.30 | 34.85 | 33.52 | 32.30 | 31.18 | 30.15 | 29.20 | 28.34 | 27.54 | 26.82 | 26.16 | 25.55 | 25.00 | 24.49 |
| 189.50 | 52.46 | 48.93 | 46.54 | 44.36 | 42.35 | 40.48 | 38.75 | 37.14 | 35.65 | 34.27 | 33.00 | 31.83 | 30.75 | 29.76 | 28.84 | 28.00 | 27.22 |
| 190.50 | 59.39 | 55.33 | 52.56 | 50.01 | 47.64 | 45.42 | 43.35 | 41.43 | 39.63 | 37.97 | 36.42 | 34.99 | 33.66 | 32.43 | 31.30 | 30.25 | 29.28 |
| 191.50 | 65.29 | 60.85 | 57.80 | 54.97 | 52.32 | 49.83 | 47.49 | 45.31 | 43.26 | 41.36 | 39.58 | 37.92 | 36.38 | 34.95 | 33.63 | 32.40 | 31.26 |
| 192.50 | 70.30 | 65.58 | 62.31 | 59.25 | 56.38 | 53.66 | 51.10 | 48.69 | 46.44 | 44.32 | 42.34 | 40.50 | 38.77 | 37.17 | 35.67 | 34.28 | 32.99 |
| 194.00 | 77.14 | 72.09 | 68.54 | 65.20 | 62.03 | 59.01 | 56.15 | 53.45 | 50.90 | 48.50 | 46.25 | 44.13 | 42.15 | 40.30 | 38.57 | 36.96 | 35.45 |
| 196.00 | 83.47 | 78.25 | 74.52 | 70.96 | 67.55 | 64.28 | 61.16 | 58.19 | 55.37 | 52.71 | 50.19 | 47.82 | 45.59 | 43.50 | 41.54 | 39.70 | 37.98 |
| 198.00 | 87.05 | 81.82 | 78.02 | 74.37 | 70.85 | 67.46 | 64.20 | 61.09 | 58.12 | 55.30 | 52.64 | 50.12 | 47.74 | 45.51 | 43.40 | 41.43 | 39.58 |
| 200.00 | 88.58 | 83.36 | 79.56 | 75.88 | 72.32 | 68.88 | 65.57 | 62.40 | 59.37 | 56.49 | 53.76 | 51.17 | 48.73 | 46.43 | 44.27 | 42.23 | 40.32 |

| DEPTH | RADIUS 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 182.50 | 20.34 | 20.30 | 20.26 | 20.23 | 20.20 | 20.18 | 20.16 | 20.14 | 20.12 | 20.10 | 20.08 | 20.07 | 20.05 | 20.04 | 20.03 | 20.02 | 20.01 |
| 186.00 | 21.99 | 21.77 | 21.58 | 21.40 | 21.24 | 21.09 | 20.95 | 20.83 | 20.72 | 20.61 | 20.51 | 20.42 | 20.34 | 20.26 | 20.18 | 20.10 | 20.03 |
| 188.00 | 24.03 | 23.61 | 23.23 | 22.87 | 22.55 | 22.25 | 21.98 | 21.73 | 21.49 | 21.28 | 21.07 | 20.88 | 20.71 | 20.54 | 20.38 | 20.22 | 20.07 |
| 189.50 | 26.51 | 25.86 | 25.25 | 24.69 | 24.18 | 23.71 | 23.27 | 22.86 | 22.48 | 22.12 | 21.79 | 21.48 | 21.18 | 20.90 | 20.63 | 20.37 | 20.12 |
| 190.50 | 28.39 | 27.56 | 26.80 | 26.09 | 25.44 | 24.83 | 24.26 | 23.74 | 23.24 | 22.78 | 22.35 | 21.94 | 21.55 | 21.18 | 20.83 | 20.49 | 20.16 |
| 191.50 | 30.20 | 29.22 | 28.30 | 27.46 | 26.67 | 25.93 | 25.25 | 24.61 | 24.01 | 23.44 | 22.91 | 22.40 | 21.92 | 21.47 | 21.03 | 20.61 | 20.20 |
| 192.50 | 31.79 | 30.67 | 29.63 | 28.66 | 27.75 | 26.91 | 26.12 | 25.37 | 24.68 | 24.02 | 23.40 | 22.81 | 22.25 | 21.71 | 21.20 | 20.71 | 20.23 |
| 194.00 | 34.05 | 32.73 | 31.51 | 30.36 | 29.29 | 28.29 | 27.35 | 26.46 | 25.63 | 24.84 | 24.10 | 23.39 | 22.72 | 22.07 | 21.45 | 20.86 | 20.28 |
| 196.00 | 36.37 | 34.86 | 33.45 | 32.13 | 30.89 | 29.72 | 28.63 | 27.59 | 26.62 | 25.70 | 24.82 | 23.99 | 23.20 | 22.44 | 21.71 | 21.01 | 20.33 |
| 198.00 | 37.84 | 36.21 | 34.68 | 33.25 | 31.90 | 30.64 | 29.44 | 28.32 | 27.25 | 26.25 | 25.29 | 24.38 | 23.51 | 22.68 | 21.88 | 21.11 | 20.36 |
| 200.00 | 38.53 | 36.84 | 35.26 | 33.77 | 32.38 | 31.06 | 29.83 | 28.66 | 27.55 | 26.51 | 25.51 | 24.56 | 23.66 | 22.79 | 21.96 | 21.16 | 20.38 |

TIME= 15777465.0 SEC. @@@ 182 DAYS 14.6 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 16853450.0 SEC. @@@ 195 DAYS 1.5 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.3727E+11
TEMP. IN=... 0.0 TEMP. OUT=... 79.3

TIME= 18148442.0 SEC. @@@ 210 DAYS 1.2 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.1013E+12
TEMP. IN=... 0.0 TEMP. OUT=... 68.6

TIME= 19443434.0 SEC. @@@ 225 DAYS 1.0 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.1546E+12
TEMP. IN=... 0.0 TEMP. OUT=... 60.5

TIME= 20738426.0 SEC. @@@ 240 DAYS 0.7 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.1991E+12
TEMP. IN=... 0.0 TEMP. OUT=... 53.8

TIME= 22033418.0 SEC. @@@ 255 DAYS 0.4 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.2363E+12
TEMP. IN=... 0.0 TEMP. OUT=... 48.3

TIME= 23328410.0 SEC. @@@ 270 DAYS 0.1 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.2675E+12
TEMP. IN=... 0.0 TEMP. OUT=... 43.7

TEMPERATURE @@@ TIME=... 23652158.0 SEC.

TEMP
=====

| DEPTH | RADIUS 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.30 | 20.27 | 20.25 | 20.23 | 20.21 | 20.19 | 20.18 | 20.16 | 20.15 | 20.14 | 20.13 | 20.12 | 20.11 | 20.10 | 20.09 | 20.08 | 20.07 |
| 182.50 | 24.36 | 23.90 | 23.60 | 23.32 | 23.07 | 22.84 | 22.62 | 22.42 | 22.24 | 22.06 | 21.90 | 21.75 | 21.61 | 21.48 | 21.36 | 21.25 | 21.14 |
| 186.00 | 32.80 | 31.56 | 30.72 | 29.95 | 29.24 | 28.58 | 27.96 | 27.38 | 26.84 | 26.33 | 25.86 | 25.41 | 25.00 | 24.61 | 24.24 | 23.89 | 23.57 |
| 188.00 | 37.99 | 36.32 | 35.18 | 34.12 | 33.14 | 32.22 | 31.35 | 30.54 | 29.77 | 29.06 | 28.38 | 27.75 | 27.16 | 26.60 | 26.07 | 25.58 | 25.12 |
| 189.50 | 40.27 | 38.50 | 37.24 | 36.06 | 34.96 | 33.91 | 32.93 | 32.00 | 31.13 | 30.31 | 29.54 | 28.81 | 28.13 | 27.49 | 26.88 | 26.31 | 25.77 |
| 190.50 | 40.59 | 38.89 | 37.63 | 36.43 | 35.30 | 34.23 | 33.22 | 32.26 | 31.36 | 30.52 | 29.72 | 28.97 | 28.26 | 27.59 | 26.96 | 26.37 | 25.81 |
| 191.50 | 38.37 | 37.16 | 35.99 | 34.88 | 33.83 | 32.84 | 31.90 | 31.01 | 30.17 | 29.39 | 28.64 | 27.94 | 27.28 | 26.66 | 26.08 | 25.53 | 25.01 |
| 192.50 | 38.20 | 37.01 | 35.85 | 34.74 | 33.69 | 32.70 | 31.76 | 30.87 | 30.03 | 29.24 | 28.49 | 27.79 | 27.13 | 26.50 | 25.92 | 25.37 | 24.86 |
| 194.00 | 38.62 | 37.40 | 36.21 | 35.07 | 33.99 | 32.96 | 31.99 | 31.07 | 30.20 | 29.38 | 28.61 | 27.88 | 27.20 | 26.56 | 25.95 | 25.39 | 24.86 |
| 196.00 | 40.04 | 38.73 | 37.45 | 36.23 | 35.06 | 33.95 | 32.90 | 31.91 | 30.97 | 30.09 | 29.25 | 28.46 | 27.72 | 27.03 | 26.38 | 25.76 | 25.19 |
| 198.00 | 41.37 | 39.98 | 38.62 | 37.32 | 36.08 | 34.90 | 33.78 | 32.72 | 31.72 | 30.77 | 29.88 | 29.04 | 28.25 | 27.50 | 26.80 | 26.15 | 25.54 |
| 200.00 | 42.13 | 40.69 | 39.29 | 37.94 | 36.65 | 35.43 | 34.27 | 33.18 | 32.14 | 31.16 | 30.24 | 29.37 | 28.55 | 27.78 | 27.05 | 26.38 | 25.74 |

| DEPTH | RADIUS 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.07 | 20.06 | 20.06 | 20.05 | 20.05 | 20.04 | 20.04 | 20.03 | 20.03 | 20.02 | 20.02 | 20.02 | 20.01 | 20.01 | 20.01 | 20.00 | 20.00 |
| 182.50 | 21.04 | 20.95 | 20.86 | 20.78 | 20.70 | 20.63 | 20.56 | 20.49 | 20.43 | 20.37 | 20.32 | 20.26 | 20.21 | 20.16 | 20.11 | 20.07 | 20.02 |
| 186.00 | 23.26 | 22.98 | 22.71 | 22.45 | 22.21 | 21.98 | 21.77 | 21.56 | 21.36 | 21.18 | 21.00 | 20.83 | 20.67 | 20.51 | 20.36 | 20.21 | 20.07 |
| 188.00 | 24.68 | 24.26 | 23.88 | 23.51 | 23.16 | 22.83 | 22.52 | 22.23 | 21.94 | 21.68 | 21.42 | 21.18 | 20.95 | 20.72 | 20.51 | 20.30 | 20.10 |
| 189.50 | 25.27 | 24.79 | 24.34 | 23.92 | 23.52 | 23.15 | 22.79 | 22.46 | 22.14 | 21.84 | 21.56 | 21.29 | 21.03 | 20.79 | 20.55 | 20.32 | 20.11 |
| 190.50 | 25.29 | 24.80 | 24.34 | 23.90 | 23.49 | 23.11 | 22.75 | 22.41 | 22.09 | 21.79 | 21.50 | 21.24 | 20.99 | 20.75 | 20.52 | 20.31 | 20.10 |
| 191.50 | 24.53 | 24.07 | 23.65 | 23.25 | 22.88 | 22.53 | 22.20 | 21.90 | 21.61 | 21.35 | 21.10 | 20.87 | 20.66 | 20.46 | 20.27 | 20.09 | 20.04 |
| 192.50 | 24.37 | 23.92 | 23.50 | 23.10 | 22.74 | 22.39 | 22.08 | 21.78 | 21.51 | 21.25 | 21.02 | 20.81 | 20.61 | 20.42 | 20.25 | 20.08 | 20.04 |
| 194.00 | 24.36 | 23.90 | 23.47 | 23.07 | 22.69 | 22.35 | 22.03 | 21.73 | 21.46 | 21.21 | 20.98 | 20.77 | 20.58 | 20.40 | 20.24 | 20.08 | 20.04 |
| 196.00 | 24.66 | 24.16 | 23.70 | 23.26 | 22.86 | 22.49 | 22.15 | 21.84 | 21.55 | 21.28 | 21.04 | 20.82 | 20.61 | 20.42 | 20.25 | 20.08 | 20.04 |
| 198.00 | 24.97 | 24.44 | 23.94 | 23.48 | 23.05 | 22.66 | 22.29 | 21.96 | 21.65 | 21.37 | 21.11 | 20.87 | 20.65 | 20.45 | 20.26 | 20.09 | 20.04 |
| 200.00 | 25.15 | 24.60 | 24.08 | 23.61 | 23.16 | 22.75 | 22.38 | 22.03 | 21.71 | 21.42 | 21.15 | 20.90 | 20.68 | 20.47 | 20.27 | 20.09 | 20.04 |

TIME= 23652158.0 SEC. @@@ 273 DAYS 18.0 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.2811E+12
TEMP. IN=... 0.0 TEMP. OUT=... 41.7

```
 NQ=   4   DT=   9567.96   ISTAB=   1   FLOW=0.000E+00 M/S

 TIME=   24628094.0 SEC. @@@  285 DAYS  1.1 HOURS
 ENERGY IN=...0.6032E+12     ENERGY OUT=...-.2811E+12
 TEMP. IN=...  0.0           TEMP. OUT=...  0.0

 TIME=   25929342.0 SEC. @@@  300 DAYS  2.6 HOURS
 ENERGY IN=...0.6032E+12     ENERGY OUT=...-.2811E+12
 TEMP. IN=...  0.0           TEMP. OUT=...  0.0

 TIME=   27221022.0 SEC. @@@  315 DAYS  1.4 HOURS
 ENERGY IN=...0.6032E+12     ENERGY OUT=...-.2811E+12
 TEMP. IN=...  0.0           TEMP. OUT=...  0.0

 TIME=   28512702.0 SEC. @@@  330 DAYS  0.2 HOURS
 ENERGY IN=...0.6032E+12     ENERGY OUT=...-.2811E+12
 TEMP. IN=...  0.0           TEMP. OUT=...  0.0

 TIME=   29813950.0 SEC. @@@  345 DAYS  1.7 HOURS
 ENERGY IN=...0.6032E+12     ENERGY OUT=...-.2811E+12
 TEMP. IN=...  0.0           TEMP. OUT=...  0.0

 TIME=   31105630.0 SEC. @@@  360 DAYS  0.5 HOURS
 ENERGY IN=...0.6032E+12     ENERGY OUT=...-.2811E+12
 TEMP. IN=...  0.0           TEMP. OUT=...  0.0

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  ENERGY BALANCE     CYCLE=...  1
  ENERGY(IN)=... 0.603E+12     ENERGY(OUT)=...-0.281E+12
  ENERGY STORED=... 0.322E+12    RECOVERY RATIO=...0.466
  REFERENCE TEMPERATURE.=...  20.0
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++

TEMPERATURE  @@@  TIME=...     31536190.0 SEC.

  TEMP
 =====
                  RADIUS
  DEPTH    1.4   3.5   4.5   5.4   6.1   6.8   7.4   7.9   8.4   8.9   9.4   9.8  10.2  10.6  11.0  11.4  11.7
 ------------------------------------------------------------------------------------------------------------
  50.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 125.00  20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00
 160.00  20.01 20.01 20.01 20.01 20.01 20.01 20.01 20.01 20.01 20.01 20.01 20.01 20.00 20.00 20.00 20.00 20.00
 175.00  20.55 20.50 20.47 20.44 20.41 20.38 20.36 20.34 20.31 20.29 20.27 20.25 20.24 20.22 20.20 20.19 20.17
 182.50  25.05 24.62 24.32 24.05 23.79 23.55 23.33 23.11 22.91 22.72 22.54 22.36 22.20 22.05 21.90 21.76 21.62
 186.00  30.25 29.39 28.80 28.26 27.75 27.27 26.81 26.38 25.97 25.58 25.21 24.86 24.52 24.21 23.90 23.61 23.34
 188.00  32.84 31.77 31.04 30.36 29.73 29.12 28.55 28.01 27.49 27.01 26.54 26.10 25.68 25.28 24.90 24.53 24.19
 189.50  34.10 32.93 32.14 31.40 30.70 30.03 29.41 28.81 28.24 27.70 27.19 26.70 26.24 25.80 25.38 24.98 24.60
 190.50  34.69 33.49 32.66 31.89 31.16 30.47 29.82 29.20 28.60 28.04 27.51 27.00 26.51 26.05 25.61 25.20 24.80
 191.50  35.03 33.80 32.96 32.17 31.43 30.73 30.06 29.42 28.82 28.24 27.70 27.17 26.68 26.21 25.76 25.33 24.92
 192.50  35.28 34.04 33.18 32.38 31.63 30.91 30.23 29.59 28.97 28.39 27.83 27.30 26.80 26.32 25.86 25.42 25.01
 194.00  35.63 34.36 33.48 32.67 31.90 31.16 30.47 29.80 29.17 28.57 28.00 27.46 26.94 26.45 25.98 25.54 25.11
 196.00  36.09 34.79 33.88 33.04 32.24 31.49 30.77 30.08 29.43 28.81 28.22 27.66 27.13 26.62 26.14 25.68 25.24
 198.00  36.53 35.18 34.26 33.39 32.57 31.79 31.05 30.35 29.68 29.04 28.43 27.86 27.31 26.79 26.29 25.82 25.37
 200.00  36.80 35.43 34.49 33.61 32.77 31.98 31.23 30.51 29.83 29.18 28.56 27.98 27.42 26.89 26.38 25.90 25.45
```

| | RADIUS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH | 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.16 | 20.15 | 20.13 | 20.12 | 20.11 | 20.10 | 20.09 | 20.08 | 20.07 | 20.06 | 20.05 | 20.04 | 20.03 | 20.03 | 20.02 | 20.01 | 20.00 |
| 182.50 | 21.49 | 21.37 | 21.26 | 21.14 | 21.04 | 20.94 | 20.84 | 20.74 | 20.65 | 20.57 | 20.48 | 20.40 | 20.32 | 20.25 | 20.17 | 20.10 | 20.03 |
| 186.00 | 23.08 | 22.83 | 22.59 | 22.36 | 22.14 | 21.93 | 21.72 | 21.53 | 21.34 | 21.16 | 20.99 | 20.82 | 20.66 | 20.51 | 20.36 | 20.21 | 20.07 |
| 188.00 | 23.86 | 23.54 | 23.24 | 22.95 | 22.68 | 22.41 | 22.16 | 21.92 | 21.68 | 21.46 | 21.24 | 21.03 | 20.83 | 20.63 | 20.45 | 20.26 | 20.09 |
| 189.50 | 24.23 | 23.89 | 23.56 | 23.24 | 22.94 | 22.65 | 22.37 | 22.10 | 21.84 | 21.60 | 21.36 | 21.13 | 20.91 | 20.70 | 20.49 | 20.29 | 20.09 |
| 190.50 | 24.42 | 24.06 | 23.71 | 23.38 | 23.06 | 22.76 | 22.47 | 22.19 | 21.92 | 21.67 | 21.42 | 21.18 | 20.95 | 20.73 | 20.51 | 20.30 | 20.10 |
| 191.50 | 24.53 | 24.16 | 23.81 | 23.47 | 23.14 | 22.83 | 22.53 | 22.25 | 21.97 | 21.71 | 21.45 | 21.21 | 20.97 | 20.74 | 20.52 | 20.31 | 20.10 |
| 192.50 | 24.61 | 24.23 | 23.87 | 23.53 | 23.20 | 22.88 | 22.58 | 22.29 | 22.01 | 21.74 | 21.48 | 21.23 | 20.99 | 20.76 | 20.53 | 20.31 | 20.10 |
| 194.00 | 24.71 | 24.32 | 23.95 | 23.60 | 23.26 | 22.94 | 22.63 | 22.33 | 22.05 | 21.77 | 21.51 | 21.25 | 21.01 | 20.77 | 20.54 | 20.32 | 20.11 |
| 196.00 | 24.82 | 24.43 | 24.05 | 23.68 | 23.34 | 23.01 | 22.69 | 22.38 | 22.09 | 21.81 | 21.54 | 21.28 | 21.03 | 20.79 | 20.55 | 20.33 | 20.11 |
| 198.00 | 24.94 | 24.53 | 24.14 | 23.77 | 23.41 | 23.07 | 22.75 | 22.44 | 22.14 | 21.85 | 21.58 | 21.31 | 21.05 | 20.81 | 20.57 | 20.33 | 20.11 |
| 200.00 | 25.01 | 24.60 | 24.20 | 23.82 | 23.46 | 23.12 | 22.79 | 22.47 | 22.17 | 21.88 | 21.60 | 21.33 | 21.07 | 20.82 | 20.57 | 20.34 | 20.11 |

TIME= 31536190.0 SEC. @@@ 0 DAYS 0.1 HOURS
ENERGY IN=...0.0000E+00 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

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NQ= 5 DT= 9521.74 ISTAB= 69 FLOW=0.233E-03 M/S

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TIME= 32402692.0 SEC. @@@ 10 DAYS 0.7 HOURS
ENERGY IN=...0.5027E+11 ENERGY OUT=...0.0000E+00
TEMP. IN=...100.0 TEMP. OUT=... 0.0

TIME= 33697652.0 SEC. @@@ 25 DAYS 0.5 HOURS
ENERGY IN=...0.1508E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=...100.0 TEMP. OUT=... 0.0

TIME= 34992372.0 SEC. @@@ 40 DAYS 0.1 HOURS
ENERGY IN=...0.2513E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=...100.0 TEMP. OUT=... 0.0

TIME= 36296612.0 SEC. @@@ 55 DAYS 2.4 HOURS
ENERGY IN=...0.3519E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=...100.0 TEMP. OUT=... 0.0

TIME= 37591332.0 SEC. @@@ 70 DAYS 2.0 HOURS
ENERGY IN=...0.4524E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=...100.0 TEMP. OUT=... 0.0

TIME= 38886052.0 SEC. @@@ 85 DAYS 1.7 HOURS
ENERGY IN=...0.5529E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=...100.0 TEMP. OUT=... 0.0

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NQ= 6 DT= 9567.96 ISTAB= 1 FLOW=0.000E+00 M/S

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TEMPERATURE @@@ TIME=... 39428740.0 SEC.

TEMP
=====

| DEPTH \ RADIUS | 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.02 | 20.02 | 20.02 | 20.02 | 20.02 | 20.02 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 |
| 175.00 | 20.77 | 20.71 | 20.67 | 20.63 | 20.60 | 20.56 | 20.53 | 20.50 | 20.47 | 20.44 | 20.41 | 20.39 | 20.36 | 20.34 | 20.31 | 20.29 | 20.27 |
| 182.50 | 25.32 | 24.85 | 24.53 | 24.25 | 23.99 | 23.74 | 23.51 | 23.30 | 23.09 | 22.90 | 22.72 | 22.54 | 22.38 | 22.22 | 22.06 | 21.92 | 21.78 |
| 186.00 | 32.74 | 31.08 | 30.04 | 29.15 | 28.36 | 27.67 | 27.05 | 26.50 | 26.00 | 25.55 | 25.13 | 24.75 | 24.40 | 24.07 | 23.77 | 23.49 | 23.22 |
| 188.00 | 43.56 | 40.08 | 37.88 | 35.99 | 34.33 | 32.88 | 31.60 | 30.48 | 29.48 | 28.60 | 27.82 | 27.13 | 26.50 | 25.94 | 25.43 | 24.97 | 24.55 |
| 189.50 | 61.12 | 55.35 | 51.51 | 48.12 | 45.10 | 42.40 | 39.98 | 37.83 | 35.92 | 34.23 | 32.74 | 31.42 | 30.25 | 29.22 | 28.30 | 27.49 | 26.76 |
| 190.50 | 76.38 | 69.20 | 64.20 | 59.72 | 55.65 | 51.93 | 48.54 | 45.47 | 42.71 | 40.24 | 38.03 | 36.07 | 34.34 | 32.81 | 31.45 | 30.26 | 29.20 |
| 191.50 | 99.76 | 89.96 | 82.64 | 77.08 | 71.93 | 67.08 | 62.52 | 58.26 | 54.32 | 50.70 | 47.41 | 44.43 | 41.77 | 39.38 | 37.27 | 35.39 | 33.72 |
| 192.50 | 99.99 | 96.39 | 90.80 | 85.77 | 80.69 | 75.64 | 70.70 | 65.93 | 61.41 | 57.18 | 53.28 | 49.71 | 46.48 | 43.58 | 40.98 | 38.67 | 36.62 |
| 194.00 | 100.00 | 99.33 | 96.81 | 93.38 | 89.17 | 84.46 | 79.48 | 74.42 | 69.43 | 64.64 | 60.12 | 55.93 | 52.08 | 48.58 | 45.44 | 42.62 | 40.12 |
| 196.00 | 100.00 | 99.80 | 98.56 | 96.24 | 92.89 | 88.75 | 84.09 | 79.14 | 74.11 | 69.15 | 64.38 | 59.89 | 55.72 | 51.90 | 48.43 | 45.31 | 42.51 |
| 198.00 | 100.00 | 99.87 | 98.93 | 96.96 | 93.95 | 90.09 | 85.62 | 80.78 | 75.79 | 70.82 | 66.01 | 61.44 | 57.17 | 53.24 | 49.66 | 46.43 | 43.53 |
| 200.00 | 100.00 | 99.88 | 99.00 | 97.12 | 94.21 | 90.44 | 86.04 | 81.25 | 76.29 | 71.33 | 66.51 | 61.92 | 57.64 | 53.68 | 50.07 | 46.81 | 43.87 |

| DEPTH \ RADIUS | 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.01 | 20.01 | 20.01 | 20.01 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.25 | 20.23 | 20.21 | 20.19 | 20.18 | 20.16 | 20.14 | 20.13 | 20.11 | 20.10 | 20.08 | 20.07 | 20.06 | 20.04 | 20.03 | 20.02 | 20.01 |
| 182.50 | 21.65 | 21.52 | 21.39 | 21.27 | 21.16 | 21.05 | 20.94 | 20.84 | 20.74 | 20.64 | 20.54 | 20.45 | 20.37 | 20.28 | 20.20 | 20.12 | 20.04 |
| 186.00 | 22.96 | 22.72 | 22.50 | 22.28 | 22.07 | 21.87 | 21.67 | 21.49 | 21.31 | 21.14 | 20.97 | 20.81 | 20.65 | 20.50 | 20.35 | 20.21 | 20.07 |
| 188.00 | 24.16 | 23.80 | 23.46 | 23.14 | 22.84 | 22.56 | 22.29 | 22.03 | 21.79 | 21.55 | 21.32 | 21.10 | 20.89 | 20.68 | 20.48 | 20.28 | 20.09 |
| 189.50 | 26.11 | 25.52 | 24.99 | 24.50 | 24.05 | 23.63 | 23.24 | 22.87 | 22.52 | 22.19 | 21.86 | 21.55 | 21.25 | 20.96 | 20.68 | 20.40 | 20.13 |
| 190.50 | 28.25 | 27.41 | 26.66 | 25.98 | 25.36 | 24.79 | 24.27 | 23.78 | 23.32 | 22.88 | 22.46 | 22.06 | 21.66 | 21.28 | 20.90 | 20.54 | 20.18 |
| 191.50 | 32.25 | 30.95 | 29.79 | 28.76 | 27.84 | 27.00 | 26.25 | 25.56 | 24.92 | 24.32 | 23.75 | 23.21 | 22.68 | 22.17 | 21.67 | 21.18 | 20.55 |
| 192.50 | 34.80 | 33.20 | 31.77 | 30.51 | 29.38 | 28.37 | 27.45 | 26.62 | 25.85 | 25.13 | 24.46 | 23.81 | 23.19 | 22.58 | 21.99 | 21.41 | 20.66 |
| 194.00 | 37.89 | 35.92 | 34.17 | 32.62 | 31.23 | 30.00 | 28.89 | 27.88 | 26.95 | 26.09 | 25.29 | 24.52 | 23.78 | 23.06 | 22.35 | 21.66 | 20.78 |
| 196.00 | 40.02 | 37.81 | 35.84 | 34.10 | 32.54 | 31.15 | 29.90 | 28.77 | 27.73 | 26.77 | 25.87 | 25.01 | 24.19 | 23.39 | 22.61 | 21.84 | 20.86 |
| 198.00 | 40.94 | 38.63 | 36.58 | 34.75 | 33.12 | 31.67 | 30.36 | 29.17 | 28.08 | 27.08 | 26.13 | 25.24 | 24.37 | 23.54 | 22.72 | 21.92 | 20.90 |
| 200.00 | 41.25 | 38.91 | 36.83 | 34.98 | 33.33 | 31.86 | 30.53 | 29.32 | 28.22 | 27.19 | 26.23 | 25.32 | 24.45 | 23.60 | 22.77 | 21.96 | 20.91 |

TIME= 39428740.0 SEC. @@@ 91 DAYS 8.4 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 40184612.0 SEC. @@@ 100 DAYS 2.4 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 41476292.0 SEC. @@@ 115 DAYS 1.2 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 42777540.0 SEC. @@@ 130 DAYS 2.6 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 44069220.0 SEC. @@@ 145 DAYS 1.4 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 45360900.0 SEC. @@@ 160 DAYS 0.3 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 46662148.0 SEC. @@@ 175 DAYS 1.7 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

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NQ= 7 DT= 9521.74 ISTAB= 69 FLOW=-.233E-03 M/S

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TEMPERATURE @@@ TIME=... 47312724.0 SEC.

TEMP
=====

| DEPTH | RADIUS 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 | 20.02 | 20.02 | 20.02 | 20.02 | 20.02 | 20.02 | 20.02 | 20.02 | 20.01 | 20.01 | 20.01 |
| 175.00 | 21.01 | 20.93 | 20.88 | 20.83 | 20.78 | 20.74 | 20.69 | 20.65 | 20.62 | 20.58 | 20.54 | 20.51 | 20.48 | 20.45 | 20.42 | 20.39 | 20.36 |
| 182.50 | 26.71 | 26.10 | 25.69 | 25.32 | 24.97 | 24.65 | 24.35 | 24.07 | 23.80 | 23.55 | 23.31 | 23.09 | 22.88 | 22.67 | 22.48 | 22.30 | 22.13 |
| 186.00 | 37.58 | 35.82 | 34.65 | 33.58 | 32.60 | 31.70 | 30.85 | 30.06 | 29.33 | 28.64 | 28.00 | 27.41 | 26.85 | 26.32 | 25.83 | 25.36 | 24.93 |
| 188.00 | 47.51 | 44.83 | 43.03 | 41.38 | 39.85 | 38.42 | 37.09 | 35.85 | 34.68 | 33.60 | 32.58 | 31.63 | 30.74 | 29.90 | 29.12 | 28.38 | 27.69 |
| 189.50 | 57.06 | 53.65 | 51.32 | 49.17 | 47.16 | 45.27 | 43.50 | 41.83 | 40.26 | 38.79 | 37.40 | 36.10 | 34.88 | 33.73 | 32.66 | 31.64 | 30.69 |
| 190.50 | 63.48 | 59.65 | 57.00 | 54.55 | 52.24 | 50.05 | 47.99 | 46.04 | 44.21 | 42.48 | 40.85 | 39.31 | 37.86 | 36.50 | 35.22 | 34.01 | 32.87 |
| 191.50 | 68.89 | 64.76 | 61.89 | 59.20 | 56.66 | 54.25 | 51.96 | 49.79 | 47.74 | 45.79 | 43.96 | 42.22 | 40.59 | 39.04 | 37.58 | 36.20 | 34.89 |
| 192.50 | 73.47 | 69.12 | 66.07 | 63.21 | 60.48 | 57.88 | 55.40 | 53.04 | 50.81 | 48.68 | 46.67 | 44.77 | 42.96 | 41.26 | 39.64 | 38.11 | 36.66 |
| 194.00 | 79.69 | 75.10 | 71.84 | 68.74 | 65.77 | 62.93 | 60.20 | 57.60 | 55.11 | 52.74 | 50.49 | 48.35 | 46.32 | 44.39 | 42.56 | 40.82 | 39.17 |
| 196.00 | 85.41 | 80.72 | 77.33 | 74.07 | 70.92 | 67.87 | 64.94 | 62.11 | 59.40 | 56.81 | 54.33 | 51.96 | 49.71 | 47.57 | 45.52 | 43.58 | 41.73 |
| 198.00 | 88.65 | 83.98 | 80.55 | 77.23 | 74.00 | 70.85 | 67.81 | 64.87 | 62.03 | 59.31 | 56.71 | 54.21 | 51.83 | 49.56 | 47.39 | 45.32 | 43.35 |
| 200.00 | 90.03 | 85.38 | 81.96 | 78.63 | 75.37 | 72.19 | 69.10 | 66.11 | 63.23 | 60.46 | 57.80 | 55.25 | 52.81 | 50.48 | 48.25 | 46.13 | 44.11 |

| DEPTH | RADIUS 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.33 | 20.31 | 20.28 | 20.26 | 20.24 | 20.21 | 20.19 | 20.17 | 20.15 | 20.13 | 20.11 | 20.09 | 20.07 | 20.06 | 20.04 | 20.02 | 20.01 |
| 182.50 | 21.96 | 21.80 | 21.65 | 21.51 | 21.37 | 21.23 | 21.11 | 20.98 | 20.86 | 20.75 | 20.64 | 20.53 | 20.43 | 20.33 | 20.23 | 20.14 | 20.04 |
| 186.00 | 24.52 | 24.13 | 23.76 | 23.42 | 23.09 | 22.77 | 22.48 | 22.19 | 21.92 | 21.66 | 21.41 | 21.17 | 20.94 | 20.72 | 20.51 | 20.30 | 20.10 |
| 188.00 | 27.04 | 26.43 | 25.85 | 25.31 | 24.79 | 24.30 | 23.83 | 23.39 | 22.97 | 22.57 | 22.18 | 21.81 | 21.45 | 21.11 | 20.78 | 20.46 | 20.15 |
| 189.50 | 29.79 | 28.94 | 28.14 | 27.38 | 26.66 | 25.98 | 25.33 | 24.72 | 24.13 | 23.57 | 23.03 | 22.52 | 22.02 | 21.54 | 21.08 | 20.64 | 20.21 |
| 190.50 | 31.79 | 30.77 | 29.81 | 28.90 | 28.04 | 27.22 | 26.44 | 25.70 | 24.99 | 24.31 | 23.66 | 23.04 | 22.44 | 21.87 | 21.31 | 20.77 | 20.25 |
| 191.50 | 33.66 | 32.49 | 31.38 | 30.33 | 29.34 | 28.39 | 27.49 | 26.63 | 25.80 | 25.02 | 24.26 | 23.54 | 22.85 | 22.17 | 21.53 | 20.90 | 20.30 |
| 192.50 | 35.29 | 33.99 | 32.76 | 31.59 | 30.47 | 29.41 | 28.40 | 27.44 | 26.52 | 25.64 | 24.79 | 23.98 | 23.20 | 22.45 | 21.72 | 21.01 | 20.33 |
| 194.00 | 37.61 | 36.12 | 34.71 | 33.37 | 32.09 | 30.87 | 29.71 | 28.60 | 27.54 | 26.52 | 25.54 | 24.60 | 23.70 | 22.83 | 21.99 | 21.17 | 20.39 |
| 196.00 | 39.98 | 38.31 | 36.71 | 35.20 | 33.75 | 32.37 | 31.05 | 29.79 | 28.59 | 27.43 | 26.32 | 25.25 | 24.22 | 23.23 | 22.27 | 21.34 | 20.44 |
| 198.00 | 41.48 | 39.69 | 37.99 | 36.36 | 34.81 | 33.33 | 31.91 | 30.56 | 29.26 | 28.01 | 26.81 | 25.66 | 24.55 | 23.48 | 22.45 | 21.44 | 20.47 |
| 200.00 | 42.18 | 40.34 | 38.58 | 36.91 | 35.31 | 33.78 | 32.32 | 30.92 | 29.57 | 28.29 | 27.05 | 25.86 | 24.71 | 23.60 | 22.53 | 21.49 | 20.49 |

TIME= 47312724.0 SEC. @@@ 182 DAYS 14.4 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...0.0000E+00
TEMP. IN=... 0.0 TEMP. OUT=... 0.0

TIME= 47960084.0 SEC. @@@ 190 DAYS 2.2 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.3873E+11
TEMP. IN=... 0.0 TEMP. OUT=... 81.6

TIME= 49254804.0 SEC. @@@ 205 DAYS 1.9 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.7403E+11
TEMP. IN=... 0.0 TEMP. OUT=... 76.2

TIME= 50549524.0 SEC. @@@ 220 DAYS 1.5 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.1366E+12
TEMP. IN=... 0.0 TEMP. OUT=... 67.8

TIME= 51844244.0 SEC. @@@ 235 DAYS 1.2 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.1900E+12
TEMP. IN=... 0.0 TEMP. OUT=... 60.8

TIME= 53138964.0 SEC. @@@ 250 DAYS 0.8 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.2356E+12
TEMP. IN=... 0.0 TEMP. OUT=... 54.8

TIME= 54433684.0 SEC. @@@ 265 DAYS 0.5 HOURS
ENERGY IN=...0.6032E+12 ENERGY OUT=...-.2743E+12
TEMP. IN=... 0.0 TEMP. OUT=... 49.6

---

NQ= 8 DT= 9567.96 ISTAB= 1 FLOW=0.000E+00 M/S

---

TEMPERATURE @@@ TIME=... 55195332.0 SEC.

TEMP
=====

| DEPTH \ RADIUS | 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.05 | 20.05 | 20.04 | 20.04 | 20.04 | 20.04 | 20.04 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 | 20.02 | 20.02 | 20.02 | 20.02 |
| 175.00 | 21.29 | 21.19 | 21.13 | 21.07 | 21.01 | 20.95 | 20.90 | 20.85 | 20.80 | 20.75 | 20.71 | 20.66 | 20.62 | 20.58 | 20.54 | 20.51 | 20.47 |
| 182.50 | 27.97 | 27.32 | 26.88 | 26.48 | 26.09 | 25.73 | 25.39 | 25.06 | 24.75 | 24.45 | 24.17 | 23.90 | 23.64 | 23.39 | 23.16 | 22.93 | 22.72 |
| 186.00 | 37.12 | 35.72 | 34.76 | 33.87 | 33.03 | 32.24 | 31.49 | 30.77 | 30.09 | 29.45 | 28.83 | 28.24 | 27.69 | 27.15 | 26.64 | 26.16 | 25.69 |
| 188.00 | 42.44 | 40.64 | 39.39 | 38.23 | 37.13 | 36.08 | 35.08 | 34.14 | 33.23 | 32.38 | 31.56 | 30.78 | 30.04 | 29.33 | 28.65 | 28.01 | 27.39 |
| 189.50 | 44.58 | 42.69 | 41.34 | 40.05 | 38.83 | 37.66 | 36.55 | 35.49 | 34.48 | 33.51 | 32.59 | 31.72 | 30.89 | 30.09 | 29.34 | 28.62 | 27.93 |
| 190.50 | 44.71 | 42.90 | 41.53 | 40.22 | 38.97 | 37.77 | 36.63 | 35.54 | 34.50 | 33.50 | 32.56 | 31.66 | 30.80 | 29.99 | 29.21 | 28.48 | 27.78 |
| 191.50 | 42.18 | 40.85 | 39.56 | 38.32 | 37.14 | 36.00 | 34.92 | 33.89 | 32.91 | 31.97 | 31.08 | 30.23 | 29.43 | 28.67 | 27.94 | 27.26 | 26.61 |
| 192.50 | 41.82 | 40.51 | 39.22 | 37.98 | 36.79 | 35.65 | 34.57 | 33.53 | 32.55 | 31.61 | 30.72 | 29.88 | 29.07 | 28.31 | 27.59 | 26.92 | 26.27 |
| 194.00 | 42.04 | 40.69 | 39.37 | 38.09 | 36.87 | 35.70 | 34.58 | 33.52 | 32.51 | 31.55 | 30.63 | 29.77 | 28.95 | 28.17 | 27.44 | 26.75 | 26.10 |
| 196.00 | 43.33 | 41.89 | 40.49 | 39.13 | 37.82 | 36.57 | 35.38 | 34.24 | 33.16 | 32.14 | 31.17 | 30.24 | 29.37 | 28.55 | 27.77 | 27.04 | 26.36 |
| 198.00 | 44.60 | 43.09 | 41.60 | 40.17 | 38.79 | 37.47 | 36.21 | 35.01 | 33.87 | 32.78 | 31.76 | 30.78 | 29.86 | 28.99 | 28.17 | 27.40 | 26.68 |
| 200.00 | 45.33 | 43.78 | 42.25 | 40.77 | 39.35 | 37.99 | 36.69 | 35.46 | 34.28 | 33.17 | 32.11 | 31.10 | 30.15 | 29.26 | 28.42 | 27.62 | 26.88 |

| DEPTH \ RADIUS | 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.02 | 20.02 | 20.02 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.44 | 20.40 | 20.37 | 20.34 | 20.31 | 20.28 | 20.25 | 20.22 | 20.20 | 20.17 | 20.15 | 20.12 | 20.10 | 20.07 | 20.05 | 20.03 | 20.01 |
| 182.50 | 22.51 | 22.31 | 22.12 | 21.94 | 21.76 | 21.59 | 21.42 | 21.27 | 21.11 | 20.97 | 20.82 | 20.69 | 20.55 | 20.42 | 20.30 | 20.18 | 20.06 |
| 186.00 | 25.25 | 24.83 | 24.42 | 24.03 | 23.66 | 23.30 | 22.95 | 22.62 | 22.30 | 21.99 | 21.70 | 21.41 | 21.14 | 20.87 | 20.61 | 20.36 | 20.12 |
| 188.00 | 26.81 | 26.25 | 25.71 | 25.20 | 24.71 | 24.24 | 23.79 | 23.36 | 22.95 | 22.55 | 22.17 | 21.80 | 21.45 | 21.11 | 20.78 | 20.46 | 20.15 |
| 189.50 | 27.28 | 26.66 | 26.07 | 25.51 | 24.97 | 24.46 | 23.97 | 23.51 | 23.07 | 22.65 | 22.24 | 21.86 | 21.49 | 21.14 | 20.80 | 20.47 | 20.15 |
| 190.50 | 27.11 | 26.48 | 25.88 | 25.32 | 24.78 | 24.27 | 23.78 | 23.33 | 22.89 | 22.48 | 22.10 | 21.73 | 21.38 | 21.05 | 20.73 | 20.43 | 20.14 |
| 191.50 | 25.99 | 25.41 | 24.86 | 24.35 | 23.86 | 23.40 | 22.97 | 22.57 | 22.19 | 21.83 | 21.50 | 21.19 | 20.90 | 20.63 | 20.37 | 20.15 | 20.05 |
| 192.50 | 25.67 | 25.10 | 24.56 | 24.06 | 23.59 | 23.14 | 22.73 | 22.35 | 21.99 | 21.66 | 21.35 | 21.07 | 20.81 | 20.56 | 20.33 | 20.13 | 20.04 |
| 194.00 | 25.49 | 24.92 | 24.39 | 23.89 | 23.42 | 22.99 | 22.58 | 22.21 | 21.87 | 21.55 | 21.26 | 20.99 | 20.75 | 20.52 | 20.30 | 20.12 | 20.04 |
| 196.00 | 25.71 | 25.11 | 24.55 | 24.02 | 23.53 | 23.08 | 22.66 | 22.27 | 21.92 | 21.59 | 21.29 | 21.02 | 20.76 | 20.53 | 20.31 | 20.12 | 20.04 |
| 198.00 | 26.00 | 25.37 | 24.77 | 24.22 | 23.71 | 23.23 | 22.79 | 22.38 | 22.01 | 21.67 | 21.35 | 21.06 | 20.80 | 20.55 | 20.32 | 20.13 | 20.04 |
| 200.00 | 26.18 | 25.52 | 24.91 | 24.34 | 23.82 | 23.32 | 22.87 | 22.45 | 22.07 | 21.72 | 21.39 | 21.09 | 20.82 | 20.57 | 20.33 | 20.13 | 20.05 |

```
TIME=   55195332.0 SEC. @@@  273 DAYS 20.0 HOURS
ENERGY IN=...0.6032E+12     ENERGY OUT=...-.3073E+12
TEMP. IN=...  0.0           TEMP. OUT=...  0.0

TIME=   55731140.0 SEC. @@@  280 DAYS  0.9 HOURS
ENERGY IN=...0.6032E+12     ENERGY OUT=...-.3073E+12
TEMP. IN=...  0.0           TEMP. OUT=...  0.0

TIME=   57032388.0 SEC. @@@  295 DAYS  2.3 HOURS
ENERGY IN=...0.6032E+12     ENERGY OUT=...-.3073E+12
TEMP. IN=...  0.0           TEMP. OUT=...  0.0

TIME=   58324068.0 SEC. @@@  310 DAYS  1.1 HOURS
ENERGY IN=...0.6032E+12     ENERGY OUT=...-.3073E+12
TEMP. IN=...  0.0           TEMP. OUT=...  0.0

TIME=   59625316.0 SEC. @@@  325 DAYS  2.6 HOURS
ENERGY IN=...0.6032E+12     ENERGY OUT=...-.3073E+12
TEMP. IN=...  0.0           TEMP. OUT=...  0.0

TIME=   60916996.0 SEC. @@@  340 DAYS  1.4 HOURS
ENERGY IN=...0.6032E+12     ENERGY OUT=...-.3073E+12
TEMP. IN=...  0.0           TEMP. OUT=...  0.0

TIME=   62208676.0 SEC. @@@  355 DAYS  0.2 HOURS
ENERGY IN=...0.6032E+12     ENERGY OUT=...-.3073E+12
TEMP. IN=...  0.0           TEMP. OUT=...  0.0

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 ENERGY BALANCE     CYCLE=...  2
 ENERGY(IN)=... 0.603E+12      ENERGY(OUT)=...-0.307E+12
 ENERGY STORED=... 0.296E+12    RECOVERY RATIO=...0.510
 REFERENCE TEMPERATURE.=...  20.0
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

------------------------------------------------------------
 NQ=   9   DT=   9521.74   ISTAB=  69   FLOW=0.233E-03 M/S
------------------------------------------------------------
```

TEMPERATURE @@@ TIME=... 63079316.0 SEC.

TEMP
=====

| DEPTH | RADIUS 1.4 | 3.5 | 4.5 | 5.4 | 6.1 | 6.8 | 7.4 | 7.9 | 8.4 | 8.9 | 9.4 | 9.8 | 10.2 | 10.6 | 11.0 | 11.4 | 11.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.07 | 20.06 | 20.06 | 20.06 | 20.06 | 20.05 | 20.05 | 20.05 | 20.04 | 20.04 | 20.04 | 20.04 | 20.04 | 20.03 | 20.03 | 20.03 | 20.03 |
| 175.00 | 21.56 | 21.45 | 21.38 | 21.31 | 21.24 | 21.17 | 21.11 | 21.05 | 20.99 | 20.93 | 20.88 | 20.83 | 20.78 | 20.73 | 20.68 | 20.63 | 20.59 |
| 182.50 | 28.14 | 27.54 | 27.12 | 26.74 | 26.37 | 26.02 | 25.68 | 25.36 | 25.05 | 24.75 | 24.47 | 24.19 | 23.93 | 23.67 | 23.43 | 23.19 | 22.96 |
| 186.00 | 33.86 | 32.83 | 32.11 | 31.44 | 30.80 | 30.20 | 29.61 | 29.06 | 28.52 | 28.01 | 27.52 | 27.05 | 26.59 | 26.16 | 25.74 | 25.34 | 24.95 |
| 188.00 | 36.55 | 35.30 | 34.44 | 33.63 | 32.87 | 32.13 | 31.43 | 30.76 | 30.12 | 29.50 | 28.91 | 28.34 | 27.80 | 27.28 | 26.78 | 26.30 | 25.84 |
| 189.50 | 37.72 | 36.38 | 35.45 | 34.57 | 33.75 | 32.95 | 32.20 | 31.47 | 30.78 | 30.11 | 29.48 | 28.87 | 28.28 | 27.72 | 27.19 | 26.67 | 26.18 |
| 190.50 | 38.22 | 36.83 | 35.87 | 34.97 | 34.11 | 33.29 | 32.51 | 31.76 | 31.04 | 30.36 | 29.70 | 29.07 | 28.47 | 27.90 | 27.34 | 26.82 | 26.31 |
| 191.50 | 38.43 | 37.02 | 36.04 | 35.13 | 34.26 | 33.43 | 32.63 | 31.87 | 31.15 | 30.45 | 29.79 | 29.15 | 28.54 | 27.96 | 27.40 | 26.86 | 26.35 |
| 192.50 | 38.57 | 37.15 | 36.16 | 35.23 | 34.35 | 33.51 | 32.71 | 31.94 | 31.20 | 30.50 | 29.83 | 29.19 | 28.57 | 27.98 | 27.42 | 26.88 | 26.37 |
| 194.00 | 38.76 | 37.31 | 36.30 | 35.36 | 34.46 | 33.61 | 32.79 | 32.01 | 31.26 | 30.55 | 29.87 | 29.22 | 28.60 | 28.00 | 27.43 | 26.89 | 26.37 |
| 196.00 | 39.06 | 37.58 | 36.54 | 35.57 | 34.66 | 33.78 | 32.94 | 32.14 | 31.38 | 30.65 | 29.96 | 29.29 | 28.66 | 28.05 | 27.48 | 26.93 | 26.40 |
| 198.00 | 39.39 | 37.87 | 36.81 | 35.82 | 34.88 | 33.99 | 33.13 | 32.31 | 31.53 | 30.79 | 30.08 | 29.40 | 28.76 | 28.14 | 27.56 | 27.00 | 26.46 |
| 200.00 | 39.62 | 38.07 | 37.00 | 35.99 | 35.04 | 34.13 | 33.26 | 32.43 | 31.64 | 30.89 | 30.17 | 29.49 | 28.84 | 28.21 | 27.62 | 27.05 | 26.51 |

| DEPTH | RADIUS 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 125.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| 160.00 | 20.03 | 20.02 | 20.02 | 20.02 | 20.02 | 20.02 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.01 | 20.00 | 20.00 | 20.00 | 20.00 |
| 175.00 | 20.55 | 20.50 | 20.46 | 20.43 | 20.39 | 20.35 | 20.32 | 20.28 | 20.25 | 20.21 | 20.18 | 20.15 | 20.12 | 20.09 | 20.07 | 20.04 | 20.01 |
| 182.50 | 22.74 | 22.53 | 22.33 | 22.13 | 21.94 | 21.75 | 21.57 | 21.40 | 21.23 | 21.07 | 20.91 | 20.76 | 20.61 | 20.47 | 20.33 | 20.20 | 20.06 |
| 186.00 | 24.58 | 24.22 | 23.87 | 23.54 | 23.22 | 22.91 | 22.61 | 22.32 | 22.04 | 21.77 | 21.51 | 21.26 | 21.01 | 20.78 | 20.55 | 20.32 | 20.11 |
| 188.00 | 25.39 | 24.97 | 24.56 | 24.16 | 23.78 | 23.42 | 23.06 | 22.72 | 22.40 | 22.08 | 21.77 | 21.47 | 21.19 | 20.91 | 20.64 | 20.38 | 20.12 |
| 189.50 | 25.71 | 25.25 | 24.81 | 24.40 | 23.99 | 23.60 | 23.23 | 22.87 | 22.52 | 22.19 | 21.86 | 21.55 | 21.25 | 20.96 | 20.67 | 20.40 | 20.13 |
| 190.50 | 25.82 | 25.36 | 24.91 | 24.48 | 24.07 | 23.67 | 23.29 | 22.92 | 22.57 | 22.23 | 21.90 | 21.58 | 21.27 | 20.97 | 20.68 | 20.40 | 20.13 |
| 191.50 | 25.86 | 25.39 | 24.94 | 24.51 | 24.09 | 23.69 | 23.31 | 22.94 | 22.58 | 22.24 | 21.91 | 21.59 | 21.28 | 20.98 | 20.69 | 20.41 | 20.13 |
| 192.50 | 25.87 | 25.40 | 24.95 | 24.51 | 24.10 | 23.69 | 23.31 | 22.94 | 22.58 | 22.24 | 21.91 | 21.59 | 21.28 | 20.98 | 20.69 | 20.41 | 20.13 |
| 194.00 | 25.87 | 25.40 | 24.94 | 24.51 | 24.09 | 23.69 | 23.30 | 22.93 | 22.57 | 22.23 | 21.90 | 21.58 | 21.27 | 20.97 | 20.68 | 20.40 | 20.13 |
| 196.00 | 25.90 | 25.42 | 24.96 | 24.52 | 24.10 | 23.69 | 23.30 | 22.93 | 22.57 | 22.23 | 21.90 | 21.58 | 21.27 | 20.97 | 20.68 | 20.40 | 20.13 |
| 198.00 | 25.95 | 25.46 | 25.00 | 24.55 | 24.13 | 23.72 | 23.33 | 22.95 | 22.59 | 22.24 | 21.91 | 21.59 | 21.28 | 20.98 | 20.69 | 20.41 | 20.13 |
| 200.00 | 26.00 | 25.51 | 25.04 | 24.59 | 24.16 | 23.75 | 23.35 | 22.97 | 22.61 | 22.26 | 21.92 | 21.60 | 21.29 | 20.98 | 20.69 | 20.41 | 20.13 |

TIME= 63079316.0 SEC. @@@ 0 DAYS 2.0 HOURS
ENERGY IN=...0.0000E+00 ENERGY OUT=...0.0000E+00
TEMP. IN=...100.0 TEMP. OUT=... 0.0

```
0001          PROGRAM CARQ !(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
0002          INCLUDE 'STEADY1.INC/LIST'
0003     1    COMMON /CMN1/ T(100,25),RLAM(100,25),C(100,25),
0004     1   1              FR(100,25),FZ(100,25),GFR(100,25),
0005     1   2              GFZ(100,25),R(100),Z(100),A(100),CIN(100,25)
0006     1    COMMON /CMN2/ RM(100),ZM(100)
0007     1    COMMON /CMN51/ M,N,M1,N1
0008     1    COMMON /CMN4/ TNEW(100,25)
0009     1    COMMON /CMN5/ TIMEQ(100),Q(100),TIN(100)
0010          DIMENSION VT(65),TBZ(25)
0011          PI=3.1415926535
0012
0013     C*'*'*'*'*  INPUT *'*'*'*'*
0014          READ(5,*)NRUN,NUT,NPR
0015          NRUNC=0
0016      2000 CONTINUE
0017          NRUNC=NRUNC+1
0018          READ(5,*)M,N
0019          M1=M+1
0020          N1=N+1
0021          READ(5,*)NN11,NN2
0022          READ(5,*)RLIM,MRLIM
0023          CALL INDIR(Z,L)
0024          IF(L.NE.M1) STOP 1
0025          CALL INDATA(M,N,T)
0026          CALL INDATA(M,N,RLAM)
0027          CALL INDATA(M,N,C)
0028          READ(5,*)ILIN
0029          IF(ILIN.EQ.1)READ(5,*)TSURF,TDEPTH,DEPTH
0030          READ(5,*)C0,RAACAW,TBOUND,TREF
0031          READ(5,*)T1,T2,TIME1,TAU
0032          READ(5,*)NQM,IPER
0033          READ(5,*)PERIOD
0034          READ(5,*) (VT(I),I=1,IPER)
0035          READ(5,*) (TIN(I),I=1,IPER)
0036          READ(5,*)TA,TB,TIMEM
0037          READ(5,*)TIME
0038
0039     C*'*'*'*'* PREPARATION OF INPUT *'*'*'*'*
0040          WRITE(6,2001)
0041     2001 FORMAT(1H1,20(1H=),/,'   STEADY FLOW MODEL',/,1X,20(1H=))
0042          MM1=M-1
0043          FRLIM=FLOAT(MRLIM)
0044          R1=RLIM/SQRT(FRLIM)
0045          R(1)=0.
0046          DO 10 I=2,M1
0047          FI=FLOAT(I-1)
0048          R(I)=SQRT(FI)*R1
0049       10 CONTINUE
0050      2002 FORMAT(2X,'NCHECK=',I3)
0051          NTA=0
0052          NTB=0
0053          TIMEQ(1)=PERIOD
0054          DO 30 I=2,NQM
0055          TIMEQ(I)=TIMEQ(I-1)+PERIOD
0056       30 CONTINUE
0057          NCHECK=1
```

```
0058          WRITE(6,2002)NCHECK
0059          HEIGHT=Z(N1)-Z(NN11)
0060          DO 40 I=1,NQM
0061          IP=MOD((I-1),IPER)+1
0062          Q(I)=VT(IP)*PI*RLIM*RLIM*HEIGHT*CO/(PERIOD*RAACAW)
0063          TIN(I)=TIN(IP)
0064       40 CONTINUE
0065          NCHECK=2
0066          WRITE(6,2002)NCHECK
0067          TIMEM=TIMEM+TIME
0068          ITIM1=0
0069          ENEXIN=0.
0070          ENEXUT=0.
0071          IF(TAU.EQ.0.)TAU=31536000.
0072
0073    C*'*'*'*'* CALCULATION OF TEMP.COORDINATES *'*'*'*'*
0074          DO 80 I=1,M
0075          RM(I)=(R(I)+R(I+1))/2.
0076       80 CONTINUE
0077          DO 90 I=1,N
0078          ZM(I)=(Z(I)+Z(I+1))/2.
0079       90 CONTINUE
0080          NCHECK=3
0081          WRITE(6,2002)NCHECK
0082
0083    C*'*'*'*'* START-TEMP LINEAR WITH DEPTH *'*'*'*'*
0084          DO 105 J=1,N
0085    105   TBZ(J)=TBOUND
0086          IF(ILIN.EQ.0) GO TO 120
0087          DO 110 J=1,N
0088          TPOINT=TSURF+(TDEPTH-TSURF)*ZM(J)/DEPTH
0089          DO 100 I=1,M
0090          T(I,J)=TPOINT
0091      100 CONTINUE
0092          TBZ(J)=TPOINT
0093      110 CONTINUE
0094      120 CONTINUE
0095
0096    C*'*'*'*'*PRINT OF INPUT *'*'*'*'*
0097          WRITE(6,125)
0098    125   FORMAT(///,1X,20(1H-),/,'   INPUT PARAMETERS',/,1X,20(1H-))
0099          WRITE(6,130)M,N
0100      130 FORMAT(/,4X,'MESH DEFINITION',/,4X,'M=...',I3,'    N=...',I3)
0101          WRITE(6,140)NN11,NN2
0102      140 FORMAT(4X,'NN11=...',I3,'   NN2=...',I3)
0103          WRITE(6,141)RLIM,MRLIM,HEIGHT
0104    141   FORMAT(4X,'RLIM=',F6.1,'  MRLIM=',I3,'  AQUIFER THICKNESS=',F6.1)
0105          WRITE(6,150)ILIN
0106      150 FORMAT(//,2X,'ILIN=...',I2)
0107          IF(ILIN.EQ.1)WRITE(6,160)TSURF,TDEPTH,DEPTH
0108      160 FORMAT(2X,'LINEAR STARTING TEMPERATURES',/,
0109         *2X,'TSURFACE=',F6.1,'  TDEPTH=',F6.1,'  DEPTH=',E9.3)
0110          WRITE(6,170)CO,RAACAW,TBOUND,TREF
0111      170 FORMAT(
0112         *2X,'HEAT CAPACITY OF AQUIFER=',E9.3/,
0113         *2X,'HEAT CAPACITY OF WATER=',E9.3/,
0114         *2X,'TEMPERATURE AT BOUNDARY=.',F8.3/,
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0115        *2X,'ENERGY BALANCE WITH T-REF=',F6.1)
0116         WRITE(6,190) T1,T2,TIME1,TAU
0117       190 FORMAT(2X,'ATMOSPHERE TEMPERATURE FUNCTION',/,
0118          *4X,'AVERAGE=',F6.1,'   AMPLITUDE=',F6.1,
0119          */,4X,'PHASE-TIME=',F12.1,' SEC.    PERIOD=',F12.1,' SEC.')
0120         WRITE(6,210) NQM,IPER
0121       210 FORMAT(2X,'NUMBER OF PERIODS=',I3,
0122          *'   PERIODS PER CYCLE=',I3)
0123         WRITE(6,220) PERIOD
0124       220 FORMAT(2X,'TIME FOR ONE PERIOD',F10.1,' SEC.')
0125         WRITE(6,230) (I,I=1,IPER)
0126       230 FORMAT(2X,/,2X,'PERIOD  ',12I10)
0127         WRITE(6,250) (TIN(I),I=1,IPER)
0128       250 FORMAT(2X,'TEMP.   ',12F10.1)
0129         WRITE(6,255) (Q(I),I=1,IPER)
0130       255 FORMAT(2X,'FLOW    ',12(1X,E9.3))
0131         WRITE(6,260) TA,TB,TIME,TIMEM
0132       260 FORMAT(2X,/,2X,'PRINTOUT INTERVALS  TA=',F12.1,'  TB=',F12.1,/,
0133          *'  START TIME=',F12.1,2X,'END TIME=..',F14.1)
0134         IF(NUT.EQ.0) GO TO 145
0135         WRITE(6,142)
0136       142   FORMAT(//,1X,44(1H-),/,'  INITIAL CONDITIONS AND MATERIAL PROPERTI
0137          XES',/,1X,44(1H-))
0138         CALL UTDATA(0,1,M,N,T,NPR)
0139         CALL UTDATA(0,2,M,N,RLAM,NPR)
0140         CALL UTDATA(1,3,M,N,C,NPR)
0141       145 CONTINUE
0142         WRITE(6,265)
0143       265   FORMAT(1H1,18(1H-),/,'       OUTPUT',/,1X,18(1H-))
0144
0145       C*'*'*'*'*CALCULATION OF GF *'*'*'*'*
0146       C*'*'*'*'* HEATCONDUCTANCES *'*'*'*'*
0147         DO 270 I=1,M
0148         GFZ(I,1)=2./((Z(2)-Z(1))/RLAM(I,1))
0149         GFZ(I,N1)=2./((Z(N1)-Z(N))/RLAM(I,N))
0150       270 CONTINUE
0151         DO 290 J=2,N
0152         DO 280 I=1,M
0153         GFZ(I,J)=2./((Z(J)-Z(J-1))/RLAM(I,J-1)+(Z(J+1)-Z(J))/RLAM(I,J))
0154       280 CONTINUE
0155       290 CONTINUE
0156         DO 300 J=1,N
0157         GFR(1,J)=2./((R(2)-R(1))/RLAM(1,J))
0158         GFR(M1,J)=2./((R(M1)-R(M))/RLAM(M,J))
0159       300 CONTINUE
0160         DO 320 I=2,M
0161         DO 310 J=1,N
0162         GFR(I,J)=2./((R(I)-R(I-1))/RLAM(I-1,J)+(R(I+1)-R(I))/RLAM(I,J))
0163       310 CONTINUE
0164       320 CONTINUE
0165
0166       C*'*'*'*'* GF=HEATCONDUCTANCE*AREA *'*'*'*'*
0167         DO 340 J=1,N1
0168         DO 330 I=1,M
0169         GFZ(I,J)=GFZ(I,J)*PI*(R(I+1)*R(I+1)-R(I)*R(I))
0170       330 CONTINUE
0171       340 CONTINUE
```

```
0172          DO 360 I=1,M1
0173          DO 350 J=1,N
0174          GFR(I,J)=GFR(I,J)*2.*PI*R(I)*(Z(J+1)-Z(J))
0175        350 CONTINUE
0176        360 CONTINUE
0177
0178      C*'*'*'*'*CALCULATION OF CIN *'*'*'*'*
0179          DO 380 I=1,M
0180          DO 370 J=1,N
0181          CIN(I,J)=1./(C(I,J)*PI*(R(I+1)**2-R(I)**2)*(Z(J+1)-
0182         *Z(J)))
0183        370 CONTINUE
0184        380 CONTINUE
0185
0186      C*'*'*'*'* WEIGHTS FOR CALCULATION OF TEMP.OUT *'*'*'*'*
0187          DO 390 J=NN11,NN2
0188          A(J)=(Z(J+1)-Z(J))/HEIGHT
0189        390 CONTINUE
0190
0191      C*'*'*'*'* TIMESTEP *'*'*'*'*
0192          CALL DTIME(M,N,DTSTAB)
0193          ISTACO=0
0194          NQ=0
0195          IYC=0
0196          IT=0
0197          ITMAX=0
0198
0199      C*'*'*'*'* START OF MAIN LOOP *'*'*'*'*
0200           OPEN (UNIT=1,NAME='STEADY.BIN',TYPE='NEW',
0201         1       FORM='UNFORMATTED',ACCESS='SEQUENTIAL')
0202          WRITE(1)M,N,(RM(I),I=1,M),(ZM(I),I=1,N)
0203          WRITE(6,405)
0204      405 FORMAT(//,1X,13(1H-),/,1X,'  MAIN LOOP',/,1X,13(1H-))
0205       1000 CONTINUE
0206          IF(IT.LT.ITMAX) GO TO 420
0207          IT=0
0208          IYC=IYC+1
0209          NQ=NQ+1
0210
0211      C*'*'*'*'* CHECK OF WATERFLOW *'*'*'*'*
0212          AQP=ABS(Q(NQ))
0213
0214      C*'*'*'*'* CALCULATION OF TIMESTEP *'*'*'*'*
0215          IF(AQP.GE.(1.E-10))GO TO 410
0216          ITMAX=IFIX(PERIOD/DTSTAB)+1
0217          DT=PERIOD/ITMAX
0218          ISTAB=1
0219          GO TO 419
0220        410 CONTINUE
0221          ISTAB=IFIX(PERIOD/(MRLIM*DTSTAB))+1
0222          DT=PERIOD/(MRLIM*ISTAB)
0223          ITMAX=MRLIM*ISTAB
0224      419 WRITE(6,415)NQ,DT,ISTAB,Q(NQ)
0225        415 FORMAT(/,1X,62(1H-),/,2X,'NQ=',I4,'   DT=',F10.2,'   ISTAB=',I4,
0226           X  '   FLOW=',E9.3,' M/S',/,1X,62(1H-),/)
0227        420 CONTINUE
0228          ISTACO=ISTACO+1
```

```
0229          IT=IT+1
0230
0231      C*'*'*'*'* AIR TEMP. *'*'*'*'*
0232          TZ=T1+T2*SIN(2.*PI*(TIME-TIME1)/TAU)
0233
0234      C*'*'*'*'* CALCULATION OF HEATFLOWS *'*'*'*'*
0235          DO 430 I=1,M
0236          FZ(I,1)=GFZ(I,1)*(TZ-T(I,1))
0237          FZ(I,N1)=0.
0238          IF(N.NE.NN2)FZ(I,N1)=GFZ(I,N1)*(T(I,N)-TBOUND)
0239        430 CONTINUE
0240          DO 450 I=1,M
0241          DO 440 J=2,N
0242          FZ(I,J)=GFZ(I,J)*(T(I,J-1)-T(I,J))
0243        440 CONTINUE
0244        450 CONTINUE
0245          DO 460 J=1,N
0246          FR(1,J)=0.
0247          FR(M1,J)=GFR(M1,J)*(T(M,J)-TBZ(J))
0248        460 CONTINUE
0249          DO 480 J=1,N
0250          DO 470 I=2,M
0251          FR(I,J)=GFR(I,J)*(T(I-1,J)-T(I,J))
0252        470 CONTINUE
0253        480 CONTINUE
0254
0255      C*'*'*'*'* CALCULATION OF NEW TEMPERATURES *'*'*'*'*
0256          DO 500 I=1,M
0257          DO 490 J=1,N
0258          T(I,J)=T(I,J)+CIN(I,J)*(FZ(I,J)-FZ(I,J+1)+FR(I,J)
0259         *-FR(I+1,J))*DT
0260        490 CONTINUE
0261        500 CONTINUE
0262
0263      C*'*'*'*'* CONVECTIVE TRANSPORT *'*'*'*'*
0264      C*'*'*'*'* CALC. OF TEMP.OUT. *'*'*'*'*
0265          IF(ISTAB.NE.ISTACO) GO TO 670
0266          TOUT=0.
0267          IF(AQP.LT.(1.E-10)) GO TO 670
0268          DO 520 I=1,M
0269          DO 510 J=1,N
0270          TNEW(I,J)=T(I,J)
0271        510 CONTINUE
0272        520 CONTINUE
0273          IF(Q(NQ).LT.0.) GO TO 570
0274          DO 550 J=NN11,NN2
0275          DO 540 I=2,M
0276          T(I,J)=TNEW(I-1,J)
0277        540 CONTINUE
0278        550 CONTINUE
0279          DO 560 J=NN11,NN2
0280          T(1,J)=TIN(NQ)
0281        560 CONTINUE
0282          GO TO 620
0283        570 CONTINUE
0284          DO 580 J=NN11,NN2
0285          TOUT=TOUT+A(J)*T(1,J)
```

```
0286      580 CONTINUE
0287          DO 600 J=NN11,NN2
0288          DO 590 I=1,MN1
0289          T(I,J)=TNEW(I+1,J)
0290      590 CONTINUE
0291      600 CONTINUE
0292          DO 610 J=NN11,NN2
0293          T(M,J)=(TNEW(M,J)+TBOUND)/2.
0294      610 CONTINUE
0295      620 CONTINUE
0296
0297    C*'*'*'*'*' START OF ENERGY BALANCE PART *'*'*'*'*'
0298    C*'*'*'*'*' CALCULATION OF ANNUAL BALANCE *'*'*'*'*
0299          IF(Q(NQ).LT.0.) GO TO 630
0300          WEX=ABS(Q(NQ))*RAACAW*(TIN(NQ)-TREF)
0301          ENEXIN=ENEXIN+WEX*DT*ISTAB
0302          GO TO 640
0303      630 WEX=ABS(Q(NQ))*RAACAW*(TREF-TOUT)
0304          ENEXUT=ENEXUT+WEX*DT*ISTAB
0305      640 CONTINUE
0306      670 CONTINUE
0307
0308    C*'*'*'*'* END OF EXTRAPOLATION *'*'*'*'*
0309          TIME=TIME+DT
0310
0311    C*'*'*'*'* CHECK IF ANNUAL CYCLE COMPLETED
0312          IF(IT.NE.ITMAX) GO TO 690
0313          ITIM2=IYC/IPER
0314          IF(ITIM1.EQ.ITIM2) GO TO 690
0315
0316    C*'*'*'*'*'* PRINT OUT OF ANNUAL ENERGY BALANCE
0317          ESTORE=ENEXIN+ENEXUT
0318          ERATIO=-ENEXUT/ENEXIN
0319          WRITE(6,680)ITIM2,ENEXIN,ENEXUT,ESTORE,ERATIO,
0320         *TREF
0321      680 FORMAT(1H ,
0322         *' ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++',
0323         */,2X,' ENERGY BALANCE    ',
0324         *' CYCLE=...',I3,/,2X,' ENERGY(IN)=...',E10.3,
0325         *'      ENERGY(OUT)=...',E10.3,/,2X,' ENERGY STORED=...',
0326         *E10.3,'     RECOVERY RATIO=...',F5.3,/,2X,
0327         *' REFERENCE TEMPERATURE.=...',F6.1/,2X,
0328         *'++++++++++++++++++++++++++++++++++++++++++++++++++++++++++',/)
0329          ITIM1=ITIM2
0330          ENEXIN=0.
0331          ENEXUT=0.
0332      690 CONTINUE
0333
0334    C*'*'*'*'*'* CHECK OF PRINT *'*'*'*'*
0335          NTAN=IFIX(TIME/TA)
0336          NTBN=IFIX(TIME/TB)
0337          IF(NTBN.NE.NTB) GO TO 740
0338          IF(NTAN.NE.NTA) GO TO 830
0339          IF(TIME.GE.TIMEM) GO TO 740
0340          GO TO 860
0341
0342    C*'*'*'*'*'* PRINT OF TEMP. *'*'*'*'*'*
```

```
0343      740 CONTINUE
0344          IBIG=1
0345      830 CONTINUE
0346          CALL UTTEMP(IBIG,NPR,NQ,TIME,ENEXIN,ENEXUT,TOUT)
0347          IBIG=0
0348
0349     C*'*'*'*'* CHECK FOR MAXTIME
0350     C*'*'*'*'* SET TIME AND PRINT COUNTERS
0351      860 CONTINUE
0352          IF(TIME.GE.TIMEM) GO TO 900
0353          NTA=NTAN
0354          NTB=NTBN
0355          IF(ISTACO.EQ.ISTAB) GO TO 880
0356          GO TO 420
0357      880 CONTINUE
0358          ISTACO=0
0359          GO TO 1000
0360      900 CONTINUE
0361          IF(NRUNC.NE.NRUN) GO TO 2000
0362          STOP
0363          END
```

```
0001          SUBROUTINE INDIR(B,L)
0002          DIMENSION NA(100),A(100),B(100)
0003          READ(5,*) ZTOP,NANT
0004          READ(5,*) (NA(I),A(I),I=1,NANT)
0005          B(1)=ZTOP
0006          L=1
0007          DO 10 J=1,NANT
0008          NE=NA(J)
0009          DO 5 I=1,NE
0010          L=L+1
0011          B(L)=B(L-1)+A(J)
0012        5 CONTINUE
0013       10 CONTINUE
0014          RETURN
0015          END
```

```
0001          SUBROUTINE INDATA(MM,NN,A)
0002          DIMENSION A(100,25),B(51)
0003          READ(5,*) VALUE
0004
0005     C*'*'*'*'* ALL CELLS = VALUE *'*'*'*'*
0006          DO 10 I=1,MM
0007          DO 5 J=1,NN
0008          A(I,J)=VALUE
0009        5 CONTINUE
0010       10 CONTINUE
0011          READ(5,*)ITYP
0012
0013     C*'*'*'*'* 11 IN ITYP,SPECIFIC-CELL = VALUE *'*'*'*'*
0014          IF(MOD(ITYP,11).NE.0) GO TO 80
0015          READ(5,*) NUMEX
0016          DO 70 NUM=1,NUMEX
0017          READ(5,*) I,J,VALUE
0018          A(I,J)=VALUE
0019       70 CONTINUE
0020       80 CONTINUE
0021
0022     C*'*'*'*'* 13 IN ITYP,BLOCK-CELLS = VALUE *'*'*'*'*
0023          IF(MOD(ITYP,13).NE.0) GO TO 120
0024          READ(5,*) IBLOCK
0025          DO 110 IBL=1,IBLOCK
0026          READ(5,*) IMIN,IMAX,JMIN,JMAX,VALUE
0027          DO 100 I=IMIN,IMAX
0028          DO 90 J=JMIN,JMAX
0029          A(I,J)=VALUE
0030       90 CONTINUE
0031      100 CONTINUE
0032      110 CONTINUE
0033      120 CONTINUE
0034          RETURN
0035          END
```

```
0001          SUBROUTINE DTIME(MM,NN,DT)
0002          INCLUDE 'STEADY1.INC/LIST'
0003    1     COMMON /CMN1/ T(100,25),RLAM(100,25),C(100,25),
0004    1    1             FR(100,25),FZ(100,25),GFR(100,25),
0005    1    2             GFZ(100,25),R(100),Z(100),A(100),CIN(100,25)
0006    1     COMMON /CMN2/ RM(100),ZM(100)
0007    1     COMMON /CMN51/ M,N,M1,N1
0008    1     COMMON /CMN4/ TNEW(100,25)
0009    1     COMMON /CMN5/ TIMEQ(100),Q(100),TIN(100)
0010          F=0.
0011          DO 20 I=1,MM
0012          DO 10 J=1,NN
0013          FTRY=CIN(I,J)*(GFZ(I,J)+GFZ(I,J+1)+GFR(I,J)+GFR(I+1,J))
0014          IF(FTRY.LT.F) GO TO 10
0015          F=FTRY
0016          ICELL=I
0017          JCELL=J
0018       10 CONTINUE
0019       20 CONTINUE
0020          DT=1./(2.*F)
0021    C*'*'*'*'* TIMESTEP-INFORMATION *'*'*'*'*
0022          WRITE(6,100)ICELL,JCELL,DT
0023      100 FORMAT(//,1X,20(1H-),/,1X,'TIMESTEP-INFORMATION ',/,1X,20(1H-),/,
0024         *' ICELL=...',I3,'   JCELL=...',I3,'   DTSTAB=...',F14.3)
0025          WRITE(6,101)CIN(ICELL,JCELL),GFZ(ICELL,JCELL),GFZ(ICELL,JCELL+1),
0026         *GFR(ICELL,JCELL),GFR(ICELL+1,JCELL),R(ICELL),
0027         *R(ICELL+1),Z(JCELL),Z(JCELL+1)
0028      101 FORMAT(1X,'CIN(I,J)=...',E10.3,/,' GFZ(I,J)    GFZ(I,J+1)',
0029         *' GFR(I,J)    GFR(I+1,J)',/,4(E10.3,1X),/,' R(I)         R(I+1)'
0030         *,/,2(E10.3,2X),/,' Z(J)         Z(J+1)',/,2(E10.3,2X))
0031          RETURN
0032          END
```

```
0001            SUBROUTINE UTDATA(IFORM,ITEXT,MM,NN,AB,NPR)
0002            DIMENSION AB(100,25),TEXT(5),B(100)
0003            INCLUDE 'STEADY1.INC/LIST'
0004   1        COMMON /CMN1/ T(100,25),RLAM(100,25),C(100,25),
0005   1       1              FR(100,25),FZ(100,25),GFR(100,25),
0006   1       2              GFZ(100,25),R(100),Z(100),A(100),CIN(100,25)
0007   1        COMMON /CMN2/ RM(100),ZM(100)
0008   1        COMMON /CMN51/ M,N,M1,N1
0009   1        COMMON /CMN4/ TNEW(100,25)
0010   1        COMMON /CMN5/ TIMEQ(100),Q(100),TIN(100)
0011             DATA TEXT/4HTEMP,4HRLAM,3HCAP,4HISOR,4HISOZ/
0012             WRITE(6,5) TEXT(ITEXT)
0013           5 FORMAT(1H0,2X,A4,/,'  =====')
0014             IF(ITEXT.EQ.3) WRITE(6,6)
0015           6 FORMAT(2X,'MULTIPLY BY 1.E6')
0016             IMIN=1
0017             IRUN=MM
0018             ICOL=17
0019             IF(NPR.EQ.1)ICOL=11
0020           8 CONTINUE
0021             IMAX=MIN0(IRUN,ICOL)+IMIN-1
0022             IRUN=MM-IMAX
0023             WRITE(6,10) (RM(I),I=IMIN,IMAX)
0024          10 FORMAT(20X,'RADIUS'/'    DEPTH ',17F6.1)
0025             IF(NPR.EQ.0)WRITE(6,30)
0026          30 FORMAT(1X,111(1H-))
0027             IF(NPR.EQ.1)WRITE(6,31)
0028          31 FORMAT(1X,76(1H-))
0029             IF(IFORM.EQ.1)GO TO 35
0030             DO 20 J=1,NN
0031             WRITE(6,15) ZM(J),(AB(I,J),I=IMIN,IMAX)
0032          20 CONTINUE
0033             GO TO 40
0034          35 DO 60 J=1,NN
0035             DO 61 I=IMIN,IMAX
0036          61 B(I)=AB(I,J)/1.E6
0037             WRITE(6,15)ZM(J),(B(I),I=IMIN,IMAX)
0038          60 CONTINUE
0039          15 FORMAT(2X,F6.2,2X,17F6.2)
0040          40 IF(IRUN.LE.0) GO TO 25
0041             IMIN=IMAX+1
0042             GO TO 8
0043          25 CONTINUE
0044             RETURN
0045             END
```

```
0001          SUBROUTINE UTTEMP(IBIG,NPR,NQ,TIME,EXIN,EXUT,TOUT)
0002          INCLUDE 'STEADY1.INC/LIST'
0003    1     COMMON /CMN1/ T(100,25),RLAM(100,25),C(100,25),
0004    1    1              FR(100,25),FZ(100,25),GFR(100,25),
0005    1    2              GFZ(100,25),R(100),Z(100),A(100),CIN(100,25)
0006    1     COMMON /CMN2/ RM(100),ZM(100)
0007    1     COMMON /CMN51/ M,N,M1,N1
0008    1     COMMON /CMN4/ TNEW(100,25)
0009    1     COMMON /CMN5/ TIMEQ(100),Q(100),TIN(100)
0010          IF(IBIG.EQ.0)GO TO 830
0011          WRITE(6,750)TIME
0012      750 FORMAT(/,' TEMPERATURE  @@@  TIME=...',F15.1,' SEC.')
0013          CALL UTDATA(0,1,M,N,T,NPR)
0014          WRITE(1)TIME,((T(II,JJ),II=1,M),JJ=1,N)
0015          WRITE(6,760)
0016      760 FORMAT(1X)
0017      C*'*'*'*'* PRINT OF TEMP.OUT *'*'*'*'*
0018      830 CONTINUE
0019          HOURS=AMOD(TIME,31536000.)
0020          IDAY=IFIX(HOURS/86400.)
0021          HOURS=HOURS/3600.-IDAY*24.
0022          WRITE(6,840)TIME,IDAY,HOURS,EXIN,EXUT,TIN(NQ),TOUT
0023      840 FORMAT(2X,'TIME= ',F12.1,' SEC. @@@ ',I4,' DAYS',F5.1,' HOURS',
0024         */,'  ENERGY IN=...',E10.4,'    ENERGY OUT=...',E10.4,
0025         */,'  TEMP. IN=...',F5.1,6X,'    TEMP. OUT=...',F5.1,/)
0026          RETURN
0027          END
```

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