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TRUST: A Computer Program for Variably Saturated Flow in Multidimensional, Deformable Media

Prepared by A. E. Reisenauer, K. T. Key, T. N. Narasimhan, R. W. Nelson

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SUMMARY

The computer code, TRUST, provides a versatile tool to solve a wide spectrum of fluid flow problems arising in variably saturated deformable porous media. The governing equations express the conservation of fluid mass in an elemental volume that has a constant volume of solid. Deformation of the skeleton may be nonelastic.

Permeability and compressibility coefficients may be nonlinearly related to effective stress. Relationships between permeability and saturation with pore water pressure in the unsaturated zone may include hysteresis. The code developed by T. N. Narasimhan grew out of the original TRUMP code written by A. L. Edwards. The code uses an integrated finite difference algorithm for numerically solving the governing equation. Marching in time is performed by a mixed explicit-implicit numerical procedure in which the time step is internally controlled. The time step control and related feature in the TRUST code provide an effective control of the potential numerical instabilities that can arise in the course of solving this difficult class of nonlinear boundary value problem. This document brings together the equations, theory, and users manual for the code as well as a sample case with input and output.

CONTENTS

FIGURES

TABLES

LIST OF SYMBOLS

A	Area or a constant
a	Coefficient in a quadratic equation, (1)
a_v	Coefficient of compressibility, (LT^2/M)
B	A constant
b	Coefficient in a quadratic equation, (1)
C	Specific moisture capacity, (1/L)
C_c	Compression index; slope of the e versus log σ' straight line in the normal consolidation region, (1)
C_k	Slope of the e versus log k straight line, (1)
C_s	Swelling index; slope of the e versus log σ' straight line in the rebound region, (1)
c_v	Coefficient of consolidation, (L^2/T)
d_ℓ	Dimension factor, length, (L)
d_w	Dimension factor, width, (L)
d_r	Dimension factor, radius, (L)
$d_{\ell,m}$	Perpendicular distance from nodal point ℓ to the interface between elements ℓ and m, (L)
E_ℓ	Difference in $\Delta\psi_\ell$ of an implicit element over two successive iterations, (L)
$E_\ell{}^p$	Value of E_ℓ at pth iteration, (L)
e	Void ratio, (1)
e_o	Void ratio at reference effective stress σ_o'(1)
F	Flow per unit area, (L^3/L^2)
F_c	Factor used in estimating time derivatives, (1)

G	Intensity of source or sink integrated over a finite subregion, (M/T)
G_ℓ	Source or sink at element ℓ, (M/T)
g	Gravitational constant, (L/T^2)
H	Fluid mass content, (M)
ΔH^p_{net}	Net change in fluid mass content of all implicit elements, between iterations p and (p - 1), (M)
$h_{s,b}$	Fluid transfer coefficient, (1/T)
K	Hydraulic conductivity, (L/T)
k	Absolute permeability, (L^2)
k_d	Symmetry indicator, (1)
k_o	Absolute permeability at reference void ratio e_o, (L^2)
k_i	Intrinsic permeability of element ℓ, (L^2)
$\overline{k}_{\ell,m}$	Mean permeability evaluated at the interface between elements ℓ and m, (L^2)
$\left.\begin{matrix}L_1\\L_2\end{matrix}\right\}$	Factors, such that area $A = L_1 \cdot L_2$, (L)
M_c	Fluid mass capacity, (M/L)
M_{cyc}	Maximum number of time step, (1)
M_{sec}	Maximum number of seconds of machine time, (T)
M_{sys}	System fluid capacity, (M/L)
$M_{c,\ell}$	Fluid mass capacity of element ℓ, (M/L)
$M_{c,net}$	Net fluid mass capacity of all the implicit elements in the system, (M/L)
m_c	Specific fluid mass capacity, (M/L^4)
$m_{c,n}$	Specific fluid mass capacity of node η, (M/L^4)
m_v	Coefficient of volumetric compressibility, (LT^2/M)

N_b	Surface node number, (1)
N_p	Number of time step remaining until next printout time, (1)
N_s	Boundary node number, (1)
n	Porosity, (1)
$\vec{n}$	Unit outer normal, (1)
p	Pressure, (M/LT^2), or iteration number, (1)
p_o	Reference pressure, (M/LT^2)
R_s	Ratio used in control of time step, (1)
R_s'	Ratio used in control of time step, (1)
r	Radial distance, (L)
S	Saturation, (1)
S_d	Scale factor, (1)
S_r	Residual saturation, (1)
S_s	Specific storage coefficient, (1/L)
s	Acceleration factor, (1)
t	Time, (T)
$t_{g,n}$	Half life, (T)
Δt	Time interval, (T)
Δt_ℓ	Stability limit of time constant of element ℓ, (T)
Δt_{large}	Largest time step allowable, (T)
Δt_{max}	Maximum time step size at which certain explicit elements would require classification as implicit elements, (T)
Δt_{small}	Smallest time step allowable, (T)
Δt_{stab}	Largest stable time step for explicit zones, (T)
$U_{\ell,b}$	Surface conductance between element ℓ and the external surroundings, (M/LT)

$U_{\ell,m}$	Conductance of the interface between ℓ and m, (M/LT)
V	Bulk volume of a finite subregion, (L^3)
$\overline{V}$	Average bulk volume of a finite subregion during a time interval, (L^3)
V_s	Volume of solids, (L^3)
V_v	Volume of voids, (L^3)
w	Total quantity of fluid, (M)
z	Elevation head, (L)
z_ℓ	Elevation of the nodal point ℓ, (L)
Z_ℓ	Sum of the conductances of all the surface segments bounding element ℓ, (L^2/T)
Z_m	Total conductance for node n,
α	A constant or volumetric coefficient, (1)
β	Coefficient of compressibility of water, (LT^2/M), or exponent for d_r, (1)
Γ	Surface bounding a finite subregion, (L^2)
$\Gamma_{\ell,m}$	Interface between elements ℓ and m, (L^2)
γ	$\ln 2/t_{g,n}$
γ_w	Specific weight of water, (M/L^2T^2)
ε_v	Volumetric strain, (1)
η	A constant, (1)
θ	Volumetric moisture content, (1), or angle in the x-y plane, (rad)
λ	Interpolation factor, (1)
μ	Coefficient of viscosity, (M/LT)
ν	Product of Ψ_{var} and $\frac{1}{40}$ of the number of iterations required for convergence or the largest percentage variation in a tabulated property, whichever is greater, (1)
ρ_w	Mass density of water, (M/L^3)
ρ_{wo}	Mass density of water at atmospheric pressure, (M/L^3)

$\rho_{w,\ell}$	Average density of water in element ℓ, (M/L^3)
$\bar{\rho}_{w,\ell,m}$	Mean density of water evaluated at the interface between elements ℓ and m, (M/L^3)
σ	Total stress, (M/LT^2)
σ_o'	Reference effective stress at which $e = e_0$, (M/LT^2)
τ_n	Stability limit, (T)
ϕ	Hydraulic head, (L), or angle measured from Z axis, (rad)
χ	Bishop's parameter or boundary porosity, relating effective stress and pore water pressure, (1)
χ'	Parameter correlating change in effective stress and change in pore pressure, $= (\chi + \psi \frac{d\chi}{d\psi})$, (1)
ψ	Pressure head; pore water pressure expressed in equivalent height of water column, (L)
ψ_A	Pressure head at air entry value, (L)
ψ_b	Pressure head of boundary element, (L)
$\bar{\psi}_b$	Mean boundary pressure head, (L)
ψ_ℓ	Pressure head of element ℓ, (L)
ψ_{var}	One-half of the maximum variation of ψ allowed during any time step, (L)
$\bar{\psi}$	Estimated mean pressure head during Δt, (L)
$\Delta\psi_{exp}$	Explicit change in ψ, (L)
$\Delta\psi_{imp}$	Implicit change in ψ, (L)
$\Delta\psi_{max}$	Maximum change in ψ during a time, (L)
$\Delta\psi_p{}^p$	Change in $\Delta\psi_\ell$ during pth iteration, (L)
$\dot{\psi}_\ell$	Estimated time derivative for element ℓ, (L/T)
$\psi_\ell{}^0$	Pressure head of element ℓ at the beginning of a time step, (L)

TRUST: A COMPUTER PROGRAM FOR VARIABLY SATURATED FLOW IN MULTIDIMENSIONAL, DEFORMABLE MEDIA

1.0 INTRODUCTION

1.1 GENERAL

The use of partially saturated flow analysis and the computer modeling of such systems is important in many different areas of application. Among these are the variety of problems in irrigation and drainage of agricultural soils, the environmental assessment of waste repositories and waste burial facilities, and the numerous applications in the mining industry ranging from enhancement of mineral recovery to providing for improved tailings disposal methods.

The common feature in all of these application areas is the significance of gradual movement of water through porous materials under conditions where part of the pores in the material are water-filled and the remaining larger pores or voids are filled with air. This important class of flow problems is described by the classical nonlinear Richards' equation (Richards 1931) and its natural extensions. The multitude of important problems in many different applications has been an important driving force to develop multi-dimensional partially saturated models over the last two decades.

Progress in multidimensional partially saturated flow modeling has been slow and at times seemingly faultering. That slowness of model development has been primarily associated with numerical solution difficulties arising from the basic nonlinearity of the equations. The progress has been further complicated by the numerical instability difficulties being minor for some problems while being very severe for other problems. For example, in humid-climate situations and in problems where the porous material is initially very wet or saturated and then gradually drains, the numerical instability may be almost nonexistent. However, if an arid climate is involved, where the porous materials are initially very dry and water is added, i.e., the wetting of a desiccated material is involved, then very large numerical instabilities generally may occur. These large instabilities occur as the advancing wetting front moves into the drier surrounding material. The greater the moisture contrast across the wetting front, the steeper the moisture gradient in the front, which gives rise to greater numerical instability.

Though not always generally cited in the technical literature, there have been numerous cases where a partially saturated model that was developed and used very satisfactorily for drainage problems or was applied primarily under humid type conditions has failed to provide stable and useful results when applied to desiccated soils in, for example, an arid climatic region. Accordingly, caution must be exercised when selecting a partially saturated flow model for multi-dimensional problems involving desiccated soils, to be sure it contains good numerical stability controls. These controls should include times step control, upstream weighting of conductances when appropriate and perhaps control of the degree of moisture saturation change in critical elements. It may also be useful to apply the correlation presented by Finlayson, 1976, as an overall measure of the degree of numerical difficulty associated with particular problems to be solved. A little experience using the Finlayson correlation can provide helpful guidance for a specific new problem.

1.2 USE OF TRUST WITH URANIUM MILL TAILINGS

The U.S. Nuclear Regulatory Commission sponsored a study performed by the Pacific Northwest Laboratory on the Reduction of Seepage from Buried Uranium Mill Tailings (Nelson, et al., 1980) at a specific site in Wyoming. The analysis involved the combined partially saturated and saturated modeling of four tailings management alternatives. The site being in the arid west involved severely desiccated soils with sharp advancing wetting fronts. Careful consideration of some of the available computer models resulted in selection of the TRUST code for evaluating the management alternatives. The excellent performance of the code under the very difficult numerical condition experienced in analyzing the Wyoming site, convinced the PNL staff of the general applicability of TRUST to the NRC needs.

Accordingly PNL joined with one of the Lawrence Berkeley Laboratory (LBL) staff to provide thorough documentation of the TRUST code. Dr. T. N. Narasimhan of LBL was responsible for previously formulating and providing in finished form the TRUST code to solve combined partially saturated and saturated flow in deformable media (Narasimhan 1975; Narasimhan and Witherspoon 1976, 1977, and 1978, Narasimhan, Witherspoon and Edwards 1978). The TRUST code grew out of the original

TRUMP code for thermal modeling. The TRUMP model was written by Arthur L. Edward (1968) of the Lawrence Livermore Laboratory. In several places in the material to follow the updated documentation of TRUMP by Mr. Edwards was liberally referenced in the course of providing the detailed TRUST documentation.

1.3 THE TRUST PROGRAM

In the material to follow, some of the philosophy of the development and use of TRUST will be described as an overview. Next the more detailed description of the underlying physical effects and the method of numerical solution will be discussed.

1.3.1 Philosophy of TRUST

The basic motivation in developing the original TRUST algorithm was to have a fairly general computational tool to implement the mass conservation equation over complex, multidimensional flow regions occupied by porous materials under conditions of variable saturation and deformation. The simple, one-dimensional deformation assumption of Terzaghi has helped dispense with the need to solve an additional set of stress-strain equation, while still enabling the consideration of matrix deformation in so far as it affects fluid flow. Viewed in this phenomenological context, the TRUST approach provides a powerful, versatile tool to solve a wide spectrum of fluid flow problems arising in disciplines such as hydrogeology, soil mechanics, soil physics, rock-mechanics, and related subjects. The following list enumerates some of the problems which have been solved in the past using TRUST: settlement and consolidation in soft-clay systems under constant or variable loads; deformation of organic soils undergoing drainage and desaturation; simulation of drainage and infiltration in variably saturated columns, ditches and sand boxes; slug tests, constant rate or constant drawdown well-tests in porous media with single or multiple-fractures; internal drainage into mines expanding with time; response of an aquifer-well system of earthquakes or earth tides; and so on.

In order that the versatility of the tool is preserved, it is necessary that the data-input structure is kept flexible and general. For this reason, it is important to make special note of the following two special features of

TRUST: a) the computational model considers pressure-dependent density variations of water and conserves the mass of water, and b) the physical parameters in the governing equation are used in their primitive forms. Although options are available to employ familiar forms rather than primitive forms of the parameters, it is felt that a greater inter-disciplinary flexibility is afforded by the latter. Thus, intrinsic permeability, fluid viscosity, fluid density and gravitational constants are separately input rather than hydraulic conductivity; so also, fluid mass capacity, assembled from deformation and desaturation parameters is physically more realistic than the traditional concept of specific storage. In addition, the organization of the input of the geometric data in the TRUST approach is such that the algorithm does not intrinsically differentiate between a one-, two-, or three-dimensional problem. In a sense this enables one to have the invariant physics in focus while using TRUST.

For the aforesaid reasons, it is suggested that a physics-based approach will help in a better interpretation of TRUST output and a strong logical basis for trouble-shooting.

1.3.2 TRUST Overview

TRUST is a computer program that implements the equation of mass conservation over explicitly defined discrete subdomains of the flow region of interest. The mass conservation may be represented in an integral form as;

$$G_\ell^{\cdot} + \int_{\Gamma_\ell} \bar{\rho} \, \frac{\bar{\bar{k}}\rho g}{\mu} \, \nabla(z + \psi) \cdot \vec{n} \, d\Gamma = M_{c,\ell} \frac{D\psi_\ell}{Dt} \qquad (1.1)$$

in which G_ℓ is the rate of fluid production from element ℓ bounded by the closed surface Γ_ℓ; $\bar{\rho}$ is the density of the fluid at the surface segment $d\Gamma$, $\bar{k}$ is the mean value of permeability at $d\Gamma$; g is acceleration due to gravity; μ is coefficient of viscosity; z is elevation, ψ is pressure head; $\vec{n}$ is unit outer normal to $d\Gamma$; $M_{c,\ell}$ is the fluid mass capacity of the element ℓ, $D/_{Dt}$ is total derivative and ψ_ℓ is the mean fluid pressure head over element ℓ. In

Equation (1.1) k and $M_{c,\ell}$ are both functions of ψ, and especially so if the element ℓ is partially saturated. In partially saturated systems, $\overline{k}$ in Equation (1.1) is to be treated as the product of absolute permeability and relative permeability.

The partial differential equation equivalent to Equation (1.1) is a generalization of Richards Equation (Richards, 1931) and may be written as:

$$\overline{g} + \nabla \cdot v_{\ell} \frac{k\rho g}{\mu} \nabla(z + \psi) = m_c \frac{D\psi}{Dt} \qquad (1.2)$$

which is obtained by normalizing Equation (1.1) with reference to the bulk volume V_ℓ of element ℓ and letting the maximum dimension of V_ℓ to tend, in the limit, to zero. In Equation (1.2) $\overline{g}$ is the fluid generation rate per unit volume of the elemental subdomain and m_c is specific fluid mass capacity $(= M_{c,\ell}/V_\ell)$.

In both Equations (1.1) and (1.2) the volume element is defined in a Lagrangian sense, assuming it to have a constant volume of incompressible solids. The storage terms, $M_{c,\ell}$ and m_c incorporate deformation of the porous medium and the fluid as well as the desaturation of the pores. The matrix deformation is handled through the simple one-dimensional deformation assumption of Terzaghi.

The parameters in Equations (1.1) or (1.2) can be functions of space, time or ψ. The boundary conditions may be in the form or prescribed fluxes, prescribed potentials or a combination of the two (as in the case of the seepage face). The initial conditions may be arbitrary.

The numerical method is an Integral Finite Difference Method (IFDM: Narasimhan and Witherspoon, 1976) in which physical quantities such as potential, density, void ratio and sautration, are properly defined averages over defined subdomains. In addition to this integral basis, the IFDM employs finite difference gradients for implementing Darcy's Law.

And finally, TRUST uses a mixed explicit-implicit approach, in setting up the final matrix of equations. The mixed explicit-implicit approach devised originally by Edwards (1968) recognizes the fact that in a flow region with volume elements having widely varying time constants (stable time steps), isolated groups of elements with relatively small time constants are only weakly coupled to each other through other elements with larger time constants. A practical consequence of this recognition is, that over a time step of a given Δt, it is necessary to solve simultaneous equations only for the isolated groups of elements with time constants less than Δt. In other words, the large matrix of the entire flow region is partitioned into one or more submatrices for purposes of matrix solution, leading to efficiency of computation. Currently, TRUST uses a Point-Jacobi type iterative scheme with an acceleration factor (Edwards 1968) for solving the implicit equations.

2.0 USE OF TRUST

2.1 GENERAL

Use of TRUST to solve problems can be broadly subdivided into the following steps, each of which will be discussed in detail in the following sections:

1. Definition of problem: Describing the system geometry, materials, the equations to be solved, including initial and boundary conditions, modes of fluid production and transport, the questions to be answered, and the required accuracy.
2. Development of calculational model: Simplifying, if required, the problem description; subdivision of the system into discrete nodes; assigning identification numbers to materials, nodes, and boundary nodes; specifying initial and boundary conditions and modes of fluid production for each node; and modes of fluid transport between all connected nodes; specifying controls on the method and accuracy of the calculation, the criteria for ending the problem, and the production of output data.
3. Preparation of input data; punching items for each data block on cards, organizing data blocks into data decks, stacking data decks for multiple-problem computer runs, addition of any necessary TRUST control cards.
4. Submission of job, interruption and restart of long problems; card, tape, and output retrieval.
5. Evaluation of calculation results: checking input data; checking output data; determining cause of any errors; dumps, or unexpected results; checking final results for accuracy and consistency; determining requirements for additional calculations; generalization of results.

2.2 THEORETICAL FOUNDATION

2.2.1 Definition of Problem

2.2.1.1 Synopsis of Governing Equations

The fundamental equation of transient groundwater motion is an equation of mass conservation and can be expressed as (Narasimhan and Witherspoon, 1977).

$$G + \int_{\Gamma} \rho_w \frac{k\rho_w g}{\mu} \nabla(z + \psi) \cdot \vec{n} d\Gamma = \frac{d}{d\psi}(\rho_w VnS) \frac{D\psi}{Dt}. \qquad (2.1)$$

Equation (2.1) is derived from the mass conservation equation in an integral form for a flow region which deforms with time. Assumptions were made that $Dz/Dt = 0$, implying that z is fixed during the time interval and that if ρ_w, V, n and S are functions only of ψ, then $\theta = nS$. G is a source term.

The right-hand side of Equation (2.1) can be expressed as

$$M_c = \frac{d}{d\psi}(\rho_w VnS)$$

$$= Vn\frac{d}{d\psi}\rho_w + \rho_w S \frac{d}{d\psi}(Vn) + V\rho_w n \frac{dS}{d\psi} \qquad (2.2)$$

Parameter M_c represents the mass of fluid which the volume V can absorb due to a unit change in the average value of ψ over V. The three terms on the right-hand side represents the compressibility of water, deformability of soil skeleton and desaturability of pores.

2.2.1.2 Discretization of the Equation

Consider an appropriately small subregion of the flow region (Figure 2.1) over which the variation of ψ is not rapid, and let the average properties of this volume element be associated with a representative nodal point ℓ. Furthermore, let the volume element be so chosen that the lines joining the nodal point ℓ to its neighbors be normal to the interfaces between the respective elements. It is assumed that the average properties, such as that ψ is associated with each nodal point are functions only of time, while the spatial variation of these average properties between adjacent nodal points can be represented by a simple linear relation which is independent of time. Then, applying (2.1) to the element in Figure 1, we can write

$$G_\ell + \sum_m \rho_w \frac{k\rho_w g}{\mu} \left[\frac{(z_m + \psi_m) - (z_\ell + \psi_\ell)}{d_{\ell,m} + d_{m,\ell}} \Gamma_{\ell,m} \right] = M_{c,\ell} \frac{\Delta\psi_\ell}{\Delta t} \qquad (2.3)$$

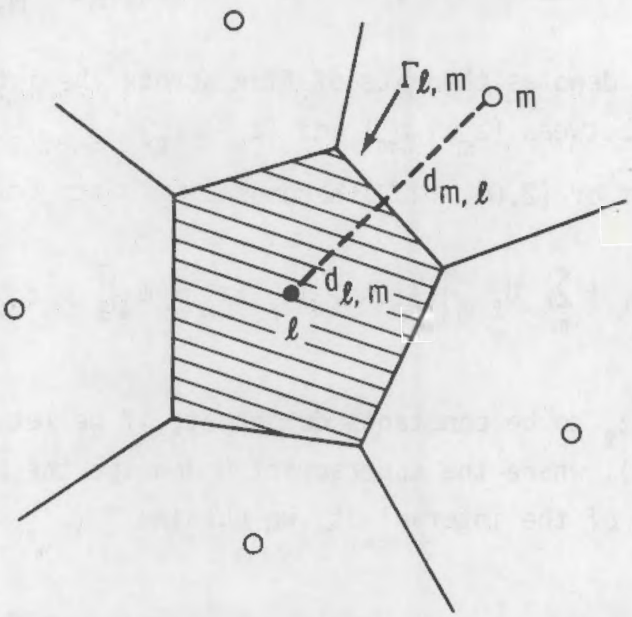


FIGURE 2.1. Volume Element Associated with Nodal Point ℓ

Note that the quantity within the summation sign in (2.3) represents the flux rate across the interface between elements ℓ and m. The quantities k and ρ_w in (2.3) are therefore to be evaluated at the interface $\Gamma_{\ell,m}$ between the elements. When there is material heterogeneity and elements ℓ and m are composed of different materials, a harmonic mean permeability (Edwards 1968; Narasimhan 1975) is used in order to preserve continuity of flux at the interface. Thus

$$\overline{k}_{\ell,m} = k_\ell k_m (d_{\ell,m} + d_{m,\ell})/(k_\ell d_{m,\ell} + k_m d_{\ell,m}) \qquad (2.4)$$

and

$$\overline{\rho}_{w,\ell,m} = \rho_{w,\ell}\rho_{w,m}(d_{\ell,m} + d_{m,\ell})/(\rho_{w,\ell}d_{m,\ell} + \rho_{w,m}d_{\ell,m}) \qquad (2.5)$$

The harmonic mean value is especially appropriate when there is a step-wise change in k at the interface. For convenience, the conductance of the interface between element ℓ and m is defined by

$$U_{\ell,m} = \bar{\rho}_{w,\ell,m} \frac{\bar{k}_{\ell,m}\bar{\rho}_{w,\ell,m}g}{\mu} \frac{\Gamma_{\ell,m}}{(d_{\ell,m} + d_{m,\ell})} \qquad (2.6)$$

Physically, $U_{\ell,m}$ denotes the rate of flux across the interface ℓ, m due to a unit difference between $(z_m + \psi_m)$ and $(z_\ell + \psi_\ell)$.

In the light of (2.6), (2.3) becomes

$$G_\ell + \sum_m U_{\ell,m}\left[(z_m + \psi_m) - (z_\ell + \psi_\ell)\right] = M_{c,\ell} \frac{\Delta\psi_\ell}{\Delta t} \qquad (2.7)$$

Assuming z_m and z_ℓ to be constants during Δt, if we let $\psi_m = \psi_m{}^o$ and $\psi_\ell = \psi_\ell{}^o$ in (2.7), where the superscript 0 denotes the known initial values at the beginning of the interval Δt, we obtain

$$G_\ell + \sum_m U_{\ell,m}[(z_m + \psi_m{}^o) - (z_\ell + \psi_\ell{}^o)] = M_{c,\ell} \frac{\Delta\psi_\ell}{\Delta t} \qquad (2.8)$$

In (2.8) all the quantities are known except $\Delta\psi_\ell$. Equation (2.8) is hence explicit, and $\Delta\psi_\ell$ can be computed by the simple relation

$$\Delta\psi_{\ell,exp} = \frac{\Delta t}{M_{c,\ell}}\left\{G_\ell + \sum_m U_{\ell,m}[(z_m + \psi_m{}^o) - (z_\ell + \psi_\ell{}^o)]\right\} \qquad (2.9)$$

For an element ℓ whose boundary surface may partly coincide with portions of the boundary of the overall flow region, (2.9) could be generalized as

$$\Delta\psi_{\ell,exp} = \frac{\Delta t}{M_{c,\ell}}\left\{G_\ell + \sum_b U_{\ell,b}[(z_b + \bar{\psi}_b) - (z_\ell + \psi_\ell{}^o)] + \sum_m U_{\ell,m}[(z_m + \psi_m{}^o) - (z_\ell + \psi_\ell{}^o)]\right\} \qquad (2.10)$$

where the subscript b denotes boundary values.

Despite its simplicity, the explicit equation is limited to small time steps, since the solution of (2.10) can become unstable with time if Δt exceeds a critical value. The phenomenon of stability, however, is local in nature (Richtmeyer and Morton 1967). On the basis of physical considerations (Dusinberre 1961; Narasimhan 1975) or an analysis of error propagation (O'Brien et al. 1951; Evans et al. 1954) it can be shown that the time step which is critical to instability of the solution in the vicinity of element ℓ is given by

$$\Delta t_\ell = M_{c,\ell} \left(\sum_m U_{\ell,m}\right)^{-1} \qquad (2.11)$$

In order to be able to progress rapidly in the time domain using conveniently large time steps we seek to write (2.7) in an implicit form by letting ψ_m and ψ_ℓ to be appropriate averages over Δt. Thus,

$$\psi_m = \psi_m{}^o + \lambda \Delta \psi_m \qquad (2.12)$$

$$\psi_\ell = \psi_\ell{}^o + \lambda \Delta \psi_\ell \quad 0 \leq \lambda \leq 1 \qquad (2.13)$$

and obtain

$$\Delta \psi_\ell = \frac{\Delta t}{M_{c,\ell}} \Big\{ G_\ell + \sum_b U_{\ell,b} [(z_b + \bar{\psi}_b) - (z_\ell + \psi_\ell{}^o + \lambda \Delta \psi_\ell)]$$

$$+ \sum_m U_{\ell,m} [(z_m + \psi_m{}^o + \lambda \Delta \psi_m) - (z_\ell + \psi_\ell{}^o + \lambda \Delta \psi_\ell)] \Big\} \qquad (2.14)$$

Note that for $\lambda = 0$, (2.14) reduces to (2.10). The three cases, $\lambda = 0$, $\lambda = 0.5$, and $\lambda = 1.0$, are known as forward differencing, central differencing, and backward differencing procedures, respectively.

By collecting similar terms, $\Delta\psi_\ell$ can be split up into an explicit and an implicit component. Thus from (2.14) and (2.10),

$$\Delta\psi_\ell = \Delta\psi_{\ell,exp} + \frac{\lambda\Delta t}{M_{c,\ell}} \left\{-\sum_b U_{\ell,b}\, \Delta\psi_\ell + \sum_m U_{\ell,m}(\Delta\psi_m - \Delta\psi_\ell)\right\} \qquad (2.15)$$

The local nature of stability and the form of (2.15) suggest that in order to carry out the solution process over the whole flow domain, one could first compute $\Delta\psi_{\ell,exp}$ for all the nodal points in the flow region and compute the implicit correction only for those elements whose stability limit is exceeded by Δt.

2.2.1.3 <u>Fluid Mass Capacity</u>

Each term of the fluid mass capacity, M_C, (Equation 2.2), is evaluated as follows:

(1) <u>Equation of State</u>. The dependence of ρ_w on fluid pressure p is given by

$$\rho_w = \rho_{wo} \exp[\beta\rho_{wo} g\psi] \qquad (2.16)$$

where,

ρ_{wo} = density of water at atmospheric pressure

ψ = pore water pressure head

β = coefficient of compressibility of water

Differentiating (2.16) we obtain

$$VnS \frac{d\rho_w}{d\psi} = VnS\rho_w\rho_{wo}\beta g = V_s eS\rho_w\rho_{wo}\beta g \qquad (2.17)$$

since $Vn = V_s e$.

(2) <u>Deformation of Soil Skeleton</u>. In one-dimensional consolidation theory, effective stress at a point is defined by the relation

$$\sigma' = \sigma - \gamma_w\psi \ . \qquad (2.18)$$

Between saturated soils, in which capillary and mechanical stresses may be fully equivalent, and extremely dry soils, in which capillary and mechanical stresses have no equivalence, lie partially saturated soils of moderate to high saturation, in which moisture suction is only partly convertible to mechanical stress. To accommodate this situation, a modified form of (2.18) has been proposed by Bishop (1960) and by McMurdie and Day (1960):

$$\sigma' = \sigma - \chi\gamma_w\psi \quad 0 \leq \chi \leq 1 \qquad (2.19)$$

Parameter χ has been empirically determined for some compacted soils and has a strong nonlinear relation to saturation. Thus $\chi = \chi(S)$.

If we assume σ to be constant, (2.19) yields

$$d\sigma'/d\psi = - \gamma_w\chi' \qquad (2.20)$$

in which $\chi' = (\chi + \psi\, d\chi/d\psi)$. In the light of (2.20), the second term becomes

$$d(Vn)/d\psi = - V_s\gamma_w\chi'\, de/d\sigma' \qquad (2.21)$$

The slope of the e versus σ' curve as in Figure 2.2A at any point of interest is called the coefficient of compressibility a_v defined by

$$a_v = -de/d\sigma' \qquad (2.22)$$

in which the negative sign accounts for the fact that e decreases with increasing σ'. Moreover, because of the nonlinear relationship between e and σ', a_v itself is a function of σ'.

Closely related to a_v is the empirical parameter, volumetric compressibility:

$$m_v = -\varepsilon_v/\Delta\sigma' \qquad (2.23)$$

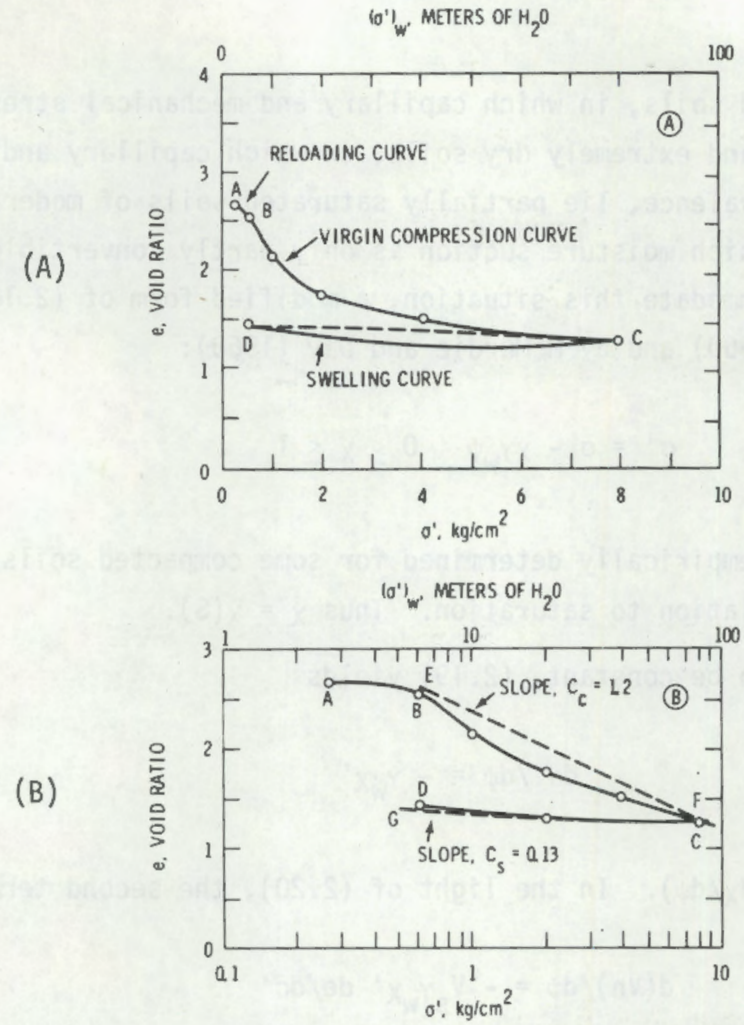


FIGURE 2.2. Variation of Void Ratio in Relation to Effective Stress. (A) Cartesian plot. (B) Semi-Log Plot. (Unpublished data from W. N. Houston, University of California, Berkeley 1974).

where ε_v is the volumetric strain given by $\Delta V/V_o$. The quantities a_v and m_v are related by

$$a_v = m_v(1 + e_o) \qquad (2.24)$$

Analysis of a large number of uniaxial test data indicates that a plot of e versus log σ' is approximately a straight line (Figure 2.2B). The slope of the best-fitting straight line is called the "compression index" C_c in the case of the virgin curve and the "swelling index" C_s in the case of the rebound curve.

Using the chain rule of differentiation, we find that

$$C_c = -\frac{de}{d(\log_{10}\sigma')}$$

$$= -\frac{de}{d\sigma'}\frac{d\sigma'}{d(\ln\sigma')}\frac{d(\ln\sigma')}{d(\log_{10}\sigma')} = 2.303\sigma' a_v \tag{2.25}$$

or

$$a_v = C_c/2.303\sigma' \tag{2.26}$$

In the present model, the time effects are ignored and e is treated as a function of σ' only. Combining (2.21) and (2.22), we get

$$\rho_w S\, d(Vn)/d\psi = V_s \rho_w S \gamma_w \chi' a_v \tag{2.27}$$

Or, making use of (2.26), we have

$$\rho_w S \frac{d(Vn)}{d\psi} = \frac{V_s \rho_w S \gamma_w \chi' C_c}{2.303\sigma'} \tag{2.28}$$

3. Desaturation of Pores. The dependence of S on ψ for $\psi < D$ is not unique but is characterized by a multiple-valued hysteresis relationship as shown in Figure 2.3.

Consider a saturated soil with $\psi = 0$ and apply suction. The soil does not physically desaturate until the applied suction exceeds a critical "air entry" value ψ_A. In the range $\psi_A < \psi < 0$ the soil remains saturated but has a negative pore pressure. The capillary fringe in natural soils coincides with this range in the values of ψ.

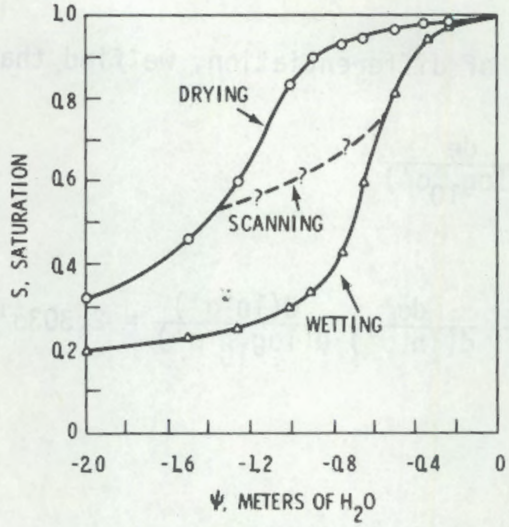


FIGURE 2.3. Variation of Saturation with Pressure Head for Del Monte Sand (after Liakopoulos 1965)

Once the threshold air entry value is reached, the S versus ψ relation follows the drying curve. If at any point in the drying curve the process is reversed, a hysteresis effect as shown by the scanning curve in Figure 2.3 results. The drying and the wetting curves form the boundaries of the hysteresis loop, within which the position of the scanning curve depends on the saturation history.

The slope of the drying, wetting, or scanning curve at any point of interest may be called the "specific saturation capacity" and is a measure of the ability of the soil to absorb or release water from storage due to saturation changes. If porosity is assumed constant, as is customary in soil physics literature, then

$$n \frac{dS}{d\psi} = \frac{d(nS)}{d\psi} = \frac{d\theta}{d\psi} = C \qquad (2.29)$$

It is obvious from Figure 2.3 that $dS/d\psi$ and $d\theta/d\psi$ are strong multiple-valued functions of ψ. Substituting (2.29) into the last term on the right-hand side of (2.2) and recognizing that $Vn = V_s e$, we see that

$$V\rho_w n\ dS/d\psi = V_s\rho_w e\ dS/d\psi \tag{2.30}$$

(4) Final Expression for M_c. We obtain a final expression for M_c by substituting (2.17), (2.27), and (2.30) into (2.2):

$$M_c = V_s\rho_w(Se\rho_{wo}\beta g + S\gamma_w\chi' a_v + e\ dS/d\psi) \tag{2.31}$$

Or using (2.28), we can use C_c instead of a_v and write

$$M_c = V_s\rho_{wo}(Se\rho_{wo}\beta g + \frac{S\gamma_w\chi' C_c}{2.303\sigma'} + e\ \frac{dS}{d\psi}) \tag{2.32}$$

Note that in (2.31) and (2.32) the quantities ρ_w, S, and e are all functions of ψ and change continuously with time. The parameter χ' and $\chi'(S)$ is also a function of ψ, since S is related to ψ.

2.3 A BRIEF OUTLINE OF THE ALGORITHM

The TRUST algorithm, derived from the TRUMP code developed by Edwards (1968; 1972) essentially consists in solving, either explicitly or implicitly, Equation (2.15) to obtain $\Delta\psi_\ell$, where ℓ = 1, 2, 3, ... L, denotes each volume element for which $\Delta\psi_\ell$ has to be computed. The algorithm has two unique features, both of which were originated by Edwards. These are:

a) To first compute $\Delta\psi_{\ell,exp}$ for all nodes using Equation (2.9) and then to evaluate the extra term on the right-hand side of Equation (2.15) only for those ℓ for which the chosen Δt exceeds the stable time-step $\Delta\psi_{\ell,stab}$. The philosphical impact of this is that in complex, heterogeneous systems it is possible to have isolated small regions undergoing rapid changes in potential separated by regions of relatively sluggish changes in potentials. In such a case, the coupling between the fast-reacting isolated regions is quite weak and one can conveniently decouple them during any given time-step. From a computational point of view, the large matrix of the entire system is partitioned into several smaller submatrices.

b) The parameter λ is calculated for each time-step depending on the of the system. In general, $0.57 \leq \lambda \leq 1.0$. This provides for improved time-integration of quantities.

The algorithms employs a quasi-linearization approach to handling time- or ψ-dependent quantities, such as k, M_c, and G_ℓ and an accelerated Point-Jacobi-type iteration scheme, for solving the set of implicit equations.

While the iterative scheme is ideally suited for three-dimensional problems which may preclude the use of direct solvers for solutions due to large band-widths, the quasi-linearized, iterative solution may lead to failure of convergence or undesirably small time-steps when non-linearities are pronounced. Such is indeed the case with infiltration problems involving sharp fronts.

This troublesome aspect of the current version of TRUST can be reduced by using a direct solver instead of the iterative solver whenever possible. A direct solver especially suited for this is the package "MA28", developed by Duff (1977) from Harwell in England. This package has a special feature of permuting the rows and columns of the conductance matrix, which is ideally suited for partitioning the matrix in the manner already described.

A second possibility to increase the time-step size for severely non-linear problems is to use the Newton-Raphson scheme or a similar procedure to iterate on the non-linearities.

3.0 DEVELOPMENT OF CALCULATIONAL MODEL

3.1 GENERAL

The next step is to translate Equation (2.15) into a calculational model. It is desirable to simplify problem complexities by taking advantage of particular physical features. In symmetrical problems, planes of symmetry may be replaced by impermeable surfaces. In case of complex geometry and heterogeneity, it is desirable to limit implicit calculations to the smallest possible regions that may be essentially decoupled during a given time step by intervening regions that may be treated explicity. In addition, it is often possible to simplify the geometry considerably by replacing complex shapes with simpler shapes of equivalent volume and resistance to fluid flow. Several geometric models may be tried for the same system to determine the effects on the results.

The system thus chosen for study must be subdivided into regions composed of different materials, each with specified properties. If density, hydraulic conductivity, or moisture capacity vary continuously with spatial location in some region, the degree of subdivision into materials with discrete properties depends on the required accuracy in describing those properties. If values of material properties are uncertain, calculations should be made for a range of values, to determine the effect on the results.

Each region may be subdivided into volume elements, or nodes, each of which may have a different initial constant or tabulated fluid generation rate, and modes of fluid transport in relation to other nodes. Each node on a permeable surface may have a different boundary condition. Nodes may be of any size and shape, with any number of internal and external fluid transport connections. Each node must contain a representative nodal point, which may be located anywhere within or on the surface of the node. Maximum accuracy in transient problems is obtained if the node shapes and nodal point locations are chosen so that lines joining the nodal points of connected nodes are perpendicularly bisected by the connected area. In steady state problems, the solution is independent of the moisture capacity associated with each node, so the nodal points may be located anywhere, without loss of accuracy.

The required fineness of subdivision of each material region into nodes depends on the degree to which properties, initial and boundary conditions, fluid generation rates and resulting distributions vary with spatial location, and the required accuracy in fitting the values. In general, less total effort and machine time are required if calculations are made for a crude subdivision, then successively finer subdivisions of the system, until no appreciable difference is found in the results, rather than beginning with excessively fine subdivisions. Often it is apparent from the first calculation which regions require finer subdivisions and which do not.

Allowable problem size limits for various versions of TRUST are summarized in Table 3.1. These limits can be changed relatively easily by changing the array sizes.

TABLE 3.1. Problem Size Limits

Item	Data Block	Size-Limit Parameter	Size Limit
Materials	2	M_2	10
Fluid Properties	3	M_3	1
Nodes	4	M_4	300
Internal Connections	5	M_5	600
External Connections	6	M_6	20
Boundary Nodes	7	M_7	20
Fluid Generation Tables	8	M_8	100
Initial Conditions	9	M_4	300
Table Lengths	2,6,7,8	M_9	100

The criteria for ending the calculation must be determined, and may include pressures falling outside a specified range, time reaching a specified limit, number of time steps or amount of machine time reaching specified limits, or attainment of steady state. These criteria are discussed more fully in Section 3.11.

The user can choose between several options for the type of difference equations and methods of controlling the size of the time step. A choice must be made between the available options for frequency and type of numerical output produced during and at the end of the problem (see Section 3.14), to obtain those results necessary to answer the questions asked.

3.2 UNIT SYSTEMS

In general, any consistent set of units may be used for the input data. However, the unit of time must be chosen so that all time steps required in the calculation are in the range from 10^{-10} to 10^{12}, except for the first time step, which is always 10^{-12}.

Typical units are given for many quantities in this report, to clarify the meaning or use of the quanitites. Output quantities appearing on printouts will be in the same unit system as input data.

3.3 NUMBERING SYSTEMS FOR MATERIALS AND NODES

Each material, system node, and boundary node must be identified by a nonzero integer number, for use in cross-referencing data in different blocks of the input data deck. The numbering system for each group is independent of all others. Within each group, all items must have unique numbers. The only limitation on the size of the numbers is that they must fit within the five-column fields on the data cards, i.e., all numbers from -9999 to 99999, except zero, are allowed. Numbers need not be in sequence, and the choice of numbers has no effect on the running time of the problem.

In complex geometries, it is often convenient to use a node numbering convention in which different groups of digits in the node number represent coordinates or zones in different directions in the system.

The size of the input data deck can be considerably reduced if groups of nodes or connectors have identical descriptions, or when K_d is 2 or 3, differ only by a constant incremental increase in radius d_r (DRAD). Such sequences can be specified with only one card, or two cards when d_r is incremented, if the nodes involved are numbered in an arithmetic sequence. When d_r is constant the first item in the sequence is described, and the number of additional items, and the incremental change in node numbers specified. When d_r is incremented, the first item in the sequence is described normally. On the next card (following any table associated with the first item, in BLOCK 6), the second item in the sequence is described, with a minus sign preceding d_r (DRAD), and the number of additional items in the sequence, and the incremental change in node number specifed. This procedure may be used in BLOCKs 4, 5, 6, 8, 9 and 10 of the input data deck.

Materials may also be assigned names consisting of up to five Hollerith characters. These are used in the program only to make identification of the materials easier in the input card decks and in printed output data.

3.4 GEOMETRIC SYMMETRY AND SCALE

A symmetry indicator K_d (KD) may be specified in data BLOCK 1, to control the way in which node volumes and connection areas are calculated from input data in BLOCKs 4, 5, and 6. Details of these calculations are given in Sections 3.6, 3.9, and 3.10 below. The choices of K_d are 1, 2, or 3, for systems with no symmetry center or axis, systems with an axis of symmetry, or systems with a center of symmetry, respectively. Simple examples of these three types are systems in which nodes are bounded by the orthogonal surfaces of a rectangular, cylindrical, or spherical coordinate system, respectively.

A geometric scale factor S_d (SCALE) may also be specified in data BLOCK 1. All linear dimensions specified in BLOCKs 4, 5, 6, and 10 will be multiplied by S_d, so that areas will scale as S_d^2 and volumes as S_d^3.

If different parts of the system are most conveniently described by use of different values of K_d or S_d, the input data may be subdivided into two or more sections. Each section may consist of type A data blocks (see Section 4.2) preceded by a BLOCK 1 with the desired values of K_d and S_d specified.

3.5 MATERIALS AND SYSTEM PROPERTIES

In deforming porous or fractured media it is necessary to provide certain system properties in addition to the properties of individual materials. The system properties so required include: the initial drying or wetting state of the system (APATH); the elevation to the land surface from zero datum (THICK; typical units, m) and the average specific gravity or relative density of the flow region material defined as the ratio of the average density of the material to that of water (RD). In addition, two additional parameters XF and QOVERH can be used if dimensionless quantities such as t_D and P_D are to be printed out for flow of water to wells in aquifers with or without a fracture.

Each material must be assigned a Hollerith name (AMAT) and a material number (MAT). In general, values must be specified for permeability and storage, each of which may be either constant or dependent on pressure-head, ψ. Several options are available in this regard. Due to the varieties of nomenclatures and conventions prevalent in various disciplines such as soil physics, soil mechanics and hydrogeology, it has not yet been possible to standardize the options. Further improvements are possible.

Permeability (CONT; typical units, m^2) may be either constant or may be variable. When it is variable, it can be used in combination with LTABK to make it either an analytical function or a tabulated function of ψ. Or, if used in combination with CK, EK and CONZ, it could be a function of void ratio. The storage parameter, in the simplest case is the quantity specific storage (SS; typical units, 1/L) which shall always remain constant. For handling storage in a more physically realistic fashion, the deformability of the matrix (AV or CC) and the desaturability of the medium (through a table a saturation versus ψ) must be used. In this case, the reference void ratio EZ and the corresponding effective stress PZ must be specified. Hysteresis effects in the k versus ψ relation and S versus ψ relation can be handled through the use of scanning curves.

3.5.1 Fluid

In order to benefit from the generality and power of the computational model, fluid properties are kept distinct from material properties. The required fluid properties include, viscosity (VISC; typical units, kg/m-sec); compressability (BETA; typical units 1/pascal); and density at atmospheric pressure (RHOZ; typical units, kg/m^3).

3.6 NODES

3.6.1 General

Each node must be assigned an identification number N_n (NODE) for use in referring to the node in various input data blocks. The identification number of the material of which the node consists (NODMAT) must be specified. The node may be classified "special" by specifying a non-zero value of K_s (KS) (see Section 3.12).

Three dimensional factors, d_ℓ (DLONG), d_w (DWIDE), and d_r (DRAD), must be specified in input data BLOCK 4 for nodes with finite volume. The volume of the node will be calculated as follows:

$$V_n = \alpha d_\ell \, d_w \, d_r^\beta \, S_d^3 \tag{3.1}$$

where α is 1, 2π, or 4π, and β is 1, 1, or 2, if K_d (KD) is 1, 2, or 3, respectively. S_d (SCALE) is the scale factor. Any dimensional factors that result in the correct volume according to Equation (3.1) may be specified. When KD is 1, the node location is determined by the node number N_n (NODE).

3.6.2 Rectangular Coordinates

The volume of a node bounded by the orthogonal surfaces of a rectangular coordinate system with axis x, y, and z is as follows:

$$V_n = (x_2 - x_1)(y_2 - y_1)(z_2 - z_1) \tag{3.2}$$

Equation (3.2) may also be used for nodes with irregular or curved surfaces, if the coordinates represent average values for each surface and are measured in three orthogonal directions. If KD is 1 and the flow is two-dimensional or one-dimensional, either one or two, respectively, of the BLOCK 4 dimensional factors d_ℓ, d_w, or d_r may be assigned an arbitrary value, such as 1.

3.6.3 Cylindrical Coordinates

The volume of a differential volume element bounded by the orthogonal surfaces of a cylindrical coordinate system with coordinates r, z (linear dimensions), and θ (angle measured in radians), is as follows:

$$\Delta V = r \Delta r \, \Delta z \, \Delta \theta \tag{3.3}$$

For a finite-volume element, or node, this becomes:

$$V_n = (1/2)(r_2^2 - r_1^2)(z_2 - z_1)(\theta_2 - \theta_1) \tag{3.4}$$

or

$$V_n = 2\pi \bar{r} (r_2 - r_1)(z_2 - z_1)[(\theta_2 - \theta_1)/(2\pi)] \tag{3.5}$$

where

$$\bar{r} = (1/2)(r_2 + r_1). \tag{3.6}$$

If KD is 2, the BLOCK 4 dimensional factors may conveniently be specified as follows:

$$\left.\begin{aligned} d_r &= \bar{r} = (1/2)(r_2 + r_1) \\ d_w &= (r_2 - r_1) \\ d_\ell &= (z_2 - z_1)(\theta_2 - \theta_1)/(2\pi) \end{aligned}\right\} \tag{3.6}$$

where

$$1/(2\pi) = 0.15915494.$$

If θ extend from 0 to 2π, d_ℓ becomes $(z_2 - z_1)$. In the case of one-dimensional radial flow, the axial length $(z_2 - z_1)$ may arbitrarily be made 1, so that d_ℓ is 1.

3.6.4 Bodies of Revolution

The volume of a differential volume element formed by rotating an area ΔA (measured in a plane containing the axis of revolution) through an angle $\Delta\theta$ (measured in radians) about the axis of revolution is as follows:

$$\Delta V = r \, \Delta A \, \Delta\theta \tag{3.7}$$

where r is the radius of area ΔA from the axis of revolution. For a finite volume element, or node, this becomes:

$$V_n = 2\pi\bar{r}\ A[(\theta_2 - \theta_1)/2\pi] \tag{3.8}$$

where $\bar{r}$ is the radius of the centroid of area A from the axis. If area A can be expressed as the product of two factors L_1 and L_2, and KD is 2, the BLOCK 4 dimensional factors may conveniently be specified as follows:

$$\left.\begin{aligned} d_r &= \bar{r} \\ d_w &= L_1 \\ d_\ell &= L_2(\theta_2 - \theta_1)/(2\pi) \end{aligned}\right\} \tag{3.9}$$

where

$$1/2(\pi) = 0.15915494.$$

If the body of revolution is complete, i.e., θ extends from 0 to 2π, then d_ℓ becomes L_2.

3.6.5 Spherical Coordinates

The volume of a differential volume element bounded by the orthogonal surfaces of a spherical coordinate system with distance from the origin r, angle in the x-y plane θ (measured in radians) and angle from the positive z axis ϕ (also measured in radians), is as follows:

$$\Delta V = r^2 \sin\theta\ \Delta r\ \Delta\theta\ \Delta\phi \tag{3.10}$$

For a finite volume element, or node, this becomes:

$$V_n = (1/3)(r_2^3 - r_1^3)(\cos\phi_1 - \cos\phi_2)(\theta_2 - \theta_1) \tag{3.11}$$

or

$$V_n = 4\pi(\bar{r})^2(r_2 - r_1)[\sin(\bar{\phi})/2](\phi_2 - \phi_1)[(\theta_2 - \theta_1)/(2\pi)], \quad (3.12)$$

where

$$\bar{r} = r_{av} \{1 + (1/12)[(r_2 - r_1)/r_{av}]^2\}^{1/2} \quad (3.13)$$

$$r_{av} = (1/2)(r_2 + r_1) \quad (3.14)$$

$$\sin \bar{\phi} = \sin(\phi_{av}) \sin[(\phi_2 - \phi_1)/2]/[(\phi_2 - \phi_1)/2] \quad (3.15)$$

$$\phi_{av} = (1/2)(\phi_2 + \phi_1). \quad (3.16)$$

If $(r_2 - r_1)$ is less than $r_{av}/6$, r_{av} may be substituted for $\bar{r}$ with an error of less than 0.1%. If $(\phi_2 - \phi_1)$ is less than 0.15 radian (8.6°), ϕ_{av} may be substituted for $\bar{\phi}$ with an error of less than 0.1%. For a solid sperical zone of inner radius zero and outer radius r_2, $\bar{r}$ reduces to $r_{av}/\sqrt{3}$, or 0.57735 r_{av}.

If KO is 3, the BLOCK 4 dimensional factors may conveniently be specified as follows:

$$d_r = \begin{cases} \bar{r}, & r_2 - r_1 > r_{av}/6 \\ r_{av}, & r_2 - r_1 < r_{av}/6 \end{cases} \quad (3.17)$$

$$d_w = r_2 - r_1 \quad (3.18)$$

$$d_\ell = [(\cos \phi_1 - \cos \phi_2)/2][(\theta_2 - \theta_1)/(2\pi)] \quad (3.19)$$

or

$$d_\ell = [\sin(\bar{\phi})/2](\phi_2 - \phi_1)[(\theta_2 - \theta_1)/(2\pi)] \tag{3.20}$$

The expressions for d_ℓ are considerably simplified if θ extends from 0 to 2π, or if ϕ extends from 0 to π. If the node is a complete spherical shell, d_ℓ is 1.

3.7 INTERNAL FLUIO GENERATION

Each node in the system may have a fluid-generation rate G_n (GONE, GG, or GT, typical units: kg/sec). This rate may be constant or specified in BLOCKS 1 or 9, or both, of the data deck, or it may be a tabulated function of time or pressure (GT or TVARG), or it may decay exponentially from a specified initial value $G_{o,n}$ (GT) with a half life $t_{g,n}$ (TVARG). Variable fluid-generation rates are specified in BLOCK 8 of the data deck. An average fluid-generation rate, $\bar{G}_n$, is used for each time step Δt.

In the case of exponential decay, $\bar{G}_n$ is exactly

$$\bar{G}_n = G_{o,n}\, e^{-\gamma t}\, (1 - e^{-\gamma\Delta t})/\gamma\Delta t, \tag{3.21}$$

where $\gamma = \ell n\, 2/t_{g,n}$. For small values of $\gamma\Delta t(<10^{-5})$, the following equation is used:

$$\bar{G}_n = G_{o,n}\, e^{-\gamma t}\, (1 - \gamma\Delta t/2). \tag{3.22}$$

The resulting pressure changes in materials with pressure-dependent specific moisture will be accurate only if the time steps are sufficiently small to limit the change in specific moisture to a small percentage. It may be necessary to specify SMALL in BLOCK 1 to accomplish this.

3.8 INITIAL CONDITIONS

Initial potential and constant fluid-generation rates, if any, may be specified in two ways. Constant values of initial potential ϕ_0 (PHONE), and fluid-generation rate G_0 (GONE) may be specified in BLOCK 1 of the input data deck. These values will be assigned to all nodes subsequently described in a BLOCK 4, unless other values are subsequently specified for individual nodes in BLOCK 9. The corresponding BLOCK 1 values will be substituted for blank input data fields in BLOCK 9. BLOCK 1 may be used more than once in a data deck to specify different sets of constants for use in later data blocks.

3.9 INTERNAL FLUID TRANSPORT

3.9.1 Internal Connections

(1) General. Each internal connection between nodes must be described in input data BLOCK 5 by specifying the two node numbers N_i (NOD1) and N_j (NOD2), two connector lengths $d_{\ell,m}$(DEL1) and $d_{m,\ell}$(DEL2), and two interface dimensional factors d_ℓ (DLONG) and d_r (DRAD).

The conductance of the connection $U_{\ell,m}$(TRAN, typical units; kg/m-sec) is calculated as follows:

$$U_{\ell,m} = \bar{\rho}_{w,\ell,m} \frac{\bar{k}_{\ell,m}\bar{\rho}_{w,\ell,m}g}{\mu} \frac{\Gamma_{\ell,m}}{(d_{\ell,m}+d_{m,\ell})} \qquad (3.23)$$

where

$$\Gamma_{\ell,m} = \alpha\, d_\ell\, d_r^\beta\, S_d^2 \qquad (3.24)$$

and

$$\bar{k}_{\ell,m} = k_\ell k_m(d_{\ell,m} + d_{m,\ell})/(k_\ell d_{m,\ell} + k_m d_{\ell,m}) \qquad (3.25)$$

$$\bar{\rho}_{w,\ell,m} = \rho_{w,\ell}\rho_{w,m}(d_{\ell,m} + d_{m,\ell})/(\rho_{w,\ell}d_{m,\ell} + \rho_{w,m}d_{\ell,m}) \qquad (3.26)$$

In Equation (3.23), k_ℓ and k_m are the intrinsic permeabilities of nodes ℓ and m during a time step.

In Equation (3.24), α is 1, 2π, or 4π, and β is 1, 1, or 2, if K_d (KD) is 1, 2, or 3, respectively. S_d (SCALE) is the scale factor.

Any number of connections may be specified between any pair of nodes. If an interface conductance has a pressure or time dependency that cannot be modeled as described above, a very thin node may be placed in series between the two nodes. The thin node may be a material with a hydraulic conductivity tabulated versus pressure or time, to obtain the desired conductance.

Any desired connector lengths and area factors which result in the correct conductance of the connection, according to Equation (3.23), may be specified. The values are independent of the dimensional factors specified in input data BLOCK 4 for the nodes. This method allows systems of any shape and with any type of interconnection to be described.

(2) Selection of Connector Lengths and Interface Areas. The selection of connector lengths depends on the location of the representative point (or nodal point) within each node. These locations may be chosen arbitrarily, but, for greatest accuracy in transient calculations, should usually be at the geometric centers of the nodes. Exceptions are nodes for which the amount of flow actually depends on surface pressures, requiring that the nodal points be located on the surface. This includes nodes with surface connections of any type except a specified flux. Care must be taken to avoid connections for which $U_{\ell,m}$ is very large in comparison with the conductances of other connections involving nodes ℓ and m. This causes numerical difficulties in calculating the fluid balance. Such connections may be eliminated by either lumping the two nodes into a single node or by moving the nodal points further apart, whichever causes the least error.

(3) Connector Lengths and Areas in Simple Coordinate Systems. In rectangular coordinates, connector lengths and areas for connections in the x and y directions are, respectively,

$$\left.\begin{aligned} d_i &= \Delta x_i,\ d_j = \Delta x_j,\ \Gamma_{i,j} = \Delta y\ \Delta z \\ d_i &= \Delta y_i,\ d_j = \Delta y_j,\ \Gamma_{i,j} = \Delta z\ \Delta x \\ d_i &= \Delta z_i,\ d_j = \Delta z_j,\ \Gamma_{i,j} = \Delta x\ \Delta y \end{aligned}\right\} \tag{3.27}$$

In cylindrical coordinates, connector lengths and areas for fluid connections in the r, θ, and z directions are, repectively,

$$\left.\begin{aligned} d_i &= \Delta r_i,\ d_j = \Delta r_j,\ \Gamma_{i,j} = r\ \Delta z\ \Delta\theta \\ d_i &= \bar{r}_i\Delta\theta_i,\ d_j = \bar{r}_j\Delta\theta_j,\ \Gamma_{i,j} = \Delta r\ \Delta z \\ d_i &= \Delta z_i,\ d_j = \Delta z_j,\ \Gamma_{i,j} = \bar{r}\ \Delta r \end{aligned}\right\} \tag{3.28}$$

where the $\bar{r}$ values are arithmetic means.

In spherical coordinates, connector lengths and areas for fluid connections in the r, θ, and ϕ directions are, respectively,

$$\left.\begin{aligned} d_i &= \Delta r_i,\ d_j = \Delta r_j,\ \Gamma_{i,j} = r^2\ \sin\bar{\phi}\Delta\phi\Delta\theta \\ d_i &= r_i\ \sin\phi_i\Delta\theta_i,\ d_j = r_j\ \sin\ \phi_j\Delta\theta_j, \Gamma_{i,j} = r_{av}\Delta r\Delta\phi \\ d_i &= r_i\Delta\phi_i,\ d_j = r_j\Delta\phi_j,\ \Gamma_{i,j} = r_{av}\Delta r\ \sin\ \phi\Delta\theta \end{aligned}\right\} \tag{3.29}$$

where r_{av} and $\bar{\phi}$ are as defined in Equations (3.14) through (3.16). The dimensional factors d_ℓ and d_r may be chosen as desired to give the correct interface areas according to Equation (3.24).

3.10 SURFACE FLUID TRANSPORT

3.10.1 External Potentials

For convenience in specifying boundary conditions that involve fluid transfer between the system and its surroundings, external potential may be specified. Each such external potential must be assigned an identification number N_b(NODB) (independent of numbering systems used for materials, and nodes) and have a specified constant or time-dependent pressure ψ_b, ψ_b may be a tabulated function of time (PSIB verus TIMEB) or vary sinusoidally with time with a specified mean value $\psi_{b,0}$ (PSIB(1)), amplitude $\Delta\psi_b$ (PSIB(2)), period t_b (TIMEB(1)), and phase advance Δt_b (TIMEB(2)), as follows:

$$\psi_b(t) = \psi_{b,0} + \Delta\psi_b \sin \left[2\pi\left(\frac{t + \Delta t_b}{t_b}\right)\right] \tag{3.30}$$

For convenience, the term "boundary node" is used in this report to refer to an external potential. These data are specified in BLOCK 7 of the input data.

An alternative way to produce a potential to be used as an external potential is by using a node with very large Fluid Mass Capacity, M_c, so that its pressure is unaffected by fluid flow between it and the system. The node may be assigned an initial pressure, which will remain constant; or may have a specified fluid-generation rate G_n (GT), which can be a tabulated function of time; or may decrease or increase exponentially with time (see Section 3.7). For a fluid-flux boundary condition, a node with very small Fluid Mass Capacity could be assigned a constant or variable fluid-generation rate and could be connected to the actual surface node.

3.10.2 External Connections

Fluid flow between the system and the extern environment takes place through external connections. Each connection between a surface node N_s (NODS) and a boundary node N_b (NODSB) must have two specified dimensional factors d_ℓ (DLONG) and d_r (DRAD) which are used to calculate the surface area $A_{s,b}$ (AREAS) of the connection, as follows:

$$A_{s,b} = \alpha\, d_\ell\, d_r^\beta\, S_d^2, \tag{3.31}$$

where α, β, and S_d are defined as in Equation (3.1). The factors d_ℓ and d_r are completely independent of dimensional factors specified for the node or any of its internal connection areas. Otherwise, the same comments apply to the use of d_ℓ and d_r as in the case of internal connection areas (see Section 3.9).

A fluid transfer coefficient $h_{s,b}$ may be constant (HSURE; typical units, 1/sec) or a tabulated function of time or pressure (HSURT versus PSIVARH). This data is specified in Block 6 of the input data deck. The overall surface conductance is calculated as follows:

$$U_{s,b} = \rho_o A_{s,b} h_{s,b} \tag{3.32}$$

In the present model, boundary conditions can be conveniently handled with the help of surface and boundary elements and the surface conductance between them. A surface element is usually a thin element which shares a segment of the external boundary of the flow region.

For simulating a prescribed potential at the boundary (Dirichlet problem) a surface element may be connected through a large surface conductance to a boundary element with a prescribed potential. Alternatively, the boundary element could be replaced by a very large element with very large M_C. A prescribed flux boundary (Neumann problem) can be simulated by connecting the surface element through a very small surface conductance to the boundary element with a very large boundary potential and choosing the boundary potential so that the product of the surface conductance and the boundary potential yields the prescribed flux. Prescribed flux can also be handled through a thin surface element generating fluid at a rate equal to that of the prescribed flux.

The seepage face is an important boundary condition arising in the consideration of saturated-unsaturated flow. On a seepage face, two conditions hold: 1) $\psi = 0$, and 2) across a seepage face, fluid can leave but not enter the flow region. To handle the seepage face, a check is carried out at the end of each time step if the flux is directed inward or outward from the flow region across each segment of the seepage face. If the flux is directed inward that segment of the seepage is made an impermeable boundary, and the time step calculations are repeated.

Sources or sinks can be conveniently handled by prescribing the fluid generation rates from one or more elements. In the present algorithm, generation rates, prescribed potentials, and prescribed fluxes can be tabulated either as functions of ψ or a function of time.

3.11 CRITERIA FOR ENDING THE PROBLEM

3.11.1 Miscellaneous Limits

A number of different criteria may be used to end a problem. Any or all may be used. A maximum problem time t_{max} (TIMAX) may be specified. If not specified, t_{max} will be ignored. If t_{max} is negative, the problem will end after the first time step. If not specified or if equal to ψ_{min}, ψ_{max} will be 10^{12}. A minimum pressure ψ_{min} (PSIMIN) may be specified. If not specified, or if equal to or greater than ψ_{max}, ψ_{min} will be -10^{12}. The limits ψ_{max} and ψ_{min} can be made to apply individually to any node in the system for any specified periods of time. This is done by connecting a zero-volume node to the controlling node, and also to a boundary node with a time-dependent fluid transfer coefficient. The connection conductances and boundary node potential are chosen so that the potential of the zero-volume node reaches a specified value of ψ_{min} or ψ_{max} when the controlling node reaches the desired limiting potential.

A maximum number of time steps M_{cyc} (MCYC) may be specified. If not specified, M_{cyc} will be ignored. A maximum number of seconds of machine time, M_{sec} (MSEC), may be specified. If not specified, M_{sec} will be ignored. If M_{cyc} or M_{sec} is negative, the problem will end after the first time step.

A "*CHECK" TRUST control card (columns 1-6) may precede the Problem Name card, to cause the problem to end on completion of the first time step. This option is convenient for checking input data for errors.

3.11.2 Steady State

If no other criteria end the problem, and boundary conditions or fluid-generation rates do not vary with time, steady state will usually be reached eventually. The following requirements must be satisfied before the program will end the problem because of steady state:

- input variable KSPEC must be nonnegative; the upper time step limit DELTMX must be equal to either DELTO or 10^{12}, whichever is smaller; or, if DELTMX is less than either, the current time step DELT must be equal to DELTMX;
- the maximum pressure change DPSIMAX must have been less than 0.1% of PSIVARY for two consecutive time steps;
- at least 10 time steps must have been completed;
- no nodes can have been reclassified as special nodes for three consecutive time steps;
- and no time steps can have been repeated for three consecutive time steps.

If the user requires only the steady-state solution, the specified average pressure change $\Delta\psi_{av}$ (PSIVARY) may be made quite large. However, if important fluid production, absorption, or transport processes in the system are strongly pressure dependent, $\Delta\psi_{av}$ should be small enough to limit changes in the magnitudes of these processes to small percentages. Otherwise, an oscillatory solution may result, preventing the steady-state criteria from being satisfied. If Δt_{max} (DELTO) is specified, it should be no larger than 10% of the approximate time constant of the system.

3.12 CONTROL OF METHOD OF CALCULATION

The types of difference equations used for fluid transport can be controlled to some extent by the user. Stable difference equations, not subject to a limiting time step, are used for all special nodes, which includes all zero-volume nodes, nodes with external connections, nodes for which the user specifies a nonzero value of KS in data BLOCK 4, and regular nodes reclassified as special nodes during the calculation. No regular nodes can be reclassified as special nodes during the calculation if the user specifies a negative value of KSPEC in data BLOCK 1. If KSPEC is zero or not specified, each regular node will be reclassified as a special node when the time step required to obtain a maximum potential change to PSIVARY approaches the stability limit of the node. If KSPEC is positive, all regular nodes will be changed to special nodes before the first time step. If KSPEC is 2, the interpolation factor FOR, which determines the amount of interpolation between initial and final potential driving forces in the fluid-transport equations, will be fixed at 1.0, so that simple backward difference equations will be used. If KSPEC is 3, the interpolation factor will be fixed at 0.5, so that central difference equations will be used. The options with nonzero KSPEC are less accurate and efficient than the option obtained when KSPEC is zero, but allow a more direct comparison with results obtained by other computer programs using simple forward, backward, or central difference equations.

In addition, the user may specify upper and lower limits for the size of the time step, SMALL and DELTO in data BLOCK 1. These may be equal, resulting in use of a fixed time step. The program will ignore the value of SMALL, however, if it is greater than the stability limit determined for the regular nodes. In most problems, the most efficient calculation is obtained by not specifying KS, KSPEC, SMALL or DELTO.

3.13 CONTROL OF ACCURACY

3.13.1 Principle Types of Errors

Accuracy is affected by six principle types of errors:

1. modeling errors, arising from use of inaccurate material properties, inaccurate initial and boundary conditions, other approximations used in modeling the real system, and interpolation errors in evaluating tabulated functions;
2. spatial truncation errors, arising from the subdivision of the system into discrete volume elements, or nodes, for which average values of spatially-dependent variables must be estimated, and for which inaccuracies in volumes, areas, and distances may arise;
3. time truncation errors, arising from the use, in the transient calculation, of discrete time steps for which average values of time-dependent variables must be estimated;

4. potential truncation errors, arising from the discrete potential changes that occur in each node in each time step, for which average values of potential dependent variables must be estimated;
5. convergence errors, arising from the use of an iterative method of solving the fluid-transport difference equations for connected special nodes, with arbitrary convergence criteria;
6. and arithmetic truncation errors, arising from accumulation of round-off errors and from the loss of significant figures that results when numerical values of widely differing magnitudes are added to, or numerical values of similar magnitude are subtracted from, each other.

3.13.2 Modeling Errors

Modeling errors can usually be estimated or determined by comparing the results of using different models of the same system. Available material properties, and assumptions made concerning boundary conditions, are seldom accurate to more than two or three significant figures. There is no justification for attempting to reduce spatial and time-step truncation errors much below modeling errors, except where their effect tends to be accumulative.

3.13.3 Spatial Truncation Errors

Spatial truncation errors are controlled by subdividing the system just finely enough so that nonlinear potential distributions are fitted within required accuracy by linear interpolation between the nodal points of the nodes, and variation of pressure-dependent properties over the volume of each node is within required limits of the average values determined for the nodal point. This may be difficult to estimate in advance but is simple to determine after a calculation has been made. Often a simplified version of the problem may be calculated to help in estimating the required degree of subdivision in different parts of the system.

In most problems, reasonable accuracy and efficient use of machine time are obtained by subdividing the system into nodes whose time constants (total capacity divided by total conductance of all connections) are about 1% of the total time range in which large potential changes occur at the location of the node in the system. This will vary widely from points near boundaries and interfaces where potential discontinuities are initially present, to points distant from any discontinuity.

3.13.4 Time Truncation Errors

Time truncation errors are usually controlled indirectly, by specification of a desired maximum potential change for each time step, PSIVARY. Each time step is adjusted from the previous value, within fixed limits, to try to maintain the maximum potential change at an average of PSIVARY, and no more than twice PSIVARY.

In addition, the time step is adjusted to limit changes in time- and pressure-dependent functions to an average of 1%, and no more than 2% over each time step. The time step is also adjusted to limit the number of iterations required in the fluid mass balance to an average of 40, and no more than 80. Results of time steps for which potential changes, changes in tabulated functions, or the number of iterations exceed these limits are discarded and the size of the time step halved. Time-dependent quantities are evaluated at an intermediate time in each time step, obtained by adding to the initial time a fraction of the time step between 0.57 and 1.0 (see Section 9.7.3).

The user may also specify upper and lower limits, DELTO and SMALL, on the size of the time step. The upper limit may be necessary to prevent a narrow peak in a tabulated function of time from being completely skipped, or to avoid slow convergence of the iteration procedure when approaching steady state, especially in problems involving highly pressure-dependent parameters. DELTO should be specified as about 0.1 to 1% of the total time in which important potential changes will occur, if that is known. The lower limit may be necessary to allow time-dependent functions to be fit more closely than would be allowed with the lower limit selected by the program, which is usually 2/3 of 1% of the smallest stability limit of any regular node in the system. The lower limit may also be used to avoid very small time steps when a tabulated parameter undergoes large percentage changes that need not be accurately followed. OELTO and SMALL may be given the same value, to force use of a constant time step, for comparison with another program or for convenience in obtaining output data at exact times.

Instabilities can result from use of too large a time step when the estimated average values of driving forces for the time step are very inaccurate. This is automatically prevented from occurring in TRUST in the case of fluid transport, by use of stable implicit equations for connections that would otherwise cause instabilities.

3.13.5 Potential Truncation Errors

Potential truncation errors are controlled by specification of PSIVARY, which controls the size of the time step within the limits of SMALL and DELTO. Pressure-dependent quantities are evaluated at estimated average pressures for each time step and are obtained by adding to the initial pressure the rate of pressure change estimated from the previous time step, multiplied by a fraction of the time step between 0.57 and 1.0. In most problems, reasonable accuracy and efficient use of machine time are obtained by specifying a value of PSIVARY of about 0.1% to 1% of the greatest pressure change expected to take place in the system, or such that no more than 1% change occurs in pressure-dependent quantities in the pressure interval PSIVARY. Average cumulative errors in the fluid mass balance and calculated pressures will amount to about 1% of PSIVARY, with individual errors no more than 10%, compared with a calculation of the same node system with very small time steps.

3.13.6 Convergence Errors

Convergence errors in the iterative solution for connected special nodes are controlled by the specified value of PSIVARY. The iteration is stopped when the change in total fluid content, divided by the total moisture capacity, of all the connected special nodes, from one step of the iteration to the next, is less than $5(10^{-5})$ of PSIVARY, and when no finite-volume special node has a change in calculated temperature, from one step of the iteration to the next, greater than 10^{-4} PSIVARY. A limit of 80 iteration steps is also imposed, which, if reached, causes the results to be rejected and the time step to be halved and repeated. PSIVARY should be no less than about 0.02% of the expected maximum total pressure change in the system. Otherwise, numerical truncation errors might prevent the convergence criterion from being satisfied for any size of time step.

The iteration procedure may converge very slowly, or fail to converge, without obtaining an accurate fluid mass balance or accurate pressure, if the system is too finely subdivided, relative to the required accuracy in space and time. In each iteration, a node is only affected by directly connected nodes, so that the number of iterations required for two nodes to properly interact is proportional to the number of connections in series between them. Because of this method of iteration, convergence may also be slow, or fail, if a single connection between two nodes has very high conductance compared with the conductances of other connections of the nodes, causing large numerical truncation errors to occur. This can occur, for example, when two very thin layers of highly permeable material are in contact between poorly permeable material. They may oscillate, or equilibrate with each other, then remain at constant pressure, regardless of the pressure changes in the poor permeable elements. This can be avoided by lumping any such pair of nodes into a single node. In every problem, the output data list of connection conductances (column headed TRAN) should be checked to see if such connections exist. The output data list of time constants of nodes (column headed SLIM) should also be checked to make sure that unnecessarily small time constants are not being used. Difficulties in convergence of the iteration procedure for special nodes and preservation of the mass balance may result if large groups of connected nodes have time constants much smaller than the time steps used in the calculations (by factors of 10 or 100 or more). Convergence can be improved by use of coarser zoning, or by specifying a much smaller value of PSIVARY, or by specifying a value of DELTO no larger than 10 to 100 times the average stability limit of the group of nodes, and no larger than 10% of the time constant of the whole system. Zero-volume nodes should be used only where absolutely necessary as for determining accurate surface pressures when an appreciable hydraulic gradient is expected at the surface.

3.13.7 Arithmetic Truncation Errors

Numerical truncation errors arising from accumulated round-off errors are generally not important, in comparison with modeling errors and space, time, and pressure truncation errors. In general, their effect is in one or two units in the last significant figure of any quantity for each time step.

Truncation errors arising from algebraic addition of terms which are nearly equal but have opposite signs, or which have widely differing orders of magnitude, can be quite serious. Net fluid-flow values and average flux rates for nodes, especially zero-volume nodes, can be affected by this type of error. These errors can be found by comparing the net fluid-flow values for a node with the net fluid flow across all connection of the node. These may represent large percentage errors, but very small absolute errors, and have no effect on calculations of pressure or moisture content.

Convergence of the iterative scheme for special nodes can be affected by this type of error, if any node has conductances of widely differing magnitude. This is why extremely high conductances should be avoided, where possible, by lumping nodes together, or by modeling very thin layers or gas gaps as interface conductances.

3.14 SELECTION OF OUTPUT DATA

3.14.1 Numerical Output

All input data--and several derived quantities such as node volumes, connection areas and table slopes, and comments concerning special input options or input errors--are written out. The results of the first, second, and last time steps are always written out. In addition, data are written out at problem time intervals of TIMEP and time-step intervals of IPRINT. The type of data written out is controlled by the input value of KDATA. The following are included in each printout:

problem name (NAME) and number (NPROB);
printout number (NPRINT);
time-step number (KCYC);
time-step lower-limit counter (MF) and upper-limit counter (MSS);
problem-end sentinel (KWIT);
time-step upper limit (DELTMX) and lower limit (SMALL);
pressure-change control (PSIVARY);
maximum pressure change (DPRES);
time-step control (DPMAXS);

number of special node fluid-balance iterations (NUTS);
total time (SUMTIM) and last time step (DELTS);
net fluid flow into the system (FLUX), resulting average pressure change (PSIER), and average rates of fluid flow (FX) and pressure change (FLX);
average system pressure (PSIAD);
total system fluid mass capacity (CAPS) and moisture content (FLUID);
total system fluid-generation rate (GS), amount of fluid generated (GENS), and resulting average pressure change (PSILE);

The table of fluid potentials (ϕ), includes only node numbers and potential, if KDATA is negative. If KDATA is nonnegative, the following data are printed out for each node: elevation (Z), pressure head (PSI), potential (PHI), pressure head change during time step (DPSI), estimated time-derivative of pressure head (DDPSI), fluid generation (G, e.g., kg/sec), total fluid content (W, e.g., kg), change in fluid content from the beginning of the problem (H), and net fluid transported into the node by internal and external connections (F, e.g., kg).

The following data are printed out for each boundary node: potential (PHIBS), net fluid flow into the system from the boundary node (FB, e.g., kg), average rate of fluid flow (FX, e.g., kg/sec), flow into Node (N) in time step DELTS(DFB), and flow rate across a connection during a preceding time step (DFBX) during the problem.

A node (NUM) may be specified in data BLOCK 1, for which NUMX, Z, PSI, PHI, DDPSI, and SUMTIM will be printed out at every time step.

Additional data are printed out only on the first and last time steps, and for other time steps if KDATA is positive. The following data are printed out for each material: the number of nodes (NODMS), total volume (VOLMS), total fluid capacity (CAPMS, e.g., kg/m), and total fluid content (WMS, e.g., kg).

The following data are printed out for each node: material number (NOXMAT), type (NTYPE), volume (VOL), density (RHO), fluid capacity (CAP, e.g., kg/m), permeability (CON, e.g., m^2), overall conductance for Node (N) (ZIP), time constant (SLIM, limiting stable time step usable with a forward difference equation), void ratio (E), saturation (S), and preconsolidation stress (PC, $kg/m\text{-}sec^2$).

The following data are printed out for each internal connection: area (AREA), overall conductance (TRAN, e.g., kg/m-sec), net fluid flow since the beginning of the problem (FI, e.g., kg) into the first node from the second node, the average rate of fluid flow (FX) and flow into Node (N) in time step DELTS (DFI), and flow rate across a connection during a preceding time step (DFIX) during the problem.

The following data are printed out for each external connection: area (AREAS), fluid-transfer coefficient (HSURE, e.g., 1/sec), overall conductance (TRANS, e.g., 1/sec), net fluid flow since the beginning of the problem (FS, e.g., kg) into the surface node from the boundary node, average rate of fluid flow since the beginning of the problem, flow into Node (N) in time step DELTS (DFS), and flow rate across a connection during preceding time step (DFSX).

During the problem, statements are printed out whenever a regular node is changed to a special node, whenever the iteration procedure for special nodes fails to converge in the allowed maximum number of iterations, and whenever a time step has to be repeated. In the latter case, the following data are printed out: the time step number (KCYC), the size of the unsuccessful time step (DELT), the problem time at the beginning of the time step (SUMTIM), the factor indicating iteration-convergence failure (DPSIMAXS = 8D.0 x PSIVARY) or too large a change in a tabulated function (DPSIMAX = % change x PSIVARY), and the maximum pressure change $\Delta\psi_{max}$ (DPRES).

After the last time step, the following additional data are written out: the problem-end sentinel (KWIT) and a table of values of its meanings, and the elapsed machine time, in second, since the beginning of the problem.

For each problem, the following data are printed out on-line: the problem number (NPROB), number of time steps used (KCYC), final problem time (SUMTIM) and problem-end indicator (KWIT), elapsed machine time, in seconds, since the beginning of the problem, and the total fluid content of the system (FLUID) and net flow into the system (FLUX).

In addition, statements are printed out on-line that are related to occurrence of various input errors, use of data from a preceding problem when data decks are stacked, failure of convergence of the iteration procedure used for special node fluid balance calculations, repetition of time steps that are rejected, and reclassification of nodes as special nodes.

3.14.2 Punched/File Output

A set of punched cards or a restart file containing the final values of node potential and constant fluid-generation rates, in the same format as the input BLOCK 9 cards, may be obtained when a problem is ended or interrupted. This is accomplished by specifying a nonzero value of NPUNCH in BLOCK 1 of the input data. The new BLOCK 9 may be used to replace the BLOCK 9 in the original data deck, as an alternative way to restart an interrupted problem or to specify the initial conditions for one or more new problems.

4.0 PREPARATION OF INPUT DATA

4.1 CARD INPUT FORMATS

All input data for TRUST are in Hollerith (A), integer (I), or floating point (E) formats.

Hollerith data may consist of any characters in the character set recognized by the computer and available on standard keypunch machines.

Integer data may consist of numbers only, preceded by a sign, and right-adjusted in the specified data fields. Only TRUST variables that are read in with an integer format have names beginning with any of the letters I, J, K, L, M, or N.

Floating point data may include numbers, preceded by a sign, and must include a decimal point if the field is not entirely blank. The exponent to the base 10 may be included (right-adjusted in the specified data field), consisting of the letter E or a sign, or both, followed by numbers. Some variables used in floating point form in the program are read in with a Hollerith frmat, converted to floating point if a decimal point is included, or assigned some other value if no decimal point is included.

Field-free input may be used for integer and floating point variables. A comma following a number is interpreted as a field terminator. If commas are used, they must follow all numbers that are not right-adjusted in the field width specified in the format statement, including the last number in the input record. Commas may not be used after numbers that are right-adjusted or fields that have X or A specifications. For example, if the input format is (A5, 4I5, 5X, 5E10.3), the input record could be as follows:

"ABCDEb242, 10745b27, 1Ø, 8bbbbb1.ØE-4, 1.23456E-3bØ.2,, b1.ØE-8,"

beginning in column 1, where the letter b indicates a blank space. Note that the integer "10745" and the floating point number "1.23456E-3" each fills its data field, so cannot be preceded by a blank or followed by a comma. The

Hollerith data "ABCDE" and the blank field specified by "5X" in the format also must each use the entire data field and cannot be followed by a comma. The fourth E data field is blank. The number in the fifth E field does not use 10 columns, so must be followed by a comma.

In this report, the symbol "Ø" is used for the number zero in descriptions of FORTRAN names and data values, where confusion with the letter "O" might otherwise result. The symbol"*" between FORTRAN names, numerical values, or combinations of these, indicates multiplication, unless otherwise noted.

4.2 DATA DECK ORGANIZATION

In the present algorithm, input is organized into convenient blocks. All control parameters, such as output interval, time limit, choice of differencing scheme, scale factor, symmetry factor Δt_{small}, Δt_{large}, ψ_{var}, and uniform initial conditions are provided through Block 1. Block 2 is used for specifying material properties, and Block 3 for properties of the fluid. Geometric properties of elements are specified in Block 4, while blocks 5 and 6 are used to specify internal and external fluid flow connections. Boundary potential are specified in Block 7, and Block 8 is used for specifying variable generation rates. Finally, Block 9 is used for specifying nonuniform initial conditions.

4.2.1 Data Decks

Each data deck must consist of a Problem Name card, any number of Block Number cards with their accompanying Block Item input cards, and a Data End card. Any number of data decks can be stacked together, using the data carry-over controls on the Problem Name cards, and the block modification controls on the Block Number cards, to eliminate the need for describing any input data block or block item more than once, when used for more than one problem. The final data deck should be followed by a "*SPLIT".

4.2.2 Problem Name Card

The first card of each data deck must be a Problem Name and Data Carryover card. The symbol "*" must be in column 1, any desired problem identification and description in columns 2 through 71 and 73 through 80, and the data carry-over control, K, in column 72. Normally K will be blank. If K is 2, 3, or 4, all data from the preceding problem will be saved, and only those data blocks and block items required to change data or add new data need be included in the data deck. The initial potentials will be the same as either the initial (K = 2) or final (K = 3 or 4) values from the preceding problem, unless modified in a new BLOCK 9, 9A or 9B. The initial time will be the same as either the initial (K = 2 or 3) or final (K = 4) time from the preceding problem, unless modified in a new BLOCK 1. SMALL should be specified in any problem for which K is 3 or 4, if not specified in the original BLOCK 1. The entire contents of the card (NAME) will appear on all output, along with a sequential problem number, and the time and date at the beginning of the run. Additional cards containing comments without "*" in column 1 may precede the name card and will appear on the on-line printer and the printout.

The second card should contain an integer (Format (1I4)) designating the interval (number of iterations) at which the tape data will be written.

4.2.3 Block Number Cards

There are presently 10 allowed input data blocks, with block numbers from 1 through 10, as described in Table 4.1. Each block used must begin with a Block Number card and, except for BLOCKs 1 and 3, must end with a blank card. The specification of data within each data block is described in Section 5.0 below.

The Block Number card must have the word "BLOCK" in columns 1 through 5, and the block number, from Ø1 through 10, in columns 6 and 7. A block type indicator (MOD) may be punched in column 8. If MOD is not A or B, the data read in for the block replaces any data previously read in for the same block. If MOD is A, data previously read in are saved and the new data are added. If MOD is B, data previously read in are also saved, and the new data either modify individual items previously described with the same reference numbers or, if none can be found, are added to the old data. These options do not apply to BLOCK 1, 3 and 10.

TABLE 4.1. TRUST Input Data Blocks

Block	Description
1[a,b]	Problem controls, limits, constants (required)
2	System and material properties (required)
3	Properties of the fluid (required)
4	Node description
5[a]	Internal fluid flow connections
6	External fluid flow connections
7[c]	External potentials; boundary nodes
8	Variable sources/sinks
9	Initial conditions, constant sources/sinks, and initial preconsolidation stress
10	Dimensionless variables, t_D and P_D

(a) Required data for all problems.
(b) Must be read in before any other data blocks.
(c) Required if BLOCK 6 is used.

Any desired block description may be in columns 9 through 80, which will appear on the printout. Additional cards containing comments may proceed or follow any data block, as long as columns 6 and 7 are blank, and will also appear on the printout.

Data BLOCK 1 must follow the Problem Name card, unless the data in BLOCK 1 is being carried over from the preceding problem. Data BLOCK 1 may be used more than once in the data deck, to change the values of parameters used in initializing data in the following data blocks, such as SCALE, KD, PHIONE, GONE, HONE, and PCDNE. Thus a data block may be subdivided into sections requiring different values of one or more of the listed parameters, and placed in the data deck with a new BLOCK 1 preceding each section. All other data blocks may be placed in any order, and any number of Type A or B blocks can be used for each data block. If more items are described for a particular block than the allowed limit (see Section 7.1), a diagnostic statement is printed out, the excess items each successively stored in the last available memory location, and KWIT will be set equal to 11. If any table length exceeds the allowed limit (see Section 7.1), the data will be incorrectly sorted, and KWIT will be set equal to 12. In either case, the problem will end after completion of the input and initialization phases.

Although a Type B data block can serve the same purpose as a Type A data block, when all the items have new reference numbers, the time spent searching the block items previously read in is wasteful.

In a Type 2, 3, or 4 continuation problem, a block of data may be cleared from memory, without substituting new data, by including a data block consisting only of a Block Number card with column 8 blank, followed by a blank card. This applies to all blocks except BLOCK 1. BLOCKs 1 and 3 require no blank cards.

If the same item is described more than once in a block, the effects will be additive in BLOCKs 5 and 6, but only the last description will be used in BLOCKs 4, 7, 8 or 9.

4.2.4 Data End Card

The last card of each data deck must be a Data End card, with the word "ENDED" in columns 1 through 5, and either "-1" or "-2" in columns 6 and 7. The options are for the problem either to be interrupted, so it can be restarted later, or to be ended, respectively.

The advantage of ending the problem is that the additional output data produced on the final time step are obtained. If NPUNCH in data BLOCK 1 is 1, the final potentials can either be punched on cards in the format of data BLOCK 9, and placed in the data deck to restart the problem or be written to a file in the BLOCK 9 format.

5.0 BLOCK ITEM DESCRIPTIONS

Input data that may be specified in each data block are summarized in this section of this report. Formats, definitions, options, and suggested uses are described for all input data specified in BLOCK 1, and for one block item in each of the other blocks. A block item is described on a card specifying the identification number or numbers of the material, node, boundary node, or combination of these involved, and other data, and any additional cards required for tables of pressure- or time-dependent variables associated with the block item.

The maximum table length and maximum number of block items allowed in each block of TRUST are given in Table 3.1. The data blocks presently allowed in TRUST are listed in Table 4.1. Short definitions of input data variables are included in the TRUST Glossary, Section 10.3.

Section 3.0 should be referred to for a detailed discussion of the development of the calculational model and selection of input data. Section 9.0 should be referred to for a detailed discussion of the methods of calculation used in the program.

5.1 BLOCK 1 Problem Controls, Limits and Constants (Required)
Read in Subroutine TALLY.

CARD 1 Format (8I5, 10X, 2E10.3)

1-5	IPRINT	Number of time steps between data output, in addition to outputs in first, second and last time steps and outputs controlled by TIMEP. Not used if negative, zero or unspecified.
6-10	NUM	Identification number of a node for which potential, rate of change of potential, source rate and time will be written for each time step. Useful for following the solution at a point of interest in the flow region. NUM not used if unspecified.
11-15	KDATA	Controls options on output data, normal amount (0 or unspecified), minimum (-1), maximum (1).

16-20	KSPEC	Node classification and implicit difference calculations. Normally zero or unspecified. If zero, explicit nodes will be reclassified as implicit nodes only when needed to assure stability and the implicit interpolation factor is made to vary between 0.57 and 1.0. If KSPEC is negative, no nodes may be reclassified and steady state criteria are not used for ending problem. If positive, all nodes are reclassified as implicit nodes before first time step. If 2, interpolation factor is set to 1.0 (backward difference or fully implicit), if 3, interpolation factor is set to 0.5 (central-differencing or Crank-Nicolson scheme). Individual node classifications may be made in BLOCK 4 with KS. All nodes in BLOCK 6 are classified as implicit modes. DELTO and SMALL must be specified when KSPEC>0.
21-25	MCYC	Maximum allowed number of time steps. Not used if zero or unspecified. If negative, problem will be ended after first time step.
26-30	MSEC	Maximum allowed machine time in seconds. MSEC will not be used if zero or unspecifed. If negative, problem will end after first time step.
31-35	NPUNCH	Causes a deck of punched cards or a computer file in BLOCK 9 format to be produced when the problem is ended by ENDED-1 or ENDED-2 or ends normally, if NPUNCH $\neq$ 0. The data are the final values of potentials and sources. The new BLOCK 9 may be inserted with an input deck, which may then be resubmitted to continue the problem.
36-40	NDOT	If nonzero, causes all time derivative to be set to zero timing the problem. Not normally used.
41-45	KSTDATA	If nonzero, data on volume strain will be printed out.
46-50		Blank field.
51-6D	TIMEP	Problem time interval between data output, in addition to outputs on first, second and last time steps and output controlled by IPRINT. TIMEP is ignored if negative, zero or unspecified. Output will be written at exact multiples of TIMEP, if possible by adjusting timesteps in the range SMALL to DELTO.
61-70	SCALE	

<u>CARD 2</u> Format (I5, 5X, 7E10.3)

1-5	KD	Symmetry-type indicator: 1 for nonsymmetric; 2 for axisymmetric; 3 for centrisymmetric. Input values of DRAD in BLOCKS 4, 5 and 6 read in after BLOCK 1 will be replaced with DRAD, 2πDRAD and $4\pi DRAD^2$ respectively. Set to 1 if unspecified or zero.

6-10		Leave blank.
11-20	DELTO	Maximum allowed time steps. May be used with SMALL to limit range of time step. DELTO is set to 10^{12} if unspecified or not in range from 10^{-10} to 10^{12}. DELTO must be specified if KSPEC is positive.
21-30	SMALL	Minimum allowed time step. If SMALL is unspecified, the program sets SMALL to 2/3 of 1% of the smallest time constant of any explicit node in the system. If at least 1/4 of the nodes are explicit nodes, set to 10^{-12}. SMALL should be specified in continuation problems of type 3 or 4, if not specified in original BLOCK 1.
31-40	PSIVARY (ψ_{vary})	Desired maximum change in potential in each time step. Set equal to 5.0 if zero or unspecified. Controls size of time step between limits SMALL and DELTO. Steady state cannot end the problem unless maximum potential change is less than 0.001 PSIVARY for two successive time steps. The convergence criteria for iterative calculations for implicit nodes are a change in the weighted average potential change of all connected implicit nodes of less than $5(10^{-5})$*PSIVARY.
41-50	TAU	Initial problem time. Will be set to zero if unspecified.
51-60	TIMAX	Maximum allowable problem time. TIMAX may not be used if zero or unspecified. If negative, problem will end after first time step.
61-70	PSIMIN	Minimum allowable pressure head in the flow domains. Will be set to 10^{-12} if equal to or larger than PSIMAX or if unspecified.
71-80	PSIMAX	Maximum allowable pressure head in the flow domains. Will be set to 10^{12} if equal to or less than PSIMIN, or if unspecified.

<u>CARD 3</u>: Format (8E10.3)

1-10	PHIONE	Initial potential (PHI = Z + PSI) for all nodes for which PPHI is not specified in BLOCK 9.
11-20	GONE	Constant source or sink rate for all nodes for which GG is not specified in BLOCK 9.
21-30	HONE	Fluid mass transfer coefficient for all external connections for which no HSURE or a HSURT table is specified in BLOCK 6.

31-40 PCONE Preconsolidation stress for all nodes for which no PC(N) is specified in BLOCK 9.

5.2 <u>BLOCK 2</u> System and Material Properties.
Read in subroutines THERM and HYST.

In this group, three groups of cards are read in as follows:

<u>Group 1</u>: System parameters. Card 1 of this group starts with "SYSTM" in cols. 1 through 5.

<u>Group 2</u>: Properties of individual materials. The first card of this group starts with the material name in cols. 1 through 5.

<u>Group 3</u>: Data relevant to the χ parameter used in deformation of the unsaturated zone. This group is simply ignored if the χ parameter is not considered.

<u>Group 1</u>: System properties

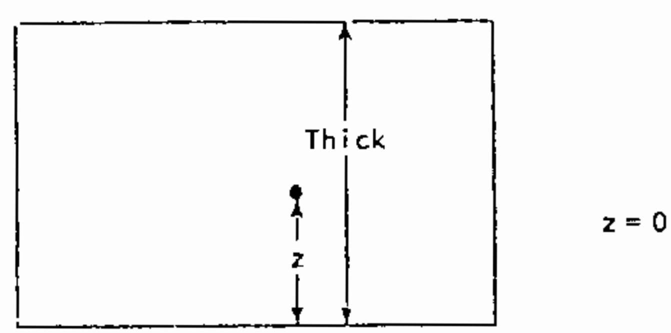
<u>CARD 1</u> Punch the word "SYST" in cols. 1 through 4.

<u>CARD 2</u> Format (A4, 6X, 4E1D.3)

1-4 APATH Punch the word "DRY" or "WET" as the case may be in the cols. 1 through 4. The program assumes that at the beginning the system is either drying everywhere or wetting everywhere. Leave this field blank for a fully saturated flow region.

5-10 Leave blank.

11-2D THICK Thickness of flow region, in units of legnth; used in calculating total stress.



As it is, provision is made only for one value of "THICK". Modifications will be needed if a general, irregularly shaped flow region is to be considered.

21-30	RD	Specific gravity of saturated soil, defined as a unit wt. of saturated soil divided by unit wt. of water.
31-40	XF	Fracture length or similar parameter used in calculating dimensionless variables such as t_D. XF has units of length and a default value of 1.0.
41-50	QOVERH	Flow rate from well per unit aquifer thickness. Used for computing dimensionless pressure P_D. Units of (L^3/T).

Group 2: Material Properties

CARD 1 Format (A4, 1X, 5I5, 5E10.3)

1-4	AMAT	Name of material.
5		Leave blank.
6-10	MAT	Material identification number.
11-15	LTABC	Number of tabulated values of saturation. Positive, if versus pressure head and negative, if versus time. Zero, if only one value is specified.

Set LTABC = 100 if S is related to ψ by the relation,

$$S = S_r + (1 - S_r) \frac{\alpha}{\alpha + (\psi_{airentry} - \psi)^n}$$

where $\psi < 0$. For $\psi > 0$, $S = 1$.

16-20	LTABSC	Number of scanning curves used when S versus ψ hysteresis is to be considered. Zero or leave blank if hysteresis is ignored.
21-25	LTABK	Number of tabulated values of permeability as a function of pressure head. Positive, if versus pressure head, negative, if versus time.

Set LTABK = 100, if permeability k is related to ψ by the relation,

$$k = k_o \frac{A}{A + (0 - \psi)^B}$$

When $\psi < 0$. For $\psi \geq 0$, either k_o is constant or is to be considered as a function of void ratio, using C_k.

26-30	LTABSK	Number of scanning curves used when k versus ψ hysteresis is ignored.
31-40	AV	Coefficient of compressibility, a_v. Has units of pressure^{-1} Set AV = 0 or leave this field blank when it is desired to use specific storage, S_s.
41-50	EZ	Reference void ratio on the curve of e versus effective stress, PZ, corresponding to EZ.
51-60	PZ	Reference effective stress corresponding to EZ. Dimension (M/LT^2).
61-70	CONT	Permeability if constant permeability is to be used (i.e., LTABK = 0). Leave blank if LTABK is not equal to zero. Dimension (L^2).
71-80	SS	Specific storage. Dimension (L^{-1}). When S_s is used, AV _must_ be set to zero or left blank.

CARD 2 For reading in C_c and/or C_k. Omit this card if C_c or C_k or both are not used.

Format (7E10.3)

1-10	CS	Swelling index, C_s. Dimensionless.
11-20	CC	Compression Index, C_s. Dimensionless.
21-30	EZ	Reference void ratio e_o on the e versus log σ' curve.
31-40	PZ	Reference effective stress corresponding to EZ. Dimension (M/LT^2).
41-50	CK	Slope of the e versus log k straight line.
51-60	EK	Reference void ratio on the e versus log σ' straight line.
61-70	CONZ	Reference permeability corresponding to EZ. Dimension (L^2).

Subgroup 2A. Cards in this group are used to input S versus ψ, k versus ψ, and scanning curve data for the unsaturated soil, $\psi \leq 0$. Read in HYST.

CARD 1 If LTABC = 100 or LTABK = 0 or both, this card is used to input the parameters α, S_r, η, A, B, k_o and $\psi_{airentry}$. When LTABC $\neq$ 100, this card and the following cards are used for tabulating the various functional dependencies.

CASE 1: LTABC = 100

CARD 1 Format (7E10.3)

1-10	A	
11-20	B	$k = k_o \dfrac{A}{A + (0 - \psi)^B}$, $\psi < 0$
21-30	CONT or k_o	
31-40	α	
41-50	η	
51-60	SR	$S = S_r + (1 - S_r) \dfrac{\alpha}{\alpha + (\psi_{air} - \psi)^\eta}$
61-70	PSIAIR	

where S_r = residual saturation and ψ_{air} = air entry value and $\psi < 0$.

CASE 2: LTABC $\geq$ 2, but $\neq$ 100, Tabulated Values of Saturation

CARD 1 Pressure head, format (8E10.3)

1-10 PSIVARC (1)

11-20 PSIVARC (2)

21-30 PSIVARC (3)

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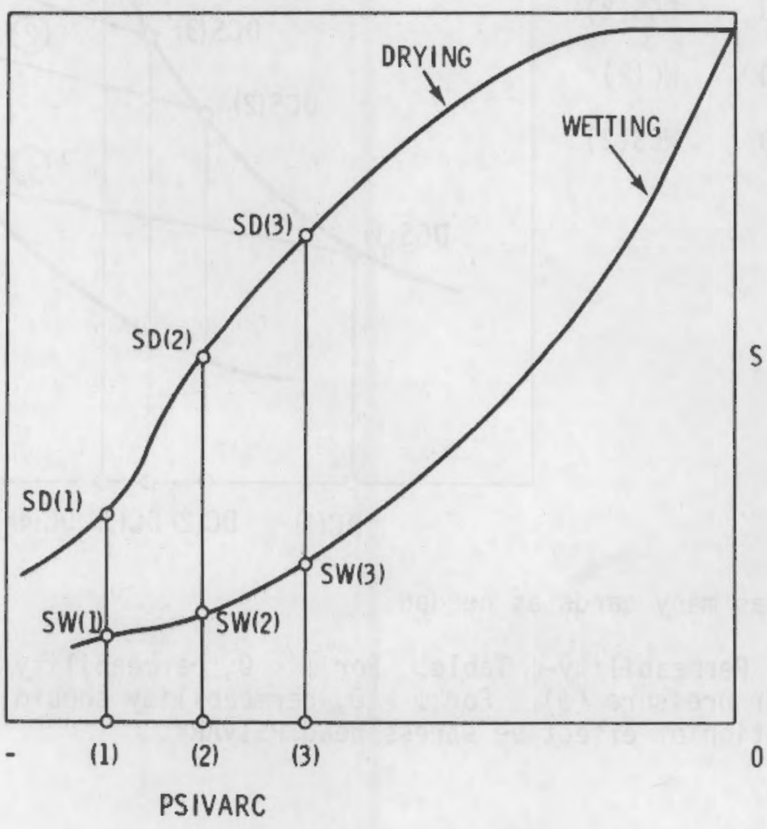


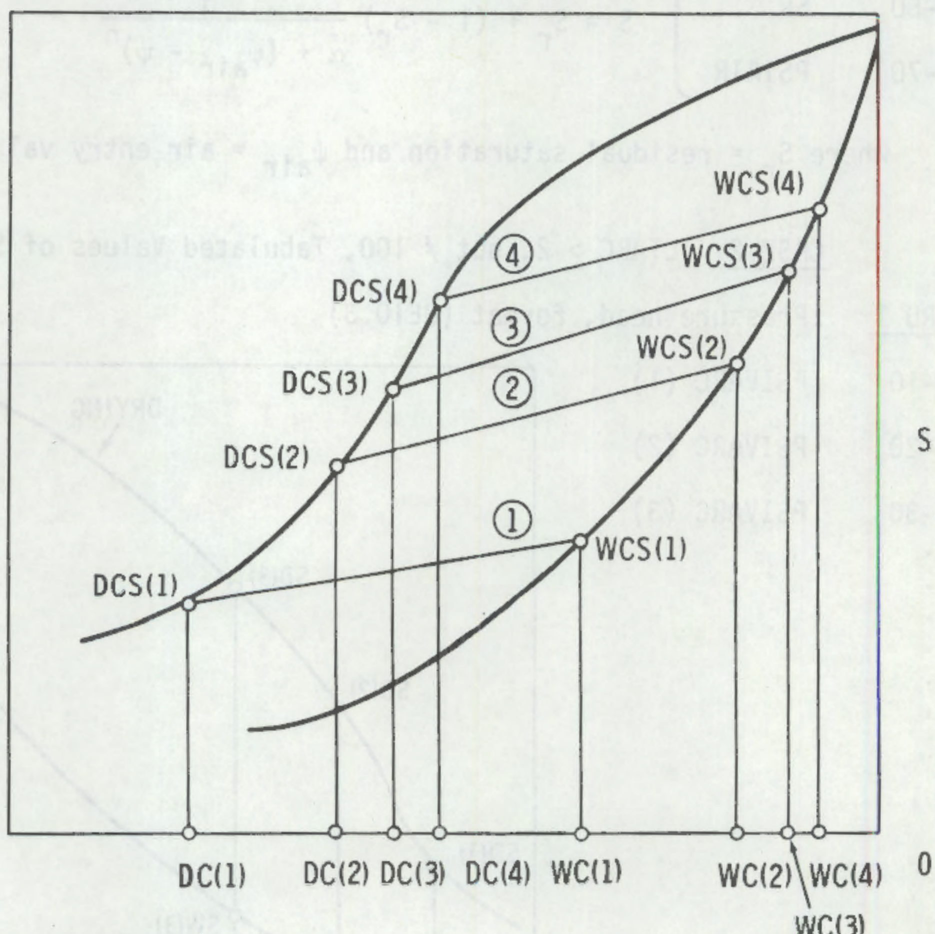
Use as many cards as needed. Note that PSIVARC (J) < PSIVARC (J + 1), J = 1, 2, 3, ... LTABC.

CARD 1A Wetting (SW), drying (SD) curves, format (8E10.3)

1-10	SW(1)	Use as many cards as needed. If there is no hysteresis, set SW = SD
11-20	SD(1)	
21-30	SW(2)	Saturation, wetting curve. } corresponding to pressure heads in CARD 1
31-40	SD(2)	Saturation, drying curve. } corresponding to pressure heads in CARD 1

CARD 2 Saturation scanning curve data. Omit this group if LTABSC = 0.

1-10	DC(1)
11-20	DCS(1)
21-30	WC(1)
31-40	WCS(1)
41-50	DC(2)
51-60	DCS(2)
61-70	WC(2)
71-80	WCS(2)



Use as many cards as needed.

Permeability-ψ Table: For $\psi < 0$, permeability is a function of pore water pressure (ψ). For $\psi > 0$, permeability should be tabulated as a function of effective stress head PSIVARK.

CARD 3 Permeability vs. pressure head. Omit this group if LTABK < 2 or LTABK = 100.

Pressure head, format (8E10.3).

1-10 PSIVARK(1)

11-20 PSIVARK(2)

21-30 PSIVARK(3)

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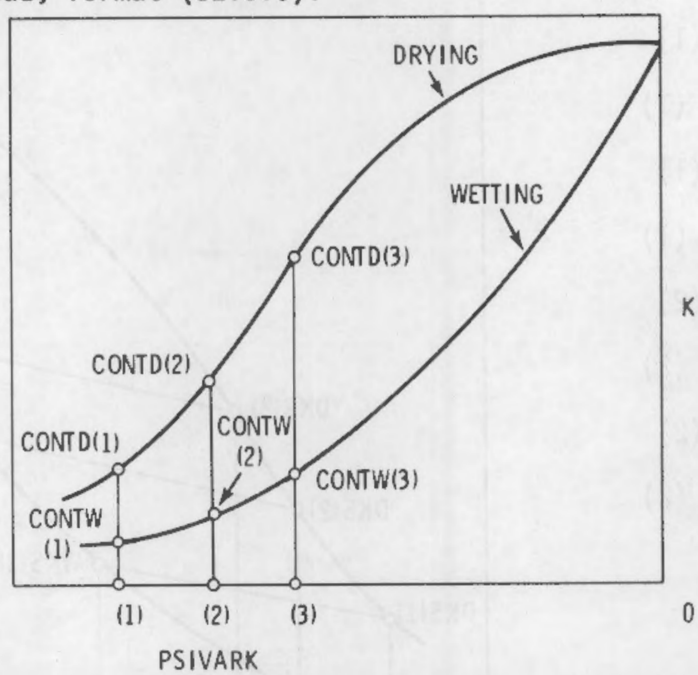

Use as many cards as needed. Note that PSIVARK (J) < PSIVARK (J + 1)

CARD 3A Wetting conductivity (CONTW) and drying conductivity (CONTD)

1-10 CONTW (1)

11-20 CONTD (1)

21-30 CONTW (2)

31-40 CONTD (2)

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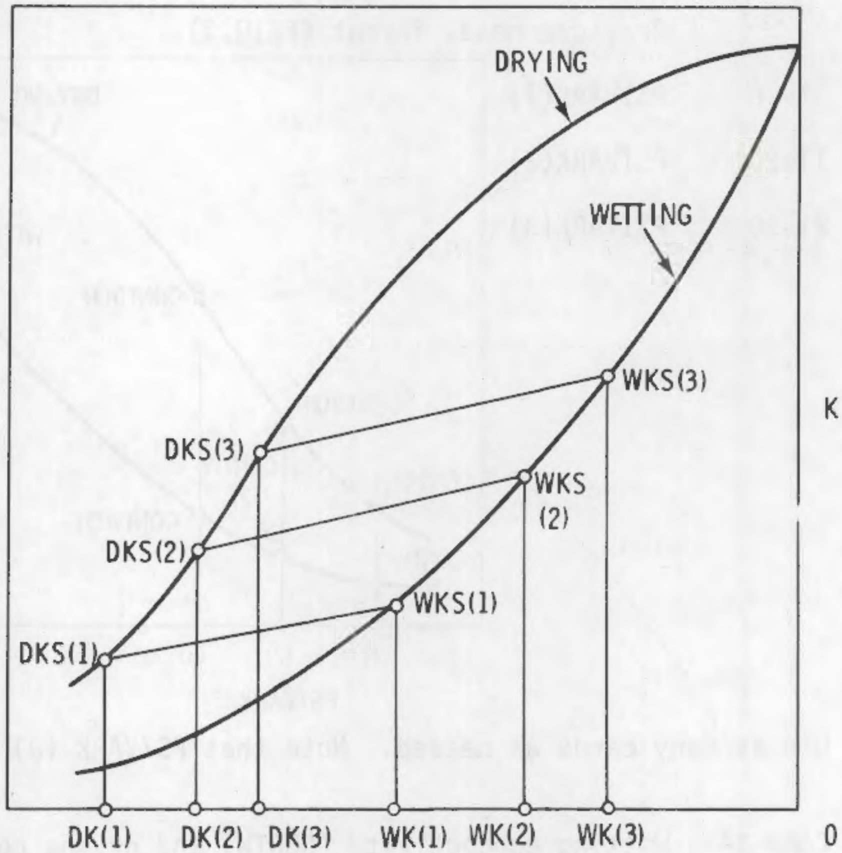
Use as many cards as needed.

CARD 4 Permeability Scanning curve data. Omit this group if LTABSK = 0.

Format (8E10.3)

1-10	DK (1)	
11-20	DKS (1)	
21-30	WK (1)	
31-40	WKS (1)	
41-50	DK (2)	
51-60	DKS (2)	
61-70	WK (2)	
71-80	WKS (2)	



Use as many cards as needed.

Group 3: Data related to the χ parameter in deformation of the unsaturated zone. Read in THERM.

CARD 1 Format (A4,1X,I5)

1-4	Punch the word "CHI" in cols. 1 to 3.	
5	Leave blank.	
6-10	LTABCHI	Number of tabulated values of χ. Positive if versus saturation. Negative if versus pressure head.

CARD 2 Format (8E10.3)

1-10	CHI (1)
11-20	CHIVARS (1) Saturation, if LTABCHI > D CHIVARP (1) Pressure head, if LTABCHI < 0

21-30 CHI (2)

31-40 CHIVARS (2)
CHIVARP (2)

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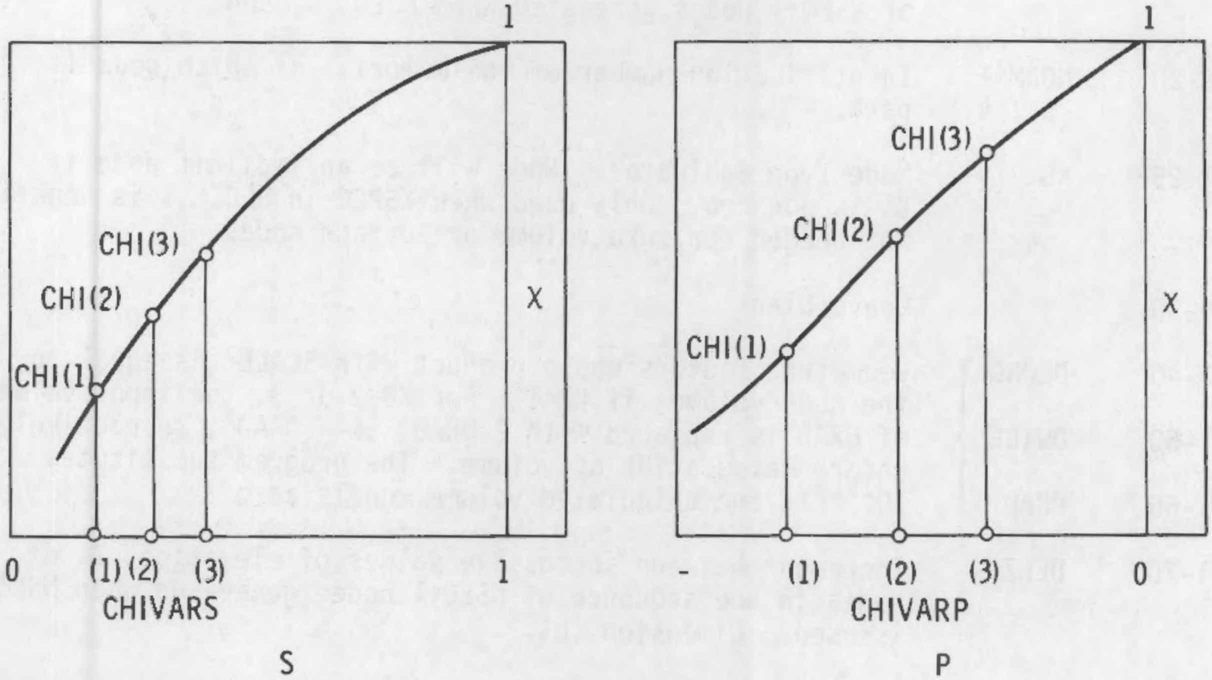
Use as many cards as needed.



End BLOCK 2 with a blank card.

5.3 <u>BLOCK 3</u> Properties of the fluid.
Read in Subroutine TALLY.

Format (10A1, 4E10.3)

1-10	AFLUID	Name of fluid.
11-20	VISC	Coefficient of viscosity (M/LT)
21-30	BETA	Compressibility of fluid (LT^2/M)
31-40	RHOZ	Density at $\psi = 0$ (M/L^3)
41-50	GEE	Gravitational constant (L/T^2)

5.4 BLOCK 4 Node description.
Read in subroutine THERM.

Format (5I5, 5X, 5E10.3)

1-5	NODE	Node identification number. Use a negative number if the node lies on or will lie on a seepage face.
6-10	NSEQ	Number of identical nodes to be generated in sequence.
11-15	NADD	Increment between successive values of NODE in the sequence of NSEQ+1 nodes generated when NSEQ is used.
16-20	NODMAT	Identification number of the material of which node is part.
21-25	KS	Node type indicator. Node will be an implicit node if KS is nonzero. Only used when KSPEC in BLOCK 1 is negative. Not needed for zero volume or surface nodes.
26-30		Leave blank
31-40	DLONG	Geometric factors whose product with $SCALE^3$ is equal to the node volume, if KD=1. For KD=2 or 3, the input value of DRAD is replaced with 2πDRAD, or $4\pi DRAD^2$, respectively, before calculation of volume. The program substitutes 10^{-24} if the calculated volume equals zero.
41-50	DWIDE	
51-60	DRAD	
61-70	DELZ	Increment between successive values of elevation, Z, of nodes in the sequence of NSEQ+1 nodes generated when NSEQ is used. Dimension (L).
71-80	Z	Elevation of node. Dimension (L).

End BLOCK 4 with a blank card.

5.5 BLOCK 5 Internal fluid flow connections.
Read in subroutine FINK.

Format (2I5, 3I3, 1X, 4E10.3)

1-5	NOD1	Identification numbers of the connected nodes.
6-10	NOD2	
11-13	NSEQ	Number of additional identical connections.
14-16	NAD1	Increments between successive values of NOD 1 and NOD 2 in the sequence of NSEQ+1 connections generated when NSEQ is used.
16-19	NAD2	

20		Leave blank.
21-30	DEL1	Lengths, when multiplied by SCALE, of the fluid flow paths from the nodal points in NOD 1 and NOD 2, to the connected interface. Should not both be zero.
31-40	DEL2	
41-50	DLONG	Geometric factors whose product with $SCALE^2$ is the area of the connected interface if KD=1. For KD values of 2 or 3, the input value of DRAD is replaced with 2πDRAD or $4\pi DRAD^2$, respectively, before calculating area.
51-60	DRAD	

End BLOCK 5 with a blank card.

5.6 <u>BLOCK 6</u> External fluid flow connections.
Read in subroutine SURE

<u>CARD 1</u> Format (6I5, 5E10.3)

1-5	NODS	Surface node identification number. NODS should be either zero volume node or with a nodal point on the external surface.
6-10	NODB	Boundary node identification number.
11-15	NSEQ	Number of additional identical connections to be generated.
16-20	NADS	Increments between successive values of NODS and NODSB respectively, in the sequence of NSEQ+1 connections to be generated when NSEQ is used.
21-25	NADSB	
26-30	LTABH	Number of tabulated values of surface fluid transfer coefficients. Positive if versus potential, negative if versus pressure head.
31-40	DLONG	Geometric factors whose product with $SCALE^2$ is the area of the external surface of NODS if KD=1. For KD=2 or 3 the input value of DRAD is replaced by 2πDRAD or $4\pi DRAD^2$ respectively, before calculating the area.
41-50	DRAD	
51-60	HSURE	Surface fluid transfer coefficient if constant. Dimensions (M/TLL^2).

<u>CARD 2</u> Format (8E10.3). Omit if LTABH = 0.

1-10	HSURT (1)	Surface fluid transfer coefficient
11-20	PSIVARH (1)	Potential, if LTABH > 0; pressure head, if LTABH < 0.

31-30	HSURT (2)	
31-40	PSIVARH (2)	

Use as many cards as needed.

End BLOCK 6 with a blank card.

5.7 BLOCK 7 Boundary nodes or external potentials. Read in subroutine SURE.

CARD 1 Format (2I5, 7E10.3)

1-5	NODB	Boundary node identification number.
6-10	LTABPHI	Number of tabulated values of external or boundary potential. To obtain sinusoidal variation of boundary potential with time, LTABPHI = 100.
11-20	ZB	Elevation of boundary node
21-30 41-50 61-70	PHIB	External potentials
31-40 51-60 71-80	TIMEB	Time corresponding to PHIB.

End Block 7 with a blank card.

5.8 BLOCK 8 Internal variable fluid generation list. Read in subroutine GEN.

CARD 1 Format (4I5, 6E10.3)

1-5	NODG	Node identification number.
6-10	NSEQ	Number of identical nodes to be generated in sequence.
11-15	NADG	Increment between successive values of NODG in the sequence of NSEQ+1 nodes generated when NSEQ is used.
16-20	LTABG	Number of tabulated values of fluid generation. Positive if versus potential, negative is versus time.
21-30 41-50 61-70	GT(1)	Fluid generation rate corresponding to TVARG 1. Dimension (L^3/T).

31-40	TVARG (1)	Potential or time corresponding to GT(1)
51-60	etc.	Up to three pairs of values on this card and four pairs on each additional card as required. Use format (8E10.3) for additional card.
71-80		

End BLOCK 8 with a blank card.

5.9 BLOCK 9 Initial conditions. Read in subroutine TALLY.

Format (3I5, 5X, 3E10.3)

1-5	NOTE	Node identification number
6-10	NSEQ	Number of additional nodes with identical initial conditions.
11-15	NADD	Increment between successive node numbers in the sequence of NSEQ+1 nodes generated when NSEQ is used.
16-20		Leave blank.
21-30	PPHI	Initial potential. Set to PHIONE (BLOCK 1) if unspecified.
31-40	GG	Fluid generation rate. Set to GONE (BLOCK 1) if unspecified. Has no effect if GT versus TVARG is specified for this node in BLOCK 8.
51-60	PC	Initial preconsolidation stress.

End BLOCK 9 with a blank card.

5.10 BLOCK 10 Data for calculating dimensionless variables t_D and P_D. Read in TALLY.

Format (3I5, 5X, 6E10.3)

1-5	NODTD	Identification number of the node for which dimensionless quantities are to be completed.
6-10	NSEQ	Number of additional nodes to be generated
11-15	NADD	Increments between successive nodes in the sequence of NSEQ+1 nodes generated when NSEQ is used.
16-20		Leave blank.
21-30	X	X-coordinate of nodal point

31-40	Y	Y-coordinate of nodal point
41-50	Z	Z-coordinate of nodal point $R(BODTD) = \sqrt{X^2 + Y^2 + Z^2}$
51-60	DELX	Increments to the values of X, Y, and Z in the sequence of NSEQ+1 nodes generated when NSEQ is used
61-70	DELY	
71-80	DELZ	

End BLOCK 10 with a blank card.

Note:

$$t_D = \frac{k\rho gt}{\mu S_S r^2}$$

$$P_D = \frac{2\pi k\rho g\Delta P}{(Q/H)\mu}$$

6.0 SYSTEM USAGE AND OPERATIONS

TRUST currently exists on UNIVAC and VAX-11 computers. It is also available on the CDC 6400/6600/7000 system at LBL. Unlike the version on UNIVAC, the TRUST programs on VAX do not deal with punching cards. There are two versions of TRUST on the VAX: single and double precisions. Both operate in the same manner.

The user first creates an input data file containing all the necessary information to run TRUST. This data file conforms to the formats specified previously for the BLOCK items. The file name for the input data file is input during the demand mode or supplied in the batch mode. The data file is opened by the program through logical Unit 1. Final conditions in BLOCK 9 format are written to logical Unit 2 as a restart file. When continuation of the run in desired, the last BLOCK 9 data in the input file should be replaced with this restart file, TAU updated and computation can resume with the revised input file. The program also requires output file name for storing a result file. The result file is written to Unit 5 at selected time plane frequence. It contains time and delta time, potentials at each node, and node pairs as specified in BLOCK Ø 5 and the flux rate during the last computed time plane. The result file, in conjunction with other existing programs, is useful in plotting velocity field, pathlines, moisture distribution and contaminant fronts.

4.4 SYSTEM USAGE AND OPERATIONS

TRUST currently exists on UNIVAC and VAX-11 computers. It is also available on the CDC 6600/6800/7000 system at LBL. Unlike the version on UNIVAC, the TRUST programs on VAX do not deal with punching cards. There are two versions of TRUST on the VAX: single and double-precisions. Both operate in the same manner.

The user first creates an input data file containing all the necessary information to run TRUST. This data file conforms to the formats specified previously for the BLOCK items. The file name for the input data file is inputs during the command mode or supplied in the batch mode. The data file is opened by the program through logical unit 8. Final conditions in BLOCK 3 format are written to logical unit 12 as a restart file. When continuation of the run is desired, the last BLOCK 3 data in the input file should be replaced with this restart file, TAU updated and computation can resume with the revised input file. The program also requires output file name for storing a result file. The result file is written to unit 3 at selected time plane frequence. It contains time and delta time, potentials at each nodes, and node pairs as specified in BLOCK # 9 and the flux rate during the last computed time plane. The result files, in conjunction with other existing programs, is useful in plotting velocity field, pathlines, moisture distribution and contaminant fronts.

7.0 EVALUATION OF CALCULATION RESULTS

7.1 DIAGNOSIS OF INPUT ERRORS

All input values, values substituted by the program for blank data fields, and values of a number of derived quantities, such as node volumes, connection areas, and material summary data, are written out at the beginning of each problem. These should be carefully checked against the intended calculational model.

If the problem ended or dumped before all the input data were read in, the cause may have been a missing Problem Name card, a missing Block Number card, a missing blank card at the end of a data block, a missing Data End card, an incorrect table length, an illegal character punched, data punched in the wrong columns, a card out of place, or a floating point exponent which is too large. These errors usually cause an illegal character, indefinite operator, overflow, or insufficient-data diagnostic.

If all the input data were read in but the problem ended before the first time step, the value of KWIT on the printout may be 5, 6, 9, 11, or 12 and indicates the type of error which occurred, as listed in Table 7.1. Diagnostic statements are written out for each occurrence of most input errors detected by the program, and the value of KWIT may indicate only the last type of error detected.

If the problem ends after the first time step, KWIT may be 1, 2, 3, 4, 6, 7, 8 or 10, because of one of the causes listed in Table 7.1 or because of an incorrect floating-point exponent in the input data, resulting in an overflow or indefinite-operator error, causing a system dump. The input values of TIMAX, TMIN, TMAX, MCYC and MSEC must be carefully considered to allow the problem to run long enough to obtain the desired redsults.

7.2 ANALYSIS OF CALCULATION RESULTS

All output data obtained for each problem should be carefully checked for accuracy, consistency, and credibility. Accuracy of the fluid mass balance

TABLE 7.1. Values of the Problem-End Sentinel KWIT

KWIT	Cause of Problem Ending
1[a]	Problem time *SUMTIM* reached TIMAX
2[a]	A pore pressure exceeded PSIMAX + 0.001*PSIVARY
3[a]	A pore pressure was less than PSIMIN - 0.001*PSIVARY
4[a]	Steady-state criteria were satisfied
5[b]	An unspecified material, node or boundary node was referred to
6	-2 punched in columns 6-7 of data end card or *CHECK card preceded problem name card
7[a]	The number of time steps reached MCYC
8[a]	The number of seconds of elapsed machine time used since the start of this job reached MSEC
9[b]	No material list (BLOCK 2) or node list (BLOCK 4) was specified or carried over from the preceding problem
10[b]	Iterative scheme for pressure head changes in connected special nodes failed to converge in 80 iterations by use of a time step = 2*SMALL
11[c]	The number of items in a data block exceeded the maximum size
12[c]	The length of a table for a time or pressure dependent input quantity exceeded the maximum size.

(a) Limits specified in data BLOCK 1, see Section 3.11.
(b) Diagnostic statements are written out for each occurrence.
(c) See Table 3.1.

can be checked for the system, each material, each node, each boundary node, each internal connection, and each external connection. Spatial and time accuracy can be determined to some degree by the smoothness of plots of potential versus position and time. Consistency and credibility can be determined by comparing the results with those obtained for similar systems or with those expected on the basis of experience, sound judgment, and familiarity with the physical laws governing the system.

Errors in the fluid mass balance can result from use of too large a value of PSIVARY, relative to the maximum total potential change in the system (see Section 3.13); use of zoning that is too fine, which results in time constants

(SLIM) that are very small, relative to the time steps used in the calculation, and usually results in slowness or failure of the iteration procedure; and use of fluid capacities that are strongly ψ dependent, combined with time steps too large to allow the moisture-capacity curves to be closely followed.

Physically unrealistic solutions can also result from evaluation of ψ dependent quantities at potentials outside the range given in input tables. This can be avoided by use of a potential range in the table that includes all possible calculated potentials, or by beginning and ending the table with zero slopes. The program substitutes 10^{-24} for zero or negative values of hydraulic conductivity, and 10^{-36} for zero or negative values of total node fluid capacity, but surface fluid-transfer coefficients and other tabulated quantities may be negative.

7.3 REQUIREMENTS FOR ADDITIONAL CALCULATIONS

Additional calculations may be required to correct errors by 1) improving accuracy by using a more finely subdivided system, 2) employing different methods of controlling the calculations, 3) determining the effects of uncertainties in input values by trying a range of values, or 4) determining the effects of simplifications in the model by trying other models. When a large number of similar calculations are to be made for the same or similar systems, careful choice of calculational controls and degree of subdivision into nodes will result in the minimum use of machine time for the required accuracy. Also, improvements such as in optimum organization of input data may greatly reduce the effort required for additional calculations.

7.4 GENERALIZATION OF RESULTS

Many problems can be generalized by expressing the results in dimensionless or normalized form, so as to be applicable to problems other than the specific problem calculated or to simplify comparison with the results of other similar calculations. Input data may be specified in dimensionless or normalized form (or optional linear transformations applied to plotted variables) to produce graphs in dimensionless or normalized form.

The parameters potential or pressure difference ψ, position x, time t, density ρ, specific moisture capacity C, hydraulic conductivity k, a basic dimension L, a basic potential or pressure difference ψ_0, fluid-generation rate G, surface flow flux per unit area F, fluid-transfer coefficient h, and total quantity of fluid W may be combined into the following dimensionless ratios, and into any combinations of them:

$$\psi/\psi_0,\ x/L,\ kt/\rho CL^2,\ Gt/\rho^2 C\psi_0,\ FL/k\psi_0,\ hL/k, \text{ and } W/\rho CL^3\psi_0.$$

Graphs are usually made by using two of the first four groups, or combinations thereof with other groups, as ordinate and abcissa. By selecting suitable groups, and scales, useful analytic approximations can often be found for large, small, or intermediate ranges of values of the groups.

8.0 SAMPLE PROBLEM

The purpose of this sample problem was to examine potential groundwater contamination by seepage from buried tailings. Extensive drilling in the area under investigation delineated the size and depth of the pit boundaries. The model was used to examine management practices and investigate reduction of the seepage from the tailings. The input and output are complex and large, but illustrate the capabilities of the model.

8.1 CONCEPTUAL MODEL

Figure 8.1 shows half of a cross-section of a typical burial pit. Only half of the typical cross section is shown for use in modeling since the other half would be a mirror image. The typical pit shown has an average width of 132.88 m or 600 ft (300 ft in Figure 8.1) and a depth of buried tailings of 25.91 m (85 ft), with the water table initially at 3.96 m (13 ft) below the top of the clay liner.

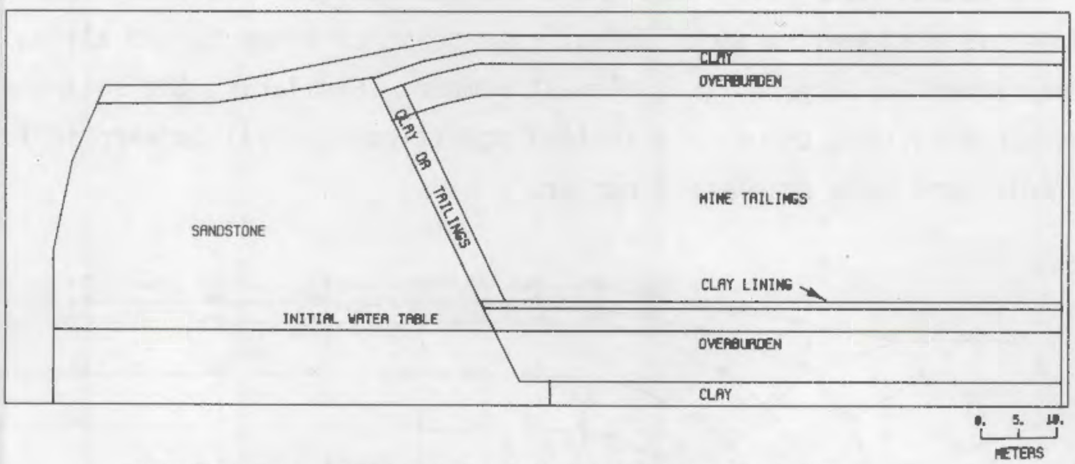


FIGURE 8.1. Schematic Diagram of Half of the Typical Tailings Burial Pit

8.1.2 Model Grid of Typical Tailings Pit

The typical tailings pit cross section and the immediately surrounding area were discretized into irregular elements for use in the integrated finite difference numerical solution method, which is used in the TRUST code for solving problems involving both partially saturated and saturated flow. The resulting element network is shown in Figure 8.2. It is convenient to think of each element in the figure as having a grid point at approximately the center of the element.

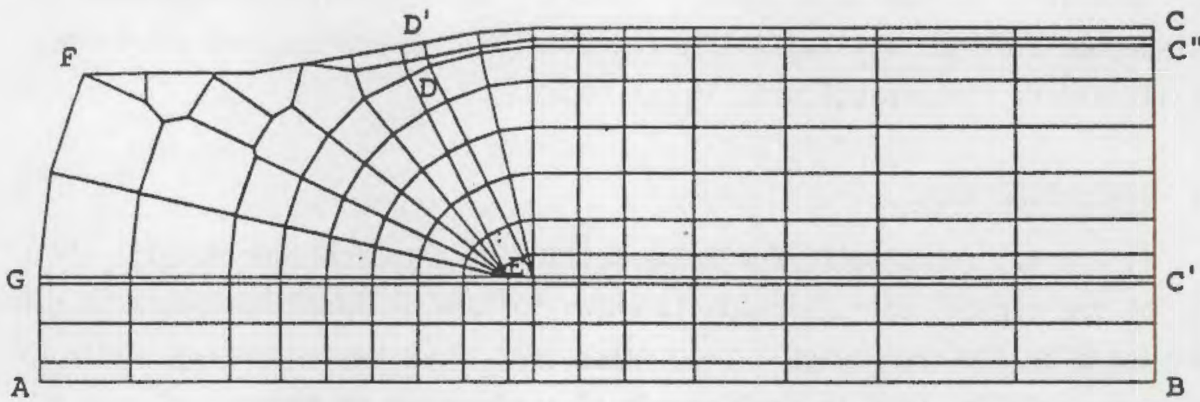


FIGURE 8.2. Model Grid Elements for Half of a Typical Tailings Burial Pit

The actual node points and their interconnections are shown in Figure 8.3. A number is assigned to each central grid point or element, and all calculations are performed in terms of that element number. Similarly, the soil characteristics, boundary conditions, and initial conditions are all indexed in terms of the individual node or element number.

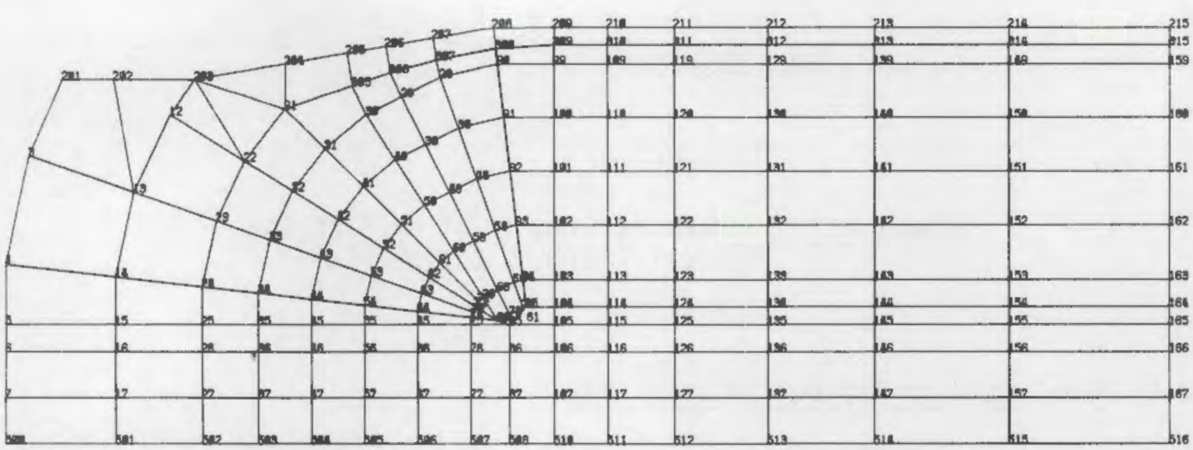


FIGURE 8.3. Grid of Model Nodes and Identifying Node Numbers

The element configuration shown in Figure 8.2 was designed to accommodate data for different soil materials such as those shown in the slim horizontal elements representing the clay liner beneath the tailings and in the clay cover for the tailings. For example, in the slim elements between C' and E in Figure 8.2, compacted clay material data are used; while in the slim elements between E and G, regular sandstone characteristics are used. In elements between D and E, if clay material is used then the side-lined alternative can be analyzed; however, those same elements are specified as tailings materials for this problem and no side wall liners is considered.

8.1.3 Fluid Flow Boundary Conditions

In Figure 8.2, along the lower boundary between A and B, the flow normal to the boundary is zero. In other words, there may be flow parallel to AB, but there is no flow vertically across this boundary. Similarly, there is no flow across boundary BC'C"C because this is a boundary of symmetry with horizontal flow components of zero. No inflow of infiltration across the top boundary CD'F is assumed. The boundary FGA was held as an equipotential boundary at the potential head of 9.75 m (32 ft), which is the initial water table elevation. Such a boundary condition between points A and G in Figure 8.2 results in essentially horizontal outflow toward the left of the system. For practical purposes, the outflow between points G and F is effectively zero for this constant potential conditions. The hydraulic conductivity in the very dry, partially saturated region between points G and F is very small.

8.1.4 Fluid Flow Initial Conditions

In the region in Figure 8.2 enclosed by ABC'EDC"CD'FGA, the materials are considered to be in equilibrium with the regional water table, which is located 3.96 m (13 ft) below the top of the bottom clay liner. The water table is at a potential head of 9.75 m (32 ft). Accordingly, everywhere in the region--except in the pit and up to the clay layer that covers the pit--the initial potential head is 9.75 m (32 ft). This assumes that only minor water table fluctuations may have occurred recently and that the large mass of natural material around the pit has not been significantly disturbed.

The initial conditions just described assume that the burial pit is completely filled at the initial time (time equals zero) either with saturated or dewatered tailings, depending upon the situation being studied. No seepage or drainage is assumed to have occurred prior to time equals zero. In actual practice, the pit is filled gradually and some seepage occurs during this time; however, any seepage losses during filling correspondingly reduce the saturation in the tailings; i.e., the two phenomena tend to be compensatory. In other words, the initial condition assumes that seepage lost during filling is still in the tailings pit at time equals zero, and that all fluid must drain out later. Such an initial condition tends to represent a worst-case maximum stress to the system from the standpoint of environmental consequences.

8.1.5 Soil Materials

The materials used for this study represent both the materials that will be mined and processed in the mill operation and the undisturbed sediments adjacent to the mine pits through which the leachate may move. The materials characterized included the following: uranium mill tailings, clayliner, overburden, and sandstone.

8.2 DATA INPUT

The input, Appendix A, mathematically describes the case presented in the conceptual model Section 8.1. The details of the card input is described in Section 4.0. The initial conditions described in Block Ø9 are replaced by output from the first run should one wish to continue and the starting time, TAU, on Card 3 of Block Ø1 would be updated. Multiple continuation runs are the rule rather than the exception on large problems. Input listings are included in Appendix A.

8.3 OUTPUT FROM TRUST

The TRUST code output can be controlled by the point frequency option on Card 1 of Block Ø1. However, the program prints a rather extensive digest of the input stream which is very helpful for error checking. The output from the typical mine tailing problem detailed in this section are included in Appendix B. It is, however, not a complete solution but only a solution for the number of days indicated. It does, however, illustrate the application of the model.

9.0 METHODS OF SOLUTION

9.1 CALCULATIONAL SCHEME AND ORGANIZATION

At the beginning of a problem the parameters are initialized, and the total stress, volume of solids, and preconsolidation pressure are calculated for each element. Following this, various system parameters are evaluated and summarized.

Before carrying out the time step calculations it is necessary to choose Δt, reclassify elements as needed, estimate time derivatives and λ, and evaluate the appropriate mean values of **k** and M_c. The first time step is always set to 10^{-12} so as to start the calculations smoothly and to establish time derivatives. For each time step, $\Delta\psi_{exp}$ and the fluxes due to the explicit changes in potential are first calculated for all elements in the system. Following this the iterative scheme is employed to make the necessary corrections to $\Delta\psi$ for all the implicit elements in the system. Upon obtaining proper convergence, final corrections are made to all the fluxes involving implicit elements and to the potentials at all explicit elements connected to implicit elements.

If convergence does not occur in 80 iterations, if $\Delta\psi_{max}$ exceeds twice ψ_{var}, or if any tabulated quantities change by more than 2%, the time step calculations are discarded, Δt is halved, and the calculations are repeated. If the reduced Δt is less than Δt_{small} and more than 40 iterations are required, failure of convergence is assumed, and the problem is terminated.

The code TRUST is organized into a main program and the principal subroutines THERM, HYST, FINK, GEN, SURE, SPECK, and TALLY. Other subroutines are used for cross-references, encode-decode, interpolation, and other subordinate operations. The main program is used for initializing parameters and for calling the various calculational subroutines. THERM is used for input of material and element properties and for evaluating ψ-dependent coefficients for $\psi > 0$. HYST is used for evaluating material properties when $\psi \leq 0$. The fluxes and the associated changes in ψ due to the explicit part are calculated in FINK for the internal connections and in SURE for the surface connections.

Explicit calculations related to sources or sinks are performed in GEN. The implicit iterative calculations as well as the associated corrections to fluid fluxes and the corrections to explicit elements connected to implicit elements are carried out in SPECK. Summarizing the material balance, making all preparations for the next time step, and controlling the frequency of output are functions of the subroutine TALLY.

9.2 CALCULATION OF PROPERTIES, HYSTERESIS AND FLUID MASS BALANCE DATA

9.2.1 Evaluation of Tabulated Properties

A number of input properties may be tabulated functions of time, potential or pressure head. These include saturation (SW and SD versus PSIVARC), saturation scanning (DCS and WCS versus DC and WC), permeability (CONTD and CONTW versus PSIVARK) and permeability scanning (DKS and WKS versus DK and WK). Also included is the Bishop's parameter χ in deformation of the unsaturated zone (CHIVARS or CHIVARP versus CHI) and surface fluid transfer coefficients (HSURT versus PSIVARH). External potential may be tabulated functions of time (PHIB versus TIMEB).

At each time t (SUMTIM) in the calculation, average values of all tabulated properties must be estimated for use during the next time step Δt (DELT). These values are calculated from the tables by the point-slope method of interpolation, with extrapolation beyond the range of the table. Time-dependent parameters are calculated for an average time:

$$\overline{t} = t + \lambda \, \Delta t \qquad (9.1)$$

except for external potentials, evaluated at $t + \Delta t$. ψ-dependent parameters are calculated for estimated average node pressure $\overline{\psi}_n$ and average external pressure $\overline{\psi}_b$:

$$\overline{\psi}_n = \psi_n + \lambda \, \Delta t \, \dot{\psi}_n \qquad (9.2)$$

$$\overline{\psi}_b = \psi_b + \lambda(\psi_b' - \psi_b) \qquad (9.3)$$

ψ_n is a node pressure head at time t, $\dot{\psi}_n$ is an estimated average rate of pressure head change (see Section 9.7.3), ψ_b and ψ_b' are external potentials evaluated at times t and t + Δt, and λ is an interpolation factor between 0.57 and 1.0 (see Section 9.7.4).

Accuracy in evaluation of tabulated properties depends on how well the curve obtained by joining the tabulated points with straight line segments fits the actual function. Errors due to use of finite time steps are controlled by limiting the percentage change in any tabulated property over any time step to 2%. If necessary, the time step is halved and repeated, subject to a lower limit, SMALL (see Section 3.13).

9.2.2 Node Fluid Mass Balance

9.2.2.1 Hydrologic Properties

Several quantities required for the pressure change calculation, and additional quantities related to the fluid balance are calculated for each node in the system. The node volume V_n (VOL) remains constant throughout the calculation:

$$V_n = \alpha \, d_\ell d_w d_r^\beta \, S_d^3 \tag{9.4}$$

where α and β depend on system symmetry (see Section 3.4); d_ℓ, d_w, and d_r are input values for each node (see Section 3.6).

The average total fluid capacity of each node $M_{c,n}$ (CAP) is calculated as follows:

$$M_{c,n} = m_{c,n} \, V_n \tag{9.5}$$

where $m_{c,n}$ is the specific fluid mass capacity of the node material at the average time and estimated average pressure of node n for the time step (Equation 9.2). Specific fluid mass capacity is given by $m_{c,n} = M_{c,n}/V_n$.

The initial fluid content W_n (ψ) of each node is calculated at the beginning of each time step as follows, if the fluid capacity of the node material is tabulated versus pressure:

$$W_n = V_n \cdot S_s \cdot \psi_n \tag{9.6}$$

Or,

$$W_n = \frac{V_n}{1+e} \cdot e \cdot \rho \cdot s \qquad \text{if } S_s \text{ is not used} \tag{9.7}$$

where ψ_n is the node pressure at the beginning of the time step, e is the void ratio, s is the saturation, ρ is the density, and S_s is the specific storage coefficient.

9.2.2.2 Fluid Balance Data

The net change in fluid content of each node since the beginning of the calculation, $H_{n,net}$ (H), is calculated at the end of each time step as follows:

$$H_{n,net} = \sum_{\Delta t} M_{c,n} \, \Delta\psi_n \tag{9.8}$$

where the summation is over all the time steps up to the current time.

The net amount of fluid transported into each node by internal and external connections since the beginning of the calculation, $H_{n,flux}$ (F), is calculated at the end of each time step as follows:

$$H_{n,flux} = \sum_{\Delta t}\left(\sum_{k} \Delta H_{n,k} + \sum_{b} \Delta H_{n,b}\right) \tag{9.9}$$

where the k summation is over all the internal connections of node n, and the b summation is over all the external connections of node n. The fluid-flow increments $\Delta H_{n,k}$ and $\Delta H_{n,b}$ are calculated for each time step with Equations (9.20) and (9.35).

9.2.3 System Fluid Mass Balance

Several quantities related to the overall fluid balance of the system are calculated. These include total volume V_{sys} (VOLS), which remains constant throughout the calculations:

$$V_{sys} = \sum_n V_n \tag{9.10}$$

where the summations are over all the nodes in the system.

At the end of each time step, the system fluid capacity M_{sys} (CAPS), fluid content W_{sys} (FLUID), and average pressure (assuming constant fluid capacity ψ_{sys} (PSIAD) are calculated as follows:

$$M_{sys} = \sum_n M_{c,n} \tag{9.11}$$

$$W_{sys} = \sum_n W_n \tag{9.12}$$

$$\overline{\psi}_{sys} = \sum_n M_{c,n} \psi_n / M_{sys} \tag{9.13}$$

Also, the net fluid flow into the system $H_{sys,flux}$ (FLUX), the resulting net pressure change (assuming constant fluid capacity) $\Delta\psi_{sys,flux}$ (PSIER), the average rate of fluid flow into the system $\dot{\overline{H}}_{sys,flux}$ (FX), and the resulting average rate of pressure change $\dot{\psi}_{sys,flux}$ (TX), are calculated as follows:

$$H_{sys,flux} = \sum_n H_{n,flux} \tag{9.14}$$

$$\Delta\psi_{sys,flux} = H_{sys,flux}/M_{sys} \tag{9.15}$$

$$\dot{\overline{H}}_{sys,flux} = H_{sys,flux}/(t-t_o) \tag{9.16}$$

$$\dot{\psi}_{sys,flux} = \Delta\psi_{sys,flux}/(t-t_0) \tag{9.17}$$

where t is the total time SUMTIM and t_0 is the initial time TAU.

The effects of internal fluid generation on the system are summarized by the net rate of fluid generation in the system G_{sys} (GS), the total amount of fluid generated $H_{sys,gen}$ (GENS), and the resulting net pressure change (assuming constant fluid capacity) $\Delta\psi_{sys,gen}$ (PSILE), calculated at each time step as follows:

$$G_{sys} = \sum_n G_n \tag{9.18}$$

$$H_{sys,gen} = \sum_s G_{sys} \Delta t_s \tag{9.19}$$

$$\Delta\psi_{sys,gen} = H_{sys,gen}/M_{sys} \tag{9.20}$$

where the s summation is over all the time steps up to the current time.

9.3 INTERNAL FLUID GENERATION

The pressure change of node n due to internal fluid generation during a time step Δt is initially calculated as follows:

$$\Delta\psi_{n,G,Reg} = \frac{\overline{G}_n \Delta t}{M_{c,n}} \tag{9.21}$$

and $\overline{G}_n$ is the estimated average fluid-generation rate in the node during the time step (see Sections 3.7 and 9.2). If node n is a special node, part of the fluid generated is redistributed, as a result of the iteration procedure, among other nodes in the system, and the resulting net pressure change is as follows:

$$\Delta\psi_{n,G} = \Delta\psi_{n,G,Reg}/(1 + \lambda\Delta t Z_n/M_{c,n}) \tag{9.22}$$

where λ is the time-step interpolation factor (see Section 9.7.4) and Z_n is the total conductance of node n (Equation 9.49).

9.4 INTERNAL FLUID TRANSPORT

9.4.1 Internal Connections

The fluid flow into node n from node k during a time step Δt, due to an internal connection, $\Delta H_{n,k,I}$, is calculated as follows:

$$\Delta H_{n,k,I} = U_{n,k} (\overline{\psi}_k - \overline{\psi}_n) \Delta t = - \Delta H_{k,n,I} \tag{9.23}$$

where $U_{n,k}$ is an average conductance, calculated as described in Sections 3.23 and 9.2, and $\overline{\psi}_k$ and $\overline{\psi}_n$ are average pressure for the time step. All nodes are first treated as regular nodes. An iterative scheme is later used to find the solution when special nodes are involved, to correspond to the following average pressure values:

Nodes n and k both regular:

$$\overline{\psi}_n = \psi_n \tag{9.24}$$

$$\overline{\psi}_k = \psi_k \tag{9.25}$$

Node n regular, node k special:

$$\overline{\psi}_n = \psi_n + \lambda\Delta\psi_{n,Reg} \tag{9.26}$$

$$\overline{\psi}_k = \psi_k + \lambda\Delta\psi_k \tag{9.27}$$

Nodes n and k both special:

$$\overline{\psi}_n = \psi_n + \lambda \, \Delta\psi_n \tag{9.28}$$

$$\overline{\psi}_k = \psi_k + \lambda \, \Delta\psi_k \tag{9.29}$$

where ψ_n and ψ_k are pressures at the beginning of the time step; λ is an interpolation factor between 0.57 and 1.0 (see Section 9.7.4); $\Delta\psi_{n,Reg}$ is the net presure change in regular node n due to all causes, excluding the final corrections made for connections to special nodes (see Section 9.6.3); and $\Delta\psi_n$ and $\Delta\psi_k$ are net pressure changes in special nodes n and k due to all causes.

The total fluid flow across each internal connection $H_{n,k}$ (FI), and the average rate $\dot{H}_{n,k}$ (FX), are calculated at each time step Δt_s, as follows:

$$H_{n,k,I} = \sum_s U_{n,k} \, (\overline{\psi}_k - \overline{\psi}_n) \, \Delta t_s \tag{9.30}$$

$$\dot{H}_{n,k,I} = H_{n,k,I} / \sum_s \Delta t_s \tag{9.31}$$

The rate for the time step, $U_{n,k} \, (\overline{\psi}_k - \overline{\psi}_n)$ is also calculated.

The net pressure change in node n due to internal connections, $\Delta\psi_{n,I}$, is initially calculated as follows:

$$\Delta\psi_{n,I,Reg} = \frac{\Delta t}{M_{c,n}} \sum_k U_{n,k}(\psi_k - \psi_n) \tag{9.32}$$

For systems which include special nodes, the final results, after applying the iteration scheme are as follows:

Regular nodes:

$$\Delta\psi_{n,I} = \frac{\Delta t}{M_{c,n}} \left[\sum_k U_{n,k}(\psi_k - \psi_n) + \lambda \sum_k^{Spec} U_{n,k}(\Delta\psi_k - \Delta\psi_{n,Reg}) \right] \tag{9.33}$$

Special nodes:

$$\Delta\psi_{n,I} = \frac{\Delta t}{M_{c,n}} \left[\sum_k^{all} U_{n,k}(\psi_k - \psi_n) + \lambda \sum_k^{Reg} U_{n,k}(\Delta\psi_{k,Reg} - \Delta\psi_n) + \lambda \sum_k^{Spec} U_{n,k}(\Delta\psi_k - \Delta\psi_n) \right] \quad (9.34)$$

9.5 SURFACE FLUID TRANSPORT

The fluid flow into node n from boundary node b during time step Δt, $\Delta H_{n,b,E}$, is calculated as follows:

$$\Delta H_{n,b,E} = U_{n,b} \, (\overline{\psi}_b - \overline{\psi}_n) \, \Delta t \quad (9.35)$$

where $U_{n,b}$ is an average conductance calculated as described in Sections 3.9.1 and 9.2, and $\overline{\psi}_b$ and $\overline{\psi}_n$ are average pressure for the time step. All nodes are first treated as regular nodes, and the iterative scheme is later applied when special nodes are included in the system. All nodes with connections to boundary nodes are classified as special nodes.

$$\overline{\psi}_b = \psi_b + \lambda(\psi_b' - \psi_b) \quad (9.36)$$

$$\overline{\psi}_n = \psi_n \quad \text{(initially)} \quad (9.37)$$

$$\overline{\psi}_n = \psi_n + \lambda \, \Delta\psi_n \quad \text{(finally)} \quad (9.38)$$

where ψ_b and ψ_b' are the boundary node (external) potentials at the beginning and end of the time step, found as described in Section 9.2; ψ_n is the pressure of node n at the beginning of the time step; and $\Delta\psi_n$ is the net potential change in node n due to all causes.

The total fluid flow across each surface connection, $H_{n,b,E}$ (FS), and average rate $\dot{H}_{n,b,E}$ (FX), are calculated each time step Δt_s as follows:

$$H_{n,b,E} = \sum_s U_{n,b} (\overline{\psi}_b - \overline{\psi}_n) \Delta t_s \tag{9.39}$$

$$\dot{H}_{n,b,E} = H_{n,b,E} / \sum_s \Delta t_s \tag{9.40}$$

The rate for the time step, $U_{n,b}(\overline{\psi}_b - \overline{\psi}_n)$, is also calculated.

The total fluid flow into the system from each boundary node, H_b (FB) and average rate $\dot{H}_b$ (FX), are calculated each time step as follows:

$$H_b = \sum_n H_{n,b,E} \tag{9.41}$$

$$\dot{H}_b = H_b / \sum_s \Delta t_s \tag{9.42}$$

The rate for the time step, $\sum_n U_{n,b} (\overline{\psi}_b - \overline{\psi}_n)$, is also calculated.

The net potential change in node n due to surface connections, $\Delta\psi_{n,E,Reg}$, is initially calculated as follows:

$$\Delta\psi_{n,E,Reg} = \frac{\Delta t}{M_{c,n}} \sum_b U_{n,b}[\psi_b + \lambda(\psi_b' - \psi_b) - \psi_n] \tag{9.43}$$

The final result, after applying the iteration scheme, is as follows:

$$\Delta\psi_{n,E} = \frac{\Delta t}{M_{c,n}} \sum_b U_{n,b}[\psi_b - \psi_n + \lambda(\psi_b' - \psi_b - \Delta\psi_n)] \tag{9.44}$$

9.6 MIXED EXPLICIT-IMPLICIT ITERATIVE SCHEME

9.6.1 Iterative Procedure

The iterative scheme used in the present work is an adaptation and a generalization of one discussed by Evans, et al. (1954). The scheme is unconditionally stable, provided the coefficients in the equation are not very strongly dependent on ψ. Convergence is generally rapid, but the number of iterations necessarily depends on the relative number and time constants of interconnected implicit elements in the system and the relative values of conductances between such elements.

The equation for the iterative scheme is obtained from (2.15) by making the following substitutions (Edwards 1968).

$$\Delta\psi_\ell, \text{ left-hand side} = \Delta\psi_\ell^{p+1} \tag{9.45}$$

$$\Delta\psi_\ell, \text{ right-hand side} = (1 + s)\ \Delta\psi_\ell^{p+1} - s\ \Delta\psi_\ell^{p} \tag{9.46}$$

$$\Delta\psi_m, \text{ right-hand side} = \Delta\psi_m^{p} \tag{9.47}$$

The acceleration factor s should be greater than zero for convergence. A value of s = 0.2 was empirically chosen by Edwards (1968) by minimizing the total required machine time for a large group of test problems. However, s is always set to zero on the first time step and for any time step in which no implicit elements are interconnected.

Making the above substitutions and solving for $\Delta\psi_\ell^{P+1}$, we obtain

$$\Delta\psi_\ell^{p+1} = \Delta\psi_{\ell,exp} + \frac{\lambda\Delta\ell}{M_{c,\ell}} \sum_m^{exp} U_{\ell,m}\ \Delta\psi_{m,exp} + \sum_m U_{\ell,m}\ \Delta\psi_m^{p}$$

$$+ \frac{sZ_\ell\ \Delta\psi_\ell^{p}}{[1 + (\lambda\Delta t/M_{c,\ell})(1 + s)\ Z_\ell]} \tag{9.48}$$

in which

$$Z_\ell = \sum_b U_{\ell,b} + \sum_m U_{\ell,m} \tag{9.49}$$

For the first iteration (p = 0) the following values are used:

$$\Delta\psi_\ell^{\,0} = \Delta t\ \dot{\psi}_\ell \tag{9.50}$$

$$\Delta\psi_m^{\,0} = \Delta t\ \dot{\psi}_m \tag{9.51}$$

where $\dot{\psi}_l$ and $\dot{\psi}_m$ are judiciously estimated values of the time derivative. The difference between successive values of $\Delta\psi_\ell$ in the iteration is given by

$$E_\ell^{\,p+1} = \Delta\psi_\ell^{\,p+1} - \Delta\psi_\ell^{\,p} \tag{9.52}$$

In the light of (9.48), (9.52) can be immediately written as

$$E_\ell^{\,p+1} = \left\{\frac{\lambda\Delta t}{M_{c,\ell}}\left[\sum_m U_{\ell,m}\left(\Delta\psi_m^{\,p} - \Delta\psi_m^{\,p-1}\right) + sZ_\ell\left(\Delta\psi_\ell^{\,p} - \Delta\psi_\ell^{\,p-1}\right)\right]\right\}\left[1 + \frac{\lambda\Delta t}{M_{c,\ell}}(1 + s)Z_\ell\right]^{-1} \tag{9.53}$$

or

$$E_\ell^{\,p+1} = \left\{\frac{\lambda\Delta t}{M_{c,\ell}}\left[\sum_m U_{\ell,m}\, E_m^{\,p} + sZ_\ell E_\ell^{\,p}\right]\right\}\left[1 + \frac{\lambda\Delta t}{M_{c,\ell}}(1 + s)\ Z_\ell\right]^{-1} \tag{9.54}$$

In (9.54), note that E_ℓ at iteration p+1 is expressed in terms of the known values of E_ℓ, E_m at iteration p. This procedure eliminates unncessary recalculation of the fixed quantities in (9.48).

To implement the iterative scheme, the values of $\Delta\psi_\ell^{\,1}$ are first computed by using (9.48), (9.50) and (9.51), and the values of $E_\ell^{\,1}$ are calculated by

$$E_\ell^{\,1} = \Delta\psi_\ell^{\,1} - \Delta t\dot{\psi}_\ell \tag{9.55}$$

Then $E_\ell^{\,2}$ is calculated by using (9.54) and $\Delta\psi_\ell^{\,2}$ is obtained by the relation

$$\Delta\psi_\ell^{\,2} = \Delta\psi_\ell^{\,1} + E_\ell^{\,2} \tag{9.56}$$

This scheme is continued until convergence criteria are satisfied. If the convergence criteria are not satisfied within a limit of 80 iterations, then the results of the time step are discarded, a new Δt, half as large, is used, and the calculations are carried out. If the new time step has already reached a minimum prescribed value, then the problem is ended, and convergence failure is assumed.

9.6.2 Convergence Criterion

The convergence criterion is intimately related to the quantity ψ_{var}, which is one half of the maximum change in ψ allowed at any nodal point in the system during a given time step. The net corrections to the fluid mass content and the fluid mass capacity of all the implicit elements in the systems for the pth iteration are given by

$$\Delta H_{net}^{\,p} = \sum_{\ell}^{imp} M_{c,\ell}\, E_\ell^{\,p} \tag{9.57}$$

$$M_{c,net} = \sum_{\ell}^{imp} M_{c,\ell} \tag{9.58}$$

The iteration procedure is stopped when the following criteria are satisfied for all elements, excluding those for which $M_{c,\ell}$ is zero (the zero volume elements):

$$\Delta H_{net}^{\,-p} < 10^{-5}(M_{c,net})(\psi_{var}) \tag{9.59}$$

$$E_{\ell,max}^{\,p} < 10^{-4}(\psi_{var}) \tag{9.60}$$

9.6.3 Final Corrections for Explicit Element

After the final changes in ψ have been found for all the implicit elements, final corrections must be made to $\Delta\psi$ in all the explicit elements connected to implicit elements in order to obtain the correct mass balance. The complete equation for explicit elements connected to implicit elements is as follows:

$$\Delta\psi_{\ell,exp,corr} = \Delta\psi_{\ell,exp} + \frac{\lambda\Delta t}{M_{c,\ell}}\left[\sum_{m}^{m-imp} U_{\ell,m}(\Delta\psi_m - \Delta\psi_{\ell,exp})\right] \qquad (9.61)$$

Corrections must also be made to the fluxes calculated for all those internal connections involving implicit elements.

9.7 PREPARATION FOR NEXT TIME STEP

9.7.1 Reclassification of Nodes

The reclassification of nodes from regular to special depends on the input values of KSPEC, PSIVARY, and DELTO in BLOCK 1. If KSPEC is negative, no regular nodes can be changed to special nodes during the calculation, and the only special nodes will be zero-volume nodes, surface nodes, and nodes for wich the input value of KS, in BLOCK 4, is nonzero. If KSPEC is positive, all regular nodes will be changed to special nodes before the first time step, and the value of the interpolation factor λ (FOR) can also be controlled (see Section 9.7.4).

If KSPEC is zero at the end of each time step for which the maximum allowed time step DELTMX was used (see Section 9.7.2), and is less than DELTO, the stability limits SLIM of all regular nodes are tested. Regular nodes for which SLIM is equal to or less than 1.8 DELTMX are reclassified as special nodes. Since DELTMX is 2/3 of the smallest stability limit of any regular nodes, all regular nodes with stability limits from 1.0 to 1.2 times the smallest values are reclassified as special nodes. This range was empirically chosen to minimize the required computation time for a large group of test problems.

The larger the value of PSIVARY, the sooner the size of the time step (see Section 9.7.2) will become large, relative to the stability limits of most of the nodes in the system, and the sooner they will be reclassified as special nodes if KSPEC is zero.

9.7.2 Control of Time Step

The user may specify minimum and maximum time steps SMALL and DELTO and a desired average maximum potential change per time step PSIVARY, and choose the method of calculation, by specifying that certain nodes be special nodes (with KS in input BLOCK 4) and by using KSPEC in input BLOCK 1 (see Section 3.12). These, and a number of other factors, all affect the way in which the time step varies as the calculation proceeds.

The first time step (KCYC=0) is always 10^{-12}. This allows zero-volume nodes to reach equilibrium, and allows time derivatives to be established. At the end of the first time step, and each succeeding time step, the minimum stability limit, τ_n (SLIM), of any regular node in the system, Δt_{stab}, is found. This search is skipped after the first time step, if no change can occur in the stability limits and node classifications. The maximum allowed time step, DELTMX, is then set at 2/3 of Δt_{stab} greatly reduces time-truncation error in coarsely zoned systems, compared with use of Δt_{stab}. The minimum time step SMALL, is initially set equal to SMALT, the input value of SMALL. If SMALL is equal or greater than DELTMX, SMALL is reduced to slightly less than DELTMX so that the input value cannot force an unstable time step to be used. If no input value of SMALL is specified, if at least 1/4 of the nodes in the system are regular nodes, and if DELTMX is not equal to 10^{12}, SMALL is set equal to 1/100 of DELTMX.

Next, the largest potential change for the time step, DPRES, is found, exclusive of zero-volume nodes on the first two time steps. Another quantity, DPSIMAX, is the product of PSIVARY and either the largest percentage change that took place in any tabulated property, or 1/40 of the number of iterations required for convergence, whichever is larger. The ratio R_s is then calculated as follows:

$$R_s = \text{PSIVARY}/(\text{DPRES, DPSIMAX})_{max} \tag{9.62}$$

If R_s is less than 0.5, and Δt_s is greater than 1.01 SMALLS, Δt_s is halved, and the time step will be repeated. If there are no regular nodes in the system,

R_s is reduced by a factor of 100 for the first time step, to insure that the calculation starts out smoothly. For values of R_s less than 1.0, a new ratio is calculated:

$$R_s' = R_s^2,\ R_s' \geq 0.5,\ 0.5 \leq R_s \leq 1.0 \tag{9.63}$$

For values of R_s greater than 1.0, a new ratio is calculated:

$$R_s' = 0.5(1 + R_s),\ R_s' \leq 2.0,\ R > 1.0 \tag{9.64}$$

The new time step is then calculated as follows:

$$\Delta t_{s+1} = \Delta t_s\ R_s' \tag{9.65}$$

$$\Delta t_{s+1} \geq \text{SMALL} \tag{9.66}$$

$$\Delta t_{s+1} \leq \text{DELTMX} \tag{9.67}$$

This method provides a continual gradual adjustment in the size of the time step to obtain a maximum pressure change of PSIVARY, or a maximum change in any tabulated property of 1%, and to prevent the number of iterations from averaging more than 40. The calculation of R_s' provides for a rapid decrease in Δt when these limits are exceeded, with a more gradual increase in Δt when the changes are smaller than these limits.

An additional adjustment in the size of the new time step is made if the input value of Δt_p (TIMEP) in BLOCK 1 is positive. This is done by multiplying the unadjusted new time step, $\Delta t_{s+1}'$ (DELT) by a factor as close as possible to 1.0, and in the range from 2/3 to 1.5, so that the remaining time to the next desired printout time is an integer multiple of the adjusted time step. Also, the adjusted time step must remain in the range from Δt_{min} (SMALL) to Δt_{max} (DELTMX). The remaining time to next desired printout time is first calculated as follows:

$$\Delta t'_{rem} = [\Delta t_p(1 + |t/\Delta t_p|) - t] \text{ modulo } \Delta t_p \tag{9.68}$$

where the vertical bars indicate that the integer value of the expression is to be used. An adjustment is made to insure that Δt_{rem} is at least 2/3 of the unadjusted new time step:

$$\Delta t_{rem} = \Delta t'_{rem} + \Delta t_p \, [1 - |(\Delta t'_{rem} - \Delta t'_{s+1}/1.5)/\Delta t_p|] \tag{9.69}$$

The number of time steps remaining until the next printout time is then estimted as follows:

$$N_p = |\Delta t_{rem}/\Delta t_{s+1} + 0.5|$$

and the adjusted new time step calculated as follows:

$$\Delta t_{s+1} = \Delta t_{rem}/N_p$$

If Δt_{s+1} is less than SMALL, the next smaller positive value of N_p is used. If Δt_{s+1} is greater than DELTMX, the next larger value of N_p is used. The limit in Equation (9.67) in then reapplied. The adjustment factor is always between the limits 2/3 and 1.5, and should average much closer to 1.0 if Δt_{s+1} is small compared with Δt_p. This method provides a continual minimum adjustment in the size of the time step, if possible, between the limits SMALL and DELTMX, to obtain the desired printout times.

If a maximum problem time t_{max} (TIMAX) has been specified, the new time step is also limited as follows, so that t will slightly exceed t_{max} on the last time step:

$$\Delta t_{s+1} \leq t_{max} - t + 10^{-12} \tag{9.70}$$

The small increment (10^{-12}) insures against truncation error.

When KSPEC is not negative, the limit in Equation (9.69) is seldom reached, since nodes are reclassified as special nodes when their stability limits are less than 1.8 DELTMX.

9.7.3 Estimation of Time Derivatives

Time derivatives of ψ are used to estimate the average pressure heads during the time step, to evaluate ψ dependent tabulated properties, and to obtain the first estimate of $\Delta\psi$ for implicit elements to begin the iterative mass balance calculations.

At the end of each time step the calculated values of $\Delta\psi$ are used to estimate the time derivatives for the next time step. The estimate makes use of the ratio of the maximum rates of change during the two preceding time steps to obtain approximately second-order accuracy. If the maximum rate of change is decreasing with time, it is assumed that the potentials throughout the flow region are exponentially approaching equilibrium with the same exponent. On the other hand, if the maximum rate of change is increasing, it is assumed that the potential changing most rapidly is following a quadratic curve and that the ratio between successive slopes is the same for all elements.

Consider first the case of exponential decay. Looking at Figure 9.1, let ψ be expressed by

$$\psi = \psi_0 e^{-\alpha t} \tag{9.71}$$

Then $\dot{\psi} = -\alpha\psi_0 e^{-\alpha t}$, and $\dot{\psi}_0 = \dot{\psi}|_{t=0} = -\alpha\psi_0$. Hence

$$\dot{\psi}/\dot{\psi}_0 = e^{-\alpha t} \tag{9.72}$$

or

$$(\dot{\psi}/\dot{\psi}_0)^{1/t} = e^{-\alpha} \tag{9.73}$$

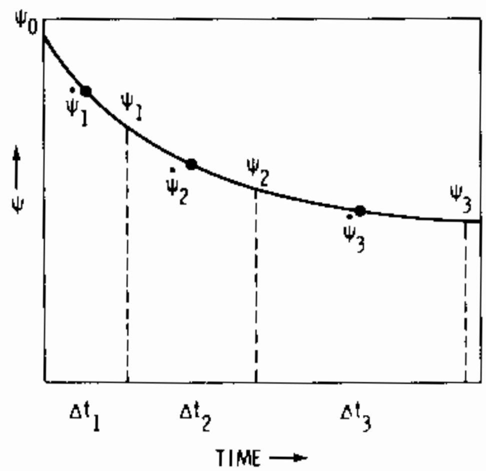


FIGURE 9.1. Estimation of $\dot{\psi}$ for Exponential Decay

In the light of (9.73) we can write

$$(\dot{\psi}_2/\dot{\psi}_1)^{[(\Delta t_1 + \Delta t_2)/2]^{-1}} = (\dot{\psi}_3/\dot{\psi}_2)^{[(\Delta t_2 + \Delta t_3)/2]^{-1}} \tag{9.74}$$

or

$$F_c = \dot{\psi}_3/\dot{\psi}_2 = (\dot{\psi}_1/\dot{\psi}_2)^{-(\Delta t_2 + \Delta t_3)/(\Delta t_1 + \Delta t_2)} \tag{9.75}$$

Consider now the second case, in which the maximum rate of change of ψ is increasing with time (Figure 9.2). Let ψ be expressed by the quadratic relation

$$\psi = \psi_0 + at + bt^2 \tag{9.76}$$

Then $\dot{\psi} = a + 2bt$, and $\dot{\psi}_0 = \dot{\psi}|_{t=0} = a$. Hence $\dot{\psi} = \dot{\psi}_0 + 2bt$. Therefore

$$(\dot{\psi}/\dot{\psi}_0) - 1 = 2bt/\dot{\psi}_0 \tag{9.77}$$

In the light of (9.77),

$$\frac{\dot{\psi}_2}{\dot{\psi}_1} - 1 = \frac{2b(\Delta t_1 + \Delta t_2)/2}{\dot{\psi}_1} \tag{9.78}$$

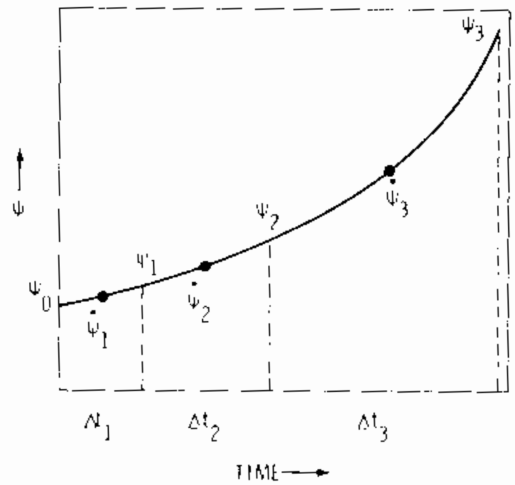


FIGURE 9.2. Estimation of $\dot{\psi}$ for Quadratic Increase

and

$$\frac{\dot{\psi}_3}{\dot{\psi}_2} - 1 = \frac{2b(\Delta t_2 + \Delta t_3)/2}{\dot{\psi}_2} \tag{9.79}$$

Dividing (9.78) by (9.79) and rearranging terms, we obtain

$$F_c = \frac{\dot{\psi}_3}{\dot{\psi}_2} = 1 + \left(1 - \frac{\dot{\psi}_1}{\dot{\psi}_2}\right) \left(\frac{\Delta t_2 + \Delta t_3}{\Delta t_1 + \Delta t_2}\right) \tag{9.80}$$

Once F_c is calculated by using (9.75) or (9.80) the estimate of the time derivative for an element ψ is obtained by

$$\dot{\psi}_{\ell,est} = F_c(\Delta\psi_\ell/\Delta t) \tag{9.81}$$

in which the quantity $(\Delta\psi_\ell/\Delta t)$ is the rate of change calculated for the last time step.

To safeguard against several possible sources of instability, the following precautions are taken: a) F_c is fixed at 1.0 for the first two time steps; b) F_c is fixed at 1.0 for two time steps after any time step has been rejected, or a regular node has been reclassified as a special node; c) time derivatives for the initial time step ($\Delta t = 10^{-12}$) are zero; d) time derivatives of zero-volume nodes are fixed at zero for the first two time steps; e) time derivatives of other special nodes are calculated as follows for the first two time steps:

$$\dot{\psi}_{n,special} = (\Delta\psi_{n,s}/\Delta t_s)/(1 + \Delta t_s\ Z_n/M_{c,n}) \qquad (9.82)$$

where Z_n is the total conductance of the node, including all connections--this produces a more accurate result for special nodes with stability limits small compared with Δt_s; f) time derivatives are multiplied by 10^{-24} whenever they change sign.

Each of these safeguards has been found necessary for some particular type of problem. More accurate derivatives could be calculated by saving several successive values of ψ for each case and using higher-order extrapolates. However, since the algorithm only uses first-order approximation in space, there is little to be gained in attempting higher-order approximation in time without reducing spatial errors.

9.7.4 Estimation of Interpolation Factor λ

The factor λ is used to estimate the average values of Ψ during the time step for 1) evaluating the ψ-dependent properties, and 2) interpolating between initial and final values of ψ for implicit calculations. In the mixed explicit-implicit procedure, λ is allowed to vary between 0.57 and 1, depending on F_c. Thus

$$\lambda = [0.57,\ (1.0,\ F_c)_{max}/(1.0 + F_c)]_{max} \qquad (9.83)$$

As can be seen from (9.83), the minimum value of λ is 0.57 instead of 0.5. This is to make sure that the small oscillations which may arise if $\lambda = 0.5$ are damped out.

The form of Equation (9.83) was chosen to give λ a value close to the interpolation factor required to obtain a correct average potential when potentials are approaching equilibrium values exponentially, i.e., near 0.5 when slopes do not change appreciably over a time step, and near 1.0 when large time steps are used near equilibrium. Thus the accuracy inherent in use of central-difference equations is obtained, without the undamped oscillations resulting from such equations when rapid changes occur in boundary conditions or ψ- or time-dependent properties, during the part of a problem in which ψ changes are rapid. The interpolation factor is gradually shifted toward 1.0 as equilibrium is approached, to maintain accuracy that is lost when central-difference equations are used. Approach to equilibrium is usually too rapid when forward- or central-difference equations are used. A much more accurate approach is obtained by the method used here. During the transient part of the problem, the value of λ used need not be exact, as errors averaged over several time steps are usually much smaller than the error for a single time step, a particular characteristic of the conduction equation.

As an additional safeguard against possible sources of instability, the value of λ is always fixed at 1.0 for the initial time step ($\Delta t = 10^{-12}$) and for any time step following a rejected time step. This insures that zero-volume nodes and other nodes with small stability limits reach equilibrium with nodes to which they are connected, without overshoot and resulting damped oscillation after any change in a boundary condition or a ψ- or time-dependent property.

The user may control the value of λ used on other time steps by specifying in data BLOCK 1, a value of KSPEC of 2, to fix λ at 1.0--or, if KSPEC is 3, to fix λ at 0.5. In both cases, all nodes are reclassified as special nodes before the first time step, so that the resulting calculation method is either the "backward" or "central" method, respectively; this will generally reduce accuracy and increase machine time, but it may be done to investigate the effect on accuracy or to compare calculational results with those of a program in which one of those methods is used.

9.7.5 Evaluation of ψ Dependent Coefficients

In a variably saturated deformable porous medium the fluid mass capacity, as well as the permeability, is a function of ψ and hence of time. Before carrying out the calculations for a time step, both M_c and k are evaluated at an estimated average value of ψ for that time step. This estimate is obtained by

$$\overline{\psi}_1 = \psi_1^{0} + \lambda \Delta t \dot{\psi}_1 \qquad (9.84)$$

In order to compute M_c (Equation 2.2) it is necessary that several quantities, such as ρ_w, e, and $\dot{s}$, be evaluated at $\overline{\psi}$. It is relatively simple to compute ρ_w with the equation of state: $\rho_w = \rho_{wo} \exp[\rho_{wo}\beta g\overline{\psi}]$. For evaluating the deformation parameters e and a_v it is essential to transform $\overline{\psi}$ into an equivalent effective stress. For this purpose the total stress σ and the volume of solids V_s for each element are calculated at the beginning of the problem and stored in memory. Then σ' is given by $\sigma' = \sigma - \gamma_w\overline{\psi}$, and e can be calculated either by $e = e_o - (\sigma - \sigma_o')\, a_v$ or, for normal consolidation, by $e = e_o - C_c[\log_{10} (\sigma - \sigma_o')]$.

The functions χ', S, and $dS/d\psi$ are tabulated as functions of ψ and hence are to be evaluated by interpolation at $\overline{\psi}$. In particular, the ψ-S relation may be characterized by hysteresis. In the present work, hysteresis is handled in a simple manner with the help of scanning curves.

The permeability parameter, k, is a function of the void ratio (or effective stress) in the saturated zone and of the ψ in the unsaturated zone. Here, just as in the case of the ψ versus S relation, k is tabulated as a function of ψ for $\psi \leq 0$ and is evaluated by interpolation at $\overline{\psi}$. In addition, when $\psi < 0$, S and k can be calculated by the empirical relations,

$$S = S_r + (1 - S_r) \frac{\alpha}{\alpha + (\psi_A - \psi)^{\eta}} \qquad (9.85)$$

and

$$k = k_o \frac{A}{A + (0 - \psi)^{B}} \qquad (9.86)$$

Where S_r is the residual saturation, ψ_A is the pressure head at the air entry value, k_o is a constant or is to be considered as a function of void ratio, and α, η, A and B are constants which provide the best fit for the Ψ - S or the ψ - k relationships. For the saturated zone, k either can be tabulated as a function of σ' or, more easily, can be evaluated by using the index C_k:

$$k = k_o \exp [2.303(e - e_o)/C_k] \tag{9.87}$$

10.0 THE PROGRAM

10.1 GENERAL

The TRUST Program consists of a main program and several subroutines. The language is FORTRAN IV, with a few statements, such as ENCODE/DECODE and certain open statements, specific for computers such as UNIVAC, CDC and VAX-11. TRUST is a modification of program TRUMP which was developed by A. L. Edwards of Lawrence Radiation Laboratory. The modifications were written by T. N. Narasimhan of University of California at Berkeley. The following subroutines are available: THERM, FINK, GEN, SURE, SPECK, TALLY, PATCH, REFER, SEEK1 and SEEK2. The added new subroutines are HYST, ENTER, SLOPE, MORTHAN and LINE. Appendices C and D contain the flowchart and program listing for TRUST.

When recompiling to obtain a specific version, the choices of inclusion or exclusion of the various optional parts of the program, and the dimensions assigned to variable arrays, are determined by the values of several parameters M_2 through M_9 in the main program. When recompiling with new values of any of these parameters, only the main program TRUST must be recompiled. Other subroutines that have changes in the dimensional arrays in COMMON statements will also need be recompiled. These are the COMMON's in the INCLUDE statements.

10.2 TRUST SUBROUTINES

10.2.1 General

TRUST consists of a main program and several required and optional subroutines, divided according to logical function, the sequence of calculations and the various modes of fluid production and transport. The subroutines required for all fluid conduction problems are THERM, HYST, FINK, SPECK, TALLY for the input, initialization, and time-step phases of the calculation; PATCH, SEEK1, and SEEK2 for the input phase only; and REFER for the initialization phase only. The optional subroutines include GEN for problems with internal fluid sources and sinks, and SURE for problems with variable boundary conditions. The additional entry point TALLY1 in TALLY is for the option of punching a card deck or writing on to a file in the format of input Data BLOCK 9, containing the final values of pressure and constant fluid-generation rates for the problem.

Some of the characteristics of the TRUST subroutines are summaried in the Glossary.

10.2.2 TRUST

TRUST is the logic control center of the program. All calls to other TRUST subroutines except PATCH, SEEK1, SEEK2, and REFER are made from TRUST. Before any input data are read in, several flags are initially set, and calls are made to ERRORS to set underflows to zero. Any TRUST control cards preceding the first Problem Name card are read in, and the appropriate variables are reset or initially set, and calls are made as necessary to control input and output unit specifications.

After the Problem Name card has been read in, various arrays are initially set depending on the value of the data carryover control in column 72. If data are being carried over from the preceding problem, TALLY is called to initially set node classifications and the initial conditions for the new problem.

Block Number cards are then read in, and the appropriate subroutines are called for reading in data from the various data blocks. After the Data End card is read in, the Problem Name and the integer value on the Data End card are stored in new locations, and subroutines TALLY and SPECK are called to initially set variables before the first time step.

At the beginning of each time step, the time-step counter is incremented. Calls are then made to the subroutines required for the time step calculations. After each time step is completed, various tests are made to determine whether the problem should be continued, ended, or interrupted and saved for later continuation. If the problem is ended, the input file is read again and TRUST control cards and Problem Name cards are handled as described above.

The machine clock is monitored at the beginning of each problem, again after all data has been read in, and again when the problem is interrupted or ended.

All data read in from the input file are written out, and statements are written out concerning the Problem Name, clock time, date, machine time used, data carryover, specification of input and output files, interruption and restart, and the end of each problem.

TRUST calls subroutines THERM, GEN, FINK, SURE, SPECK, and TALLY.

10.2.3 THERM

Subroutine THERM is entered to read in the data items in data BLOCKs 2 (material properties) and 4 (node descriptions). All input data and immediately derived data, such as table slopes, and node classifications and volumes, are written out.

For the first time step, subroutine THERM is entered to initially set cross-reference tables that relate the node list to the material list and determine initial stress and total stress on the nodes. The node conductivities, masses, fluid capacities, and fluid contents, and the total material volumes, moisture capacities, fluid contents, and average pressures, are calculated.

For each time step, THERM is entered to recalculate any of the quantities above that are variable. At intervals determined by input data, summary data are written out for each material, listing name, number, moisture capacity, fluid content, average pressure, and transition pressure. Summary data are written out for each node, listing number, material number, classification, location, volume, mass, moisture capacity, conductivity, net conductance, and time constant.

THERM calls TRUST subroutines PATCH, HYST, SEEK1, SEEK2 and REFER and returns to TRUST.

10.2.4 HYST

Subroutine HYST is entered to read in the data items in data BLOCK 2 that concern the tabulated values of saturation, the tabulated values of permeability, scanning curve data of S versus ψ and K versus ψ. All input data and immediately derived data, such as table slopes and specific moisture capacity table, are written out.

Subroutine HYST is for evaluating saturation and permeability when pressure head is less than zero (unsaturated zone), since both saturation and permeability have hysteretic relationship with negative pressure head.

HYST is called by and returns to THERM.

10.2.5 GEN

Subroutine GEN is entered to read in the data items in data BLOCK 8, the list of nodes with variable fluid-generation rates. All input data and immediately derived data, such as table slopes, are written out.

For the first time step, GEN is entered to initially set the cross-reference table that relates the variable-fluid-generation tables to the node list. At each time step, all variable fluid-generation rates are recalculated, and the fluid added to or removed from each node by variable or constant fluid generation is calculated.

GEN calls TRUST subroutines SEEK1 and REFER, and returns to TRUST.

10.2.6 FINK

Subroutine FINK is entered to read in the data items in data BLOCK 5, the connection list. All input data and immediately derived data, such as connection areas, are written out.

For the first time step, FINK is entered to initially set the cross-reference table that relates connections to the node list, and to initially set the conductances of each connection.

At each time step, FINK is entered to recalculate the conductance of connections involving nodes with variable hydraulic conductivity, and to calculate the amount of flow across each connection, based on the pressure difference at the beginning of the time step.

At intervals determined by input data, summary data for each connection are written out, including the node numbers, area, interface conductance, overall conductance, cumulative total fluid flow, and average rate of fluid flow, across the connection.

10.2.7 SURE

Subroutine SURE is entered to read in the data items in data BLOCK 6, the surface-connection list, and in data BLOCK 7, the external-potential (boundary-node) list. All input data and immediately derived data, such as connection areas and table slopes, are written out.

For the first time step, SURE is entered to initially set the cross-reference tables that relates the surface-connection list to the node list and the boundary-node list. The initial values of several quantities are calculated, including the conductance of the surface connections.

At each time step, SURE is entered to calculate the cumulative fluid flow across each surface connection, the new boundary node potential, the new surface-connection conductances, and the amounts of fluid flow across each surface connection. These calculations are based on estimated average conductances during the time step, surface-node potentials at the beginning of the time step, and boundary-node potentials at the end of the time step.

At intervals determined by input data, summary data are written out for each surface connection, including the surface and boundary node numbers, the connection area, the surface conductance, the overall conductance, and the net fluid flow and average fluid-flow rate into the surface node from the boundary node. Summary data are written out for each boundary node, including the boundary node number, the external potential and the net fluid flow and average fluid-flow rate into the system from the boundary node. The total fluid flow and average flow rate into the system for all boundary nodes are also written out.

SURE calls TRUST subroutines PATCH, SEEK2, and REFER, and returns to TRUST.

10.2.8 SPECK

Subroutine SPECK is entered after all input data have been read in, and, for the first time step, to initially set various quantities.

At each time step, SPECK is entered to make the final calculation of fluid flow across surface connections, and across internal connections including nodes classified as special nodes. This calculation is based on interpolated values of special node potentials during the time step, weighted from 0.57 to 1.00 toward the pressures at the end of the time step.

When special nodes are connected to each other, an iterative calculation is required, which is done by an accelerated method and imposes strict convergence criteria on average and individual potential changes. Diagnostic statements are written out if a specified maximum number of iterations are required, and if the problem must be ended because of convergence failure when the smallest allowable time step is being used.

Fluid flow into regular nodes connected to special nodes is corrected to maintain an exact fluid mass balance for each connection.

At intervals determined by input data, summary data are written out, including the number of time steps completed; the total, average, and maximum number of iterations used; and the potential interpolation factor.

SPECK returns to TRUST.

10.2.9 TALLY

Subroutine TALLY is entered after the Problem Name card of a continuation problem has been read in, to determine the initial conditions and node classifications for the new problem. Subroutine TALLY is entered to read in the input items in data BLOCK 9, the initial condition list. All input data and immediately derived data are written out.

After all input data has been read in, TALLY is entered to write out a summary of the number and sizes of input data blocks, data carried over from preceding problems, the number of tables of various types, the numbers of certain types of input items, and the amount of memory used for groups of variables and arrays required for various input-data options. The problem time, the size of the first time step and interpolation factor, and other variables are initially set.

Subroutine TALLY is the time-step control center of the program. At the end of the first time step, TALLY is entered to initially set several variables used thereafter in TALLY. At the end of every time step, TALLY is entered to determine the maximum stable time step for regular nodes. Nodes may be classified as special nodes to keep the size of the time step from being limited. The largest potential change for the time step is found. The results of the time step are accepted or rejected, based on input data, the largest potential change, and changes in tabulated quantities during the time step. The size of the next time step is determined based on a number of criteria. The interpolation factor and slope-correction factor for the next time step are determined. The new values of potential are found, and fluid mass balance data are updated. Various criteria for ending the problem are tested. Various criteria for producing output data for the time step are tested. When required, summary data for the time step are written out, including fluid mass balance data for the system, new values, change and rates of change of potentials, and fluid mass balance data for the nodes. Other special output data may also be produced if required by input data.

TALLY is entered at entry point TALLY1 when a problem is ended or interrupted, if required by input data, to punch or write to a file the final conditions of the problem in the format of data BLOCK 9. These cards may be added to the original data deck as a means of continuing the problem.

TALLY calls TRUST subroutines PATCH, SEEK1, and REFER, and returns to TRUST.

10.2.10 PATCH

Subroutine PATCH is entered during the input phase of the problem, to test certain input variables in several data blocks. These variables are initially read in as 10 separate Hollerith characters. In PATCH, these characters are tested to see if any of them is a decimal point. If so, the array of 10 characters is converted to a floating point number and assigned to the input variable. If not, a floating point number in the subroutine argument list is assigned to the input variable. If not, a floating point number in the subroutine argument list is assigned to the input variable. A sentinel is also returned, indicating whether or not a decimal point was found.

PATCH is used for several purposes. Data in data BLOCK 1 are substituted for certain input variables when the data field on the input cards is blank. Other input variables have specific values, written into the program, assigned to them when the input data field is blank. Other input variables have data fields in columns 72 through 80 of the input cards, which may contain Hollerith data when produced by certain procedures. It is sometimes convenient to purposely put Hollerith data, as a comment, in the data fields of input variables tested by PATCH, when numerical values of those variables are not needed.

PATCH returns to the calling routine, which may be THERM, FINK, SURE, or TALLY.

10.2.11 SEEK1

Subroutine SEEK1 is entered only during the data-input phase of the problem, when a data BLOCK 2, 3, 4, 7, 8, or 9 of type B is being read in. The list of identification numbers previously read in for the same data block is searched, in reverse sequential order, to find one equal to the last one read in. If one is found, the sequence number in the list is returned, so that the new input data can be substituted for the old input data. If one is not found, the new input data are added to the end of the list.

This procedure allows input data already in memory to be modified, or new data added, with a minimum number of input data cards. The data to be modified may have been carried over from a preceding data deck, or read in as an item in a separate data block, or as a preceding item in the same data block.

SEEK1 returns to the calling routine, which may be THERM, GEN, SURE, or TALLY.

10.2.12 SEEK2

Subroutine SEEK2 is entered only during the data input phase of the problem, when a data BLOCK 5, 6, or 10 of type B is read in. SEEK2 has the same function and follows the same procedures as SEEK1, except that the search is for a pair of identification numbers which are the same as the pair just read in.

SEEK2 returns to the calling routine, which may be THERM, FINK, or SURE.

10.2.13 REFER

Subroutine REFER is entered only during the first time step, to produce cross-reference tables relating various input-data item lists to others. The sequence number in the node list (data BLOCK 4) must be found for all nodes listed in data BLOCKs 1, 5, 6, 8, 9, and 10. The sequence number in the material list (data BLOCK 2) must be found for each material listed in data BLOCK 4. The sequence number in the boundary-node list (data BLOCK 7) must be found for each boundary node listed in data BLOCK 6. This procedure makes possible the use of arbitrarily chosen identification numbers for each of the four types of items referenced by other data blocks, allowing flexibility in arranging and modifying data decks. Also, the identification numbers may be chosen to convey additional information to the user, such as composition, spatial location, function in the problem, or sequence of modification of data.

The search for each item referenced is made in reverse sequence, so that the latest item in the list is used. If a referenced identification number is not in the list being searched, a diagnostic statement is immediately written out. An error indicator is set, and certain parts of the program are skipped, and the problem is ended at the end of the first time step.

REFER returns to the calling routine, which may be THERM, GEN, FINK, SURE, or TALLY.

10.3 TRUST PROGRAM GLOSSARY

10.3.1 General Definitions

BLOCK ITEM	An input data description of a material, node, internal connection, external connection, boundary node, fluid generation table, or node initial condition.
BOUNDARY	Pertaining to specified conditions at an external surface, or to an external potential (boundary node) connected to the system.
CONDUCTANCE	Rate of fluid mass flow per unit pressure difference.

CONNECTION	A means of fluid transport between two nodes, or between a surface node and an external potential.
CONVERGENCE	Acceptance of results of iterative calculation of the fluid mass balance for inter-connected special nodes. See PSIVARY, ERRS.
DATA BLOCK	A group of input data of a particular type, or a list of block items, preceded by a block number card and followed by a blank card. Block items need not be on the same input unit as the block number card. See BLOCK.
DATA DECK	Input data for a single problem, consisting of a problem name card, data blocks, and a data end card.
EXPLICIT NODES	See "REGULAR"
EXTERNAL	Pertaining to a boundary node or connection between a node and a boundary node.
IMPLICIT NODES	See "SPECIAL"
INTERFACE	A surface common to two nodes, through which fluid may be transported.
INTERNAL	Pertaining to a node or connection between nodes.
ITERATION	A repetitive step in the calculation of the fluid mass balance for inter-connected special nodes.
MATERIAL	A substance with density, fluid capacity, and hydraulic conductivity.
NODAL POINT	A representative point within a node, from which distances to interfaces are measured to describe internal connections.
NODE	A volume element of a particular material.
REGULAR	Classification of nodes for which the fluid mass balance is based on potentials at the beginning of each time step for connections with other regular nodes. These nodes may also be called Explicit Nodes.

SPECIAL	Classification of nodes for which the fluid mass balance is based on average potential during the time step. See REGULAR, NTYPE, KS, KSPEC, FOR, SPECK. These nodes may also be called <u>Implicit Nodes</u>.
STEADY STATE	A condition in which remaining time dependencies are insignificant compared with a specified allowable error.
SURFACE	Pertaining to a node connected to a boundary node, to the connection, or the area which is connected.
TIME STEP	A small interval of time for which a pseudo steady state calculation is made to determine changes in time-dependent variables.
TRANSIENT	Pertaining to variation with time, non-steady state.

10.3.2 <u>TRUST Control Cards</u>

BLOCK	BLOCK number card, with block number (see IBLOCK) in Cols. 6-7, BLOCK type (see MOD) in Col. 8. Cols. 9-80 may contain a title (see ABLOCK).
ENDED	Data end card (must follow last data block). Columns 6-7 must be either -1 or -2, and the problem will either be interrupted or ended, resp.
(BLANK)	A blank card indicates the end of a list of block items in BLOCKS 2, 4, 5, 6, 7, 8, 9, and 10, and the end of material selection list in BLOCK 2. Extra blanks may be inserted anywhere except within block item lists.
*CHECK	Data deck preprocessing control card (preceding data deck). Causes next problem to end after the first time step. Used for checking input data.
*SPLIT	Job completion control card (following data deck). If read, program will call exit.
*(NAME)	Problem name card. Column 1 must be an *. Column 72 controls use of data from preceding problem (see K).

10.3.3 Glossary of Variables and Parameters Occurring in Program TRUST (Prepared by T. N. Narasimhan, Earth Sciences Division, Lawrence Laboratory, Berkeley, California)

NAME	DESCRIPTION
ABLOCK	DESCRIPTIVE INFORMATION PUNCHED ON BLOCK NUMBER CARD IN
ABLOCK	COLUMNS 9 THRU 80
ADATA	ALPHANUMERIC CHARACTERS IN COLUMNS 1 THRU 5 OF THE
ADATA	BLOCK NUMBER CARD
ADD	DIFFERENCE BETWEEN SUCCESSIVE VALUES OF DRAD IN A
ADD	SEQUENCE OF NODES OR CONNECTIONS PRODUCED BY NSEQ
AFLUID	NAME OF FLUID. SPECIFIED IN COLUMNS 1 THRU 10 OF BLOCK3
AMAT(N)	DESCRIPTIVE NAME OF MATERIAL WITH NUMBER MAT(N)
APATH	DESCRIPTION OF THE PATH OF SATURATION OF THE FLOW
APATH	SYSTEM. CAN BE DRYING OR WETTING. IF BLANK, SYSTEM IS
APATH	ASSUMED TO BE SATURATED
AREA(N)	INTERFACE AREA BETWEEN NOD1(N) AND NOD2(N), EQUALS
AREA(N)	(GEOM*ULONG*DRAD*KSYM)*SCALE**2. SEE KD
AREAS(N)	AREA OF NODS(N) EXPOSED TO BOUNDARY NODE NODSB(N),
AREAS(N)	EQUALS (GEOM*DLONG*DRAD*KSYM)*SCALE**2. SEE KD
AV(N)	COEFFICIENT OF COMPRESSIBILITY OF MATERIAL WITH NUMBER
AV(N)	MAT(N)
A1	TEMPORARY VARIABLE IN ALPHANUMERIC FORMAT
B(N)	PARAMETER FOR DESCRIBING PRESSURE HEAD VERSUS
	PERMEABILITY RELATION FOR THE NTH MATERIAL TURATED
BET	VALUE OF A TABULATED PROPERTY USED TO FIND CHANGE
BETA	COEFFICIENT OF COMPRESSIBILITY OF FLUID
BETW	VALUE OF W(N) BEFORE FINDING NEW VALUE
BIG	CONSTANT WITH VALUE 0.99999999E 12
BPRIME	LUMPED PARAMETER OF FLUID, EQUALS BETA*RHOZ*GEE
CAP(N)	FLUID MASS CAPACITY OF NODE(N) AT PSI(N),SUMTIM
CAPM(N)	SPECIFIC MOISTURE CAPACITY OF PARTIALLY SATURATED SOIL
CAPM(N)	IN NODE(N),COMPUTED AS CHANGE IN SATURATION PER UNIT
CAPM(N)	CHANGE IN PSI(N)
CAPMS	TOTAL FLUID MASS CAPACITY OF A MATERIAL
CAPS	TOTAL FLUID MASS CAPACITY OF SYSTEM
CAPT(J,N)	FLUID MASS CAPACITY PER UNIT VOLUME OF A NODE, RELATED
CAPT(J,N)	TO CAP(N) BY, CAP(N) = CAPT(J,N)*VOL(N).
CAPT(J,N)	INPUT IN BLOCK 2 AS CAPACITY OF MAT(N) AT SIVARC(J,N)
CC(N)	COMPRESSION INDEX OF MATERIAL MAT(N)
CHI(J,N)	JTH TABULATED VALUE OF CHI FOR MATERIAL N
CHIAT	THE VALUE OF CHI AT ANY PARTICULAR VALUE OF PSI
CHIDASH	SAME AS CHIPRIME DEFINED IN THE THEORY PAPER
CHIDASH	PART 1 BY NARASIMHAN AND WITHERSPOON
CHIMID	LOCAL VALUE OF CHI(J,N)
CHIMIDP	MEAN VALUE OF TWO ADJACENT VALUES OF CHIVARP
CHIVARP(J,N)	VALUE OF PRESSURE HEAD AT WHICH CHI HAS A VALUE OF
CHIVARP(J,N)	CHI(J,N)
CHIVARS(J,N)	VALUE OF SATURATION AT WHICH CHI HAS A VLUE OF CHI(J,N)
CK(N)	COEFFICIENT INDICATING RELATION BETWEEN VOID RATIO AND
CK(N)	LOGARITHM OF ABSOLUTE PERMEABILITY OF MATERIAL WITH
CK(N)	NUMBER MAT(N)
CON(N)	HYDRAULIC CONDUCTIVITY (L/T) OF NODE(N) AT

CON(N)	PSI(N), SUMTIM
CONE	VALUE GIVEN A NON-DECIMAL BCD NUMBER NXX IN PATCH
CONST	TEMPORARY CONSTANT,USED IN CALCULATING ABSOLUTE PERMEA-
CONST	BILITY FROM VOID RATIO
CONST1	CONSTANT USED IN CALCULATING VOID RATIO WHEN COEFFIC -
CONST1	IENT OF COMPRESSIBILITY (AV) IS USED
CONST2	CONSTANT USED WHEN COMPRESSION INDEX (CC) IS USED
CONT(J,N)	ABSOLUTE PERMEABILITY OF MAT(N) AT PSIVARK(J,N)
CONTD(J,N)	J-TH TABULATED VALUE OF ABSOLUTE PERMEABILITY ON THE
CONTD(J,N)	DRYING CURVE OF MATERIAL WITH NUMBER MAT(N)
CONTW(J,N)	J-TH TABULATED VALUE OF ABSOLUTE PERMEABILITY ON THE
CONTW(J,N)	WETTING CURVE OF MATERIAL WITH NUMBER MAT(N)
CONZ(N)	REFERENCE VALUE OF ABSOLUTE PERMEABILITY AT THE KNOWN
CONZ(N)	VOID RATIO EZ(N) OF MATERIAL WITH NUMBER MAT(N)
CS(N)	SWELLING INDEX OF MATERIAL WITH NUMBER MAT(N)
DAY	TEMPORARY NAME FOR DATE
DC(J,N)	SCANNING CURVE DATA FOR SATURATION. J-TH REFERENCE
DC(J,N)	VALUE OF PRESSURE HEAD FOR MATERIAL WITH NUMBER MAT(N)
DCS(J,N)	SATURATION VALUE AT THE PRESSURE HEAD OF DC(J,N)
DELT	TIME STEP CONTROLLED BY PSIVARY,SMALL,DELTO,DELTMX,
DELT	TIMEP AND TIMAX. ALSO SEE KS,KSPEC
DELTG	LAST ACCEPTED TIME STEP COMPLETED
DELTMX	MAXIMUM ALLOWABLE TIME STEP,NO LARGER THAN EITHER DELTO
DELTMX	OR 2/3 OF THE SMALLEST VALUE OF SLIM(N) FOR REGULAR
DELTMX	NODES (NTYPE(N)=0). SEE KSPEC,KS. ABSOLUTE LIMITS ARE
DELTMX	FROM 1.E-10 TO 1.E12
DELTO	MAXIMUM ALLOWABLE TIME STEP. BLANK=1.0E12. MUST BE
DELTO	SPECIFIED IF KSPEC IS POSITIVE
DELTOLD	LAST ACCEPTED TIME STEP
DELTS	LAST TIME STEP COMPLETED
DELTSS	LAST ACCEPTED TIME STEP COMPLETED BEFORE DELTS
DELVOL(N)	CUMULATIVE CHANGE IN THE VOLUME OF NODE(N)
DEL1(N)	AVERAGE LENGTH OF FLUID FLOW PATH FROM NODAL POINT IN
DEL1(N)	NOD1(N) TO INTERFACE WITH NOD2(N). SEE SCALE
DEL2(N)	AVERAGE LENGTH OF FLUID FLOW PATH FROM NODAL POINT IN
DEL2(N)	NOD2(N) TO INTERFACE WITH NOD1(N). SEE SCALE
DEX	TEMPORARY VALUE OF DDPSI(N)
DF(N)	NET MASS FLOW INTO NODE(N) IN TIME STEP DELT
DELZ	DIFFERENCE IN ELEVATION BETWEEN THE NODE BEING
DELZ	GENERATED AND THE PREVIOUS NODE IN SEQUENCE
DFI(N)	FLUID FLOW FROM NOD2(N) TO NOD1(N) DURING TIME STEP DELT
DFS(N)	MASS FLOW FROM NODSB(N) TO NODS(N) IN TIME STEP DELT
DK(J,N)	SCANNING CURVE DATA FOR PERMEABILITY TABLE. J-TH
DK(J,N)	REFERENCE VALUE OF PRESSURE HEAD FOR MATERIAL WITH
DK(J,N)	NUMBER MAT(N)
DKLIM(N)	ABSOLUTE PERMEABILITY CORRESPONDIND TO DPLIMK(N).
DKS(J,N)	ABSOLUTE PERMEABILITY CORRESPONDING TO DK(J,N)
DLONG	AVERAGE LENGTH OF A NODE IN BLOCK 4, AN INTERFACE IN
DLONG	BLOCK 5, OR A SURFACE IN BLOCK 6. SEE DRAD
DNDP	DERIVATIVE OF POROSITY WITH REFERENCE TO EFFECTIVE
DNDP	STRESS. THE LATTER BEING IN METRES OF WATER
DPLIM(N)	HYSTERESIS INFORMATION. PRESSURE HEAD AT THE POINT ON
DPLIM(N)	THE DRYING CURVE FROM WHICH THE SCANNING CURVE OF
DPLIM(N)	NODE(N) COMMENCED ON THE SATURATION CURVE
DPLIMK(N)	HYSTERESIS INFORMATION. PRESSURE HEAD AT THE POINT ON
DPLIMK(N)	THE DRYING CURVE FROM WHICH THE SCANNING CURVE OF
DPLIMK(N)	NODE(N) COMMENCED ON THE PERMEABILITY CURVE
DPMAXS	VALUE OF DPSIMAX FOR TIME STEP DELTS
DPRES	MAXIMUM PRESSURE HEAD CHANGE IN TIME STEP DELTS
DPSI(N)	CHANGE IN PRESSURE HEAD IN NODE(N) IN TIME STEP DELT
DPSIMAX	MAXIMUM CHANGE IN ANY TABULATED PROPERTY, IN EQUIVALENT

DRAD	MEAN DEPTH (KD=1), OR MEAN RADIUS (KD=2 OR 3) OF A NODE
DRAD	IN BLOCK 4, AN INTERFACE IN BLOCK 5, OR A SURFACE IN
DRAD	BLOCK 6. SEE NSEQ FOR USE OF NEGATIVE VALUE. ALSO SEE
DRAD	VOL(N), AREA(N),AREAS(N) AND SCALE
DRADS	VALUE OF DRAD FOR NODE OR CONNECTION LAST READ IN
DSLIM(N)	SATURATION AT DPLIM(N)
DVOL	CHANGE IN VOLUME DURING TIMESTEP DELTS OF THE NODE
DVOL	UNDER CONSIDERATION
DWIDE	AVERAGE WIDTH OF A NODE IN BLOCK 4. SEE DRAD
DX	VOLUMETRIC FLUID GENERATION IN TIME STEP DELT FOR THE
DX	NODE UNDER CONSIDERATION
DX1	INCREMENTAL VALUE OF X COORDINATE FOR NODAL POINT
DX1	GENERATION IN BLOCK 4
DY1	SAME AS DX1 BUT FOR Y COORDINATE
EAVG	VOID RATIO EVALUATED AT THE ESTIMATED MEAN VALUE OF
EAVG	EFFECTIVE STRESS DURING TIME STEP DELT FOR THE NODE
EAVG	UNDER CONSIDERATION
EC	NEW VALUE OF REFERENCE VOID RATIO WHEN THE SOIL BEGINS
EC	TO SWELL ALONG A NEW SWELLING CURVE
EK(N)	REFERENCE VALUE OF VOID RATIO ON THE VOID RATIO VERSUS
EK(N)	LOG EFFECTIVE STRESS PLOT OF MATERIAL WITH NUMBER
EK(N)	MAT(N)
ELT	TEMPORARY NAME FOR ELAPSED TIME
EMAX	LARGEST CHANGE IN THE CALCULATED PRESSURE HEAD CHANGE
EMAX	OF ANY FINITE-VOLUME SPECIAL NODE IN ONE ITERATION.
EMAX	MUST BE LESS THAN 10.0*ERRS*PSIVARY FOR CONVERGENCE
EPSINCR	INCREMENTAL VOLUMETRIC STRAIN DURING TIMESTEP DELTS OF
EPSINCR	THE NODE UNDER CONSIDERATION
EPSMEAN	CUMULATIVE VOLUMETRIC STRAIN OF THE NODE UNDER CONSIDE-
EPSMEAN	RATION
ERROR(N)	NEW ESTIMATED CHANGE IN MASS FLOW INTO NODE(N)
ERRORX(N)	LAST ESTIMATED CHANGE IN MASS FLOW INTO NODE(N)
ERRS	MAXIMUM ALLOWABLE FRACTION OF PSIVARY FOR THE CHANGE IN
ERRS	THE CALCULATED AVERAGE PRESSURE HEAD CHANGE OF INTER-
ERRS	CONNECTED SPECIAL NODES IN ONE ITERATION, FOR CONVER-
ERRS	GENCE
ESTRESS	EFFECTIVE STRESS IN UNITS OF FORCE PER UNIT AREA OF
ESTRESS	THE NODE UNDER CONSIDERATION
ESTRIN	INITIAL EFFECTIVE STRESS AT THE BEGINNING OF TIME STEP
ESTRIN	DELT OF THE NODE UNDER CONSIDERATION
ESTRMIN	MINIMUM EFFECTIVE STRESS OF THE SYSTEM
ESUM	CHANGE IN THE CALCULATED TOTAL MASS CONTENT OF INTER-
ESUM	CONNECTED SPECIAL NODES IN ONE ITERATION
ETA(N)	PARAMETER FOR DESCRIBING PRESSURE HEAD VERSUS
	SATURATION RELATION FOR THE NTH MATERIAL
EX	EXTRAPOLATION OF PRESSURE HEAD OR TIME FOR TABLE LOOKUP
EX	OR A CORRECTION TO THE PRESSURE HEAD CHANGE OF A
EX	SPECIAL NODE FOR ONE ITERATION STEP
EZ(N)	REFERENCE VOID RATIO ON THE VOID RATIO VERSUS LOG
EZ(N)	EFFECTIVE STRESS PLOT OF MATERIAL WITH NUMBER MAT(N)
F(N)	TOTAL MASS FLOW INTO NODE(N) AT SUMTIM
FB(N)	TOTAL MASS ADDED TO SYSTEM FROM BOUNDARY NODE NODB(N)
FEX	MASS FLOW FROM NOD2(N) TO NOD1(N) IN TIME STEP DELT
FG(N)	TOTAL MASS GENERATED FROM NODE(N)
FI(N)	TOTAL MASS FLOW FROM NOD2(N) TO NOD1(N) AT SUMTIM
FIN	DUMMY LIST ARGUMENT USED FOR WRITE STATEMENTS WITH NO
FIN	LIST, TO AVOID FIN STATEMENT REQUIRED IN LRLTRAN
FIN	BUT NOT ALLOWED IN CHAT.
FLEX	FINAL CORRECTION TO MASS FLUX BETWEEN NODES
FLUID	TOTAL FLUID MASS CONTENT OF SYSTEM
FLUX	NET TOTAL FLUID MASS FLOW INTO ALL NODES IN THE SYSTEM
FLUXS	NET TOTAL FLUID MASS FLOW INTO SYSTEM FROM BOUNDARY

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FLUXS           NODES
FLX             FLUID CONTENT OF SYSTEM BASED ON CONSTANT CAP(N)
FOR             INTERPOLATION FACTOR BETWEEN PRESSURE HEADS AT THE BE-
FOR              GINNING AND AT THE END OF TIME STEP. FOR IS SET TO 1.0
FOR              FOR THE FIRST TIME STEP AND AFTER REJECTED TIME STEPS.
FOR              FOR OTHER TIME STEPS,FOR IS 1.0 IF KPEC IS 2, 0.5 IF
FOR              KSPEC IS 3, OR BETWEEN 0.57 AND 1.0, DEPENDING ON RAST
FORD            FACTOR FOR ESTIMATING CHANGES. EQUALS FOR*DELT OR
FORD             0.5*DELT
FS(N)           TOTAL MASS FLOW FROM NODSB(N) TO NODS(N) AT SUMTIM
FX              AVERAGE RATE OF MASS FLOW ACROSS A CONNECTION
FX               SINCE TIME TAU
F1,F2,F3        TEMPORARY VARIABLES
G(N)            VOLUMETRIC FLUID GENERATION RATE IN NODE(N). SEE GONE,
G(N)             GG(N), GT(J,N)
GBYMU           LUMPED CONSTANT. EQUALS GRAVITATIONAL CONSTANT DIVIDED
GBYMU            BY VISCOSITY OF FLUID
GEE             GRAVITATIONAL CONSTANT
GENS            NET TOTAL AMOUNT OF FLUID MASS GENERATED IN SYSTEM
GENS             SINCE TIME TAU
GEOM            GEOMETRIC FACTOR, 1.0 FOR KD = 1, 2.0*PI FOR KD = 2,
GEOM             AND 4.0*PI FOR KD = 3 (PI = 3.14159265)
GG(N)           INITIAL VOLUMETRIC FLUID GENERATION RATE IN NODE(N).
GG(N)            BLANK=GONE
GMASS           TOTAL MASS GENERATION IN NODE(N) DURING TIME STEP DELT
GONE            CONSTANT VOLUMETRIC FLUID GENERATION RATE ASSIGNED TO
GONE             ALL NODES IN BLOCK 4 READ IN AFTER BLOCK 1, AND SUB-
GONE             STITUTED FOR ANY GG(N) IN ANY BLOCK 10 READ IN AFTER
GONE             BLOCK 1. WILL NOT BE USED FOR NODES LISTED IN BLOCK 8
GS              NET TOTAL MASS GENERATION RATE IN SYSTEM
GT(J,N)         VOLUMETRIC FLUID GENERATION RATE IN NODG(N) AT TVARG
GT(J,N)          (J,N).IF LTABG(N) IS -1.0 OR1, GT IS THE VOLUMETRIC
GT(J,N)          GENERATION RATE AT TIME ZERO, DECAYING WITH HALF LIFE
GT(J,N)          TVARG(1,N)
GX              TEMPORARY VALUE OF GG(N)
H(N)            FLUID MASS ADDED TO NODE(N) UPTO SUMTIM
HEX             MASS FLOW BETWEEN NODES DURING TIME STEP DELT
HONE            SURFACE CONDUCTANCE FOR ANY EXTERNAL CONNECTIONS WITH
HONE             HSURE(N) BLANK IN A BLOCK 6 READ IN AFTER BLOCK 1
HSUM            TOTAL FLUID MASS CAPACITY OF ALL SPECIAL NODES WHICH
HSUM             HAVE INTERNAL CONNECTIONS WITH OTHER SPECIAL NODES
HSURE(N)        SURFACE CONDUCTANCE BETWEEN NODS(N) AND NODSB(N)
HSURT(J,N)      SURFACE CONDUCTANCE OF NODS(N) AT TVARH(J,N).BLANK=HONE
HX              TEMPORARY VALUE OF HSURE(N)
HYST1,HYST2     ENTRY POINTS WITHIN SUBROUTINE HYST
HYST3,HYST4     ENTRY POINTS WITHIN SUBROUTINE HYST
I               ARRAY SUBSCRIPT
IBLOCK          BLOCK NUMBER  --  1     CONTROLS,LIMITS, AND CONSTANTS
IBLOCK                            2     MATERIAL PROPERTIES
IBLOCK                            3     FLUID PROPERTIES
IBLOCK                                  (NOT APPLICABLE FOR FLUMP)
IBLOCK                            4     NODAL POINT DATA
IBLOCK                            5     ELEMENT DATA
IBLOCK                            6     EXTERNAL FLUID CONNECTIONS
IBLOCK                            7     EXTERNAL HEADS
IBLOCK                            8     VARIABLE FLUID GENERATION RATES
IBLOCK                            9     INITIAL CONDITIONS
IBLOCK                                  (HEADS AND FLUID GENERATION RATES)
IBLOCK                           10    DATALFORFDIMENSICNLESS VARIABLES
IBLOCL          VALUE OF IBLOCK ON DATA END CARD
II              ARRAY SUBSCRIPT
IJ              ARRAY SUBSCRIPT
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IPATH(N)	INDEX DESCRIBING PATH WITHIN HYSTERESIS LOOP. IPATH =1
IPATH(N)	IF ON DRYING CURVE, IPATH = 1,IF ON WETTING CURVE,
IPATH(N)	IPATH = 3 IF ON SCANNING CURVE FROM WETTING TO DRYING
IPATH(N)	AND IPATH = 4 IF ON SCANNING CURVE FROM WETTING TO
IPATH(N)	DRYING. SUBSCRIPT REFERS TO INDEX OF NODE
IPRINT	INDICATES THAT DATA PRINTOUTS WILL BE MADE WHENEVER
IPRINT	THE NUMBER OF TIME STEPS IS EVENLY DIVISIBLE BY IPRINT,
IPRINT	IN ADDITION TO THE FIRST, SECOND AND LAST TIME STEPS,
IPRINT	AND OTHER TIME STEPS ACCORDING TO TIMEP. SEE KDATA,
IPRINT	NUM, IRITE,TIMEP
IRITE	>0, INDICATES DATA WILL BE WRITTEN ON UNIT 'ITAPE'
IRITE	WHENEVER KCYC IS EVENLY DIVISIBLE BY IRITE, IN
IRITE	ADDITION TO THE FIRST, SECOND, AND LAST TIME STEPS
ITAPE	OUTPUT UNIT ON WHICH TIME, NODE NUMBERS, AND
ITAPE	HEADS ARE WRITTEN. SEE IRITE.
ITEMS(N)	NUMBER OF CROSS REFERENCED ITEMS IN DATA BLOCK N
J	ARRAY SUBSCRIPT
JJ	ARRAY SUBSCRIPT
J1	TEMPORARY VALUE OF NODMAT(NOD1(N)) OR MAT(N)
J2	TEMPORARY VALUE OF NODMAT(NOD2(N))
K	IN COLUMN 72 OF PROBLEM NAME CARD, IF 2,3 OR 4,
K	INDICATES NEW PROBLEM WILL USE ALL DATA FROM THE
K	PREVIOUS PROBLEM, INCLUDING EITHER THE INITIAL (K=2)
K	OR FINAL (K = 3 OR 4) PRESSURE HEADS AND START AT
K	EITHER THE INITIAL (K = 2 OR 3) OR FINAL (K = 4)
K	PROBLEM TIME.(ALSO USED FOR ARRAY SUBSCRIPTS,FLAGS IN
K	SEEK1 AND SEEK2, TEMPORARY VALUES OF SUBSCRIPTED
K	INTEGERS)
KCYC	INDICATES PROBLEM IS IN DATA INPUT PHASE (IF -1),OR IN
KCYC	INITIALIZATION PHASE,INCLUDING INITIAL TIME STEP OF
KCYC	1.0E-12 (IF 0),OR THE NUMBER OF TIME STEPS COMPLETED
KD	GEOMETRIC SYMMETRY INDICATOR, 1 FOR NON SYMMETRIC,
KD	2 FOR AXISYMMMETRIC, 3 FOR CENTRISYMMETRIC. USED TO
KD	CONTROL CALCULATION OF NODE VOLUMES AND CONNECTION
KD	AREAS FOR BLOCKS 4,5 AND 6 READ IN AFTER BLOCK 1.(MORE
KD	THAN ONE BLOCK 1 MAY BE USED, TO CHANGE KD.)
KDATA	CONTROLS AMOUNT OF DATA ON PRINTOUTS, MINIMUM IF NEGA-
KDATA	TIVE, NORMAL IF ZERO, AND MAXIMUM IF POSITIVE. MAXIMUM
KDATA	OUTPUT IS ALWAYS PRODUCED ON FIRST, SECOND AND LAST
KDATA	TIME STEPS. SEE IPRINT, NUM, TIMEP.
KDATAX	INPUT VALUE OF KDATA
KGOOD	NUMBER OF SUCCESSIVE TIME STEPS NOT REPEATED, OR NOT
KGOOD	INVOLVING CHANGES TO SPECIAL NODES, AFTER SECOND
KK	ARRAY SUBSCRIPT
KNOCK	NUMBER OF FLUID FLOW CONNECTIONS BETWEEN PAIRS OF SPE-
KNOCK	CIAL NODES
KONSTIM	>0, CONSTANT TIME STEP USED (DELT = DELTO)
KONSTIM	<=0, VARIABLE TIME STEP USED
KS	INDICATES THAT NODE(N) IS A SPECIAL NODE. SEE KSPEC
KSECS	MACHINE TIME CHARGED TO PROBLEM, IN SECONDS, MEASURED
KSECS	FROM JUST BEFORE READING PROBLEM NAME CARD FOR EACH
KSECS	DATA DECK
KSPEC	INDICATES REGULAR NODES WILL BE CHANGED TO SPECIAL
KSPEC	NODES AS NEEDED TO ALLOW LARGER TIME STEPS (0), BE-
KSPEC	FORE FIRST TIMESTEP (1,2 OR 3), OR NOT ALL, AND STEADY
KSPEC	STATE CRITERIA CANNOT END PROBLEM (-1). CAN FIX INTER-
KSPEC	POLATION FACTOR (FOR) AT 1.0 (2), OR AT 0.5 (3).
KSPEC	NORMAL VALUE OF KSPEC IS ZERO. DELTO MUST BE SPECIFIED
KSPEC	IF KSPEC IS POSITIVE
KSYM	SYMMETRY FACTOR, 1 IF KD IS 1 OR 2, 2 IF KD IS 3
KWIT	FLAG INDICATING REASON FOR ENDING PROBLEM --
KWIT	INDICATES TIME STEP TO BE REPEATED (-1), SUMTIME EX-

KWIT	CEEDS TIMAX (1), PSI OVER PSIMAX (2), OR UNDER PSIMIN
KWIT	(3), STEADY STATE REACHED (4), INPUT ERROR (5), *CHECK
KWIT	CARD READ IN (6), KCYC OVER MSYC (7), KSECS OVER MSEC
KWIT	(8), MISSING BLOCK 2 OR BLOCK 4 (9), ITERATION CONVER-
KWIT	GENCE FAILURE (10), NUMBER OF BLOCK ITEMS TOO LARGE
KWIT	(11), OR TABLE LENGTH OVER M9 (12)
KWITLOC	NUMBER TEN-LETTER ALPHA NUMERIC WORDS IN EACH KWITMSG
KWITLOC	STATEMENT. KWITLOC IS USED PRINT DIAGNOSTIC STATEMENT
KWITLOC	ON ENDING THE PROBLEM
KWITMSG	DIAGNOSTIC MESSAGE ON REASON FOR ENDING THE PROBLEM
K1,K2	TEMPORARY VARIABLES
L	TEMPORARY VARIABLE
LABEL	INDICATES TABLE HEADINGS TO BE REWRITTEN, IF NONZERO
LASTEM	INDICATES PRESSURE SCALE IS LINEAR IF 0, LOG IF 1.
	INCLUDED IN THE BATTELLE VERSION OF TRUST ONLY
LASTIM	INDICATES TIME SCALE IS LINEAR IF 0, LOG IF 1.
	INCLUDED IN THE BATTELE VERSION OF TRUST ONLY
LBX	INDICATES INPUT DATA FIELD FOR NXX BLANK IF ZERO
LIST(N)	INPUT ARRAY WHICH MUST BE RECALCULATED IN SUBR REFER.
LIST(N)	CONTAINS INTERNALLY ASSIGNED NODAL POINT NUMBERS
LIST(N)	WHICH ARE SET = J WHERE LISTX(N) = LISTR(J)
LISTR(N)	ARRAY CONTAINING NUMBERS TO WHICH ARRAY LIST REFERS.
LISTX(N)	INPUT VALUES OF ARRAY LIST
LTAB	ABSOLUTE VALUE OF A TABLE LENGTH
LTABC(N)	LENGTH OF A TABLE OF SATURATION (WETTING OR DRYING)
LTABC(N)	VERUS PSIVARC(J,N) OF MATERIAL WITH NUMBER MAT(N)
LTABG(N)	LENGTH OF A TABLE OF GT(J,N) VERSUS TVARG (J,N) FOR
LTABG(N)	NODG(N), IS NEGATIVE FOR TIME TABLE, IS POSITIVE FOR
LTABG(N)	PRESSURE HEAD TABLE, -1,0 OR 1 FOR EXPONENTIALLY VARY-
LTABG(N)	ING FLUID GENERATION WITH RATE GT(1,N) AT TIME 0, HALF
LTABG(N)	LIFE TVARG(1,N)
LTABH(N)	LENGTH OF A TABLE OF HSURT(J,N) VERSUS TVARH(J,N) FOR
LTABH(N)	NODS(N), IS NEGATIVE FOR TIME TABLE, POSITIVE FOR
LTABH(N)	PRESSURE HEAD TABLE
LTABK(N)	LENGTH OF A TABLE OF CONTO(J,N),CONTW(J,N) VERSUS
LTABK(N)	PSIVARK(J,N) OF MATERIAL WITH NUMBER MAT(N)
LTABSC(N)	LENGTH OF A TABLE OF SATURATION SCANNING CURVE OF MATE-
LTABSC(N)	RIAL WITH NUMBER MAT(N)
LTABSK(N)	LENGTH OF A TABLE OF PERMEABILITY SCANNING CURVE OF
LTABSK(N)	MATERIAL WITH NUMBER MAT(N)
LTABPHI(N)	LENGTH OF A TABLE OF PHIB(J,N) VERSUS TIMEB(J,N) OF
LTABPHI(N)	NODB(N). MAKE 100 TO GET SINUSOIDAL VARIATION OF
LTABPHI(N)	PHIB(N) AROUND PHIB(1,N) WITH AMPLITUDE PHIB(2,N),
LTABPHI(N)	PERIOD TIMEB(1,N) AND PHASE ADVANCE TIME TIMEB(2,N).
LXX	INDICATES INPUT DATA FIELD FOR NXX BLANK IF ZERO
L1 TO L4	TEMPORARY VALUES
M	UNIT NUMBER FOR OUTPUT OF CALCULATIONAL RESULTS
MAR	SIZE OF ARRAY LISTR IN SUBROUTINE REFER
MAT(N)	IDENTIFICATION NUMBER OF MATERIAL WITH INDEX N
MAX	SIZE OF ARRAYS LIST AND LISTX IN SUBROUTINE REFER.
MAX	HIGHEST INDEX OF PART OF TABLE BEING SEARCHED
MAXE	SIZE OF ARRAYS LIST AND LISTX IN SUBROUTINE REFER.
	HIGHEST INDEX OF PART OF TABLE BEING SEARCHED
MCYC	MAXIMUM ALLOWED NUMBER OF TIME STEPS (LIMIT ON KCYC).
MCYC	NEGATIVE WILL STOP PROBLEM AT END OF FIRST TIME STEP.
MCYC	ZERO OR BLANK IS IGNORED
MF	TOTAL NUMBER OF TIMES DPRES OR DPSIMAX HAS EXCEEDED
MF	PSIVARY IN TIME STEPS FOR WHICH DELT WAS ECUAL TO SMALL
MID	CENTRAL INDEX OF PART OF TABLE BEING SEARCHED
MIN	LOWEST INDEX OF PART OF TABLE BEING SEARCHED
MODS	INDICATES MOE IS A (+1), B (-1), OR NEITHER (0)
MS	NUMBER OF TIME STEPS FOR WHICH DELT WAS EQUAL TO DELTMX

MS	AND DPRES AND DPSIMAX WERE LESS THAN PSIVARY, SINCE
MS	LAST REGULAR NODE WAS RECLASSIFIED AS A SPECIAL NODE
MSEC	MAXIMUM ALLOWED USE OF MACHINE TIME, IN SECONDS. NEGA-
MSEC	TIVE WILL STOP PROBLEM AT END OF FIRST TIME STEP. ZERO
MSEC	OR BLANK IS IGNORED
MSS	TOTAL NUMBER OF TIMES DPRES AND DPSIMAX WERE LESS THAN
MSS	PSIVARY IN TIME STEPS FOR WHICH DELT WAS EQUAL TO
MSS	DELTMX
MW	NORMAL MONITOR OUTPUT UNIT NUMBER (03 AT LRL)
M1 - M12	PARAMETERS CONTROLLING DIMENSIONS OF ARRAYS FOR
M1 - M12	MATERIALS (M2),NODES (M4), INTERNAL CONNECTIONS (M5),
M1 - M12	SURFACE CONNECTIONS (M6), BOUNDARY NODES (M7), FLUID
M1 - M12	GENERATION NODES (M8), TABLE LENGTH(M9). M1,M3,M10,M11
M1 - M12	AND M12 ARE PRESENTLY UNUSED
N	ARRAY SUBSCRIPT
NADD	DIFFERENCE BETWEEN SUCCESSIVE VALUES OF NODE IN SEQUENCE
NADG	DIFFERENCE BETWEEN SUCCESSIVE VALUES OF NODG IN SEQUENCE
NADS	DIFFERENCE BETWEEN SUCCESSIVE VALUES OF NODS IN SEQUENCE
NADSB	DIFFERENCE BETWEEN SUCCESSIVE VALUES OF NODSB IN SEQUENCE
NAD1	DIFFERENCE, AFTER MULTIPLYING BY 10**NZ, BETWEEN VALUES
NAD1	OF NAD1 IN A SEQUENCE OF CONNECTIONS
NAD2	DIFFERENCE, AFTER MULTIPLYING BY 10**NZ,BETWEEN
NAD2	VALUES OF NAD2 IN A SEQUENCE OF CONNECTIONS
NAME	80-CHARACTER TITLE OF PROBLEM NAME CARD. FIRST CHARACTER
NAME	MUST BE AN *. CHARACTER 72 CONTROLS USE OF DATA FROM
NAME	PRECEDING PROBLEM (SEE K)
NAMES	PROBLEM NAME AT TIME LAST DATA END CARD WAS READ IN
NB	INPUT UNIT NUMBER FOR BLOCK ITEMS
NB1(N)	INTEGER WHICH SEEK1 OR SEEK2 IS TO SEARCH FOR.
NB2(N)	WITH NB1(N) CONSTITUTES PAIR OF ARRAYS OF
NB2(N)	INTEGERS SEARCHED FOR IN SUBROUTINE SEEK2
NC	ARRAY SUBSCRIPT OF NXX IN PATCH
NCHECK	INDICATES /*CHECK/ READ IN IF NON ZERO
NCYC	TEMPORARY PARAMETER. EQUALS KCYC-1
NDOT	INDICATES TIME DERIVATIVE DDPSI(N) WILL BE USED
NDOT	(NDOT > 0) OR MAINTAINED AT 0.0 (NDOT NOT 0)
NDUMMY	COLLECTIVE NAME FOR CROSS REFERENCED VARIABLES GROUPED
NDUMMY	BEHIND NOSPEC IN BLANK COMMON
NEWBL(N)	NUMBER OF TIMES DATA BLOCK N HAS BEEN READ IN. 1000 IS
NEWBL(N)	ADDED EACH TIME A REFERENCED DATA BLOCK IS READ IN.
NEWBL(N)	THIS WILL APPEAR AS LEADING ZEROES IN THE PRINTOUT DUE
NEWBL(N)	TO THE FORMAT USED
NEWS	NUMBER OF REGULAR NODES MADE SPECIAL IN ONE TIME STEP
NIT	NUMBER OF NODES WITHINITIAL VALUES PPHI AND GG
NMAT	NUMBER OF MATERIALS DESCRIBED IN INPUT BLOCK 2
NN	ARRAY SUBSCRIPT
NND	ARRAY SUBSCRIPT
NOCON	NUMBER OF INTERNAL NODE CONNECTIONS (BLOCK 5)
NODB(N)	NUMBER OF BOUNDARY NODE WITH INDEX N
NODBS	NUMBER OF BOUNDARY NODES (INPUT BLOCK 7)
NODE(N)	IDENTIFICATION NUMBER OF NODE WITH INDEX N
NODES	NUMBER OF NODES INPUT IN BLOCK 4 PLUS NUMBER OF
NODES	WELLS INPUT IN BLOCK 9 (FLUMP)
NODIM	NUMBER OF NODES FOR WHICH TD AND PD ARE TO BE
NODIM	CALCULATED
NODTD(N)	SERIAL NUMBER IN THE NODE LIST OF THE NTH
NODTD(N)	VOLUME ELEMENT FOR WHICH DIMENSIONLESS
NODTD(N)	QUANTITIES ARE REQUIRED
NODG(N)	NUMBER OF A NODE WITH VARIABLE FLUID GENERATION
NODMAT(N)	IDENTIFICATION NUMBER OF MATERIAL IN NODE(N)
NODMS	TOTAL NUMBER OF NODES OF A MATERIAL
NODREF	INDEX OF NODE BEING REFERRED TO

NODS(N)	IDENTIFICATION NUMBER OF SURFACE NODE CONNECTED TO
NODS(N)	NODSB(N)
NODSB(N)	IDENTIFICATION NUMBER OF BOUNDARY NODE CONNECTED TO
NODSB(N)	NODS(N)
NOD1(N)	IDENTIFICATION NUMBER OF INTERNAL NODE CONNECTED TO
NOD1(N)	NOD2(N)
NOD2(N)	IDENTIFICATION NUMBER OF INTERNAL NODE CONNECTED TO
NOD2(N)	NOD1(N)
NOGEN	NUMBER OF NODES WITH FLUID GENERATION
NOSCON	NUMBER OF EXTERNAL CONNECTIONS (INPUT BLOCK 6)
NOSPEC	NUMBER OF SPECIAL NODES IN SYSTEM
NOTE(N)	IDENTIFICATION NUMBER OF NODE WITH INITIAL CONDITIONS
NOTE(N)	PPHI, GG
NOW	INDICATES PRINTOUTS ARE BEING PRODUCED FOR THE TIME
NOW	STEP JUST COMPLETED, IF NON ZERO
NOXE(N)	INPUT VALUE OF NOTE(N)
NOXG(N)	INPUT VALUE OF NODG(N)
NOXS(N)	INPUT VALUE OF NODS(N)
NOXSB(N)	INPUT VALUE OF NODSB(N)
NOX1(N)	INPUT VALUE OF NOD1(N)
NOX2(N)	INPUT VALUE OF NOD2(N)
NPRINT	NUMBER OF PRESSURE HEAD (PSI) VERSUS NODE NUMBER PRINT-
NPRINT	OUTS MADE
NPR38	PROBLEM NUMBER COUNTED FROM LAST /*DATA/ CARD
NPUNCH	INDICATES FINAL VALUES OF PHI,AND CONSTANT VALUES OF G
NPUNCH	WILL BE PUNCHED IN THE FORMAT OF BLOCK 9 WHEN THE
NPUNCH	PROBLEM IS ENDED OR INTERRUPTED, TO ALLOW A CONTINUA-
NPUNCH	TION PROBLEM TO BE RUN
NR	INPUT UNIT NUMBER FOR DATA DECKS
NRS	NORMAL MONITOR INPUT UNIT NUMBER (02 AT LRL)
NREG	NUMBER OF REGULAR NODES IN SYSTEM
NSAVE	INDICATES A *DECKS CARD HAS BEEN READ IN, IF 1, AND
NSAVE	UNUSED DATA DECKS ARE TO BE SAVED
NSEQ	NUMBER OF BLOCK ITEMS TO BE GENERATED IN ADDITION TO
NSEQ	THE ITEM DESCRIBED
NSTOP	INDICATES PROBLEM TO END WHEN TIME STEP IS COMPLETE
NTABLE	TOTAL NUMBER OF TABLES IN INPUT DATA
NTYPE(N)	NODE TYPE, REGULAR (0), SURFACE (1), ZERO-VOLUME (2),
NTYPE(N)	KS=1 SPECIAL (3), KS=0 CONVERTED TO SPECIAL (4) OR
NTYPE(N)	KSPEC = 1 CONVERTED TO SPECIAL (5)
NTYPES(N)	INITIAL NODE TYPE, SEE NTYPE(N)
NUM	NUMBER OF A NODE FOR WHICH PSI, PHI,DOPSI,SUMTIM WILL
NUM	BE WRITTEN ON OUTPUT EVERY TIME STEP. THIS IS IN ADDI-
NUM	TION TO THE DATA WRITTEN OUT FOR ALL NODES AT INTER-
NUM	VALS CONTROLLED BY IPRINT AND TIMEP
NUMX	INPUT VALUE OF NUM
NUTAVG	AVERAGE NUMBER OF ITERATIONS PER CYCLE
NUTMAX	MAXIMUM ALLOWABLE NUMBER OF ITERATIONS OF THE MASS
NUTMAX	BALANCE EQUATIONS FOR INTERCONNECTED SPECIAL NODES(80)
NUTS	NUMBER OF ITERATIONS COMPLETED BEFORE CONVERGENCE. WILL
NUTS	CAUSE NEXT TIME STEP TO BE REDUCED IF MORE THAN 40
NUTSUM	TOTAL NUMBER OF ITERATIONS USED IN PROBLEM
NUTX	MAXIMUM NUMBER OF ITERATIONS USED IN ANY TIME STEP
NUTX1	TEMPORARY VARIABLE FOR NUTX
NVARC	NUMBER OF MATERIALS WITH VARIABLE FLUID MASS CAPACITY
NVARCHI	NUMBER OF MATERIALS WITH TABULATED VALUES OF CHI
NVARG	NUMBER OF NODES WITH VARIABLE FLUID GENERATION
NVARH	NUMBER OF NODES WITH VARIABLE SURFACE CONDUCTANCE
NVARK	NUMBER OF NODES WITH VARIABLE PERMEABILITY
NVART	NUMBER OF BOUNDARY NODES WITH VARIABLE POTENTIAL
NX	TEMPORARY VALUE OF NEWBL(N), OUTPUT LINE COUNTER
NX1(N)	INPUT NUMBER HSURE(N), PPHI(N) IN BCD FORM

NX2(N)	INPUT NUMBER GG(N) IN BCD FORM
NX3(N)	INPUT NUMBER PC(N) IN BCD FORM
NX4(N)	INPUT NUMBER GG(N) IN BCD FORM
NXX(N)	A BCD NUMBER TO BE TESTED FOR A DECIMAL PT. IN PATCH
NZ	INDICATES NAD1,NAD2 ARE TO BE MULTIPLIED BY 10**NZ
N1,N2,N3	TEMPORARY VALUES OF VARIOUS INTEGERS
OLDVOL	VOLUME OF NODE UNDER CONSIDERATION AT THE END OF LAST
OLDVOL	COMPLETED TIME STEP
PC(N)	PRECONSOLIDATION STRESS OF NODE (N).
PCH(N)	PC(N) EXPRESSED IN EQUIVALENT COLUMN OF FLUID
PCONE	CONSTANT PRECONSOLIDATION STRESS ASSIGNED TO ALL NODES
PCONE	IN ANY BLOCK 4 READ IN AFTER BLOCK 1, AND SUBSTITUTED
PCONE	FOR ANY UNSPECIFIED PC(N) IN ANY BLOCK 10 READ IN AFTER
PCONE	BLOCK 1.
PCX	TEMPORARY VALUE OF PC(N) IN INPUT DATA BLOCK 10.
PD	DIMENSIONLESS PRESSURE, CONVENTIONALLY USED IN
PD	PETROLEUM LITERATURE. PD = PLUMP * DRAWDOWN
PHIB(J,N)	FLUID POTENTIAL OF NODB(N) AT TIMEB(J,N)
PHIB(1,N)	AVERAGE VALUE OF PHB(N), IF LTABT(N) IS 100
PHIB(2,N)	AMPLITUDE OF VARIATION OF PHB(N), IF LTABT(N) IS 100
PHIBS	AVERAGE VALUE OF BOUNDARY NODE POTENTIAL DURING TIMESTEP
PHIMAX	MAXIMUM ALLOWABLE POTENTIAL. REPLACED WITH 1.0 E12
PHIMAX	IF NOT LARGER THAN PHIMIN. PROBLEM TERMINATES IF
PHIMAX	SIMAX1 BECOMES LARGER THAN PHIMAX
PHIMIN	MINIMUM ALLOWABLE POTENTIAL. REPLACED WITH -1.0E12
PHIMIN	IF NOT LESS THAN PHIMAX. PROBLEM TERMINATES IF
PHIMIN	SIMIN1 FALLS BELOW PHIMIN
PHIONE	INITIAL FLUID POTENTIAL ASSIGNED TO ALL NODES IN ANY
PHIONE	BLOCK 4 READ IN AFTER BLOCK 1,AND SUBSTITUTED FOR UN-
PHIONE	SPECIFIED PPHI(N) IN ANY BLOCK 9 READ IN AFTER BLOCK 1
PHIX	TEMPORARY VALUE OF PPHI(N)
PIX	NUMBER OF TIME STEPS ESTIMATED TO REMAIN BEFORE TIMAX
PIX	REACHES AN INTEGRAL MULTIPLE OF TIMEP
PLUMP	THE CONSTANT PORTION OF PD FOR A GIVEN PROBLEM.
PLUMP	PLUMP TIMES DRAWDOWN EQUALS PD. PLUMP =
PLUMP	(2.* 3.14159 * CON * RHO * GEE)/(QOVERH * VISC)
PORS	POROSITY
POUT	FLOATING POINT VALUE GIVEN A BCD NUMBER NXX IN PATCH.
POUT	USED FOR SETTING INITIAL VALUES -- PPHI(N), GG(N),
POUT	HSURF(N) TO EITHER INPUT VALUES IN BLOCKS 6,10
POUT	OR DEFAULT VALUES IN BLOCK 1.
PPHI(N)	INITIAL POTENTIAL IN NOTE (N). BLANK = PHIONE
PSI(N)	PRESSURE HEAD IN NODE(N). EQUALS PHI(N)-Z(N)
PSIAO	AVERAGE PRESSURE HEAD OF SYSTEM. CONSTANT CAP(N)
PSIAIR(N)	PRESSURE HEAD AT AIR ENTRY VALUE
PSIER	CHANGE IN AVERAGE PRESSURE HEAD OF SYSTEM DUE TO NET
PSIER	SURFACE FLUX
PSILE	CHANGE IN AVERAGE PRESSURE HEAD DUE TO FLUID GENERATION
PSIB(N)	PRESSURE HEAD AT NODB(N)
PSIBS(N)	AVERAGE VALUE OF PSIB(N) DURING A TIME STEP
PSIMAX	MAXIMUM ALLOWABLE PRESSURE HEAD. REPLACED WITH 1.0E12
PSIMAX	IF NOT LARGER THAN PSIMIN.
PSIMAX1	MAXIMUM PRESSURE HEAD IN SYSTEM AT SUMTIM
PSIMIDC(J,N)	MEDIAN VALUE OF PRESSURE AT WHICH SPECIFIC MOISTURE
PSIMIDC(J,N)	CAPACITY OF A MATERIAL WITH NUMBER MAT(N) IS EVALUATED.
PSIVARC(J,N)	VALUE OF PRESSUREHEAD PSI AT WHICH SATURATION HAS
PSIVARC(J,N)	A VALUE OF SW(J,N) OR SD(J,N)
PSIVARK(J,N)	VALUE OF PRESSURE HEAD PSI AT WHICH PERMEABILITY HAS
PSIVARK(J,N)	A VALUE OF CONTD(J,N) OR CONTW(J,N)
QOVERH	VOLUMETRIC FLOW RATE FROM WELL PER UNIT AQUIFER
QOVERH	THICKNESS,USED FOR GENERATING DIMENSIONLESS VARIABLES.
QOVERH	USED ONLY IF BLOCK10 IS USED

RATG	VALUE OF SIVARY/DHEAD IN TIME STEP DELTG
R(N)	RADIUS TO NTH NODE IN AN AXISYMMETRIC SYSTEM. USED FOR COMPUTING DIMENSIONLESS TIME
RATIO	RATIO OF DELT TO DELTS, BEFORE RESTRICTING DELT TO
RATIO	LIMITS SMALL AND DELTMX. RATIO IS SET EQUAL TO
RATIO	SIVARY/MAX1F(DHEAD,DSIMAX), RESTRICTED TO THE
RATIO	RANGE FROM 0.5 TO 2.0
RAT1	VALUE OF SIVARY/DHEAD IN TIME STEP DELTS
RAT2	VALUE OF SIVARY/DHEAD IN TIME STEP DELTSS
RD	RELATIVE DENSITY OR SPECIFIC GRAVITY OF THE OVER-
RD	MATERIAL, DEFINED AS THE RATIO OF THE AVERAGE
RD	UNIT WEIGHT OF THE OVERBURDEN MATERIAL TO THE
RD	UNIT WEIGHT OF WATER
RDELT	= (DELT + DELTS) / (DELTS + DELTSS)
RHO(N)	DENSITY OF FLUID IN THE N TH VOLUME ELEMENT
RHOMEAN	MEAN DENSITY OF FLUID AT THE INTERFACE BETWEEN
RHOMEAN	TWO VOLUME ELEMENTS
RHOZ	REFERENCE DENSITY OF THE FLUID AT REFERENCE PRESSURE,
RHOZ	USUALLY ATMOSPHERIC
S(N)	SATURATIONAT NODE N
SAVG	AVERAGE VALUE OF SATURATION OVER A TIME STEP DELT
SAVG	USED IN ESTIMATING CAP(N)
SCALE	LINEAR SCALE FACTOR USED IN CALCULATING ALL LENGTHS,
SCALE	AREAS, AND VOLUMES FOR BLOCKS 4, 5, AND 6. SET TO
SCALE	1 IF NEGATIVE, ZERO, OR UNSPECIFIED IN BLOCK 1
SD(J,N)	JTH VALUE OF SATURATION ON THE DRYING CURVE FOR THE
SD(J,N)	NTH MATERIAL
SET	TIME OR HEAD FOR TABLE LOOK-UP
SLIM(N)	MAXIMUM STABLE TIME STEP FOR A REGULAR NODE(N),
SLIM(N)	= CAP(N)/ZIP(N)
SLOC(J,N)	SLOPE BETWEEN ENTRIES J AND J-1 IN CAPT(J,N) TABLE
SLOCD(J,N)	SLOPE BETWEEN J AND J-1 ENTRIES IN THE DRYING CURVE
SLOCHI(J,N)	SLOPE BETWEEN THE J AND J-1 ENTRIES IN THE CHI TABLE
SLOCHI(J,N)	OF THE N TH MATERIAL
SLOCW (J,N)	SLOPE BETWEEN J AND J-1 ENTRIES IN THE WETTING CURVE
SLOCW (J,N)	TABLE FOR THE N TH MATERIAL
SLOCD(J,N)	TABLE FOR THE N TH MATERIAL.
SLOG(J,N)	SLOPE BETWEEN ENTRIES J AND J-1 IN GT(J,N) TABLE
SLOH(J,N)	SLOPE BETWEEN ENTRIES J AND J-1 IN HSURT(J,N) TABLE
SLOK(J,N)	SLOPE BETWEEN ENTRIES J AND J-1 IN CONT(J,N) TABLE
SLOKD(J,N)	SLOPE BETWEEN J AND J-1 ENTRIES IN THE DRYING,
SLOKD(J,N)	PERMEABILITY VERSUS PRESSURE HEAD TABLE OF N TH MATERIAL
SLOKW(J,N)	SLOPE BETWEEN J AND J-1 ENTRIES IN THE WETTING,
SLOKW(J,N)	PERMEABILITY VERSUS PRESSURE HEAD TABLE OF THE
SLOKW(J,N)	N TH MATERIAL
SLOPS	RATIO OF MAXIMUM RATES OF HEAD CHANGE IN TIME STEPS
SLOPS	DELTS AND DELTSS. = (RAT1 * DELTS)/(RAT2 * DELTSS)
SLOT(J,N)	SLOPE BETWEEN ENTRIES J AND J-1 IN PHIB(J,N) TABLE
SMALL	MINIMUM ALLOWABLE TIME STEP. BLANK = 1.E-12, LATER
SMALL	REPLACED WITH 0.01*DELTMX, AS LONG AS AT LEAST 1/4
SMALL	OF THE NODES ARE REGULAR NODES.
SMALT	INPUT VALUE OF SMALL OR 1.0 E-12, WHICHEVER LARGER
SPEED	ACCELERATION PARAMETER FOR POINT ITERATIVE SCHEME, = 0.2
SR(N)	RESIDUAL SATURATION OF NTH MATERIAL
SS(N)	SPECIFIC STORAGE COEFFICIENT OF THE NTH MATERIAL
STRATE	TIME RATE OF VOLUMETRIC STRAIN ESPRESSED AS A
STRATE	PERCENTAGE. STRATE = 100.* EPSINCR/DELTS
SUMTIM	TOTAL PROBLEM TIME, STARTING AT TAU. LIMIT IS TIMAX.
SW(J,N)	JTH VALUE OF SATURATION ON THE WETTING CURVE FOR THE
SW(J,N)	NTH MATERIAL
TAU	INITIAL VALUE OF PROBLEM TIME
TD	DIMENSIONLESS TIME FREQUESTLY USED IN THE PETROLEUM

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TD              LITERATURE.  TD = (CON * RHO *GEE/VISC*SS*RADIUS**2)
TD               *SUMTIM
TIM             REMAINING TIME BETWEEN SUMTIM AND NEXT HIGHER INTEG-
TIM              ER MULTIPLE OF TIMEP FOR WHICH PRINTOUT PRODUCED
TIMAX           MAXIMUM VALUE OF PROBLEM TIME.  IF <0, PROBLEM
TIMAX            WILL END AFTER FIRST TIME STEP.  IF UNSPECIFIED
TIMAX            IT IS NOT USED.
TIMEB(J,N)      TIME AT WHICH NODB(N) IS AT PHIB(J,N)
TIMEB(1,N)      SINE WAVE PERIOD OF PHB(N), IF LTABT(N) IS 100
TIMEB(2,N)      SINE WAVE ADVANCE TIME OF PHB(N), IT LTABT(N) IS 100
TIMEP           PROBLEM TIME INTERVAL BETWEEN DATA DATA OUTPUT IN
TIMEP            ADDITON TO OUTPUT ON FIRST, SECOND, AND LAST TIME
TIMEP            STEP, AND IN ADDITION TO OUTPUT CONTROLLED BY
TIMEP            'IPRINT'.  IF <= 0, IT IS NOT USED.
TRAN(N)         CONDUCTANCE BETWEEN NOD1(N) AND NOD2(N)
TLUMP           THE CONSTANT PORTION OF TD FOR A GIVEN PROBLEM.
TLUMP            TD = TLUMP * (SUMTIM/R(N)**2) FOR A GIVEN NODE N
TLUMP            OR, TD = TLUMP *(SUMTIM/XF**2) FOR A WELL
TLUMP            INTERCEPTING A FRACTURE OF LENGTH (OR,RADIUS) XF.
TRANS(N)        CONDUCTANCE BETWEEN NODS(N) AND NODSB(N)
TRANS(N)         =AREAS(N)*HSURE(N)
TVARG(1,N)      HALF-LIFE OF GENERATION RATE IN NODG(N) WHEN
TVARG(1,N)       LTABG(N) IS -1, 0, OR +1
TVARG(J,N)      HEAD OR TIME AT WHICH NODG(N) HAS GT(J,N)
TVARH(J,N)      HEAD OR TIME AT WHICH NODS(N) HAS HSURT(J,N)
VLOST           TOTAL VOLUME CHANGE OVER THE ENTIRE FLOW REGION
VOL(N)          VOLUME OF NODE(N) BASED ON INPUT IN BLOCKS 1 AND 4,
VOL(N)           = (GEOM*DWIDE*DLONG*DRAD**KSYM)*SCALE**3
VOLMS           TOTAL VOLUME OF A MATERIAL
VOLS            TOTAL VOLUME OF SYSTEM
VSOLID(N)       VOLUME OF SOLIDS IN ELEMENT N
W(N)            QUANTITY OF FLUID CONTAINED IN EXCLUSIVE SUBDOMAIN
W(N)             ASSOCIATED WITH NODE (N)
WMS             TOTAL FLUID MASS CONTENT OF A MATERIAL
XF              LENGTH OF VERTICAL FRACTURE OR RADIUS OF HORIZONTAL
XF               FRACTURE.  USED IN CALCULATING TD
X1              TEMPORARY VARIABLE IN THERM: X COORDINATE IN TALLY
X2              TEMPORARY VARIABLE IN THERM: Y COORDINATE IN TALLY
X3              TEMPORARY VARIABLE IN THERM: Z COORDINATE IN TALLY
X4              TEMPORARY VARIABLE
Z(N)            ELEVATION OF NODE N ABOVE DATUM
ZIP(N)          OVERALL CONDUCTANCE FOR NODE(N), =SUM OF CONDUCTANCES
ZIP(N)           OF ALL INTERNAL AND EXTERNAL FLUID CONNECTIONS TO
ZIP(N)           NODE(N).  =CAPT(N)*VOL(N)/SLIM(N)
```

10.3.4 TRUST Subroutines

FINK — Subroutine of TRUST for flow between nodes by conduction. Uses data from BLOCK 5. Treats all nodes as regular nodes. Skipped if NOCON = 0.

GEN — Subroutine of TRUST for internal flow generation. Uses data from BLOCKS 1, 8, and 9 (optional, skipped if NOGEN = 0).

PATCH — Subroutine of TRUST to convert a number from BCD to floating point if it contains a decimal point, or substituting a specified floating point number.

REFER — Subroutine of TRUST to find array subscripts of materials, nodes, or boundary nodes referred to by identification number in another data block, and to write out diagnostic statements whenever one cannot be found.

SEEK1 — Subroutine of TRUST for finding an identification number of a material, node, or boundary node in a block item list.

SEEK2 — Subroutine of TRUST for finding the identification numbers of a pair of nodes in a block item list.

SPECK — Subroutine of TRUST for flow between special nodes and other nodes or boundary nodes. Iterates to solve set of implicit difference equations when special nodes are connected to each other. Skipped if NOSPEC = 0.

SURE — Subroutine of TRUST for flow between surface nodes, or boundary nodes. Uses data from BLOCKS 6 and 7. Treats all surface nodes as regular nodes. See SPECK. (Optional, skipped if M6 or M7 is zero). Skipped if NOSCON = 0.

TALLY — Subroutine of TRUST for initialization, totaling and checking results, finding new DELTMX and DELT, converting regular to special nodes, testing for ending the problem. Uses data from BLOCKS 1 and 9.

TALLY1 — Entry point in TALLY for punching BLOCK 9 cards or writing to a file.

THERM — Subroutine of TRUST for material properties and node descriptions. Uses data from BLOCKS 2 and 4.

TRUST — A computer program for transient and steady state potential distributions in multidimensional systems with conduction, flow generation, and variable properties and boundary conditions. Also for reading in TRUST control cards, problem name cards, block number cards, data end cards, and making subroutine calls for data input and time step calculations. Controls problem interruption and restart.

REFERENCES

Bishop, A. W. 1960. "The Principle of Effective Stress," Pub. 32, pp. 1-5, Norwegian Geotech. Inst. Oslo, Norway.

Duff, I. S. 1977. "MA28: A Set of FORTRAN Subroutines for Sparse Unsymmetric Linear Equations," AERE REPR. R8730, Harwell, Didcot, Oxon, England.

Dusinberre, G. M. 1961. Heat Transfer Calculations by Finite Differences, International. Scranton, PA.

Edwards, A. L. 1968. "TRUMP: A Computer Program for Transient and Steady State Temperature Distributions in Multidimensional Systems," Rep. UCRL-14754, Nat. Tech. Inform. Serv., Springfield, VA., (Third revision, 1972).

Evans, G. W., R. J. Brousseau and R. Kierstead. 1954. "Instability Considerations for Various Difference Equations Derived from the Diffusion Equation," Rep. USRL 4476, Lawrence Livermore Lab., Livermore, CA.

Finlayson, B. A. 1976. "Water Movement in Desicated Soils" in Finite Elements in Water Resources, edited by W. G. Gray, G. F. Pinder and C. A. Bubbia. pp. 3.91-3.106.

Liakopoulos, A. C. 1965. "Transient Flow Through Unsaturated Porous Media," D. Eng. dissertation, University of California, Berkely, CA.

McMurdie, J. L. and P. R. Day. 1960. "Slow Tests Under Soil Moisture Suction," Soil Sci. Soc. Amer. Proc., 24, pp. 441-444.

Narasimhan, T. N. 1975. "A Unified Numerical Model for Saturated-Unsaturated Groundwater Flow," Ph.D. dissertation, University of California, Berkeley, CA, February.

Narasimhan, T. N. and P. A. Witherspoon. 1976. "An Integrated Finite Difference Method for Analyzing Fluid Flow in Porous Media," Water Resour Res., 12(1), pp. 57-64.

Narasimhan, T. N. and P. A. Witherspoon. 1977. "Numerical Model for Saturated-Unsaturated Flow in Deformable Porous Media, 1, Theory," Water Resour. Res., 13(3), pp. 657-664.

Narasimhan, T. N., P. A. Witherspoon and A. L. Edwards. 1978. "Numerical Model for Saturated-Unsaturated Flow in Deformable Porous Media, 2, The Algorithm," Water Resour Res., 14(2), pp. 255-261.

Narasimhan, T. N. and P. A. Witherspoon. 1978. "Numerical Model for Saturated-Unsaturated Flow in Deformable Porous Media, 3, Applications," Water Resour Res., 14(6), pp. 1017-1034.

Nelson, R. W., A. E. Reisenauer and G. W. Gee. 1980. Model Assessment of Alternatives for Reducing Seepage of Contaminants from Buried Uranium Mill Tailings at the Morton Ranch Site in Central Wyoming. NUREG/CR-1495 PNL-3378, Prepared for U.S. Regulatory Commission by Pacific Northwest Laboratory, Richland, Washington.*

O'Brien, G. G., M. A. Hyman and S. Kaplan. 1951. "A Study of the Numerical Solution of Partial Differential Equations," J. Math. Phys., 29, pp. 223-251.

Richards, L. A. 1931. "Capillary Conduction of Liquids Through Porous Mediums," Physics, 1, pp. 318-333.

Richtmeyer, R. D. and K. W. Morton. 1967. "Difference Methods for Initial Value Problems," Interscience, New York.

*Available for purchase from the NRC/GPO Sales Program, U.S. Nuclear Regulatory Commission, Washington, DC 20555, and/or the National Technical Information Service, Springfield, VA 22161.

APPENDIX A

SAMPLE PROBLEM INPUT LISTING

```
*    MINE TAILING CASE
2000
BLOCK 1
  100                  1000
    1      2,00       1,      E-09 0,01         0,00
       52,        0,0         0,0        0,0
BLOCK 2
SYSTM
SANDS     1  +40     0  +40      5,     E-16 ,515       1,00  E+138,205 E-11
-2,606E+04-1,219E+04-5,701E+03-2,760E+03-1,465E+03-7,780E+02-4,130E+02-2,193E+02
-1,164E+02-6,180E+01-3,281E+01-1,402E+01-8,927E+00-7,298E+00-5,967E+00-4,878E+00
-3,988E+00-3,270E+00-2,943E+00-2,649E+00-2,384E+00-2,146E+00-1,951E+00-1,855E+00
-1,678E+00-1,423E+00-1,286E+00-1,240E+00-1,195E+00-1,152E+00-1,111E+00-1,071E+00
-9,958E-01-9,174E-01-8,438E-01-7,761E-01-7,139E-01-6,566E-01-6,080E-01-5,630E-01
-5,114E-01-4,645E-01-4,220E-01-3,833E-01-3,549E-01-3,415E-01-3,287E-011000,
 2,941E-02 2,941E-02 3,912E-02 3,912E-02 4,882E-02 4,882E-02 5,853E-02 5,853E-02
 6,824E-02 6,824E-02 7,794E-02 7,794E-02 8,765E-02 8,765E-02 9,735E-02 9,735E-02
 1,071E-01 1,071E-01 1,168E-01 1,168E-01 1,265E-01 1,265E-01 1,362E-01 1,362E-01
 1,459E-01 1,459E-01 1,556E-01 1,556E-01 1,653E-01 1,653E-01 1,750E-01 1,750E-01
 1,847E-01 1,847E-01 1,944E-01 1,944E-01 2,041E-01 2,041E-01 2,138E-01 2,138E-01
 2,235E-01 2,235E-01 2,332E-01 2,332E-01 2,429E-01 2,429E-01 2,526E-01 2,526E-01
 2,721E-01 2,721E-01 2,915E-01 2,915E-01 3,109E-01 3,109E-01 3,303E-01 3,303E-01
 3,467E-01 3,497E-01 3,691E-01 3,691E-01 3,885E-01 3,885E-01 4,079E-01 4,079E-01
 4,468E-01 4,468E-01 4,856E-01 4,865E-01 5,244E-01 5,244E-01 5,632E-01 5,632E-01
 6,021E-01 6,021E-01 6,409E-01 6,409E-01 6,797E-01 6,797E-01 7,185E-01 7,185E-01
 7,671E-01 7,671E-01 8,156E-01 8,156E-01 8,641E-01 8,641E-01 9,126E-01 9,126E-01
 9,515E-01 9,515E-01 9,709E-01 9,709E-01 9,903E-01 9,903E-01 1,0       1,0
-2,606E+04-1,219E+04-5,701E+03-2,760E+03-1,465E+03-7,760E+02-4,130E+02-2,193E+02
-1,164E+02-6,180E+01-3,281E+01-1,402E+01-8,927E+00-7,298E+00-5,967E+00-4,878E+00
-3,958E+00-3,274E+00-2,943E+00-2,649E+00-2,384E+00-2,146E+00-1,951E+00-1,855E+00
-1,678E+00-1,423E+00-1,286E+00-1,240E+00-1,195E+00-1,152E+00-1,111E+00-1,071E+00
-9,958E-01-9,174E-01-8,438E-01-7,761E-01-7,139E-01-6,566E-01-6,080E-01-5,630E-01
-5,114E-01-4,645E-01-4,220E-01-3,833E-01-3,549E-01-3,415E-01-3,287E-011000,
+5,014E-26 5,014E-26 5,547E-25 5,547E-25 3,897E-24 3,897E-24 2,142E-23 2,142E-23
+1,013E-22 1,013E-22 4,427E-22 4,427E-22 1,857E-21 1,857E-21 7,606E-21 7,606E-21
+3,066E-20 3,066E-20 1,222E-19 1,222E-19 5,160E-19 5,160E-19 2,473E-18 2,473E-18
+8,203E-18 8,203E-18 2,052E-17 2,052E-17 4,386E-17 4,386E-17 8,528E-17 8,528E-17
+1,559E-16 1,559E-16 2,713E-16 2,713E-16 4,494E-16 4,494E-16 7,121E-16 7,121E-16
+1,087E-15 1,087E-15 1,611E-15 1,611E-15 2,324E-15 2,324E-15 3,266E-15 3,266E-15
+4,005E-14 4,005E-14 5,775E-14 5,775E-14 8,066E-14 8,066E-14 1,097E-13 1,097E-13
+1,904E-13 1,904E-13 3,094E-13 3,094E-13 4,791E-13 4,791E-13 7,147E-13 7,147E-13
+1,035E-12 1,035E-12 1,464E-12 1,464E-12 2,031E-12 2,031E-12 2,768E-12 2,768E-12
+3,996E-12 3,996E-12 5,659E-12 5,659E-12 7,884E-12 7,884E-12 1,084E-11 1,084E-11
+1,305E-11 1,305E-11 1,563E-11 1,563E-11 8,098E-11 8,098E-11 8,203E-11 8,203E-11
MRD        2  +29     0  +29      5,     E-16 ,421       1,0   E+131,495 E-14
-7,584E+03-4,567E+03-3,257E+03-1,962E+03-1,181E+03-7,114E+02-4,285E+02-2,629E+02
-1,997E+02-1,663E+02-1,264E+02-9,601E+01-7,994E+01-6,657E+01-5,058E+01-3,843E+01
-2,455E+01-1,473E+01-9,482E+00-7,598E+00-6,364E+00-5,331E+00-4,465E+00-3,740E+00
-2,817E+00-2,102E+00-1,785E+00-1,157E+00 1,000E+03
 1,884E-01 1,884E-01 2,173E-01 2,173E-01 2,367E-01 2,367E-01 2,656E-01 2,656E-01
 2,946E-01 2,946E-01 3,236E-01 3,236E-01 3,527E-01 3,527E-01 3,912E-01 3,912E-01
 4,202E-01 4,202E-01 4,394E-01 4,394E-01 4,684E-01 4,684E-01 4,975E-01 4,975E-01
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 6,328E-01 6,328E-01 6,716E-01 6,716E-01 7,101E-01 7,101E-01 7,584E-01 7,584E-01
 7,972E-01 7,972E-01 8,356E-01 8,356E-01 8,745E-01 8,745E-01 9,129E-01 9,129E-01
 9,517E-01 9,517E-01 9,710E-01 9,710E-01 9,808E-01 9,808E-01 9,902E-01 9,902E-01
1,0         1,0
-7,584E+03-4,567E+03-3,257E+03-1,962E+03-1,181E+03-7,114E+02-4,285E+02-2,629E+02
-1,997E+02-1,663E+02-1,264E+02-9,601E+01-7,994E+01-6,657E+01-5,058E+01-3,843E+01
-2,455E+01-1,473E+01-9,482E+00-7,598E+00-6,364E+00-5,331E+00-4,465E+00-3,740E+00
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-2,817E+00-2,102E+00-1,705E+00-1,157E+00 1,000E+03
+1,782E-23 1,782E-23 6,019E-23 6,019E-23 1,331E-22 1,331E-22 4,291E-22 4,291E-22
+1,364E-21 1,364E-21 4,249E-21 4,249E-21 1,313E-20 1,313E-20 5,480E-20 5,480E-20
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+1,658E-18 1,658E-18 2,552E-18 2,551E-18 4,882E-18 4,882E-18 9,209E-18 9,209E-18
+2,159E-17 2,159E-17 5,273E-17 5,273E-17 1,391E-16 1,391E-16 4,170E-16 4,170E-16
+8,662E-16 8,662E-16 1,639E-15 1,639E-15 2,909E-15 2,909E-15 4,934E-15 4,934E-15
+8,123E-15 8,133E-15 1,052E-14 1,052E-14 1,212E-14 1,212E-14 1,476E-14 1,476E-14
+1,495E-14 1,495E-14
CLAY      3  +53    0   +33      5,9    E-15 ,6260     1,0    E+132,739 E=16
-1,234E+02-1,161E+02-1,089E+02-1,017E+02-9,449E+01-8,727E+01-8,005E+01-7,283E+01
-5,840E+01-4,396E+01-3,188E+01-2,778E+01-2,368E+01-1,959E+01-1,549E+01-9,726E+00
-7,801E+00-6,839E+00-5,876E+00-4,914E+00-4,433E+00-3,952E+00-3,470E+00-3,281E-02
+10000,
 6,057E-01 6,057E-01 6,143E-01 6,143E-01 6,229E-01 6,229E-01 6,314E-01 6,314E-01
 6,400E-01 6,400E-01 6,486E-01 6,486E-01 6,571E-01 6,571E-01 6,657E-01 6,657E-01
 6,743E-01 6,743E-01 6,829E-01 6,829E-01 6,914E-01 6,914E-01 7,000E-01 7,000E-01
 7,086E-01 7,086E-01 7,171E-01 7,171E-01 7,257E-01 7,257E-01 7,343E-01 7,343E-01
 7,514E-01 7,514E-01 7,686E-01 7,686E-01 7,857E-01 7,857E-01 8,029E-01 8,029E-01
 8,200E-01 8,200E-01 8,371E-01 8,371E-01 8,543E-01 8,543E-01 8,800E-01 8,800E-01
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 9,743E-01 9,743E-01 9,829E-01 9,829E-01 9,914E-01 9,914E-01 1,000E+00 1,000E+00
1,0       1,0
-1,553E+03-9,539E+02-3,747E+02-1,594E+02-1,522E+02-1,450E+02-1,378E+02-1,306E+02
-1,234E+02-1,161E+02-1,089E+02-1,017E+02-9,449E+01-8,727E+01-8,005E+01-7,283E+01
-5,840E+01-4,396E+01-3,188E+01-2,778E+01-2,368E+01-1,959E+01-1,549E+01-9,726E+00
-7,801E+00-6,839E+00-5,876E+00-4,914E+00-4,433E+00-3,952E+00-3,470E+00-3,281E-02
1000,
 3,766E-22 3,766E-22 5,256E-22 5,256E-22 1,693E-21 1,693E-21 4,941E-21 4,941E-21
 1,058E-20 1,058E-20 1,698E-20 1,698E-20 3,055E-20 3,055E-20 4,580E-20 4,580E-20
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 6,170E-19 6,170E-19 9,533E-19 9,533E-19 1,519E-18 1,519E-18 2,439E-18 2,439E-18
 3,860E-18 3,860E-18 6,012E-18 6,012E-18 9,321E-18 9,321E-18 1,856E-17 1,856E-17
 4,634E-17 4,634E-17 7,033E-17 7,033E-17 1,044E-16 1,044E-16 1,528E-16 1,528E-16
 1,845E-16 1,845E-16 2,230E-16 2,230E-16 2,708E-16 2,708E-16 2,739E-16 2,739E-16
 2,739E-16 2,739E-16
CLAY      4  +53    0   +33      5,9    E-15 ,6260     1,0    E+132,739 E=16
-1,553E+03-9,539E+02-3,747E+02-1,594E+02-1,522E+02-1,450E+02-1,378E+02-1,306E+02
-1,234E+02-1,161E+02-1,089E+02-1,017E+02-9,449E+01-8,727E+01-8,005E+01-7,283E+01
-5,840E+01-4,396E+01-3,188E+01-2,778E+01-2,368E+01-1,959E+01-1,549E+01-9,726E+00
1000,
 6,057E-01 6,057E-01 6,143E-01 6,143E-01 6,229E-01 6,229E-01 6,314E-01 6,314E-01
 6,400E-01 6,400E-01 6,486E-01 6,486E-01 6,571E-01 6,571E-01 6,657E-01 6,657E-01
 6,743E-01 6,743E-01 6,829E-01 6,829E-01 6,914E-01 6,914E-01 7,000E-01 7,000E-01
 7,086E-01 7,086E-01 7,171E-01 7,171E-01 7,257E-01 7,257E-01 7,343E-01 7,343E-01
 7,514E-01 7,514E-01 7,686E-01 7,686E-01 7,857E-01 7,857E-01 8,029E-01 8,029E-01
 8,200E-01 8,200E-01 8,371E-01 8,371E-01 8,543E-01 8,543E-01 8,800E-01 8,800E-01
 9,143E-01 9,143E-01 9,314E-01 9,314E-01 9,486E-01 9,486E-01 9,657E-01 9,657E-01
 9,743E-01 9,743E-01 9,829E-01 9,829E-01 9,914E-01 9,914E-01 1,000E+00 1,000E+00
1,0       1,0
-1,553E+03-9,539E+02-3,747E+02-1,594E+02-1,522E+02-1,450E+02-1,378E+02-1,306E+02
-1,234E+02-1,161E+02-1,089E+02-1,017E+02-9,449E+01-8,727E+01-8,005E+01-7,283E+01
-5,840E+01-4,396E+01-3,188E+01-2,778E+01-2,368E+01-1,959E+01-1,549E+01-9,726E+00
-7,801E+00-6,839E+00-5,876E+00-4,914E+00-4,433E+00-3,952E+00-3,470E+00-3,281E-02
1020,
 3,766E-22 3,766E-22 5,256E-22 5,256E-22 1,693E-21 1,693E-21 4,941E-21 4,941E-21
 1,058E-20 1,058E-20 1,898E-20 1,898E-20 3,055E-20 3,055E-20 4,580E-20 4,580E-20
 6,523E-20 6,523E-20 8,960E-20 8,960E-20 1,197E-19 1,197E-19 1,565E-19 1,565E-19
 2,012E-19 2,012E-19 2,554E-19 2,554E-19 3,211E-19 3,211E-19 4,008E-19 4,008E-19
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 6,170E-19 6,170E-19 9,533E-19 9,533E-19 1,519E-18 1,519E-18 2,439E-18 2,439E-18
 3,860E-18 3,860E-18 6,012E-18 6,012E-18 9,321E-18 9,321E-18 1,856E-17 1,856E-17
 4,634E-17 4,634E-17 7,033E-17 7,033E-17 1,044E-16 1,044E-16 1,528E-16 1,528E-16
 1,845E-16 1,845E-16 2,230E-16 2,230E-16 2,708E-16 2,708E-16 2,739E-16 2,739E-16
 2,739E-16 2,739E-16
MINET      5  +28     0  +28      5,9   E-16 ,7889     1,0   E+132,370 E-12
-1,141E+03-8,665E+02-6,576E+02-4,991E+02-3,789E+02-2,876E+02-2,183E+02-1,258E+02
-5,501E+01-3,200E+01-2,213E+01-8,893E+00-6,119E+00-4,211E+00-2,860E+00-2,172E+00
-1,655E+00-1,133E+00-4,561E-01+6,565E-02+1,212E-02+5,210E-03-2,2390-03-9,620E-04
-4,134E-04-1,777E-04-7,634E-05+1,000E+03
+2,279E-01+2,279E-01+2,376E-01+2,376E-01+2,474E-01+2,474E-01+2,571E-01+2,571E-01
+2,669E-01+2,669E-01+2,769E-01+2,769E-01+2,866E-01+2,866E-01+2,959E-01+2,959E-01
+3,354E-01+3,354E-01+3,549E-01+3,549E-01+3,746E-01+3,746E-01+4,331E-01+4,331E-01
+7,458E-01+7,458E-01+8,143E-01+8,431E-01+8,730E-01+8,730E-01+9,120E-01+9,120E-01
+9,315E-01+9,315E-01+9,413E-01+9,413E-01+9,512E-01+9,512E-01+9,610E-01+9,610E-01
+9,707E-01+9,707E-01+9,675E-01+9,805E-01+9,902E-01+9,902E-01+1,0        1,0
-1,141E+03-8,665E+02-6,576E+02-4,991E+02-3,789E+02-2,876E+02-2,183E+02-1,258E+02
-5,501E+01-3,200E+01-2,213E+01-8,893E+00-6,119E+00-4,211E+00-2,860E+00-2,172E+00
-1,655E+00-1,133E+00-4,561E-01-6,565E-02-1,212E-02-5,210E-03-2,2390-03-9,620E-04
-4,134E-04-1,777E-04-7,634E-05+1,000E+03
+3,254E-20+3,254E-20+5,047E-20+5,047E-20+7,636E-20+7,636E-20+1,133E-19+1,133E-19
+1,654E-19+1,654E-19+2,386E-19+2,386E-19+3,405E-19+3,405E-19+4,819E-19+4,819E-19
+1,824E-18+1,824E-18+6,712E-18+6,712E-18+5,598E-17+5,598E-17+2,969E-16+2,969E-16
+1,048E-15+1,048E-15+3,594E-15+3,594E-15+8,965E-15+8,965E-15+2,299E-14+2,299E-14
+5,319E-14+5,319E-14+1,203E-13+1,203E-13+2,678E-13+2,678E-13+4,363E-13+4,363E-13
+5,667E-13+5,667E-13+7,429E-13+7,429E-13+9,815E-13+9,815E-13+1,305E-12+1,305E-12
+1,744E-12+1,744E-12+2,339E-12+2,339E-12+2,370E-12+2,370E-12+2,370E-12+2,370E-12

BLOCK  3
WATER       1,00        1,17  E-21 1,937      2,4015E+11
BLOCK  4
```

3	1	0	28,898	28,898	1,000	1,000	105,323
4	1	0	40,514	40,514	1,000	1,000	65,440
5	1	0	10,954	10,954	1,000	1,000	43,500
6	1	0	25,923	25,923	1,000	1,000	33,600
7	1	0	49,111	49,111	1,000	1,000	16,800
12	1	0	23,982	23,982	1,000	1,000	120,442
13	1	0	37,918	37,918	1,000	1,000	91,791
14	1	0	36,813	36,813	1,000	1,000	60,855
15	1	0	11,358	11,358	1,000	1,000	43,500
16	1	0	29,629	29,629	1,000	1,000	33,600
17	1	0	26,878	26,878	1,000	1,000	16,800
21	1	0	25,192	25,192	1,000	1,000	122,669
22	1	0	24,185	24,185	1,000	1,000	103,356
24	1	0	23,159	23,159	1,000	1,000	57,264
25	1	0	8,124	8,124	1,000	1,000	43,500
26	1	0	19,225	19,225	1,000	1,000	33,600
27	1	0	19,225	19,225	1,000	1,000	16,800
28	2	0	18,501	18,501	1,000	1,000	134,314
29	2	0	13,202	13,202	1,000	1,000	127,238
30	1	0	19,158	19,158	1,000	1,000	120,559
31	1	0	19,890	19,890	1,000	1,000	107,975
32	1	0	19,883	19,883	1,000	1,000	92,316
33	1	0	19,883	19,883	1,000	1,000	74,346
34	1	0	19,883	19,883	1,000	1,000	54,994
35	1	0	7,746	7,746	1,000	1,000	43,500
36	1	0	18,330	18,330	1,000	1,000	33,600
37	1	0	18,330	18,330	1,000	1,000	16,800
38	5	0	18,566	18,566	1,000	1,000	115,511
39	5	0	14,142	14,142	1,000	1,000	109,460

40	1	0	17,535	17,535	1,000	1,000	143,768
41	1	0	17,535	17,535	1,000	1,000	93,980
42	1	0	17,535	17,535	1,200	1,000	81,801
43	1	0	17,535	17,535	1,000	1,000	67,825
44	1	0	17,535	17,535	1,000	1,000	52,734
45	1	0	7,746	7,746	1,000	1,000	43,500
46	1	0	18,330	18,330	1,000	1,000	33,600
47	1	0	18,330	18,330	1,000	1,000	16,800
48	5	0	15,899	15,899	1,000	1,000	96,703
49	5	0	14,142	14,142	1,000	1,000	91,682
50	1	0	14,820	14,820	1,000	1,000	86,977
51	1	0	14,820	14,820	1,000	1,000	79,986
52	1	0	14,820	14,820	1,000	1,200	71,287
53	1	0	14,820	14,820	1,000	1,000	61,304
54	1	0	14,820	14,820	1,000	1,000	50,524
56	1	0	18,330	18,330	1,000	1,000	33,600
57	1	0	18,330	18,330	1,000	1,000	16,800
58	5	0	12,683	12,683	1,000	1,000	77,905
59	5	0	14,142	14,142	1,000	1,000	73,903
60	1	0	11,400	11,480	1,000	1,000	70,186
61	1	0	11,479	11,479	1,000	1,000	65,982
62	1	0	11,479	11,479	1,000	1,000	60,772
63	1	0	11,479	11,479	1,200	1,000	54,762
64	1	0	11,479	11,479	1,000	1,000	48,315
65	1	0	7,746	7,746	1,000	1,000	43,500
66	1	0	18,330	18,330	1,000	1,000	33,600
67	1	0	18,330	18,330	1,000	1,000	16,800
68	5	0	7,767	7,767	1,000	1,000	59,102
69	5	0	12,247	12,247	1,000	1,000	56,000
70	1	0	6,628	6,628	1,000	1,000	53,395
71	1	0	6,628	6,628	1,000	1,000	51,997
72	1	0	6,628	6,628	1,200	1,000	50,257
73	1	0	6,628	6,628	1,000	1,000	48,261
74	1	0	6,628	6,628	1,200	1,000	46,105
75	1	0	7,746	7,746	1,000	1,000	43,500
76	1	0	18,330	18,330	1,000	1,000	33,60
77	1	0	18,330	18,330	1,000	1,000	16,800
78	5	0	3,389	3,389	1,000	1,000	49,701
79	5	0	3,390	3,390	1,000	1,000	47,236
80	3	0	0,0	0.0	1.0	1.0	44.
81	3	0	0,0	0.0	1.0	1.0	44.
85	3	0	5,791	5,791	1,000	1,000	43,500
86	1	0	13,704	13,704	1,000	1,000	33,600
87	1	0	13,704	13,704	1,000	1,000	16,800
90	2	0	17,758	17,758	1,000	1,000	139,363
91	5	0	18,561	18,561	1,000	1,000	119,497
93	5	0	12,680	12,680	1,000	1,000	79,765
94	5	0	7,765	7,765	1,000	1,000	59,899
95	5	0	3,389	3,389	1,000	1,000	49,966
99	2	0	17,321	17,321	1,000	1,000	139,363
100	5	0	20,000	20,000	1,000	1,000	119,497
101	5	0	20,000	20,000	1,000	1,000	99,631
102	5	0	20,000	20,000	1,000	1,000	79,765
103	5	0	17,321	17,321	1,000	1,000	59,899
104	5	0	14;142	14,142	1,000	1,000	50,000
105	3	0	7,746	7,746	1,000	1,000	43,500
106	2	0	18,330	18,330	1,000	1,000	33,600
107	2	0	18,330	18,330	1,000	1,000	16,800
109	2	0	17,321	17,321	1,000	1,000	139,363
110	5	0	20,000	20,000	1,000	1,000	119,497

111		5	0	20,000	20,000	1,000	1,000	99,631
112		5	0	20,000	20,000	1,000	1,000	79,765
113		5	0	17,321	17,321	1,000	1,000	59,899
114		5	0	14,142	14,142	1,000	1,000	50,000
115		3	0	7,746	7,746	1,000	1,000	43,500
116		2	0	18,330	18,330	1,000	1,000	33,600
117		2	0	18,330	18,330	1,000	1,000	16,800
119		2	0	21,213	21,213	1,000	1,000	139,363
120		5	0	24,495	24,495	1,000	1,000	119,497
121		5	0	24,495	24,495	1,000	1,000	99,631
122		5	0	24,495	24,495	1,000	1,000	79,765
123		5	0	21,213	21,213	1,000	1,000	59,899
124		5	0	17,321	17,321	1,000	1,000	50,000
125		3	0	9,487	9,487	1,000	1,000	43,500
126		2	0	22,450	22,450	1,000	1,000	33,600
127		2	0	22,450	22,450	1,000	1,000	16,800
129		2	0	24,495	24,495	1,000	1,000	139,363
131		5	0	28,284	28,284	1,000	1,000	99,631
132	0	5	0	24,495	24,495	1,000	1,000	79,76
133		5	0	24,495	24,495	1,000	1,000	59,899
134		5	0	20,000	20,000	1,000	1,000	50,000
135		3	0	10,954	10,954	1,000	1,000	43,500
136		2	0	25,923	25,923	1,000	1,000	33,600
137		2	0	25,923	25,923	1,000	1,000	16,800
139		2	0	24,495	24,495	1,000	1,000	139,363
140		5	0	28,284	28,284	1,000	1,000	119,497
141		5	0	28,284	28,284	1,000	1,000	99,631
142		5	0	28,284	28,284	1,000	1,000	79,765
143		5	0	24,495	24,495	1,000	1,000	59,899
144		5	0	20,000	20,000	1,000	1,000	50,000
145		3	0	10,954	10,954	1,000	1,000	43,500
146		2	0	25,923	25,923	1,000	1,000	33,600
147		2	0	25,923	25,923	1,000	1,000	16,800
149		2	0	30,000	30,000	1,000	1,000	139,363
150		5	0	34,641	34,641	1,000	1,000	119,497
151		5	0	34,641	34,641	1,000	1,000	99,631
152		5	0	34,641	34,641	1,000	1,000	79,765
153		5	0	30,000	30,000	1,000	1,000	59,899
154		5	0	24,495	24,495	1,000	1,000	50,000
155		3	0	13,416	13,416	1,000	1,000	43,500
156		2	0	31,749	31,749	1,000	1,000	33,600
157		2	0	31,749	31,749	1,000	1,000	16,800
159		2	0	30,000	30,000	1,000	1,000	139,363
160		5	0	34,641	34,641	1,000	1,000	119,497
161		5	0	34,641	34,641	1,000	1,000	99,631
162		5	0	34,641	34,641	1,000	1,000	79,765
163		5	0	30,000	30,000	1,000	1,000	59,899
164		5	0	24,495	24,495	1,000	1,000	50,000
165		3	0	13,416	13,416	1,000	1,000	43,500
167		2	0	31,749	31,749	1,000	1,000	16,800
201		1	0	13,320	13,320	1,000	1,000	133,468
202		1	0	21,324	21,324	1,000	1,000	133,468
203		1	0	22,048	22,048	1,000	1,000	133,468
204		2	0	10,256	10,256	1,000	1,000	139,361
205		2	0	12,177	12,177	1,000	1,000	143,388
206		2	0	8,265	8,265	1,000	1,000	149,023
207		2	0	12,453	12,453	1,000	1,000	149,023
208		2	0	11,610	11,610	1,000	1,000	153,000
209		2	0	10,037	10,037	1,000	1,000	153,000
210		2	0	10,000	10,000	1,000	1,000	153,000

211	2	0	12.247	12.247	1.000	1.000	153.000
212	2	0	14.142	14.142	1.000	1.000	153.000
213	2	0	14.142	14.142	1.000	1.000	153.000
214	2	0	17.321	17.321	1.000	1.000	153.000
215	2	0	17.321	17.321	1.000	1.000	153.000
305	1	0	14.553	14.553	1.000	1.000	131.295
306	4	0	7.227	7.227	1.000	1.000	136.108
307	4	0	8.794	8.794	1.000	1.000	140.934
308	4	0	8.156	8.156	1.000	1.000	145.120
309	4	0	7.760	7.760	1.000	1.000	146.500
310	4	0	7.746	7.746	1.000	1.000	146.500
311	4	0	9.487	9.487	1.000	1.000	146.500
312	4	0	10.954	10.954	1.000	1.000	146.500
313	4	0	10.954	10.954	1.000	1.000	146.500
314	4	0	13.416	13.416	1.000	1.000	146.500
315	4	0	9.487	9.487	1.000	1.000	146.500
500	1	0	18.329	18.329	1.000	1.000	0.001
501	1	0	19.000	19.000	1.000	1.000	0.001
502	1	0	13.595	13.593	1.000	1.000	0.001
503	1	0	12.961	12.961	1.000	1.000	0.001
505	1	0	12.961	12.961	1.000	1.000	0.001
506	1	0	12.961	12.961	1.000	1.000	0.001
507	1	0	12.961	12.961	1.000	1.000	0.001
508	1	0	9.690	9.690	1.000	1.000	0.001
510	1	0	12.961	12.961	1.000	1.000	0.001
511	3	0	12.961	12.961	1.000	1.000	0.001
512	3	0	15.874	15.874	1.000	1.000	0.001
513	3	0	18.329	18.329	1.000	1.000	0.001
514	3	0	18.329	18.329	1.000	1.000	0.001
515	3	0	22.449	22.449	1.000	1.000	0.001
516	3	0	22.449	22.449	1.000	1.000	0.001

BLOCK 5

201	202	4.077	14.538	12.883	1.000
201	3	9.056	20.950	30.149	1.000
3	4	20.443	20.440	40.000	1.000
4	5	20.440	1.500	39.999	1.000
5	6	1.500	8.400	40.000	1.000
6	7	8.400	8.400	40.000	1.000
7	500	8.400	8.400	40.875	1.000
202	203	12.371	17.787	1.443	1.000
202	3	19.411	23.013	11.126	1.000
202	13	14.577	22.768	10.762	1.000
222	12	13.077	11.700	20.956	1.000
203	12	10.149	5.730	31.364	1.000
12	13	13.187	18.524	31.538	1.000
13	14	15.655	15.655	43.000	1.000
14	15	15.655	1.500	43.000	1.000
15	16	1.500	8.400	43.000	1.000
16	17	8.400	8.400	47.277	1.000
17	501	8.404	8.401	43.000	1.000
203	21	21.787	13.585	16.787	1.000
203	22	21.790	13.555	9.718	1.000
204	21	4.741	11.951	22.950	1.000
21	22	12.264	12.264	20.270	1.000
22	23	12.254	12.264	22.000	1.000
23	24	12.264	12.264	32.860	1.000
24	25	12.264	1.500	22.000	1.000
25	26	1.500	8.400	22.000	1.000
26	27	8.400	8.400	22.000	1.000

27	542	8,400	8,400	22,000	1,000
204	205	10,045	12,515	9,006	1,000
205	206	9,561	5,235	6,713	1,000
205	305	6,715	5,561	22,086	1,000
206	306	6,714	3,269	10,223	1,000
305	30	3,914	8,051	21,888	1,000
306	29	1,915	7,953	10,036	1,000
207	307	6,710	1,498	23,857	1,000
307	28	1,590	5,191	23,540	1,000
208	308	6,421	1,500	23,490	1,000
90	28	10,987	10,987	14,705	1,000
28	29	10,987	5,000	17,329	1,000
29	30	5,0	9,943	18,461	1,000
30	31	9,943	9,943	20,016	1,000
31	32	9,943	9,943	20,000	1,000
32	33	9,943	9,943	20,000	1,000
33	34	9,945	9,943	20,000	1,000
34	35	9,943	1,500	20,000	1,000
35	36	1,500	8,400	20,000	1,000
36	37	8,400	8,400	20,000	1,000
37	503	8,400	8,400	20,000	1,000
91	38	8,676	8,676	20,000	1,000
39	40	5,000	7,734	20,000	1,000
40	41	7,734	7,734	20,000	1,000
41	42	7,734	7,734	20,000	1,000
42	43	7,734	7,734	20,000	1,000
43	44	7,734	7,734	20,000	1,000
44	45	7,734	1,500	20,000	1,000
46	47	8,400	8,400	20,000	1,000
47	504	8,400	8,400	20,000	1,000
48	49	6,362	5,000	20,000	1,000
92	48	6,362	6,362	20,000	1,000
49	50	5,000	5,524	20,000	1,000
50	51	5,524	5,524	20,000	1,000
51	52	5,524	5,524	20,000	1,000
52	53	5,524	5,524	20,000	1,000
53	54	5,524	5,524	20,000	1,000
54	55	5,524	1,500	20,000	1,000
55	56	1,500	8,400	20,000	1,000
56	57	8,400	8,400	20,000	1,000
59	60	4,048	5,000	20,000	1,000
60	61	3,314	3,314	20,000	1,000
61	62	3,314	3,314	20,000	1,000
62	63	3,314	3,314	20,000	1,000
63	64	3,314	3,314	20,000	1,000
64	65	3,314	1,500	20,000	1,000
65	66	1,500	8,400	20,000	1,000
66	67	8,400	8,400	20,000	1,000
67	506	8,400	8,400	20,000	1,000
94	68	1,735	1,735	15,000	1,000
68	69	1,735	5,000	15,000	1,000
69	70	5,000	1,105	15,000	1,000
70	71	1,105	1,105	20,000	1,000
71	72	1,105	1,105	20,000	1,000
72	73	1,105	1,105	20,000	1,000
73	74	1,105	1,105	20,000	1,000
74	75	1,105	1,500	20,000	1,000
75	76	1,500	8,400	20,000	1,000
76	77	8,400	8,400	20,000	1,000
77	507	8,400	8,400	20,000	1,000

95	76	0,382	0,562	10,000	1,000
76	79	0,302	5,000	10,000	1,000
79	85	2,256	1,500	11,18	1,000
85	86	1,500	8,400	11,179	1,000
86	87	8,400	8,400	11,179	1,000
87	508	8,400	8,400	11,179	1,000
209	309	5,000	1,500	20,148	1,000
309	99	1,530	5,637	20,000	1,000
99	100	9,363	10,503	20,000	1,000
100	101	9,497	10,369	20,000	1,000
101	102	9,631	10,235	20,000	1,000
102	103	9,765	10,111	20,000	1,000
103	104	4,899	5,000	20,000	1,000
104	105	5,000	1,500	20,000	1,000
105	106	1,500	8,400	20,000	1,000
106	107	8,400	8,400	20,000	1,000
107	510	8,400	8,400	20,000	1,000
210	310	5,000	1,500	20,000	1,000
310	109	1,500	5,637	20,000	1,000
109	110	9,363	10,503	20,000	1,000
110	111	9,497	10,369	20,000	1,000
111	112	9,631	10,235	20,000	1,000
112	113	9,765	10,111	20,000	1,000
113	114	4,899	5,000	20,000	1,000
114	115	5,000	1,500	20,000	1,000
115	116	1,500	8,400	20,000	1,000
115	117	8,400	8,400	20,000	1,000
211	311	5,000	1,500	30,000	1,000
311	119	1,500	5,637	30,000	1,000
119	120	9,363	10,503	30,000	1,000
120	121	9,497	10,369	30,000	1,000
121	122	9,631	10,235	30,000	1,000
122	123	9,765	10,111	30,000	1,000
123	124	4,899	5,000	30,000	1,000
124	125	5,000	1,500	30,000	1,000
125	126	1,500	8,400	30,000	1,000
126	127	8,400	8,400	30,000	1,000
127	512	8,400	8,400	30,000	1,000
212	312	5,000	1,500	40,000	1,000
312	129	1,500	5,637	40,000	1,000
129	130	9,363	10,503	40,000	1,000
130	131	9,497	10,369	40,000	1,000
131	132	9,631	10,235	40,000	1,000
132	133	9,765	10,111	40,000	1,000
133	134	4,899	5,000	40,000	1,000
134	135	5,000	1,500	40,000	1,000
135	136	1,500	8,400	40,000	1,000
136	137	8,400	8,400	40,000	1,000
137	513	8,400	8,400	40,000	1,000
213	313	5,000	1,500	40,000	1,000
313	139	1,500	5,637	40,000	1,000
139	140	9,363	10,503	40,000	1,000
141	142	9,631	10,235	40,000	1,000
142	143	9,765	10,111	40,000	1,000
143	144	4,899	5,000	40,000	1,000
144	145	5,000	1,500	40,000	1,000
145	146	1,500	8,400	40,000	1,000
146	147	8,400	8,400	40,000	1,000
147	514	8,400	8,400	40,000	1,000
214	314	5,000	1,500	60,000	1,000

314	149	1,500	5,657	60,000	1,000
149	150	9,363	10,503	60,000	1,000
150	151	9,497	10,369	60,000	1,000
151	152	9,631	10,235	60,000	1,000
152	153	9,765	10,101	60,000	1,000
153	154	4,899	5,000	60,000	1,000
154	155	5,000	1,500	60,000	1,000
155	156	1,500	8,400	60,000	1,000
156	157	8,400	8,400	60,000	1,000
157	515	8,400	8,400	60,000	1,000
215	315	5,000	1,500	60,000	1,000
315	159	1,500	5,657	60,000	1,000
159	160	9,363	10,503	60,000	1,000
160	161	9,497	10,369	60,000	1,000
161	162	9,631	10,235	60,000	1,000
162	163	9,765	10,110	60,000	1,000
163	164	4,099	5,000	60,000	1,000
164	165	5,000	1,500	60,000	1,000
165	166	1,500	8,400	60,000	1,000
166	167	8,400	8,400	60,000	1,000
167	516	8,400	8,400	60,000	1,000
4	14	21,010	20,490	36,462	1,000
14	24	22,247	10,253	26,960	1,000
24	34	11,612	9,388	22,098	1,000
34	40	10,490	9,510	17,679	1,000
44	54	10,367	9,632	13,259	1,000
54	64	10,235	9,755	8,839	1,000
64	74	10,122	9,878	4,420	1,000
74	80	10,000	0,000	0,000	1,000
3	13	21,010	20,490	32,819	1,000
13	23	22,247	10,253	26,960	1,000
23	33	11,612	9,388	22,1	1,000
33	43	10,490	9,510	17,679	1,000
43	53	10,367	9,632	13,259	1,000
53	63	10,245	9,755	8,839	1,000
63	73	10,122	9,878	4,420	1,000
73	80	10,000	0,000	0,000	1,000
12	22	19,645	12,855	15,747	1,000
22	32	11,612	9,388	22,098	1,000
32	42	10,490	9,510	17,679	1,000
42	52	10,367	9,632	13,259	1,000
52	62	10,245	9,755	8,839	1,000
62	72	10,122	9,678	4,420	1,000
72	80	10,000	0,000	0,000	1,000
41	51	10,367	9,632	13,259	1,000
51	61	10,245	9,755	8,839	1,000
61	71	10,122	9,878	4,420	1,000
71	80	10,000	0,000	0,000	1,000
30	40	10,490	9,510	17,679	1,000
40	50	10,367	9,632	13,259	1,000
50	60	10,245	9,755	8,839	1,000
60	70	10,122	9,878	4,420	1,000
70	80	10,000	0,000	0,000	1,000
29	39	9,449	10,429	10,000	1,000
39	49	9,575	10,306	10,000	1,000
49	59	9,694	10,184	10,000	1,000
59	69	9,816	10,061	10,000	1,000
69	79	4,939	5,000	10,	1,000
28	38	10,570	9,430	19,665	1,000
38	48	10,436	9,564	15,038	1,000

48	58	10,302	9,698	10,411	1,000
58	68	10,168	9,832	5,784	1,000
68	78	5,067	4,899	2,312	1,000
78	81	5,034	0,000	0,000	1,000
90	91	10,570	9,430	19,634	1,000
91	92	10,436	9,564	15,030	1,000
92	93	10,302	9,698	10,405	1,000
93	94	10,168	9,832	5,781	1,000
94	95	5,067	4,899	2,312	1,000
500	90	1,508	4,329	23,099	1,000
95	81	5,034	0,000	0,000	1,000
500	501	18,667	22,379	8,399	1,000
501	502	20,621	11,600	8,399	1,000
502	503	10,320	10,551	8,399	1,000
503	504	9,449	10,429	8,399	1,000
505	506	9,694	10,184	8,399	1,000
506	507	9,816	10,061	8,399	1,000
507	508	9,939	4,472	8,399	1,000
508	510	6,708	10,000	8,399	1,000
510	511	10,000	10,000	8,399	1,000
511	512	10,000	15,000	8,399	1,000
512	513	15,000	20,000	8,399	1,000
513	514	20,000	20,000	8,399	1,000
514	515	20,000	30,000	8,399	1,000
515	516	30,000	30,000	8,399	1,000
7	17	18,667	22,379	16,800	1,000
17	27	20,621	11,600	16,800	1,000
27	37	10,320	10,551	16,800	1,000
37	47	9,449	10,429	16,800	1,000
47	57	9,571	10,306	16,800	1,000
57	67	9,694	10,184	16,800	1,000
67	77	9,816	10,061	16,800	1,000
77	87	9,939	4,472	16,800	1,000
87	107	6,708	10,000	16,800	1,000
107	117	10,000	10,000	16,800	1,000
117	127	10,000	15,000	16,800	1,000
127	137	15,000	20,000	16,800	1,000
137	147	20,000	20,000	16,800	1,000
147	157	20,000	30,000	16,800	1,000
157	167	30,000	30,000	16,800	1,000
6	16	18,667	22,379	16,800	1,000
16	26	20,621	11,600	16,8	1,000
26	36	10,320	10,551	16,800	1,000
36	46	9,449	10,429	16,800	1,000
46	56	9,571	10,306	16,800	1,000
56	66	9,694	10,184	16,800	1,000
66	76	9,816	10,061	16,800	1,000
86	106	6,708	10,000	16,800	1,000
106	116	10,000	10,000	16,800	1,000
116	126	10,000	15,000	16,800	1,000
126	136	15,000	20,000	16,800	1,000
136	146	20,000	20,000	16,800	1,000
146	156	20,000	30,000	16,800	1,000
156	166	30,000	30,000	16,800	1,000
5	15	18,667	22,379	3,000	1,000
15	25	20,621	11,600	3,000	1,000
25	35	10,320	10,551	3,000	1,000
35	45	9,449	10,429	3,000	1,000
45	55	9,571	10,306	3,000	1,000
55	65	9,694	10,184	3,000	1,000

65	75	9,016	10,061	5,000	1,000
75	85	9,959	4,472	3,000	1,000
85	105	6,704	10,000	3,000	1,000
105	115	10,000	10,000	3,000	1,000
115	125	10,000	15,000	3,000	1,000
125	135	15,000	20,000	3,000	1,000
135	145	20,000	20,000	3,000	1,000
145	155	20,000	30,000	3,000	1,000
155	165	30,000	30,000	3,000	1,000
95	104	0,582	10,000	10,000	1,000
104	114	10,000	10,000	10,000	1,000
114	124	10,000	15,000	10,000	1,000
124	134	15,000	20,000	10,000	1,000
134	144	20,000	20,000	10,000	1,000
144	154	20,000	30,000	10,000	1,000
154	164	30,000	30,000	10,000	1,000
94	103	1,735	10,000	15,000	1,000
103	113	10,000	10,000	15,000	1,000
123	133	10,000	15,000	15,000	1,000
143	153	20,000	30,000	15,000	1,000
153	163	30,000	30,000	15,000	1,000
93	102	4,048	10,000	20,000	1,000
102	112	10,000	10,000	20,000	1,000
112	122	10,000	15,000	20,000	1,000
122	132	15,000	20,000	20,000	1,000
132	142	20,000	20,000	20,000	1,000
142	152	20,000	30,000	20,000	1,000
152	162	30,000	30,000	20,000	1,000
92	101	6,361	10,000	20,000	1,000
101	111	10,000	10,000	20,000	1,000
111	121	10,000	15,000	20,000	1,000
121	131	15,000	20,000	20,000	1,000
131	141	20,000	20,000	20,000	1,000
141	151	20,000	30,000	20,000	1,000
151	161	30,000	30,000	20,000	1,000
91	100	8,674	10,000	20,000	1,000
100	110	10,000	10,000	20,000	1,000
110	120	10,000	15,000	20,000	1,000
120	130	15,000	20,000	20,000	1,000
130	140	20,000	20,000	20,000	1,000
140	150	20,000	30,000	20,000	1,000
150	160	30,000	30,000	20,000	1,000
90	99	10,987	10,000	15,000	1,000
99	109	10,000	10,000	15,000	1,000
109	119	10,000	15,000	15,000	1,000
119	129	15,000	20,000	15,000	1,000
129	139	20,000	20,000	15,000	1,000
139	149	20,000	30,000	15,000	1,000
149	159	30,000	30,000	15,000	1,000
305	306	10,315	4,685	6,602	1,000
307	308	10,957	11,629	2,724	1,000
308	309	11,029	10,874	3,004	1,000
309	310	10,000	10,000	3,000	1,000
310	311	10,000	15,000	3,000	1,000
311	312	15,000	20,000	3,000	1,000
312	313	20,000	20,000	3,000	1,000
313	314	20,000	30,000	3,000	1,000
314	315	30,000	30,000	3,0	1,000
206	207	4,981	12,894	6,714	1,000
207	208	10,940	12,097	6,298	1,000

```
  208   209              12,575     10,000      5,000      1,000
  209   210              10,000     10,000      5,000      1,000
  210   211              14,000     15,000      5,000      1,000
  211   212              15,000     20,000      5,000      1,000
  212   213              20,000     20,000      5,000      1,000
  213   214              20,000     30,000      5,000      1,000
  214   215              30,000     30,000      5,000      1,000
   13    22              25,965     16,860      3,531      1,000

BLOCK 6
    4 1000                    40,40       1.          1.7    E-16
    5 1000                    5.          1.          1.87   E-15
    6 1000                    16.8        1.          2.6    E-12
    7 1000                    16.8        1.          7.4    E-09
  500 1000                    8.4         1.          7.39   E-09

BLOCK 7
 1000               32.

BLOCK 8
  500     8     1      32.0
   28     1     1     145.0
   98     5     1     145.0
   99     5    10     145.0
  100     5    10     145.0
  101     5    10     145.0
  102     5    10     145.0
  103     5    10     145.0
  104     5    10     145.0
  105     5    10     145.0
  305    10     1      32.0
  207     8     1     145.0
  205     1     1     143.38

ENDFO=2
*SPLIT
```

APPENDIX B

SAMPLE PROBLEM OUTPUT LISTING

TRUST OUTPUT DATA   PROGRAM DATA   DATA DECK   1

*   MINE TAILING CASE

TAPE DATA WILL BE WRITTEN AT INTERVALS OF   200 ITERATIONS

ELAPSED TIME SINCE START OF TRUST JOB =   0.130 SECONDS.

==

NO DATA CARRY-OVER FROM PRECEDING PROBLEM.

==

DATA BLOCK 1

IPRINT	NUM	KDATA	KSPEC	MCYC	MSEC	NPUNCH	NOUT	TIMEP	SCALE
1000	0	0	0	1000	0	0	0	0.00000E+00	0.10000E+01

KD	DELTO	SMALL	PSIVARY	TAU	TIMAX	PSIMIN	PSIMAX,
1	0.20000E+01	0.10000E-08	0.10000E-01	0.00000E+00	0.00000E+00	-0.10000E+13	0.10000E+13

KD	KSYM	GEOM
1	1	0.10000E+01

PHIONE	GONE	HONE	PCONE
0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00

==

DATA BLOCK 2

FLOW REGION PROPERTIES

SATURATION	THICKNESS OF FLOW REGION	REL DEN OF SATURATED SOIL	XF	QOVERH
DRY	0.1550E+03	0.2000E+01	0.1000E+01	0.0000E+00

==

AMAT	MATL	INDEX	LTABC	LTABSC	LTABX	LTABSK	AV	EZ	PZ	CONDUCTIVITY
SAND	1	1	48	0	48	0	0.6000E-15	0.5150E+00	0.1000E+14	0.8205E-10

SATURATION TABLE

	PRESSURE HEAD (PSI)	WETTING CURVE (SW)	DRYING CURVE (SD)
1	-0.2606E+05	0.2941E-01	0.2941E-01
2	-0.1219E+05	0.3912E-01	0.3912E-01
3	-0.5701E+04	0.4882E-01	0.4882E-01
4	-0.2769E+04	0.5853E-01	0.5853E-01
5	-0.1465E+04	0.6824E-01	0.6824E-01
6	-0.7790E+03	0.7794E-01	0.7794E-01
7	-0.4130E+03	0.8765E-01	0.8765E-01
8	-0.2193E+03	0.9735E-01	0.9735E-01
9	-0.1169E+03	0.1071E+00	0.1071E+00
10	-0.6180E+02	0.1158E+00	0.1168E+00
11	-0.3281E+02	0.1265E+00	0.1265E+00
12	-0.1492E+02	0.1362E+00	0.1362E+00
13	-0.8927E+01	0.1459E+00	0.1459E+00
14	-0.7298E+01	0.1555E+00	0.1556E+00

15	-0.5967E+01	0.1653E+00	0.1653E+00
16	-0.4878E+01	0.1750E+00	0.1750E+00
17	-0.3988E+01	0.1847E+00	0.1847E+00
18	-0.3270E+01	0.1944E+00	0.1944E+00
19	-0.2943E+01	0.2041E+00	0.2041E+00
20	-0.2649E+01	0.2138E+00	0.2138E+00
21	-0.2384E+01	0.2235E+00	0.2235E+00
22	-0.2146E+01	0.2332E+00	0.2332E+00
23	-0.1951E+01	0.2429E+00	0.2429E+00
24	-0.1855E+01	0.2526E+00	0.2526E+00
25	-0.1678E+01	0.2721E+00	0.2721E+00
26	-0.1423E+01	0.2915E+00	0.2915E+00
27	-0.1286E+01	0.3109E+00	0.3109E+00
28	-0.1240E+01	0.3303E+00	0.3303E+00
29	-0.1195E+01	0.3497E+00	0.3497E+00
30	-0.1152E+01	0.3691E+00	0.3691E+00
31	-0.1111E+01	0.3885E+00	0.3885E+00
32	-0.1071E+01	0.4079E+00	0.4079E+00
33	-0.9958E+00	0.4468E+00	0.4468E+00
34	-0.9174E+00	0.4856E+00	0.4865E+00
35	-0.8438E+00	0.5244E+00	0.5244E+00
36	-0.7761E+00	0.5632E+00	0.5632E+00
37	-0.7139E+00	0.6021E+00	0.6021E+00
38	-0.6566E+00	0.6409E+00	0.6409E+00
39	-0.6080E+00	0.6797E+00	0.6797E+00
40	-0.5630E+00	0.7185E+00	0.7185E+00
41	-0.5114E+00	0.7671E+00	0.7671E+00
42	-0.4645E+00	0.8156E+00	0.8156E+00
43	-0.4220E+00	0.8641E+00	0.8641E+00
44	-0.3833E+00	0.9126E+00	0.9126E+00
45	-0.3549E+00	0.9515E+00	0.9515E+00
46	-0.3415E+00	0.9709E+00	0.9709E+00
47	-0.3287E+00	0.9903E+00	0.9903E+00
48	0.1000E+00	0.1000E+01	0.1000E+01

SPECIFIC MOISTURE CAPACITY TABLE

	PRESSURE HEAD (PSI)	WETTING CURVE (SLUCW)	DRYING CURVE (SLUCD)
1	-2.6060E+04	7.0007D-07	7.0007D-07
2	-1.9125E+04	7.0007D-07	7.0007D-07
3	-4.9455E+03	1.4948D-06	1.4948D-06
4	-4.2305E+03	3.3016D-06	3.3016D-06
5	-2.1125E+03	7.4981D-06	7.4981D-06
6	-1.1215E+03	1.4119D-05	1.4119D-05
7	-5.9550E+02	2.6603D-05	2.6603D-05
8	-3.1615E+02	5.0077D-05	5.0077D-05
9	-1.6785E+02	9.4752D-05	9.4752D-05
10	-8.9100E+01	1.7766D-04	1.7766D-04
11	-4.7305E+01	3.3460D-04	3.3460D-04
12	-2.3815E+01	5.3919D-04	5.3919D-04
13	-1.1874E+01	1.6460D-03	1.6460D-03
14	-8.1125E+00	5.9546D-03	5.9546D-03
15	-6.6325E+00	7.2878D-03	7.2878D-03
16	-5.4225E+00	8.9073D-03	8.9073D-03
17	-4.4330E+00	1.0899D-02	1.0899D-02
18	-3.6290E+00	1.3510D-02	1.3510D-02
19	-3.1065E+00	2.9664D-02	2.9668D-02

20	-2.7960E+00	3.2993D-02	3.2993D-02
21	-2.5165E+00	3.6604D-02	3.6604D-02
22	-2.2650E+00	4.0756D-02	4.0756D-02
23	-2.0485E+00	4.9744D-02	4.9744D-02
24	-1.9030E+00	1.0104D-01	1.0104D-01
25	-1.7665E+00	1.1017D-01	1.1017D-01
26	-1.5505E+00	7.6078D-02	7.6078D-02
27	-1.3545E+00	1.4161D-01	1.4161D-01
28	-1.2630E+00	4.2174D-01	4.2174D-01
29	-1.2175E+00	3.6444D-01	4.3111D-01
30	-1.1735E+00	5.2093D-01	4.5116D-01
31	-1.1315E+00	4.7317D-01	4.7317D-01
32	-1.0910E+00	4.8500D-01	4.8500D-01
33	-1.0334E+00	5.1729D-01	5.1729D-01
34	-9.5660E-01	4.9490D-01	5.0638D-01
35	-8.8060E-01	5.2717D-01	5.1495D-01
36	-8.0995E-01	5.7312D-01	5.7312D-01
37	-7.4500E-01	6.2540D-01	6.2540D-01
38	-6.8525E-01	6.7714D-01	6.7714D-01
39	-6.3230E-01	7.9835D-01	7.9835D-01
40	-5.8550E-01	8.6222D-01	8.6222D-01
41	-5.3720E-01	9.4186D-01	9.4186D-01
42	-4.8795E-01	1.0341D+00	1.0341D+00
43	-4.4325E-01	1.1412D+00	1.1412D+00
44	-4.0265E-01	1.2532D+00	1.2532D+00
45	-3.6910E-01	1.3697D+00	1.3697D+00
46	-3.4820E-01	1.4478D+00	1.4478D+00
47	-3.3510E-01	1.5156D+00	1.5156D+00
48	4.9984E+02	9.6968D-06	9.6968D-06
49	1.0000E+03	0.0000D+00	0.0000D+00

PERMEABILITY TABLE

	PSIVARK	CONTW	SLOKW	CONTD	SLOKD
1	-2.6060E+04	5.0140D-26	3.6378D-29	5.0140E-26	3.6378E-29
2	-1.2190E+04	5.5470D-25	3.6378D-29	5.5470E-25	3.6378E-29
3	-5.7010E+03	3.8970D-24	5.1507D-28	3.8970E-24	5.1507E-28
4	-2.7600E+03	2.1420D-23	5.9582D-27	2.1420E-23	5.9582E-27
5	-1.4650E+03	1.0130D-22	6.1683D-26	1.0130E-22	6.1683E-26
6	-7.7800E+02	4.4270D-22	4.9694D-25	4.4270E-22	4.9694E-25
7	-4.1390E+02	1.8570D-21	3.8748D-24	1.8570E-21	3.8748E-24
8	-2.1930E+02	7.6060D-21	2.9680D-23	7.6060E-21	2.9680E-23
9	-1.1640E+02	3.0660D-20	2.2404D-22	3.0660E-20	2.2404E-22
10	-6.1800E+01	1.2220D-19	1.6766D-21	1.2220E-19	1.6766E-21
11	-3.2810E+01	5.1600D-19	1.3584D-20	5.1600E-17	1.3584E-20
12	-1.4820E+01	2.4730D-18	1.0878D-19	2.4730E-18	1.0878E-19
13	-8.9270E+00	8.2030D-18	9.7234D-19	8.2030E-18	9.7234E-19
14	-7.2980E+00	2.0520D-17	7.5611D-18	2.0520E-17	7.5611E-18
15	-5.9670E+00	4.3860D-17	1.7536D-17	4.3860E-17	1.7536E-17
16	-4.8780E+00	8.5280D-17	3.8035D-17	8.5280E-17	3.8035E-17
17	-3.9880E+00	1.5590D-16	7.9348D-17	1.5590E-16	7.9348E-17
18	-3.2700E+00	2.7130D-16	1.6072D-16	2.7130E-16	1.6072E-16
19	-2.9430E+00	4.4940D-16	5.4465D-16	4.4940E-16	5.4465E-16
20	-2.6490E+00	7.1210D-16	8.9354D-16	7.1210E-16	8.9354E-16
21	-2.3840E+00	1.0870D-15	1.4147D-15	1.0870E-15	1.4147E-15
22	-2.1460E+00	1.6110D-15	2.2017D-15	1.6110E-15	2.2017E-15
23	-1.9510E+00	2.3240D-15	3.6564D-15	2.3240E-15	3.6564E-15
24	-1.8550E+00	3.2660D-15	9.8125D-15	3.2660E-15	9.8125E-15
25	-1.6780E+00	6.0230D-15	1.5576D-14	6.0230E-15	1.5576E-14
26	-1.4230E+00	1.0380D-14	1.7086D-14	1.0380E-14	1.7086E-14
27	-1.2860E+00	1.7070D-14	4.8832D-14	1.7070E-14	4.8832E-14
28	-1.2400E+00	2.6740D-14	2.1022D-13	2.6740E-14	2.1022E-13

29	-1,1950E+00	4,0059D-14	2,9578D-13	4,0059E-14	2,9578E-13
30	-1,1520E+00	5,7750D-14	4,1163D-13	5,7750E-14	4,1163E-13
31	-1,1110E+00	8,0660D-14	5,5878D-13	8,0660E-14	5,5878E-13
32	-1,0710E+00	1,0970D-13	7,2600D-13	1,0970E-13	7,2600E-13
33	-9,9580E-01	1,9040D-13	1,0731D-12	1,9040E-13	1,0731E-12
34	-9,1740E-01	3,0940D-13	1,5179D-12	3,0940E-13	1,5179E-12
35	-8,4380E-01	4,7910D-13	2,3057D-12	4,7910E-13	2,3057E-12
36	-7,7610E-01	7,1470D-13	3,4801D-12	7,1470E-13	3,4801E-12
37	-7,1390E-01	1,0350D-12	5,1495D-12	1,0350E-12	5,1495E-12
38	-6,5660E-01	1,4640D-12	7,4869D-12	1,4640E-12	7,4869E-12
39	-6,0800E-01	2,0310D-12	1,1667D-11	2,0310E-12	1,1667E-11
40	-5,6300E-01	2,7680D-12	1,6378D-11	2,7680E-12	1,6378E-11
41	-5,1140E-01	3,9960D-12	2,3798D-11	3,9960E-12	2,3798E-11
42	-4,6450E-01	5,6590D-12	3,5458D-11	5,6590E-12	3,5458E-11
43	-4,2200E-01	7,8840D-12	5,2353D-11	7,8840E-12	5,2353E-11
44	-3,9330E-01	1,0840D-11	7,6382D-11	1,0840E-11	7,6382E-11
45	-3,5490E-01	1,3850D-11	1,0599D-10	1,3850E-11	1,0599E-10
46	-3,4150E-01	1,5630D-11	1,3284D-10	1,5630E-11	1,3284E-10
47	-3,2870E-01	8,0980D-11	5,1055D-09	8,0980E-11	5,1055E-09
48	1,0000E+03	8,2030D-11	1,0497D-15	8,2030E-11	1,0497E-15

AMAT	MATL	INDEX	LTABC	LTABSC	LTABK	LTABSK	AV	EZ	PZ	CONDUCTIVITY
MRU	2	2	29	0	29	0	0,5000E-15	0,4210E+00	0,1000E+14	0,1495E-13

SATURATION TABLE

	PRESSURE HEAD (PSI)	WETTING CURVE (SW)	DRYING CURVE (SD)
1	-0,7584E+04	0,1884E+00	0,1884E+00
2	-0,4567E+04	0,2173E+00	0,2173E+00
3	-0,3257E+04	0,2367E+00	0,2367E+00
4	-0,1962E+04	0,2656E+00	0,2656E+00
5	-0,1181E+04	0,2946E+00	0,2946E+00
6	-0,7114E+03	0,3236E+00	0,3236E+00
7	-0,4285E+03	0,3527E+00	0,3527E+00
8	-0,2629E+03	0,3912E+00	0,3912E+00
9	-0,1797E+03	0,4202E+00	0,4202E+00
10	-0,1663E+03	0,4394E+00	0,4394E+00
11	-0,1269E+03	0,4684E+00	0,4684E+00
12	-0,9601E+02	0,4975E+00	0,4975E+00
13	-0,7794E+02	0,5170E+00	0,5170E+00
14	-0,6657E+02	0,5363E+00	0,5363E+00
15	-0,5059E+02	0,5653E+00	0,5653E+00
16	-0,3843E+02	0,5943E+00	0,5943E+00
17	-0,2455E+02	0,6328E+00	0,6328E+00
18	-0,1473E+02	0,6716E+00	0,6716E+00
19	-0,9482E+01	0,7101E+00	0,7101E+00
20	-0,7598E+01	0,7584E+00	0,7584E+00
21	-0,6360E+01	0,7972E+00	0,7972E+00
22	-0,5331E+01	0,8356E+00	0,8356E+00
23	-0,4465E+01	0,8745E+00	0,8745E+00
24	-0,3740E+01	0,9129E+00	0,9129E+00
25	-0,2817E+01	0,9517E+00	0,9517E+00
26	-0,2102E+01	0,9710E+00	0,9710E+00
27	-0,1705E+01	0,9808E+00	0,9808E+00
28	-0,1157E+01	0,9902E+00	0,9902E+00
29	0,1000E+00	0,1000E+01	0,1000E+01

SPECIFIC MOISTURE CAPACITY TABLE

	PRESSURE HEAD (PSI)	WETTING CURVE (SLOCW)	DRYING CURVE (SLOCD)
1	-7.5840E+03	9.5791D-06	9.5791D-06
2	-6.0755E+03	9.5791D-06	9.5791D-06
3	-3.9120E+03	1.4809D-05	1.4809D-05
4	-2.6095E+03	2.2317D-05	2.2317D-05
5	-1.5715E+03	3.7132D-05	3.7132D-05
6	-9.4620E+02	6.1755D-05	6.1755D-05
7	-5.6995E+02	1.0286D-04	1.0286D-04
8	-3.4570E+02	2.3249D-04	2.3249D-04
9	-2.3130E+02	4.5886D-04	4.5886D-04
10	-1.8300E+02	5.7485D-04	5.7485D-04
11	-1.4635E+02	7.2682D-04	7.2682D-04
12	-1.1121E+02	9.5755D-04	9.5755D-04
13	-8.7975E+01	1.2134D-03	1.2134D-03
14	-7.3255E+01	1.4435D-03	1.4435D-03
15	-5.8575E+01	1.8136D-03	1.8136D-03
16	-4.4505E+01	2.3868D-03	2.3868D-03
17	-3.1490E+01	2.7738D-03	2.7738D-03
18	-1.9640E+01	3.9511D-03	3.9511D-03
19	-1.2106E+01	7.3361D-03	7.3361D-03
20	-8.5400E+00	2.5637D-02	2.5637D-02
21	-6.9810E+00	3.1442D-02	3.1442D-02
22	-5.8475E+00	3.7173D-02	3.7173D-02
23	-4.8980E+00	4.4919D-02	4.4919D-02
24	-4.1025E+00	5.2966D-02	5.2966D-02
25	-3.2785E+00	4.2037D-02	4.2037D-02
26	-2.4595E+00	2.6973D-02	2.6993D-02
27	-1.9035E+00	2.4685D-02	2.4685D-02
28	-1.4310E+00	1.7153D-02	1.7153D-02
29	4.9942E+02	9.7887D-06	9.7887D-06
30	1.0000E+03	0.0000D+00	0.0000D+00

PERMEABILITY TABLE

	PSIVARK	CONTW	SLOKW	CONTD	SLOKD
1	-7.5840E+03	1.7820D-23	1.4044D-26	1.7820E-23	1.4044E-26
2	-4.5670E+03	6.0190D-23	1.4044D-26	6.0190E-23	1.4044E-26
3	-3.2570E+03	1.3310D-22	5.5656D-26	1.3310E-22	5.5656E-26
4	-1.9620E+03	4.2910D-22	2.2857D-25	4.2910E-22	2.2857E-25
5	-1.1810E+03	1.3600D-21	1.1919D-24	1.3600E-21	1.1919E-24
6	-7.1100E+02	4.2490D-21	6.1520D-24	4.2490E-21	6.1520E-24
7	-4.2850E+02	1.3130D-20	3.1393D-23	1.3130E-20	3.1393E-23
8	-2.6290E+02	5.4860D-20	2.5163D-22	5.4860E-20	2.5163E-22
9	-1.9970E+02	1.3700D-19	1.3006D-21	1.3700E-19	1.3006E-21
10	-1.6630E+02	2.3750D-19	3.0090D-21	2.3750E-19	3.0090E-21
11	-1.2640E+02	5.0980D-19	6.8246D-21	5.0980E-19	6.8246E-21
12	-9.6010E+01	1.0390D-18	1.7414D-20	1.0390E-18	1.7414E-20
13	-7.9940E+01	1.6380D-18	3.7274D-20	1.6380E-18	3.7274E-20
14	-6.6570E+01	2.5520D-18	6.8362D-20	2.5510E-18	6.8287E-20
15	-5.0580E+01	4.8820D-18	1.4572D-19	4.8820E-18	1.4578E-19
16	-3.8430E+01	9.2090D-18	3.5613D-19	9.2090E-18	3.5613E-19
17	-2.4550E+01	2.1390D-17	8.7759D-19	2.1390E-17	8.7759E-19
18	-1.4780E+01	5.2730D-17	3.1914D-18	5.2730E-17	3.1914E-18
19	-7.4820E+00	1.3910D-16	1.6458D-17	1.3910E-16	1.6458E-17
20	-7.5980E+00	4.1700D-16	1.4751D-16	4.1700E-16	1.4751E-16

21	-6,3690E+00	8,6620D-16	3,6402D-16	8,6620E-16	3,6402E-16
22	-5,3310E+00	1,6390D-15	7,4811D-16	1,6390E-15	7,4811E-16
23	-4,4650E+00	2,9090D-15	1,4665D-15	2,9090E-15	1,4665E-15
24	-3,7400E+00	4,9340D-15	2,7931D-15	4,9340E-15	2,7931E-15
25	-2,8170E+00	8,1230D-15	3,4550D-15	8,1330E-15	3,4659E-15
26	-2,1020E+00	1,0520D-14	3,3524D-15	1,0520E-14	3,3385E-15
27	-1,7050E+00	1,2120D-14	4,0302D-15	1,2120E-14	4,0302E-15
28	-1,1570E+00	1,4760D-14	4,8175D-15	1,4760E-14	4,8175E-15
29	1,0000E+03	1,4950D-14	1,8978D-19	1,4950E-14	1,8978E-19

AMAT	MATL	INDEX	LTABC	LTABSC	LTABK	LTABSK	AV	EZ	PZ	CONDUCTIVITY
CLAY	3	3	33	0	33	0	0,5900E-14	0,6260E+00	0,1000E+14	0,2739E-15

SATURATION TABLE

	PRESSURE HEAD (PSI)	WETTING CURVE (SW)	DRYING CURVE (SD)
1	-0,1533E+04	0,6057E+00	0,6057E+00
2	-0,9539E+03	0,6143E+00	0,6143E+00
3	-0,3747E+03	0,6229E+00	0,6229E+00
4	-0,1594E+03	0,6314E+00	0,6314E+00
5	-0,1522E+03	0,6400E+00	0,6400E+00
6	-0,1450E+03	0,6486E+00	0,6486E+00
7	-0,1378E+03	0,6571E+00	0,6571E+00
8	-0,1306E+03	0,6657E+00	0,6657E+00
9	-0,1234E+03	0,6743E+00	0,6743E+00
10	-0,1161E+03	0,6829E+00	0,6829E+00
11	-0,1089E+03	0,6914E+00	0,6914E+00
12	-0,1017E+03	0,7000E+00	0,7000E+00
13	-0,9449E+02	0,7086E+00	0,7086E+00
14	-0,8727E+02	0,7171E+00	0,7171E+00
15	-0,8005E+02	0,7257E+00	0,7257E+00
16	-0,7283E+02	0,7343E+00	0,7343E+00
17	-0,5840E+02	0,7514E+00	0,7514E+00
18	-0,4396E+02	0,7686E+00	0,7686E+00
19	-0,3188E+02	0,7857E+00	0,7857E+00
20	-0,2778E+02	0,8029E+00	0,8029E+00
21	-0,2368E+02	0,8200E+00	0,8200E+00
22	-0,1959E+02	0,8371E+00	0,8371E+00
23	-0,1549E+02	0,8543E+00	0,8543E+00
24	-0,9726E+01	0,8800E+00	0,8800E+00
25	-0,7801E+01	0,9143E+00	0,9143E+00
26	-0,6839E+01	0,9314E+00	0,9314E+00
27	-0,5876E+01	0,9486E+00	0,9486E+00
28	-0,4914E+01	0,9657E+00	0,9657E+00
29	-0,4433E+01	0,9743E+00	0,9743E+00
30	-0,3952E+01	0,9829E+00	0,9829E+00
31	-0,3470E+01	0,9914E+00	0,9914E+00
32	-0,3281E-01	0,1000E+01	0,1000E+01
33	0,1000E+05	0,1000E+01	0,1000E+01

SPECIFIC MOISTURE CAPACITY TABLE

PRESSURE HEAD (PSI)	WETTING CURVE (SLOCW)	DRYING CURVE (SLOCD)

1	-1.5330E+03	1.4851D-05	1.4851D-05
2	-1.2435E+03	1.4851D-05	1.4851D-05
3	-6.6430E+02	1.4848D-05	1.4848D-05
4	-2.6705E+02	3.9480D-05	3.9480D-05
5	-1.5580E+02	1.1944D-03	1.1944D-03
6	-1.4860E+02	1.1944D-03	1.1944D-03
7	-1.4140E+02	1.1806D-03	1.1806D-03
8	-1.3420E+02	1.1944D-03	1.1944D-03
9	-1.2700E+02	1.1944D-03	1.1944D-03
10	-1.1975E+02	1.1781D-03	1.1781D-03
11	-1.1250E+02	1.1806D-03	1.1806D-03
12	-1.0530E+02	1.1944D-03	1.1944D-03
13	-9.8095E+01	1.1928D-03	1.1928D-03
14	-9.0880E+01	1.1773D-03	1.1773D-03
15	-8.3660E+01	1.1911D-03	1.1911D-03
16	-7.6440E+01	1.1911D-03	1.1911D-03
17	-6.5615E+01	1.1850D-03	1.1850D-03
18	-5.1180E+01	1.1911D-03	1.1911D-03
19	-3.7920E+01	1.4156D-03	1.4156D-03
20	-2.9830E+01	4.1951D-03	4.1951D-03
21	-2.5730E+01	4.1707D-03	4.1707D-03
22	-2.1635E+01	4.1809D-03	4.1809D-03
23	-1.7540E+01	4.1951D-03	4.1951D-03
24	-1.2608E+01	4.4587D-03	4.4587D-03
25	-8.7635E+00	1.7818D-02	1.7818D-02
26	-7.3200E+00	1.7775D-02	1.7775D-02
27	-6.3575E+00	1.7861D-02	1.7861D-02
28	-5.3950E+00	1.7775D-02	1.7775D-02
29	-4.6735E+00	1.7879D-02	1.7879D-02
30	-4.1925E+00	1.7879D-02	1.7879D-02
31	-3.7110E+00	1.7635D-02	1.7635D-02
32	-1.7514E+00	2.5020D-03	2.5020D-03
33	5.0000E+03	0.0000D+00	0.0000D+00
34	1.0000E+04	0.0000D+00	0.0000D+00

PERMEABILITY TABLE

	PSIVARK	CONTW	SLOKW	CONTD	SLOKD
1	-1.5330E+03	3.7660D-22	2.5730D-25	3.7660E-22	2.5730E-25
2	-9.5390E+02	5.2560D-22	2.5730D-25	5.2560E-22	2.5730E-25
3	-3.7470E+02	1.6930D-21	2.0155D-24	1.6930E-21	2.0155E-24
4	-1.5940E+02	4.9410D-21	1.5086D-23	4.9410E-21	1.5086E-23
5	-1.5220E+02	1.0580D-20	7.8319D-22	1.0580E-20	7.8319E-22
6	-1.4500E+02	1.8980D-20	1.1667D-21	1.8980E-20	1.1667E-21
7	-1.3780E+02	3.0550D-20	1.6069D-21	3.0550E-20	1.6069E-21
8	-1.3060E+02	4.5800D-20	2.1181D-21	4.5800E-20	2.1181E-21
9	-1.2340E+02	6.5230D-20	2.6986D-21	6.5230E-20	2.6986E-21
10	-1.1610E+02	8.9600D-20	3.3384D-21	8.9600E-20	3.3384E-21
11	-1.0890E+02	1.1970D-19	4.1806D-21	1.1970E-19	4.1806E-21
12	-1.0170E+02	1.5650D-19	5.1111D-21	1.5650E-19	5.1111E-21
13	-9.4490E+01	2.0120D-19	6.1997D-21	2.0120E-19	6.1997E-21
14	-8.7270E+01	2.5540D-19	7.5069D-21	2.5540E-19	7.5069E-21
15	-8.0050E+01	3.2110D-19	9.0997D-21	3.2110E-19	9.0997E-21
16	-7.2830E+01	4.0080D-19	1.1039D-20	4.0080E-19	1.1039E-20
17	-5.8400E+01	6.1700D-19	1.4983D-20	6.1700E-19	1.4983E-20
18	-4.3960E+01	9.5330D-19	2.3289D-20	9.5330E-19	2.3289E-20
19	-3.1880E+01	1.5190D-18	4.6829D-20	1.5190E-18	4.6829E-20
20	-2.7780E+01	2.4390D-18	2.2439D-19	2.4390E-18	2.2439E-19
21	-2.3680E+01	3.8600D-18	3.4659D-19	3.8600E-18	3.4659E-19
22	-1.9590E+01	6.0120D-18	5.2616D-19	6.0120E-18	5.2616E-19
23	-1.5490E+01	9.3210D-18	8.0707D-19	9.3210E-18	8.0707E-19

24	-9.7260E+00	1.8560D-17	1.6029D-18	1.8560E-17	1.6029E-18
25	-7.8010E+00	4.6340D-17	1.4431D-17	4.6340E-17	1.4431E-17
26	-6.8390E+00	7.0330D-17	2.4938D-17	7.0330E-17	2.4938E-17
27	-5.8760E+00	1.0440D-16	3.5379D-17	1.0440E-16	3.5379E-17
28	-4.9140E+00	1.5280D-16	5.0312D-17	1.5280E-16	5.0312E-17
29	-4.4330E+00	1.8450D-16	6.5904D-17	1.8450E-16	6.5904E-17
30	-3.9520E+00	2.2300D-16	8.0042D-17	2.2300E-16	8.0042E-17
31	-3.4700E+00	2.7080D-16	9.9170D-17	2.7080E-16	9.9170E-17
32	-3.2810E-02	2.7390D-16	9.0190D-19	2.7390E-16	9.0190E-19
33	1.0000E+03	2.7390D-16	0.0000D+00	2.7390E-16	0.0000E+00

AMAT	MATL	INDEX	LTABC	LTABSC	LTABK	LTABSK	AV	EZ	PZ	CONDUCTIVITY
CLAY	4	4	33	0	33	0	0.5900E-14	0.6260E+00	0.1000E+14	0.2739E-15

SATURATION TABLE

	PRESSURE HEAD (PSI)	WETTING CURVE (SW)	DRYING CURVE (SD)
1	-0.1533E+04	0.6057E+00	0.6057E+00
2	-0.9539E+03	0.6143E+00	0.6143E+00
3	-0.3747E+03	0.6229E+00	0.6229E+00
4	-0.1594E+03	0.6314E+00	0.6314E+00
5	-0.1522E+03	0.6400E+00	0.6400E+00
6	-0.1450E+03	0.6486E+00	0.6486E+00
7	-0.1378E+03	0.6571E+00	0.6571E+00
8	-0.1306E+03	0.6657E+00	0.6657E+00
9	-0.1234E+03	0.6743E+00	0.6743E+00
10	-0.1161E+03	0.6829E+00	0.6829E+00
11	-0.1089E+03	0.6914E+00	0.6914E+00
12	-0.1017E+03	0.7000E+00	0.7000E+00
13	-0.9449E+02	0.7086E+00	0.7086E+00
14	-0.8727E+02	0.7171E+00	0.7171E+00
15	-0.8005E+02	0.7257E+00	0.7257E+00
16	-0.7283E+02	0.7343E+00	0.7343E+00
17	-0.5840E+02	0.7514E+00	0.7514E+00
18	-0.4396E+02	0.7686E+00	0.7686E+00
19	-0.3188E+02	0.7857E+00	0.7857E+00
20	-0.2778E+02	0.8029E+00	0.8029E+00
21	-0.2368E+02	0.8200E+00	0.8200E+00
22	-0.1959E+02	0.8371E+00	0.8371E+00
23	-0.1549E+02	0.8543E+00	0.8543E+00
24	-0.9726E+01	0.8800E+00	0.8800E+00
25	-0.7801E+01	0.9143E+00	0.9143E+00
26	-0.6839E+01	0.9314E+00	0.9314E+00
27	-0.5876E+01	0.9486E+00	0.9486E+00
28	-0.4914E+01	0.9657E+00	0.9657E+00
29	-0.4433E+01	0.9743E+00	0.9743E+00
30	-0.3952E+01	0.9829E+00	0.9829E+00
31	-0.3470E+01	0.9914E+00	0.9914E+00
32	-0.3281E-01	0.1000E+01	0.1000E+01
33	0.1000E+04	0.1000E+01	0.1000E+01

SPECIFIC MOISTURE CAPACITY TABLE

PRESSURE HEAD (PSI)	WETTING CURVE (SLOPW)	DRYING CURVE (SLOPD)

1	-1.5330E+03	1.4851D-05	1.4851D-05
2	-1.2435E+03	1.4851D-05	1.4851D-05
3	-6.6430E+02	1.4848D-05	1.4848D-05
4	-2.6705E+02	3.9480D-05	3.9480D-05
5	-1.5540E+02	1.1944D-03	1.1944D-03
6	-1.4860E+02	1.1944D-03	1.1944D-03
7	-1.4140E+02	1.1806D-03	1.1806D-03
8	-1.3420E+02	1.1944D-03	1.1944D-03
9	-1.2700E+02	1.1944D-03	1.1944D-03
10	-1.1975E+02	1.1781D-03	1.1781D-05
11	-1.1250E+02	1.1806D-03	1.1806D-03
12	-1.0530E+02	1.1944D-03	1.1944D-03
13	-9.8095E+01	1.1928D-03	1.1928D-03
14	-9.0880E+01	1.1773D-03	1.1773D-03
15	-8.3660E+01	1.1911D-03	1.1911D-03
16	-7.6440E+01	1.1911D-03	1.1911D-03
17	-6.5615E+01	1.1850D-03	1.1850D-03
18	-5.1180E+01	1.1911D-03	1.1911D-03
19	-3.7920E+01	1.4156D-03	1.4156D-03
20	-2.9930E+01	4.1951D-03	4.1951D-03
21	-2.5730E+01	4.1707D-03	4.1707D-03
22	-2.1635E+01	4.1809D-03	4.1809D-03
23	-1.7540E+01	4.1951D-03	4.1951D-03
24	-1.2609E+01	4.4587D-03	4.4587D-03
25	-8.7635E+00	1.7818D-02	1.7818D-02
26	-7.3200E+00	1.7775D-02	1.7775D-02
27	-6.3575E+00	1.7861D-02	1.7861D-02
28	-5.3950E+00	1.7775D-02	1.7775D-02
29	-4.6735E+00	1.7879D-02	1.7879D-02
30	-4.1925E+00	1.7879D-02	1.7879D-02
31	-3.7110E+00	1.7635D-02	1.7635D-02
32	-1.7534E+00	2.5020D-03	2.5020D-03
33	4.9998E+02	0.0000D+00	0.0000D+00
34	1.0000E+03	0.0000D+00	0.0000D+00

PERMEABILITY TABLE

	PSIVARK	CONTW	SLOKW	CONTD	SLOKD
1	-1.5330E+03	3.7660D-22	2.5730D-25	3.7660E-22	2.5730E-25
2	-9.5390E+02	5.2560D-22	2.5730D-25	5.2560E-22	2.5730E-25
3	-3.7470E+02	1.6930D-21	2.0155D-24	1.6930E-21	2.0155E-24
4	-1.5940E+02	4.9410D-21	1.5086D-23	4.9410E-21	1.5086E-23
5	-1.5220E+02	1.0580D-20	7.8319D-22	1.0580E-20	7.8319E-22
6	-1.4500E+02	1.8980D-20	1.1667D-21	1.8980E-20	1.1667E-21
7	-1.3780E+02	3.0550D-20	1.6069D-21	3.0550E-20	1.6069E-21
8	-1.3060E+02	4.5800D-20	2.1181D-21	4.5800E-20	2.1181E-21
9	-1.2340E+02	6.5230D-20	2.6986D-21	6.5230E-20	2.6986E-21
10	-1.1610E+02	8.9600D-20	3.3384D-21	8.9600E-20	3.3384E-21
11	-1.0890E+02	1.1970D-19	4.1806D-21	1.1970E-19	4.1806E-21
12	-1.0170E+02	1.5650D-19	5.1111D-21	1.5650E-19	5.1111E-21
13	-9.4490E+01	2.0120D-19	6.1997D-21	2.0120E-19	6.1997E-21
14	-8.7270E+01	2.5540D-19	7.5069D-21	2.5540E-19	7.5069E-21
15	-8.0050E+01	3.2110D-19	9.0997D-21	3.2110E-19	9.0997E-21
16	-7.2830E+01	4.0080D-19	1.1039D-20	4.0080E-19	1.1039E-20
17	-5.8400E+01	6.1700D-19	1.6983D-20	6.1700E-19	1.6983E-20
18	-4.3960E+01	9.5330D-19	2.3289D-20	9.5330E-19	2.3289E-20
19	-3.1880E+01	1.5190D-18	4.6829D-20	1.5190E-18	4.6829E-20
20	-2.7780E+01	2.4390D-18	2.2439D-19	2.4390E-18	2.2439E-19
21	-2.3680E+01	3.8600D-18	3.4659D-19	3.8600E-18	3.4659E-19
22	-1.9530E+01	6.0120D-18	5.2616D-19	6.0120E-18	5.2616E-19

23	-1.5490E+01	9.3210D-18	8.0707D-19	9.3210E-18	8.0707E-19
24	-9.7260E+00	1.8560D-17	1.6029D-18	1.8560E-17	1.6029E-18
25	-7.8010E+00	4.6340D-17	1.4431D-17	4.6340E-17	1.4431E-17
26	-6.8590E+00	7.0330D-17	2.4938D-17	7.0330E-17	2.4938E-17
27	-5.8760E+00	1.0440D-16	3.5379D-17	1.0440E-16	3.5379E-17
28	-4.9140E+00	1.5280D-16	5.0312D-17	1.5280E-16	5.0312E-17
29	-4.4330E+00	1.8450D-16	6.5904D-17	1.8450E-16	6.5904E-17
30	-3.9520E+00	2.2300D-16	8.0042D-17	2.2300E-16	8.0042E-17
31	-3.4700E+00	2.7080D-16	9.9170D-17	2.7080E-16	9.9170E-17
32	-3.2810E-02	2.7390D-16	9.0190D-19	2.7390E-16	9.0190E-19
33	1.0000E+03	2.7390D-16	0.0000D+00	2.7390E-16	0.0000E+00

AMAT	MATL	INDEX	LTABC	LTABSC	LTABK	LTABSK	AV	EZ	PZ	CONDUCTIVITY
MINE	5	5	28	0	28	0	0.5900E-15	0.7889E+00	0.1000E+14	0.2370E-11

SATURATION TABLE

	PRESSURE HEAD (PSI)	WETTING CURVE (SW)	DRYING CURVE (SD)
1	-0.1141E+04	0.2279E+00	0.2279E+00
2	-0.8665E+03	0.2376E+00	0.2376E+00
3	-0.6576E+03	0.2474E+00	0.2474E+00
4	-0.4991E+03	0.2571E+00	0.2571E+00
5	-0.3789E+03	0.2669E+00	0.2669E+00
6	-0.2876E+03	0.2769E+00	0.2769E+00
7	-0.2183E+03	0.2866E+00	0.2866E+00
8	-0.1258E+03	0.2959E+00	0.2959E+00
9	-0.5501E+02	0.3354E+00	0.3354E+00
10	-0.3206E+02	0.3549E+00	0.3549E+00
11	-0.2213E+02	0.3746E+00	0.3746E+00
12	-0.8893E+01	0.4331E+00	0.4331E+00
13	-0.6119E+01	0.4918E+00	0.4918E+00
14	-0.4211E+01	0.5503E+00	0.5503E+00
15	-0.2860E+01	0.6188E+00	0.6188E+00
16	-0.2172E+01	0.6776E+00	0.6776E+00
17	-0.1655E+01	0.7458E+00	0.7458E+00
18	-0.1133E+01	0.8143E+00	0.8431E+00
19	-0.4561E+00	0.8730E+00	0.8730E+00
20	-0.6565E-01	0.9120E+00	0.9120E+00
21	-0.1212E-01	0.9315E+00	0.9315E+00
22	-0.5210E-02	0.9413E+00	0.9413E+00
23	-0.2239E-02	0.9512E+00	0.9512E+00
24	-0.7620E-03	0.9610E+00	0.9610E+00
25	-0.4134E-03	0.9707E+00	0.9707E+00
26	-0.1777E-03	0.9805E+00	0.9805E+00
27	-0.7634E-04	0.9902E+00	0.9902E+00
28	0.1000E+04	0.1000E+01	0.1000E+01

SPECIFIC MOISTURE CAPACITY TABLE

	PRESSURE HEAD (PSI)	WETTING CURVE (SLOCW)	DRYING CURVE (SLOCD)
1	-1.1410E+03	3.5311D-05	3.5311D-05
2	-1.0037E+03	3.5311D-05	3.5311D-05

3	-7.6195E+02	4.6957D-05	4.6957D-05
4	-5.7835E+02	6.1199D-05	6.1199D-05
5	-4.3900E+02	8.1531D-05	8.1531D-05
6	-3.3325E+02	1.0953D-04	1.0953D-04
7	-2.5295E+02	1.3997D-04	1.3997D-04
8	-1.7205E+02	1.0054D-04	1.0054D-04
9	-9.0405E+01	5.5799D-04	5.5799D-04
10	-4.3535E+01	8.4967D-04	8.4967D-04
11	-2.7095E+01	1.9834D-03	1.9839D-03
12	-1.5512E+01	4.4194D-03	4.4194D-03
13	-7.5060E+00	2.1161D-02	2.1161D-02
14	-5.1650E+00	3.0660D-02	3.0660D-02
15	-3.5355E+00	5.0703D-02	5.0703D-02
16	-2.5160E+00	8.5465D-02	8.5465D-02
17	-1.9135E+00	1.3191D-01	1.3191D-01
18	-1.3940E+00	1.3123D-01	1.8640D-01
19	-7.9455E-01	8.6719D-02	4.4172D-02
20	-2.6088E-01	9.9885D-02	9.9885D-02
21	-3.8885E-02	3.6428D-01	3.6428D-01
22	-8.6650E-03	1.4182D+00	1.4182D+00
23	-3.7245E-03	3.3322D+00	3.3322D+00
24	-1.6005E-03	7.6742D+00	7.6742D+00
25	-6.8770E-04	1.7681D+01	1.7681D+01
26	-2.9555E-04	4.1578D+01	4.1578D+01
27	-1.2702E-04	9.5698D+01	9.5698D+01
28	5.0009E+02	9.8000D-06	9.8000D-06
29	1.0000E+03	0.0000D+00	0.0000D+00

PERMEABILITY TABLE

	PSIVARK	CONTW	SLOKW	CONTD	SLOKD
1	-1.1910E+03	3.2540D-20	6.5271D-23	3.2540E-20	6.5271E-23
2	-8.6630E+02	5.0470D-20	6.5271D-23	5.0470E-20	6.5271E-23
3	-6.5760E+02	7.6360D-20	1.2405D-22	7.6360E-20	1.2405E-22
4	-4.9910E+02	1.1330D-19	2.3306D-22	1.1330E-19	2.3306E-22
5	-3.7890E+02	1.6540D-19	4.3344D-22	1.6540E-19	4.3344E-22
6	-2.8760E+02	2.3860D-19	8.0175D-22	2.3860E-19	8.0175E-22
7	-2.1830E+02	3.4050D-19	1.4704D-21	3.4050E-19	1.4704E-21
8	-1.2580E+02	4.8190D-19	1.5286D-21	4.8190E-19	1.5286E-21
9	-5.5010E+01	1.8240D-18	1.8959D-20	1.8240E-18	1.8959E-20
10	-3.2060E+01	6.7120D-18	2.1298D-19	6.7120E-18	2.1298E-19
11	-2.2130E+01	5.5980D-17	4.9615D-18	5.5980E-17	4.9615E-18
12	-8.8930E+00	2.9690D-16	1.8200D-17	2.9690E-16	1.8200E-17
13	-6.1190E+00	1.0480D-15	2.7076D-16	1.0480E-15	2.7076E-16
14	-4.2110E+00	3.5940D-15	1.3344D-15	3.5940E-15	1.3344E-15
15	-2.8600E+00	8.9650D-15	3.9756D-15	8.9650E-15	3.9756E-15
16	-2.1720E+00	2.2990D-14	2.0385D-14	2.2990E-14	2.0385E-14
17	-1.6550E+00	5.3190D-14	5.8414D-14	5.3190E-14	5.8414E-14
18	-1.1330E+00	1.2030D-13	1.2856D-13	1.2030E-13	1.2856E-13
19	-4.5610E-01	2.6780D-13	2.1791D-13	2.6780E-13	2.1791E-13
20	-6.5650E-02	4.3630D-13	4.3155D-13	4.3630E-13	4.3155E-13
21	-1.2120E-02	5.6670D-13	2.4360D-12	5.6670E-13	2.4360E-12
22	-5.2100E-03	7.4290D-13	2.5499D-11	7.4290E-13	2.5499E-11
23	-2.2390E-03	9.8150D-13	8.0310D-11	9.8150E-13	8.0310E-11
24	-9.6200E-04	1.3050D-12	2.5333D-10	1.3050E-12	2.5333E-10
25	-4.1340E-04	1.7440D-12	8.0022D-10	1.7440E-12	8.0022E-10
26	-1.7770E-04	2.3390D-12	2.5244D-09	2.3390E-12	2.5244E-09
27	-7.6340E-05	2.3700D-12	3.0584D-10	2.3700E-12	3.0584E-10
28	1.0000E+03	2.3700D-12	0.0000D+00	2.3700E-12	0.0000E+00

DATA BLOCK 3

FLUID	VISCOSITY	BETA	RHOZ	GEE	G/VISCOSITY	BETA PRIME
WATER	0.18000E+01	0.11700E-20	0.19370E+01	0.20015E+12	0.13342E+12	0.54425E-09

DATA BLOCK 4

NODE	INDEX	MATL	NTYPE	DLONG	DWIDE	DRAD	VOLUME	Z
3	1	1	0	0.28898E+02	0.28898E+02	0.10000E+01	0.83509E+03	0.10532E+03
4	2	1	0	0.40314E+02	0.40314E+02	0.10000E+01	0.16252E+04	0.65440E+02
5	3	1	0	0.10954E+02	0.10954E+02	0.10000E+01	0.11999E+03	0.43500E+02
6	4	1	0	0.25923E+02	0.25923E+02	0.10000E+01	0.67200E+03	0.33600E+02
7	5	1	0	0.49111E+02	0.49111E+02	0.10000E+01	0.24119E+04	0.16800E+02
12	6	1	0	0.23982E+02	0.23982E+02	0.10000E+01	0.57514E+03	0.12044E+03
13	7	1	0	0.37918E+02	0.37918E+02	0.10000E+01	0.14378E+04	0.91791E+02
14	8	1	0	0.36813E+02	0.36813E+02	0.10000E+01	0.13552E+04	0.60855E+02
15	9	1	0	0.11358E+02	0.11358E+02	0.10000E+01	0.12900E+03	0.43500E+02
16	10	1	0	0.29629E+02	0.29629E+02	0.10000E+01	0.87788E+03	0.33600E+02
17	11	1	0	0.26878E+02	0.26878E+02	0.10000E+01	0.72243E+03	0.16800E+02
21	12	1	0	0.25192E+02	0.25192E+02	0.10000E+01	0.63464E+03	0.12267E+03
22	13	1	0	0.24185E+02	0.24185E+02	0.10000E+01	0.58491E+03	0.10336E+03
23	14	1	0	0.28837E+02	0.28837E+02	0.10000E+01	0.83157E+03	0.81194E+02
24	15	1	0	0.23159E+02	0.23159E+02	0.10000E+01	0.53634E+03	0.57260E+02
25	16	1	0	0.81240E+01	0.81240E+01	0.10000E+01	0.65999E+02	0.43500E+02
26	17	1	0	0.19225E+02	0.19225E+02	0.10000E+01	0.36960E+03	0.33600E+02
27	18	1	0	0.19225E+02	0.19225E+02	0.10000E+01	0.36960E+03	0.16800E+02
28	19	2	0	0.18501E+02	0.18501E+02	0.10000E+01	0.34229E+03	0.13431E+03
29	20	2	0	0.13202E+02	0.13202E+02	0.10000E+01	0.17429E+03	0.12724E+03
30	21	1	0	0.19158E+02	0.19158E+02	0.10000E+01	0.36703E+03	0.12056E+03
31	22	1	0	0.19890E+02	0.19890E+02	0.10000E+01	0.39561E+03	0.10797E+03
32	23	1	0	0.19883E+02	0.19883E+02	0.10000E+01	0.39533E+03	0.92316E+02
33	24	1	0	0.19883E+02	0.19883E+02	0.10000E+01	0.39533E+03	0.74346E+02
34	25	1	0	0.19883E+02	0.19883E+02	0.10000E+01	0.39533E+03	0.54994E+02
35	26	1	0	0.77460E+01	0.77460E+01	0.10000E+01	0.60001E+02	0.43500E+02
36	27	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.33600E+02
37	28	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.16800E+02
38	29	5	0	0.18566E+02	0.18566E+02	0.10000E+01	0.34470E+03	0.11551E+03
39	30	5	0	0.14142E+02	0.14142E+02	0.10000E+01	0.20000E+03	0.10946E+03
40	31	1	0	0.17535E+02	0.17535E+02	0.10000E+01	0.30748E+03	0.10377E+03
41	32	1	0	0.17535E+02	0.17535E+02	0.10000E+01	0.30748E+03	0.93980E+02
42	33	1	0	0.17535E+02	0.17535E+02	0.10000E+01	0.30748E+03	0.81801E+02
43	34	1	0	0.17535E+02	0.17535E+02	0.10000E+01	0.30748E+03	0.67825E+02
44	35	1	0	0.17535E+02	0.17535E+02	0.10000E+01	0.30748E+03	0.52734E+02
45	36	1	0	0.77460E+01	0.77460E+01	0.10000E+01	0.60001E+02	0.43500E+02
46	37	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.33600E+02
47	38	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.16800E+02
48	39	5	0	0.15899E+02	0.15899E+02	0.10000E+01	0.25278E+03	0.96703E+02
49	40	5	0	0.14142E+02	0.14142E+02	0.10000E+01	0.20000E+03	0.91682E+02
50	41	1	0	0.14820E+02	0.14820E+02	0.10000E+01	0.21963E+03	0.86977E+02
51	42	1	0	0.14820E+02	0.14820E+02	0.10000E+01	0.21963E+03	0.79986E+02
52	43	1	0	0.14820E+02	0.14820E+02	0.10000E+01	0.21963E+03	0.71287E+02
53	44	1	0	0.14820E+02	0.14820E+02	0.10000E+01	0.21963E+03	0.61304E+02
54	45	1	0	0.14820E+02	0.14820E+02	0.10000E+01	0.21963E+03	0.50524E+02
55	46	1	0	0.77460E+01	0.77460E+01	0.10000E+01	0.60001E+02	0.43500E+02
56	47	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.33600E+02
57	48	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.16800E+02
58	49	5	0	0.12683E+02	0.12683E+02	0.10000E+01	0.16086E+03	0.77905E+02
59	50	5	0	0.14142E+02	0.14142E+02	0.10000E+01	0.20000E+03	0.73903E+02
60	51	1	0	0.11480E+02	0.11480E+02	0.10000E+01	0.13179E+03	0.70186E+02
61	52	1	0	0.11479E+02	0.11479E+02	0.10000E+01	0.13177E+03	0.65982E+02
62	53	1	0	0.11479E+02	0.11479E+02	0.10000E+01	0.13177E+03	0.60772E+02
63	54	1	0	0.11479E+02	0.11479E+02	0.10000E+01	0.13177E+03	0.54782E+02

64	55	1	0	0.11479E+02	0.11479E+02	0.10000E+01	0.13177E+03	0.48315E+02
65	56	1	0	0.77460E+01	0.77460E+01	0.10000E+01	0.60001E+02	0.43500E+02
66	57	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.33600E+02

NODE	INDEX	MATL	NTYPE	DLUNG	DWIDE	DRAD	VOLUME	Z
67	58	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.16800E+02
68	59	5	0	0.77670E+01	0.77670E+01	0.10000E+01	0.60326E+02	0.59102E+02
69	60	5	0	0.12247E+02	0.12247E+02	0.10000E+01	0.14999E+03	0.56000E+02
70	61	1	0	0.66280E+01	0.66280E+01	0.10000E+01	0.43930E+02	0.53395E+02
71	62	1	0	0.66280E+01	0.66280E+01	0.10000E+01	0.43930E+02	0.51997E+02
72	63	1	0	0.66280E+01	0.66280E+01	0.10000E+01	0.43930E+02	0.50257E+02
73	64	1	0	0.66280E+01	0.66280E+01	0.10000E+01	0.43930E+02	0.48261E+02
74	65	1	0	0.66280E+01	0.66280E+01	0.10000E+01	0.43930E+02	0.46105E+02
75	66	1	0	0.77460E+01	0.77460E+01	0.10000E+01	0.60001E+02	0.43500E+02
76	67	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.33600E+02
77	68	1	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.16800E+02
78	69	5	0	0.33890E+01	0.33890E+01	0.10000E+01	0.11485E+02	0.49701E+02
79	70	5	0	0.33900E+01	0.33900E+01	0.10000E+01	0.11492E+02	0.47236E+02
80	71	3	2	0.00000E+00	0.00000E+00	0.10000E+01	0.10000E-23	0.44000E+02
81	72	3	2	0.00000E+00	0.00000E+00	0.10000E+01	0.10000E-23	0.44000E+02
85	73	3	0	0.57910E+01	0.57910E+01	0.10000E+01	0.33536E+02	0.43500E+02
86	74	1	0	0.13704E+02	0.13704E+02	0.10000E+01	0.18780E+03	0.33600E+02
87	75	1	0	0.13704E+02	0.13704E+02	0.10000E+01	0.18780E+03	0.16800E+02
90	76	2	0	0.17758E+02	0.17758E+02	0.10000E+01	0.31535E+03	0.13936E+03
91	77	5	0	0.18561E+02	0.18561E+02	0.10000E+01	0.34451E+03	0.11950E+03
92	78	5	0	0.15895E+02	0.15895E+02	0.10000E+01	0.25265E+03	0.99631E+02
93	79	5	0	0.12680E+02	0.12680E+02	0.10000E+01	0.16078E+03	0.79765E+02
94	80	5	0	0.77650E+01	0.77650E+01	0.10000E+01	0.60295E+02	0.59899E+02
95	81	5	0	0.33890E+01	0.33890E+01	0.10000E+01	0.11485E+02	0.49966E+02
99	82	2	0	0.17321E+02	0.17321E+02	0.10000E+01	0.30002E+03	0.13936E+03
100	83	5	0	0.20000E+02	0.20000E+02	0.10000E+01	0.40000E+03	0.11950E+03
101	84	5	0	0.20000E+02	0.20000E+02	0.10000E+01	0.40000E+03	0.99631E+02
102	85	5	0	0.20000E+02	0.20000E+02	0.10000E+01	0.40000E+03	0.79765E+02
103	86	5	0	0.17321E+02	0.17321E+02	0.10000E+01	0.30002E+03	0.59899E+02
104	87	5	0	0.14142E+02	0.14142E+02	0.10000E+01	0.20000E+03	0.50000E+02
105	88	3	0	0.77460E+01	0.77460E+01	0.10000E+01	0.60001E+02	0.43500E+02
106	89	2	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.33600E+02
107	90	2	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.16800E+02
109	91	2	0	0.17321E+02	0.17321E+02	0.10000E+01	0.30002E+03	0.13936E+03
110	92	5	0	0.20000E+02	0.20000E+02	0.10000E+01	0.40000E+03	0.11950E+03
111	93	5	0	0.20000E+02	0.20000E+02	0.10000E+01	0.40000E+03	0.99631E+02
112	94	5	0	0.20000E+02	0.20000E+02	0.10000E+01	0.40000E+03	0.79765E+02
113	95	5	0	0.17321E+02	0.17321E+02	0.10000E+01	0.30002E+03	0.59899E+02
114	96	5	0	0.14142E+02	0.14142E+02	0.10000E+01	0.20000E+03	0.50000E+02
115	97	3	0	0.77460E+01	0.77460E+01	0.10000E+01	0.60001E+02	0.43500E+02
116	98	2	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.33600E+02
117	99	2	0	0.18330E+02	0.18330E+02	0.10000E+01	0.33599E+03	0.16800E+02
119	100	2	0	0.21213E+02	0.21213E+02	0.10000E+01	0.44999E+03	0.13936E+03
120	101	5	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.11950E+03
121	102	5	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.99631E+02
122	103	5	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.79765E+02
123	104	5	0	0.21213E+02	0.21213E+02	0.10000E+01	0.44999E+03	0.59899E+02
124	105	5	0	0.17321E+02	0.17321E+02	0.10000E+01	0.30002E+03	0.50000E+02
125	106	3	0	0.94870E+01	0.94870E+01	0.10000E+01	0.90003E+02	0.43500E+02
126	107	2	0	0.22450E+02	0.22450E+02	0.10000E+01	0.50400E+03	0.33600E+02
127	108	2	0	0.22450E+02	0.22450E+02	0.10000E+01	0.50400E+03	0.16800E+02
129	109	2	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.13936E+03
130	110	5	0	0.28284E+02	0.28284E+02	0.10000E+01	0.79998E+03	0.11950E+03
131	111	5	0	0.28284E+02	0.28284E+02	0.10000E+01	0.79998E+03	0.99631E+02
132	112	5	0	0.24475E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.79760E+02

133	113	5	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.59899E+02
134	114	5	0	0.20000E+02	0.20000E+02	0.10000E+01	0.40000E+03	0.50000E+02

NODE	INDEX	MATL	NTYPE	DLONG	DWIDE	DRAD	VOLUME	Z
135	115	3	0	0.10954E+02	0.10954E+02	0.10000E+01	0.11999E+03	0.43500E+02
136	116	2	0	0.25923E+02	0.25923E+02	0.10000E+01	0.67200E+03	0.33600E+02
137	117	2	0	0.25923E+02	0.25923E+02	0.10000E+01	0.67200E+03	0.16800E+02
139	118	2	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.13936E+03
140	119	5	0	0.28284E+02	0.28284E+02	0.10000E+01	0.79998E+03	0.11950E+03
141	120	5	0	0.28284E+02	0.28284E+02	0.10000E+01	0.79998E+03	0.99631E+02
142	121	5	0	0.28284E+02	0.28284E+02	0.10000E+01	0.79998E+03	0.79765E+02
143	122	5	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.59899E+02
144	123	5	0	0.20000E+02	0.20000E+02	0.10000E+01	0.40000E+03	0.50000E+02
145	124	3	0	0.10954E+02	0.10954E+02	0.10000E+01	0.11999E+03	0.43500E+02
146	125	2	0	0.25923E+02	0.25923E+02	0.10000E+01	0.67200E+03	0.33600E+02
147	126	2	0	0.25923E+02	0.25923E+02	0.10000E+01	0.67200E+03	0.16800E+02
149	127	2	0	0.30000E+02	0.30000E+02	0.10000E+01	0.90000E+03	0.13936E+03
150	128	5	0	0.34641E+02	0.34641E+02	0.10000E+01	0.12000E+04	0.11950E+03
151	129	5	0	0.34641E+02	0.34641E+02	0.10000E+01	0.12000E+04	0.99631E+02
152	130	5	0	0.34641E+02	0.34641E+02	0.10000E+01	0.12000E+04	0.79765E+02
153	131	5	0	0.30000E+02	0.30000E+02	0.10000E+01	0.90000E+03	0.59899E+02
154	132	5	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.50000E+02
155	133	3	0	0.13416E+02	0.13416E+02	0.10000E+01	0.17999E+03	0.43500E+02
156	134	2	0	0.31749E+02	0.31749E+02	0.10000E+01	0.10080E+04	0.33600E+02
157	135	2	0	0.31749E+02	0.31749E+02	0.10000E+01	0.10080E+04	0.16800E+02
159	136	2	0	0.30000E+02	0.30000E+02	0.10000E+01	0.90000E+03	0.13936E+03
160	137	5	0	0.34641E+02	0.34641E+02	0.10000E+01	0.12000E+04	0.11950E+03
161	138	5	0	0.34641E+02	0.34641E+02	0.10000E+01	0.12000E+04	0.99631E+02
162	139	5	0	0.34641E+02	0.34641E+02	0.10000E+01	0.12000E+04	0.79765E+02
163	140	5	0	0.30000E+02	0.30000E+02	0.10000E+01	0.90000E+03	0.59899E+02
164	141	5	0	0.24495E+02	0.24495E+02	0.10000E+01	0.60001E+03	0.50000E+02
165	142	3	0	0.13416E+02	0.13416E+02	0.10000E+01	0.17999E+03	0.43500E+02
166	143	2	0	0.31749E+02	0.31749E+02	0.10000E+01	0.10080E+04	0.33600E+02
167	144	2	0	0.31749E+02	0.31749E+02	0.10000E+01	0.10080E+04	0.16800E+02
201	145	1	0	0.13320E+02	0.13320E+02	0.10000E+01	0.17742E+03	0.13347E+03
202	146	1	0	0.21324E+02	0.21324E+02	0.10000E+01	0.45471E+03	0.13347E+03
203	147	1	0	0.22048E+02	0.22048E+02	0.10000E+01	0.48611E+03	0.13347E+03
204	148	2	0	0.10256E+02	0.10256E+02	0.10000E+01	0.10519E+03	0.13936E+03
205	149	2	0	0.12177E+02	0.12177E+02	0.10000E+01	0.14828E+03	0.14339E+03
206	150	2	0	0.82830E+01	0.82830E+01	0.10000E+01	0.68608E+02	0.14902E+03
207	151	2	0	0.12453E+02	0.12453E+02	0.10000E+01	0.15508E+03	0.14902E+03
208	152	2	0	0.11610E+02	0.11610E+02	0.10000E+01	0.13479E+03	0.15300E+03
209	153	2	0	0.10037E+02	0.10037E+02	0.10000E+01	0.10078E+03	0.15300E+03
210	154	2	0	0.10000E+02	0.10000E+02	0.10000E+01	0.10000E+03	0.15300E+03
211	155	2	0	0.12247E+02	0.12247E+02	0.10000E+01	0.14999E+03	0.15300E+03
212	156	2	0	0.14142E+02	0.14142E+02	0.10000E+01	0.20000E+03	0.15300E+03
213	157	2	0	0.14142E+02	0.14142E+02	0.10000E+01	0.20000E+03	0.15300E+03
214	158	2	0	0.17321E+02	0.17321E+02	0.10000E+01	0.30002E+03	0.15300E+03
215	159	2	0	0.17321E+02	0.17321E+02	0.10000E+01	0.30002E+03	0.15300E+03
305	160	1	0	0.14553E+02	0.14553E+02	0.10000E+01	0.21179E+03	0.13130E+03
306	161	4	0	0.72270E+01	0.72270E+01	0.10000E+01	0.52230E+02	0.13611E+03
307	162	4	0	0.87940E+01	0.87940E+01	0.10000E+01	0.77334E+02	0.14093E+03
308	163	4	0	0.81580E+01	0.81580E+01	0.10000E+01	0.66553E+02	0.14512E+03
309	164	4	0	0.77600E+01	0.77600E+01	0.10000E+01	0.60218E+02	0.14650E+03
310	165	4	0	0.77460E+01	0.77460E+01	0.10000E+01	0.60001E+02	0.14650E+03
311	166	4	0	0.94870E+01	0.94870E+01	0.10000E+01	0.90003E+02	0.14650E+03
312	167	4	0	0.10954E+02	0.10954E+02	0.10000E+01	0.11999E+03	0.14650E+03
313	168	4	0	0.10954E+02	0.10954E+02	0.10000E+01	0.11999E+03	0.14650E+03
314	169	4	0	0.13416E+02	0.13416E+02	0.10000E+01	0.17999E+03	0.14650E+03
315	170	4	0	0.94870E+01	0.94870E+01	0.10000E+01	0.90003E+02	0.14650E+03

500	171	1	0	0.18329E+02	0.18329E+02	0.10000E+01	0.33595E+03	0.10000E-02

NODE	INDEX	MATL	NTYPE	DLONG	DWIDE	DRAD	VOLUME	Z
501	172	1	0	0.19004E+02	0.19004E+02	0.10000E+01	0.36115E+03	0.10000E-02
502	173	1	0	0.13593E+02	0.13593E+02	0.10000E+01	0.18477E+03	0.10000E-02
503	174	1	0	0.12961E+02	0.12961E+02	0.10000E+01	0.16799E+03	0.10000E-02
504	175	1	0	0.12961E+02	0.12961E+02	0.10000E+01	0.16799E+03	0.10000E-02
505	176	1	0	0.12961E+02	0.12961E+02	0.10000E+01	0.16799E+03	0.10000E-02
506	177	1	0	0.12961E+02	0.12961E+02	0.10000E+01	0.16799E+03	0.10000E-02
507	178	1	0	0.12961E+02	0.12961E+02	0.10000E+01	0.16799E+03	0.10000E-02
508	179	1	0	0.96900E+01	0.96900E+01	0.10000E+01	0.93896E+02	0.10000E-02
510	180	1	0	0.12961E+02	0.12961E+02	0.10000E+01	0.16799E+03	0.10000E-02
511	181	3	0	0.12961E+02	0.12961E+02	0.10000E+01	0.16799E+03	0.10000E-02
512	182	3	0	0.15874E+02	0.15874E+02	0.10000E+01	0.25198E+03	0.10000E-02
513	183	3	0	0.18329E+02	0.18329E+02	0.10000E+01	0.33595E+03	0.10000E-02
514	184	3	0	0.18329E+02	0.18329E+02	0.10000E+01	0.33595E+03	0.10000E-02
515	185	3	0	0.22449E+02	0.22449E+02	0.10000E+01	0.50396E+03	0.10000E-02
516	186	3	0	0.22449E+02	0.22449E+02	0.10000E+01	0.50396E+03	0.10000E-02

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DATA BLOCK 5

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	AREA
201	202	1	0.4677E+01	0.1454E+02	0.1288E+02	0.1000E+01	0.1288E+02
201	3	2	0.9858E+01	0.2095E+02	0.3015E+02	0.1000E+01	0.3015E+02
3	4	3	0.2044E+02	0.2044E+02	0.4000E+02	0.1000E+01	0.4000E+02
4	5	4	0.2044E+02	0.1500E+01	0.4000E+02	0.1000E+01	0.4000E+02
5	6	5	0.1500E+01	0.8400E+01	0.4000E+02	0.1000E+01	0.4000E+02
6	7	6	0.8400E+01	0.8400E+01	0.4000E+02	0.1000E+01	0.4000E+02
7	500	7	0.8400E+01	0.8400E+01	0.4087E+02	0.1000E+01	0.4087E+02
202	203	8	0.1237E+02	0.1779E+02	0.1443E+01	0.1000E+01	0.1443E+01
202	3	9	0.1941E+02	0.2301E+02	0.1113E+02	0.1000E+01	0.1113E+02
202	13	10	0.1958E+02	0.2277E+02	0.1078E+02	0.1000E+01	0.1078E+02
202	12	11	0.1308E+02	0.1170E+02	0.2096E+02	0.1000E+01	0.2096E+02
203	12	12	0.1015E+02	0.5730E+01	0.3138E+02	0.1000E+01	0.3138E+02
12	13	13	0.1319E+02	0.1852E+02	0.3154E+02	0.1000E+01	0.3154E+02
13	14	14	0.1585E+02	0.1585E+02	0.4300E+02	0.1000E+01	0.4300E+02
14	15	15	0.1585E+02	0.1500E+01	0.4300E+02	0.1000E+01	0.4300E+02
15	16	16	0.1500E+01	0.8400E+01	0.4300E+02	0.1000E+01	0.4300E+02
16	17	17	0.8400E+01	0.8400E+01	0.4728E+02	0.1000E+01	0.4728E+02
17	501	18	0.8400E+01	0.8400E+01	0.4300E+02	0.1000E+01	0.4300E+02
203	204	19	0.2310E+02	0.1109E+02	0.2878E+01	0.1000E+01	0.2878E+01
203	21	20	0.2179E+02	0.1358E+02	0.1879E+02	0.1000E+01	0.1879E+02
203	22	21	0.2179E+02	0.1359E+02	0.9718E+01	0.1000E+01	0.9718E+01
204	21	22	0.4741E+01	0.1195E+02	0.2295E+02	0.1000E+01	0.2295E+02
21	22	23	0.1226E+02	0.1226E+02	0.2027E+02	0.1000E+01	0.2027E+02
22	23	24	0.1226E+02	0.1226E+02	0.2200E+02	0.1000E+01	0.2200E+02
23	24	25	0.1226E+02	0.1226E+02	0.3286E+02	0.1000E+01	0.3286E+02
24	25	26	0.1226E+02	0.1500E+01	0.2200E+02	0.1000E+01	0.2200E+02
25	26	27	0.1500E+01	0.8400E+01	0.2200E+02	0.1000E+01	0.2200E+02
26	27	28	0.8400E+01	0.8400E+01	0.2200E+02	0.1000E+01	0.2200E+02
27	502	29	0.8400E+01	0.8400E+01	0.2200E+02	0.1000E+01	0.2200E+02
204	205	30	0.1049E+02	0.1251E+02	0.9086E+01	0.1000E+01	0.9086E+01
205	206	31	0.9581E+01	0.5235E+01	0.6713E+01	0.1000E+01	0.6713E+01
205	305	32	0.6715E+01	0.5561E+01	0.2209E+02	0.1000E+01	0.2209E+02
206	306	33	0.6714E+01	0.3269E+01	0.1022E+02	0.1000E+01	0.1022E+02
305	30	34	0.3914E+01	0.8051E+01	0.2189E+02	0.1000E+01	0.2189E+02
306	29	35	0.1915E+01	0.7953E+01	0.1004E+02	0.1000E+01	0.1004E+02
207	307	36	0.6714E+01	0.1498E+01	0.2384E+02	0.1000E+01	0.2384E+02
307	28	37	0.1590E+01	0.5191E+01	0.2354E+02	0.1000E+01	0.2354E+02

208	308	38	0.6021E+01	0.1500E+01	0.2349E+02	0.1000E+01	0.2349E+02
90	28	39	0.1099E+02	0.1099E+02	0.1471E+02	0.1000E+01	0.1471E+02
28	29	40	0.1099E+02	0.5000E+01	0.1733E+02	0.1000E+01	0.1733E+02
29	30	41	0.5000E+01	0.9943E+01	0.1846E+02	0.1000E+01	0.1846E+02
30	31	42	0.9943E+01	0.9943E+01	0.2002E+02	0.1000E+01	0.2002E+02
31	32	43	0.9943E+01	0.9943E+01	0.2000E+02	0.1000E+01	0.2000E+02
32	33	44	0.9943E+01	0.9943E+01	0.2000E+02	0.1000E+01	0.2000E+02
33	34	45	0.9943E+01	0.9943E+01	0.2000E+02	0.1000E+01	0.2000E+02
34	35	46	0.9943E+01	0.1500E+01	0.2000E+02	0.1000E+01	0.2000E+02
35	36	47	0.1500E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
36	37	48	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
37	503	49	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
91	38	50	0.8676E+01	0.8676E+01	0.2000E+02	0.1000E+01	0.2000E+02
38	39	51	0.8676E+01	0.5000E+01	0.2000E+02	0.1000E+01	0.2000E+02
39	40	52	0.5000E+01	0.7734E+01	0.2000E+02	0.1000E+01	0.2000E+02
40	41	53	0.7734E+01	0.7734E+01	0.2000E+02	0.1000E+01	0.2000E+02
41	42	54	0.7734E+01	0.7734E+01	0.2000E+02	0.1000E+01	0.2000E+02
42	43	55	0.7734E+01	0.7734E+01	0.2000E+02	0.1000E+01	0.2000E+02
43	44	56	0.7734E+01	0.7734E+01	0.2000E+02	0.1000E+01	0.2000E+02
44	45	57	0.7734E+01	0.1500E+01	0.2000E+02	0.1000E+01	0.2000E+02

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	AREA
46	47	58	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
47	504	59	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
48	49	60	0.6362E+01	0.5000E+01	0.2000E+02	0.1000E+01	0.2000E+02
92	48	61	0.6362E+01	0.6362E+01	0.2000E+02	0.1000E+01	0.2000E+02
49	50	62	0.5000E+01	0.5524E+01	0.2000E+02	0.1000E+01	0.2000E+02
50	51	63	0.5524E+01	0.5524E+01	0.2000E+02	0.1000E+01	0.2000E+02
51	52	64	0.5524E+01	0.5524E+01	0.2000E+02	0.1000E+01	0.2000E+02
52	53	65	0.5524E+01	0.5524E+01	0.2000E+02	0.1000E+01	0.2000E+02
53	54	66	0.5524E+01	0.5524E+01	0.2000E+02	0.1000E+01	0.2000E+02
54	55	67	0.5524E+01	0.1500E+01	0.2000E+02	0.1000E+01	0.2000E+02
55	56	68	0.1500E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
56	57	69	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
45	46	70	0.1500E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
57	505	71	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
93	58	72	0.4048E+01	0.4048E+01	0.2000E+02	0.1000E+01	0.2000E+02
58	59	73	0.4048E+01	0.5000E+01	0.2000E+02	0.1000E+01	0.2000E+02
59	60	74	0.5000E+01	0.3314E+01	0.2000E+02	0.1000E+01	0.2000E+02
60	61	75	0.3314E+01	0.3314E+01	0.2000E+02	0.1000E+01	0.2000E+02
61	62	76	0.3314E+01	0.3314E+01	0.2000E+02	0.1000E+01	0.2000E+02
62	63	77	0.3314E+01	0.3314E+01	0.2000E+02	0.1000E+01	0.2000E+02
63	64	78	0.3314E+01	0.3314E+01	0.2000E+02	0.1000E+01	0.2000E+02
64	65	79	0.3314E+01	0.1500E+01	0.2000E+02	0.1000E+01	0.2000E+02
65	66	80	0.1500E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
66	67	81	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
67	506	82	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
94	68	83	0.1735E+01	0.1735E+01	0.1500E+02	0.1000E+01	0.1500E+02
68	69	84	0.1735E+01	0.5000E+01	0.1500E+02	0.1000E+01	0.1500E+02
69	70	85	0.5000E+01	0.1105E+01	0.1500E+02	0.1000E+01	0.1500E+02
70	71	86	0.1105E+01	0.1105E+01	0.2000E+02	0.1000E+01	0.2000E+02
71	72	87	0.1105E+01	0.1105E+01	0.2000E+02	0.1000E+01	0.2000E+02
72	73	88	0.1105E+01	0.1105E+01	0.2000E+02	0.1000E+01	0.2000E+02
73	74	89	0.1105E+01	0.1105E+01	0.2000E+02	0.1000E+01	0.2000E+02
74	75	90	0.1105E+01	0.1500E+01	0.2000E+02	0.1000E+01	0.2000E+02
75	76	91	0.1500E+01	0.6400E+01	0.2000E+02	0.1000E+01	0.2000E+02
76	77	92	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
77	507	93	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
95	78	94	0.5820E+00	0.5820E+00	0.1000E+02	0.1000E+01	0.1000E+02
78	79	95	0.5820E+00	0.5000E+01	0.1000E+02	0.1000E+01	0.1000E+02

79	85	96	0.2236E+01	0.1500E+01	0.1118E+02	0.1000E+01	0.1118E+02
85	86	97	0.1500E+01	0.8400E+01	0.1118E+02	0.1000E+01	0.1118E+02
86	87	98	0.8400E+01	0.8400E+01	0.1118E+02	0.1000E+01	0.1118E+02
87	508	99	0.8400E+01	0.8400E+01	0.1118E+02	0.1000E+01	0.1118E+02
209	309	100	0.5000E+01	0.1500E+01	0.2015E+02	0.1000E+01	0.2015E+02
309	99	101	0.1500E+01	0.5637E+01	0.2000E+02	0.1000E+01	0.2000E+02
99	100	102	0.9363E+01	0.1050E+02	0.2000E+02	0.1000E+01	0.2000E+02
100	101	103	0.9497E+01	0.1037E+02	0.2000E+02	0.1000E+01	0.2000E+02
101	102	104	0.9631E+01	0.1024E+02	0.2000E+02	0.1000E+01	0.2000E+02
102	103	105	0.9765E+01	0.1011E+02	0.2000E+02	0.1000E+01	0.2000E+02
103	104	106	0.4899E+01	0.5900E+01	0.2000E+02	0.1000E+01	0.2000E+02
104	105	107	0.5000E+01	0.1500E+01	0.2000E+02	0.1000E+01	0.2000E+02
105	106	108	0.1500E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
106	107	109	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
107	510	110	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
210	310	111	0.5000E+01	0.1500E+01	0.2000E+02	0.1000E+01	0.2000E+02
310	109	112	0.1500E+01	0.5637E+01	0.2000E+02	0.1000E+01	0.2000E+02
109	110	113	0.9363E+01	0.1050E+02	0.2000E+02	0.1000E+01	0.2000E+02
110	111	114	0.9497E+01	0.1037E+02	0.2000E+02	0.1000E+01	0.2000E+02

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	AREA
111	112	115	0.9631E+01	0.1024E+02	0.2000E+02	0.1000E+01	0.2000E+02
112	113	116	0.9765E+01	0.1011E+02	0.2000E+02	0.1000E+01	0.2000E+02
113	114	117	0.4899E+01	0.5000E+01	0.2000E+02	0.1000E+01	0.2000E+02
114	115	118	0.5000E+01	0.1500E+01	0.2000E+02	0.1000E+01	0.2000E+02
115	116	119	0.1500E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
116	117	120	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2000E+02
117	511	121	0.8400E+01	0.8400E+01	0.2000E+02	0.1000E+01	0.2900E+02
211	311	122	0.5000E+01	0.1500E+01	0.3000E+02	0.1000E+01	0.3000E+02
311	119	123	0.1500E+01	0.5637E+01	0.3000E+02	0.1000E+01	0.3000E+02
119	120	124	0.9363E+01	0.1050E+02	0.3000E+02	0.1000E+01	0.3000E+02
120	121	125	0.9497E+01	0.1037E+02	0.3000E+02	0.1000E+01	0.3000E+02
121	122	126	0.9631E+01	0.1024E+02	0.3000E+02	0.1000E+01	0.3000E+02
122	123	127	0.9765E+01	0.1011E+02	0.3000E+02	0.1000E+01	0.3000E+02
123	124	128	0.4899E+01	0.5000E+01	0.3000E+02	0.1000E+01	0.3000E+02
124	125	129	0.5000E+01	0.1500E+01	0.3000E+02	0.1000E+01	0.3000E+02
125	126	130	0.1500E+01	0.8400E+01	0.3000E+02	0.1000E+01	0.3000E+02
126	127	131	0.8400E+01	0.8400E+01	0.3000E+02	0.1000E+01	0.3000E+02
127	512	132	0.8400E+01	0.8400E+01	0.3000E+02	0.1000E+01	0.3000E+02
212	312	133	0.5000E+01	0.1500E+01	0.4000E+02	0.1000E+01	0.4000E+02
312	129	134	0.1500E+01	0.5637E+01	0.4000E+02	0.1000E+01	0.4000E+02
129	130	135	0.9363E+01	0.1050E+02	0.4000E+02	0.1000E+01	0.4000E+02
130	131	136	0.9497E+01	0.1037E+02	0.4000E+02	0.1000E+01	0.4000E+02
131	132	137	0.9631E+01	0.1024E+02	0.4000E+02	0.1000E+01	0.4000E+02
132	133	138	0.9765E+01	0.1011E+02	0.4000E+02	0.1000E+01	0.4000E+02
133	134	139	0.4899E+01	0.5000E+01	0.4000E+02	0.1000E+01	0.4000E+02
134	135	140	0.5000E+01	0.1500E+01	0.4000E+02	0.1000E+01	0.4000E+02
135	136	141	0.1500E+01	0.8400E+01	0.4000E+02	0.1000E+01	0.4000E+02
136	137	142	0.8400E+01	0.8400E+01	0.4000E+02	0.1000E+01	0.4000E+02
137	513	143	0.8400E+01	0.8400E+01	0.4000E+02	0.1000E+01	0.4000E+02
213	313	144	0.5000E+01	0.1500E+01	0.4000E+02	0.1000E+01	0.4000E+02
313	139	145	0.1500E+01	0.5637E+01	0.4000E+02	0.1000E+01	0.4000E+02
139	140	146	0.9363E+01	0.1050E+02	0.4000E+02	0.1000E+01	0.4000E+02
140	141	147	0.9497E+01	0.1037E+02	0.4000E+02	0.1000E+01	0.4000E+02
141	142	148	0.9631E+01	0.1024E+02	0.4000E+02	0.1000E+01	0.4000E+02
142	143	149	0.9765E+01	0.1011E+02	0.4000E+02	0.1000E+01	0.4000E+02
143	144	150	0.4899E+01	0.5000E+01	0.4000E+02	0.1000E+01	0.4000E+02
144	145	151	0.5000E+01	0.1500E+01	0.4000E+02	0.1000E+01	0.4000E+02
145	146	152	0.1500E+01	0.8400E+01	0.4000E+02	0.1000E+01	0.4000E+02
146	147	153	0.8400E+01	0.8400E+01	0.4000E+02	0.1000E+01	0.4000E+02

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	AREA
147	514	154	0.8400E+01	0.8400E+01	0.4000E+02	0.1000E+01	0.4000E+02
214	314	155	0.5000E+01	0.1500E+01	0.6000E+02	0.1000E+01	0.6000E+02
314	149	156	0.1500E+01	0.5637E+01	0.6000E+02	0.1000E+01	0.6000E+02
149	150	157	0.9363E+01	0.1050E+02	0.6000E+02	0.1000E+01	0.6000E+02
150	151	158	0.9497E+01	0.1037E+02	0.6000E+02	0.1000E+01	0.6000E+02
151	152	159	0.9631E+01	0.1024E+02	0.6000E+02	0.1000E+01	0.6000E+02
152	153	160	0.9765E+01	0.1010E+02	0.6000E+02	0.1000E+01	0.6000E+02
153	154	161	0.4899E+01	0.5000E+01	0.6000E+02	0.1000E+01	0.6000E+02
154	155	162	0.5000E+01	0.1500E+01	0.6000E+02	0.1000E+01	0.6000E+02
155	156	163	0.1500E+01	0.8400E+01	0.6000E+02	0.1000E+01	0.6000E+02
156	157	164	0.8400E+01	0.8400E+01	0.6000E+02	0.1000E+01	0.6000E+02
157	515	165	0.8400E+01	0.8400E+01	0.6000E+02	0.1000E+01	0.6000E+02
215	315	166	0.5000E+01	0.1500E+01	0.6000E+02	0.1000E+01	0.6000E+02
315	159	167	0.1500E+01	0.5637E+01	0.6000E+02	0.1000E+01	0.6000E+02
159	160	168	0.9363E+01	0.1050E+02	0.6000E+02	0.1000E+01	0.6000E+02
160	161	169	0.9497E+01	0.1037E+02	0.6000E+02	0.1000E+01	0.6000E+02
161	162	170	0.9631E+01	0.1024E+02	0.6000E+02	0.1000E+01	0.6000E+02
162	163	171	0.9765E+01	0.1011E+02	0.6000E+02	0.1000E+01	0.6000E+02
163	164	172	0.4899E+01	0.5000E+01	0.6000E+02	0.1000E+01	0.6000E+02
164	165	173	0.5000E+01	0.1500E+01	0.6000E+02	0.1000E+01	0.6000E+02
165	166	174	0.1500E+01	0.8400E+01	0.6000E+02	0.1000E+01	0.6000E+02
166	167	175	0.8400E+01	0.8400E+01	0.6000E+02	0.1000E+01	0.6000E+02
167	516	176	0.8400E+01	0.8400E+01	0.6000E+02	0.1000E+01	0.6000E+02
4	14	177	0.2101E+02	0.2049E+02	0.3646E+02	0.1000E+01	0.3646E+02
14	24	178	0.2225E+02	0.1025E+02	0.2696E+02	0.1000E+01	0.2696E+02
24	34	179	0.1161E+02	0.9388E+01	0.2210E+02	0.1000E+01	0.2210E+02
34	44	180	0.1049E+02	0.9510E+01	0.1768E+02	0.1000E+01	0.1768E+02
44	54	181	0.1037E+02	0.9632E+01	0.1326E+02	0.1000E+01	0.1326E+02
54	64	182	0.1024E+02	0.9755E+01	0.8839E+01	0.1000E+01	0.8839E+01
64	74	183	0.1012E+02	0.9878E+01	0.4420E+01	0.1000E+01	0.4420E+01
74	80	184	0.1000E+02	0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00
3	13	185	0.2101E+02	0.2049E+02	0.3282E+02	0.1000E+01	0.3282E+02
13	23	186	0.2225E+02	0.1025E+02	0.2696E+02	0.1000E+01	0.2696E+02
23	33	187	0.1161E+02	0.9388E+01	0.2210E+02	0.1000E+01	0.2210E+02
33	43	188	0.1049E+02	0.9510E+01	0.1768E+02	0.1000E+01	0.1768E+02
43	53	189	0.1037E+02	0.9632E+01	0.1326E+02	0.1000E+01	0.1326E+02
53	63	190	0.1025E+02	0.9755E+01	0.8839E+01	0.1000E+01	0.8839E+01
63	73	191	0.1012E+02	0.9878E+01	0.4420E+01	0.1000E+01	0.4420E+01
73	80	192	0.1000E+02	0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00
12	22	193	0.1905E+02	0.1285E+02	0.1575E+02	0.1000E+01	0.1575E+02
22	32	194	0.1161E+02	0.9389E+01	0.2210E+02	0.1000E+01	0.2210E+02
32	42	195	0.1049E+02	0.9510E+01	0.1768E+02	0.1000E+01	0.1768E+02
42	52	196	0.1037E+02	0.9632E+01	0.1326E+02	0.1000E+01	0.1326E+02
52	62	197	0.1025E+02	0.9755E+01	0.8839E+01	0.1000E+01	0.8839E+01
62	72	198	0.1012E+02	0.9878E+01	0.4420E+01	0.1000E+01	0.4420E+01
72	80	199	0.1000E+02	0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00
21	31	200	0.1161E+02	0.9388E+01	0.2211E+02	0.1000E+01	0.2211E+02
31	41	201	0.1049E+02	0.9510E+01	0.1768E+02	0.1000E+01	0.1768E+02
41	51	202	0.1037E+02	0.9632E+01	0.1326E+02	0.1000E+01	0.1326E+02
51	61	203	0.1025E+02	0.9755E+01	0.8839E+01	0.1000E+01	0.8839E+01
61	71	204	0.1012E+02	0.9878E+01	0.4420E+01	0.1000E+01	0.4420E+01
71	80	205	0.1000E+02	0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00
30	40	206	0.1049E+02	0.9510E+01	0.1768E+02	0.1000E+01	0.1768E+02
40	50	207	0.1037E+02	0.9632E+01	0.1326E+02	0.1000E+01	0.1326E+02
50	60	208	0.1025E+02	0.9755E+01	0.8839E+01	0.1000E+01	0.8839E+01
60	70	209	0.1012E+02	0.9878E+01	0.4420E+01	0.1000E+01	0.4420E+01
70	80	210	0.1000E+02	0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00
29	39	211	0.9497E+01	0.1043E+02	0.1000E+02	0.1000E+01	0.1000E+02

39	49	212	0.9575E+01	0.1031E+02	0.1000E+02	0.1000E+01	0.1000E+02
49	59	213	0.9694E+01	0.1018E+02	0.1000E+02	0.1000E+01	0.1000E+02
59	69	214	0.9816E+01	0.1006E+02	0.1000E+02	0.1000E+01	0.1000E+02
69	79	215	0.4939E+01	0.5000E+01	0.1000E+02	0.1000E+01	0.1000E+02
28	38	216	0.1057E+02	0.9430E+01	0.1967E+02	0.1000E+01	0.1967E+02
38	48	217	0.1044E+02	0.9564E+01	0.1504E+02	0.1000E+01	0.1504E+02
48	58	218	0.1030E+02	0.9698E+01	0.1041E+02	0.1000E+01	0.1041E+02
58	68	219	0.1017E+02	0.9832E+01	0.5784E+01	0.1000E+01	0.5784E+01
68	78	220	0.5067E+01	0.4899E+01	0.2312E+01	0.1000E+01	0.2312E+01
78	81	221	0.5034E+01	0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00
90	91	222	0.1057E+02	0.9430E+01	0.1965E+02	0.1000E+01	0.1965E+02
91	92	223	0.1044E+02	0.9564E+01	0.1503E+02	0.1000E+01	0.1503E+02
92	93	224	0.1030E+02	0.9698E+01	0.1041E+02	0.1000E+01	0.1041E+02
93	94	225	0.1017E+02	0.9832E+01	0.5781E+01	0.1000E+01	0.5781E+01
94	95	226	0.5067E+01	0.4899E+01	0.2312E+01	0.1000E+01	0.2312E+01
108	90	227	0.1500E+01	0.4329E+01	0.2310E+02	0.1000E+01	0.2310E+02
95	81	228	0.5034E+01	0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	AREA
500	501	229	0.1887E+02	0.2238E+02	0.8399E+01	0.1000E+01	0.8399E+01
501	502	230	0.2062E+02	0.1168E+02	0.8399E+01	0.1000E+01	0.8399E+01
502	503	231	0.1032E+02	0.1055E+02	0.8399E+01	0.1000E+01	0.8399E+01
503	504	232	0.9449E+01	0.1043E+02	0.8399E+01	0.1000E+01	0.8399E+01
504	505	233	0.9571E+01	0.1031E+02	0.8399E+01	0.1000E+01	0.8399E+01
505	506	234	0.9694E+01	0.1018E+02	0.8399E+01	0.1000E+01	0.8399E+01
506	507	235	0.9816E+01	0.1006E+02	0.8399E+01	0.1000E+01	0.8399E+01
507	508	236	0.9939E+01	0.4472E+01	0.8399E+01	0.1000E+01	0.8399E+01
508	510	237	0.6708E+01	0.1000E+02	0.8399E+01	0.1000E+01	0.8399E+01
510	511	238	0.1000E+02	0.1000E+02	0.8399E+01	0.1000E+01	0.8399E+01
511	512	239	0.1000E+02	0.1500E+02	0.8399E+01	0.1000E+01	0.8399E+01
512	513	240	0.1500E+02	0.2000E+02	0.8399E+01	0.1000E+01	0.8399E+01
513	514	241	0.2000E+02	0.2000E+02	0.8399E+01	0.1000E+01	0.8399E+01
514	515	242	0.2000E+02	0.3000E+02	0.8399E+01	0.1000E+01	0.8399E+01
515	516	243	0.3000E+02	0.3000E+02	0.8399E+01	0.1000E+01	0.8399E+01
7	17	244	0.1887E+02	0.2238E+02	0.1680E+02	0.1000E+01	0.1680E+02
17	27	245	0.2062E+02	0.1168E+02	0.1680E+02	0.1000E+01	0.1680E+02
27	37	246	0.1032E+02	0.1055E+02	0.1680E+02	0.1000E+01	0.1680E+02
37	47	247	0.9449E+01	0.1043E+02	0.1680E+02	0.1000E+01	0.1680E+02
47	57	248	0.9571E+01	0.1031E+02	0.1680E+02	0.1000E+01	0.1680E+02
57	67	249	0.9694E+01	0.1018E+02	0.1680E+02	0.1000E+01	0.1680E+02
67	77	250	0.9816E+01	0.1006E+02	0.1680E+02	0.1000E+01	0.1680E+02
77	87	251	0.9939E+01	0.4472E+01	0.1680E+02	0.1000E+01	0.1680E+02
87	107	252	0.6708E+01	0.1000E+02	0.1680E+02	0.1000E+01	0.1680E+02
107	117	253	0.1000E+02	0.1000E+02	0.1680E+02	0.1000E+01	0.1680E+02
117	127	254	0.1000E+02	0.1500E+02	0.1680E+02	0.1000E+01	0.1680E+02
127	137	255	0.1500E+02	0.2000E+02	0.1680E+02	0.1000E+01	0.1680E+02
137	147	256	0.2000E+02	0.2000E+02	0.1680E+02	0.1000E+01	0.1680E+02
147	157	257	0.2000E+02	0.3000E+02	0.1680E+02	0.1000E+01	0.1680E+02
157	167	258	0.3000E+02	0.3000E+02	0.1680E+02	0.1000E+01	0.1680E+02
6	16	259	0.1887E+02	0.2238E+02	0.1680E+02	0.1000E+01	0.1680E+02
16	26	260	0.2062E+02	0.1168E+02	0.1680E+02	0.1000E+01	0.1680E+02
26	36	261	0.1032E+02	0.1055E+02	0.1680E+02	0.1000E+01	0.1680E+02
36	46	262	0.9449E+01	0.1043E+02	0.1680E+02	0.1000E+01	0.1680E+02
46	56	263	0.9571E+01	0.1031E+02	0.1680E+02	0.1000E+01	0.1680E+02
56	66	264	0.9694E+01	0.1018E+02	0.1680E+02	0.1000E+01	0.1680E+02
66	76	265	0.9816E+01	0.1006E+02	0.1680E+02	0.1000E+01	0.1680E+02
76	86	266	0.9939E+01	0.4472E+01	0.1680E+02	0.1000E+01	0.1680E+02
86	106	267	0.6708E+01	0.1000E+02	0.1680E+02	0.1000E+01	0.1680E+02
106	116	268	0.1000E+02	0.1000E+02	0.1680E+02	0.1000E+01	0.1680E+02
116	126	269	0.1000E+02	0.1500E+02	0.1680E+02	0.1000E+01	0.1680E+02

126	136	270	0.1500E+02	0.2000E+02	0.1680E+02	0.1000E+01	0.1680E+02
136	146	271	0.2000E+02	0.2000E+02	0.1680E+02	0.1000E+01	0.1680E+02
146	156	272	0.2000E+02	0.3000E+02	0.1680E+02	0.1000E+01	0.1680E+02
156	166	273	0.3000E+02	0.3000E+02	0.1680E+02	0.1000E+01	0.1680E+02
5	15	274	0.1887E+02	0.2238E+02	0.3000E+01	0.1000E+01	0.3000E+01
15	25	275	0.2062E+02	0.1168E+02	0.3000E+01	0.1000E+01	0.3000E+01
25	35	276	0.1052E+02	0.1055E+02	0.3000E+01	0.1000E+01	0.3000E+01
35	45	277	0.9449E+01	0.1043E+02	0.3000E+01	0.1000E+01	0.3000E+01
45	55	278	0.9571E+01	0.1031E+02	0.3000E+01	0.1000E+01	0.3000E+01
55	65	279	0.9694E+01	0.1018E+02	0.3000E+01	0.1000E+01	0.3000E+01
65	75	280	0.9816E+01	0.1006E+02	0.3000E+01	0.1000E+01	0.3000E+01
75	85	281	0.9939E+01	0.4472E+01	0.3000E+01	0.1000E+01	0.3000E+01
85	105	282	0.6708E+01	0.1000E+02	0.3000E+01	0.1000E+01	0.3000E+01
105	115	283	0.1000E+02	0.1000E+02	0.3000E+01	0.1000E+01	0.3000E+01
115	125	284	0.1000E+02	0.1500E+02	0.3000E+01	0.1000E+01	0.3000E+01
125	135	285	0.1500E+02	0.2000E+02	0.3000E+01	0.1000E+01	0.3000E+01

NOD1	NOD2	INDEX	DEL1	DEL2	DLONG	DRAD	AREA
135	145	286	0.2000E+02	0.2000E+02	0.3000E+01	0.1000E+01	0.3000E+01
145	155	287	0.2000E+02	0.3000E+02	0.3000E+01	0.1000E+01	0.3000E+01
155	165	288	0.3000E+02	0.3000E+02	0.3000E+01	0.1000E+01	0.3000E+01
95	104	289	0.5820E+00	0.1000E+02	0.1000E+02	0.1000E+01	0.1000E+02
104	114	290	0.1000E+02	0.1000E+02	0.1000E+02	0.1000E+01	0.1000E+02
114	124	291	0.1000E+02	0.1500E+02	0.1000E+02	0.1000E+01	0.1000E+02
124	134	292	0.1500E+02	0.2000E+02	0.1000E+02	0.1000E+01	0.1000E+02
134	144	293	0.2000E+02	0.2000E+02	0.1000E+02	0.1000E+01	0.1000E+02
144	154	294	0.2000E+02	0.3000E+02	0.1000E+02	0.1000E+01	0.1000E+02
154	164	295	0.3000E+02	0.3000E+02	0.1000E+02	0.1000E+01	0.1000E+02
94	103	296	0.1735E+01	0.1000E+02	0.1500E+02	0.1000E+01	0.1500E+02
103	113	297	0.1000E+02	0.1000E+02	0.1500E+02	0.1000E+01	0.1500E+02
113	123	298	0.1500E+02	0.1000E+02	0.1500E+02	0.1000E+01	0.1500E+02
123	133	299	0.1000E+02	0.1500E+02	0.1500E+02	0.1000E+01	0.1500E+02
133	143	300	0.2000E+02	0.2000E+02	0.1500E+02	0.1000E+01	0.1500E+02
143	153	301	0.2000E+02	0.3000E+02	0.1500E+02	0.1000E+01	0.1500E+02
153	163	302	0.3000E+02	0.3000E+02	0.1500E+02	0.1000E+01	0.1500E+02
93	102	303	0.4048E+01	0.1000E+02	0.2000E+02	0.1000E+01	0.2000E+02
102	112	304	0.1000E+02	0.1000E+02	0.2000E+02	0.1000E+01	0.2000E+02
112	122	305	0.1000E+02	0.1500E+02	0.2000E+02	0.1000E+01	0.2000E+02
122	132	306	0.1500E+02	0.2000E+02	0.2000E+02	0.1000E+01	0.2000E+02
132	142	307	0.2000E+02	0.2000E+02	0.2000E+02	0.1000E+01	0.2000E+02
142	152	308	0.2000E+02	0.3000E+02	0.2000E+02	0.1000E+01	0.2000E+02
152	162	309	0.3000E+02	0.3000E+02	0.2000E+02	0.1000E+01	0.2000E+02
92	101	310	0.6561E+01	0.1000E+02	0.2000E+02	0.1000E+01	0.2000E+02
101	111	311	0.1000E+02	0.1000E+02	0.2000E+02	0.1000E+01	0.2000E+02
111	121	312	0.1000E+02	0.1500E+02	0.2000E+02	0.1000E+01	0.2000E+02
121	131	313	0.1500E+02	0.2000E+02	0.2000E+02	0.1000E+01	0.2000E+02
131	141	314	0.2000E+02	0.2000E+02	0.2000E+02	0.1000E+01	0.2000E+02
141	151	315	0.2000E+02	0.3000E+02	0.2000E+02	0.1000E+01	0.2000E+02
151	161	316	0.3000E+02	0.3000E+02	0.2000E+02	0.1000E+01	0.2000E+02
91	100	317	0.8674E+01	0.1000E+02	0.2000E+02	0.1000E+01	0.2000E+02
100	110	318	0.1000E+02	0.1000E+02	0.2000E+02	0.1000E+01	0.2000E+02
110	120	319	0.1000E+02	0.1500E+02	0.2000E+02	0.1000E+01	0.2000E+02
120	130	320	0.1500E+02	0.2000E+02	0.2000E+02	0.1000E+01	0.2000E+02
130	140	321	0.2000E+02	0.2000E+02	0.2000E+02	0.1000E+01	0.2000E+02
140	150	322	0.2000E+02	0.3000E+02	0.2000E+02	0.1000E+01	0.2000E+02
150	160	323	0.3000E+02	0.3000E+02	0.2000E+02	0.1000E+01	0.2000E+02
90	99	324	0.1099E+02	0.1000E+02	0.1500E+02	0.1000E+01	0.1500E+02
99	109	325	0.1000E+02	0.1000E+02	0.1500E+02	0.1000E+01	0.1500E+02
109	119	326	0.1000E+02	0.1500E+02	0.1500E+02	0.1000E+01	0.1500E+02
119	129	327	0.1500E+02	0.2000E+02	0.1500E+02	0.1000E+01	0.1500E+02

129	139	328	0.2000E+02	0.2000E+02	0.1500E+02	0.1000E+01	0.1500E+02
139	149	329	0.2000E+02	0.3000E+02	0.1500E+02	0.1000E+01	0.1500E+02
149	159	330	0.3000E+02	0.3000E+02	0.1500E+02	0.1000E+01	0.1500E+02
21	305	331	0.1509E+02	0.1147E+02	0.1286E+02	0.1000E+01	0.1286E+02
305	306	332	0.1031E+02	0.4685E+01	0.6602E+01	0.1000E+01	0.6602E+01
306	307	333	0.5293E+01	0.1268E+02	0.3814E+01	0.1000E+01	0.3814E+01
307	308	334	0.1096E+02	0.1163E+02	0.2724E+01	0.1000E+01	0.2724E+01
308	309	335	0.1163E+02	0.1007E+02	0.3004E+01	0.1000E+01	0.3004E+01
309	310	336	0.1000E+02	0.1000E+02	0.3000E+01	0.1000E+01	0.3000E+01
310	311	337	0.1000E+02	0.1500E+02	0.3000E+01	0.1000E+01	0.3000E+01
311	312	338	0.1500E+02	0.2000E+02	0.3000E+01	0.1000E+01	0.3000E+01
312	313	339	0.2000E+02	0.2000E+02	0.3000E+01	0.1000E+01	0.3000E+01
313	314	340	0.2000E+02	0.3000E+02	0.3000E+01	0.1000E+01	0.3000E+01
314	315	341	0.3000E+02	0.3000E+02	0.3000E+01	0.1000E+01	0.3000E+01
206	207	342	0.4981E+01	0.1289E+02	0.6714E+01	0.1000E+01	0.6714E+01

NOD1	NOD2	INDEX	DEL1	DEL2	DLUNG	DRAD	AREA
207	208	343	0.1099E+02	0.1210E+02	0.6298E+01	0.1000E+01	0.6298E+01
208	209	344	0.1257E+02	0.1000E+02	0.5000E+01	0.1000E+01	0.5000E+01
209	210	345	0.1000E+02	0.1000E+02	0.5000E+01	0.1000E+01	0.5000E+01
210	211	346	0.1000E+02	0.1500E+02	0.5000E+01	0.1000E+01	0.5000E+01
211	212	347	0.1500E+02	0.2000E+02	0.5000E+01	0.1000E+01	0.5000E+01
212	213	348	0.2000E+02	0.2000E+02	0.5000E+01	0.1000E+01	0.5000E+01
213	214	349	0.2000E+02	0.3000E+02	0.5000E+01	0.1000E+01	0.5000E+01
214	215	350	0.3000E+02	0.3000E+02	0.5000E+01	0.1000E+01	0.5000E+01
13	22	351	0.2596E+02	0.1686E+02	0.3531E+01	0.1000E+01	0.3531E+01

****

DATA BLOCK 6

NODS	NODSB	INDEX	LTABH	DLUNG	DRAD	HSURE	AREAS
4	1000	1	0	0.4088E+02	0.1000E+01	0.1700E-15	0.4088E+02
5	1000	2	0	0.3000E+01	0.1000E+01	0.1870E-14	0.3000E+01
6	1000	3	0	0.1680E+02	0.1000E+01	0.2600E-11	0.1680E+02
7	1000	4	0	0.1680E+02	0.1000E+01	0.7400E-08	0.1680E+02
500	1000	5	0	0.8400E+01	0.1000E+01	0.7390E-08	0.8400E+01

****

DATA BLOCK 7

NODB	INDEX	LTABT	ZB	PHIB	SLOPE	TIMEB
1000	1	0	0.000000E+00	0.320000E+02		0.000000E+00

****

DATA BLOCK 9 STARTING INPUT

NODE	INDEX	PPHI	GG	PC
28	1	0.320000E+02	0.000000E+00	0.000000E+00
29	2	0.320000E+02	0.000000E+00	0.000000E+00
90	3	0.145000E+03	0.000000E+00	0.000000E+00
91	4	0.145000E+03	0.000000E+00	0.000000E+00
99	5	0.145000E+03	0.000000E+00	0.000000E+00
100	6	0.145000E+03	0.000000E+00	0.000000E+00
101	7	0.145000E+03	0.000000E+00	0.000000E+00
102	8	0.145000E+03	0.000000E+00	0.000000E+00
103	9	0.145000E+03	0.000000E+00	0.000000E+00
104	10	0.145000E+03	0.000000E+00	0.000000E+00
100	11	0.145000E+03	0.000000E+00	0.000000E+00
110	12	0.145000E+03	0.000000E+00	0.000000E+00
120	13	0.145000E+03	0.000000E+00	0.000000E+00
130	14	0.145000E+03	0.000000E+00	0.000000E+00

140	15	0.145000E+03	0.000000E+00	0.000000E+00
150	16	0.145000E+03	0.000000E+00	0.000000E+00
101	17	0.145000E+03	0.000000E+00	0.000000E+00
111	18	0.145000E+03	0.000000E+00	0.000000E+00
121	19	0.145000E+03	0.000000E+00	0.000000E+00
131	20	0.145000E+03	0.000000E+00	0.000000E+00
141	21	0.145000E+03	0.000000E+00	0.000000E+00
151	22	0.145000E+03	0.000000E+00	0.000000E+00
102	23	0.145000E+03	0.000000E+00	0.000000E+00
112	24	0.145000E+03	0.000000E+00	0.000000E+00
122	25	0.145000E+03	0.000000E+00	0.000000E+00
132	26	0.145000E+03	0.000000E+00	0.000000E+00
142	27	0.145000E+03	0.000000E+00	0.000000E+00
152	28	0.145000E+03	0.000000E+00	0.000000E+00
103	29	0.145000E+03	0.000000E+00	0.000000E+00
113	30	0.145000E+03	0.000000E+00	0.000000E+00
123	31	0.145000E+03	0.000000E+00	0.000000E+00
133	32	0.145000E+03	0.000000E+00	0.000000E+00
143	33	0.145000E+03	0.000000E+00	0.000000E+00
153	34	0.145000E+03	0.000000E+00	0.000000E+00
104	35	0.145000E+03	0.000000E+00	0.000000E+00
114	36	0.145000E+03	0.000000E+00	0.000000E+00
124	37	0.145000E+03	0.000000E+00	0.000000E+00
134	38	0.145000E+03	0.000000E+00	0.000000E+00
144	39	0.145000E+03	0.000000E+00	0.000000E+00
154	40	0.145000E+03	0.000000E+00	0.000000E+00
105	41	0.145000E+03	0.000000E+00	0.000000E+00
115	42	0.145000E+03	0.000000E+00	0.000000E+00
125	43	0.145000E+03	0.000000E+00	0.000000E+00
135	44	0.145000E+03	0.000000E+00	0.000000E+00
145	45	0.145000E+03	0.000000E+00	0.000000E+00
155	46	0.145000E+03	0.000000E+00	0.000000E+00
305	47	0.320000E+02	0.000000E+00	0.000000E+00
306	48	0.320000E+02	0.000000E+00	0.000000E+00
307	49	0.320000E+02	0.000000E+00	0.000000E+00
308	50	0.320000E+02	0.000000E+00	0.000000E+00
309	51	0.320000E+02	0.000000E+00	0.000000E+00
310	52	0.320000E+02	0.000000E+00	0.000000E+00
311	53	0.320000E+02	0.000000E+00	0.000000E+00
312	54	0.320000E+02	0.000000E+00	0.000000E+00
313	55	0.320000E+02	0.000000E+00	0.000000E+00
314	56	0.320000E+02	0.000000E+00	0.000000E+00
315	57	0.320000E+02	0.000000E+00	0.000000E+00

NODE	INDEX	PPHI	QG	PC
207	58	0.145000E+03	0.000000E+00	0.000000E+00
208	59	0.145000E+03	0.000000E+00	0.000000E+00
209	60	0.145000E+03	0.000000E+00	0.000000E+00
210	61	0.145000E+03	0.000000E+00	0.000000E+00
211	62	0.145000E+03	0.000000E+00	0.000000E+00
212	63	0.145000E+03	0.000000E+00	0.000000E+00
213	64	0.145000E+03	0.000000E+00	0.000000E+00
214	65	0.145000E+03	0.000000E+00	0.000000E+00
215	66	0.145000E+03	0.000000E+00	0.000000E+00
205	67	0.143380E+03	0.000000E+00	0.000000E+00
206	68	0.143380E+03	0.000000E+00	0.000000E+00

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DATA ENDED =2

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ELAPSED TIME SINCE START OF TRUST JOB = 11.220 SECONDS.

SUMMARY OF INPUT DATA

BLOCK NUMBER	2	3	4	5	6	7	8	9
TIMES READ IN	***	1	***	***	***	1	***	***
ITEM NAME	MAT	FLUID	NODE	NODI	NODS	NODSB	NODG	NOTE
MAXIMUM SIZE	10	1	300	600	20	20	100	100
UNMODIFIED SIZE	0	0	0	0	0	0	0	0
FINAL SIZE	5	0	186	351	5	1	0	68

TABLES	CAPM	CONT	HSURT	PHIB	GT	TOTAL
	5	5	0	0	0	10

MAXIMUM ALLOWED TABLE LENGTH IS 100.

OTHER TOTALS	NOSPEC	NOGEN
	2	0

INITIAL DISTRIBUTION OF TOTAL STRESS AND EFFECTIVE STRESS

NODE	TOTAL STRESS IN UNITS OF LENGTH	TOTAL STRESS IN UNITS OF PRESSURE	INITIAL STRESS IN UNITS OF LENGTH	INITIAL STRESS IN UNITS OF PRESSRE
3	0.4968E+02	0.2311E+14	0.4968E+02	0.2311E+14
4	0.8956E+02	0.4166E+14	0.8956E+02	0.4166E+14
5	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
6	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
7	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
12	0.3456E+02	0.1608E+14	0.3457E+02	0.1608E+14
13	0.6321E+02	0.2940E+14	0.6321E+02	0.2941E+14
14	0.9414E+02	0.4379E+14	0.9415E+02	0.4379E+14
15	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
16	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
17	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
21	0.3233E+02	0.1504E+14	0.3234E+02	0.1504E+14
22	0.5164E+02	0.2402E+14	0.5165E+02	0.2403E+14
23	0.7381E+02	0.3433E+14	0.7381E+02	0.3433E+14
24	0.9774E+02	0.4546E+14	0.9774E+02	0.4547E+14
25	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
26	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
27	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
28	0.2069E+02	0.9623E+13	0.2070E+02	0.9627E+13
29	0.2776E+02	0.1291E+14	0.2777E+02	0.1292E+14
30	0.3444E+02	0.1602E+14	0.3445E+02	0.1603E+14
31	0.4703E+02	0.2187E+14	0.4703E+02	0.2188E+14
32	0.6268E+02	0.2916E+14	0.6269E+02	0.2916E+14
33	0.8065E+02	0.3752E+14	0.8066E+02	0.3752E+14
34	0.1000E+03	0.4652E+14	0.1000E+03	0.4652E+14
35	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
36	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
37	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
38	0.3949E+02	0.1837E+14	0.3950E+02	0.1837E+14
39	0.4554E+02	0.2118E+14	0.4555E+02	0.2119E+14
40	0.5123E+02	0.2383E+14	0.5124E+02	0.2383E+14
41	0.6102E+02	0.2838E+14	0.6103E+02	0.2839E+14
42	0.7320E+02	0.3405E+14	0.7320E+02	0.3405E+14
43	0.8718E+02	0.4055E+14	0.8718E+02	0.4055E+14
44	0.1023E+03	0.4757E+14	0.1023E+03	0.4757E+14
45	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14

46	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
47	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
48	0.5830E+02	0.2712E+14	0.5830E+02	0.2712E+14
49	0.6332E+02	0.2945E+14	0.6332E+02	0.2946E+14
50	0.6802E+02	0.3164E+14	0.6803E+02	0.3164E+14
51	0.7501E+02	0.3489E+14	0.7502E+02	0.3490E+14
52	0.8371E+02	0.3894E+14	0.8372E+02	0.3894E+14
53	0.9370E+02	0.4358E+14	0.9370E+02	0.4359E+14
54	0.1045E+03	0.4860E+14	0.1045E+03	0.4860E+14
55	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
56	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
57	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
58	0.7710E+02	0.3586E+14	0.7710E+02	0.3586E+14
59	0.8110E+02	0.3772E+14	0.8110E+02	0.3773E+14
60	0.8481E+02	0.3945E+14	0.8482E+02	0.3945E+14
61	0.8902E+02	0.4141E+14	0.8902E+02	0.4141E+14
62	0.9423E+02	0.4383E+14	0.9423E+02	0.4383E+14
63	0.1002E+03	0.4662E+14	0.1002E+03	0.4662E+14
64	0.1067E+03	0.4963E+14	0.1067E+03	0.4963E+14
65	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
66	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
67	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
68	0.9590E+02	0.4461E+14	0.9590E+02	0.4461E+14
69	0.9900E+02	0.4605E+14	0.9900E+02	0.4605E+14
70	0.1016E+03	0.4726E+14	0.1016E+03	0.4726E+14
71	0.1030E+03	0.4791E+14	0.1030E+03	0.4791E+14
72	0.1047E+03	0.4872E+14	0.1047E+03	0.4872E+14
73	0.1067E+03	0.4965E+14	0.1067E+03	0.4965E+14
74	0.1089E+03	0.5065E+14	0.1089E+03	0.5066E+14
75	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
76	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
77	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
78	0.1053E+03	0.4898E+14	0.1053E+03	0.4898E+14
79	0.1078E+03	0.5013E+14	0.1078E+03	0.5013E+14
80	0.1110E+03	0.5163E+14	0.1110E+03	0.5163E+14
81	0.1110E+03	0.5163E+14	0.1110E+03	0.5163E+14
85	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
86	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
87	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
90	0.2127E+02	0.9896E+13	0.1564E+02	0.7274E+13
91	0.6101E+02	0.2838E+14	0.3550E+02	0.1651E+14
92	0.5537E+02	0.2576E+14	0.5538E+02	0.2576E+14
93	0.7523E+02	0.3500E+14	0.7524E+02	0.3500E+14
94	0.9510E+02	0.4424E+14	0.9510E+02	0.4424E+14
95	0.1050E+03	0.4886E+14	0.1050E+03	0.4886E+14
99	0.2127E+02	0.9896E+13	0.1564E+02	0.7274E+13
100	0.6101E+02	0.2438E+14	0.3550E+02	0.1651E+14
101	0.1007E+03	0.4686E+14	0.5537E+02	0.2576E+14
102	0.1405E+03	0.6534E+14	0.7523E+02	0.3500E+14
103	0.1802E+03	0.8382E+14	0.9510E+02	0.4424E+14
104	0.2000E+03	0.9303E+14	0.1050E+03	0.4884E+14
105	0.2130E+03	0.9908E+14	0.1115E+03	0.5187E+14
106	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
107	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
109	0.1564E+02	0.7274E+13	0.1565E+02	0.7279E+13
110	0.6101E+02	0.2838E+14	0.3550E+02	0.1651E+14
111	0.1007E+03	0.4686E+14	0.5537E+02	0.2576E+14
112	0.1405E+03	0.6534E+14	0.7523E+02	0.3500E+14
113	0.1802E+03	0.8382E+14	0.9510E+02	0.4424E+14
114	0.2000E+03	0.9303E+14	0.1050E+03	0.4880E+14
115	0.2130E+03	0.9908E+14	0.1115E+03	0.5187E+14

116	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
117	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
119	0.1564E+02	0.7274E+13	0.1565E+02	0.7279E+13
120	0.6101E+02	0.2838E+14	0.3550E+02	0.1651E+14
121	0.1007E+03	0.4686E+14	0.5537E+02	0.2576E+14
122	0.1405E+03	0.6534E+14	0.7523E+02	0.3500E+14
123	0.1802E+03	0.8382E+14	0.9510E+02	0.4424E+14
124	0.2000E+03	0.9303E+14	0.1050E+03	0.4884E+14
125	0.2130E+03	0.9908E+14	0.1115E+03	0.5187E+14
126	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
127	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
129	0.1564E+02	0.7274E+13	0.1565E+02	0.7279E+13
130	0.6101E+02	0.2838E+14	0.3550E+02	0.1651E+14
131	0.1007E+03	0.4686E+14	0.5537E+02	0.2576E+14
132	0.1405E+03	0.6535E+14	0.7524E+02	0.3500E+14
133	0.1802E+03	0.8382E+14	0.9510E+02	0.4420E+14
134	0.2000E+03	0.9303E+14	0.1050E+03	0.4884E+14
135	0.2130E+03	0.9908E+14	0.1115E+03	0.5187E+14
136	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
137	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
139	0.1564E+02	0.7274E+13	0.1565E+02	0.7279E+13
140	0.6101E+02	0.2838E+14	0.3550E+02	0.1651E+14
141	0.1007E+03	0.4686E+14	0.5537E+02	0.2576E+14
142	0.1405E+03	0.6534E+14	0.7523E+02	0.3500E+14
143	0.1802E+03	0.8382E+14	0.9510E+02	0.4424E+14
144	0.2000E+03	0.9303E+14	0.1050E+03	0.4884E+14
145	0.2130E+03	0.9908E+14	0.1115E+03	0.5187E+14
146	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
147	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
149	0.1564E+02	0.7274E+13	0.1565E+02	0.7279E+13
150	0.6101E+02	0.2838E+14	0.3550E+02	0.1651E+14
151	0.1007E+03	0.4686E+14	0.5537E+02	0.2576E+14
152	0.1405E+03	0.6534E+14	0.7523E+02	0.3500E+14
153	0.1802E+03	0.8382E+14	0.9510E+02	0.4424E+14
154	0.2000E+03	0.9303E+14	0.1050E+03	0.4884E+14
155	0.2130E+03	0.9908E+14	0.1115E+03	0.5187E+14
156	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
157	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
159	0.1564E+02	0.7274E+13	0.1565E+02	0.7279E+13
160	0.3550E+02	0.1651E+14	0.3551E+02	0.1652E+14
161	0.5537E+02	0.2576E+14	0.5538E+02	0.2576E+14
162	0.7523E+02	0.3500E+14	0.7524E+02	0.3500E+14
163	0.9510E+02	0.4424E+14	0.9510E+02	0.4424E+14
164	0.1050E+03	0.4884E+14	0.1050E+03	0.4884E+14
165	0.1115E+03	0.5187E+14	0.1115E+03	0.5187E+14
166	0.1214E+03	0.5647E+14	0.1214E+03	0.5647E+14
167	0.1534E+03	0.7136E+14	0.1382E+03	0.6429E+14
201	0.2153E+02	0.1002E+14	0.2154E+02	0.1002E+14
202	0.2153E+02	0.1002E+14	0.2154E+02	0.1002E+14
203	0.2153E+02	0.1002E+14	0.2154E+02	0.1002E+14
204	0.1564E+02	0.7275E+13	0.1565E+02	0.7280E+13
205	0.1161E+02	0.5402E+13	0.1161E+02	0.5402E+13
206	0.5977E+01	0.2780E+13	0.5978E+01	0.2781E+13
207	0.5977E+01	0.2780E+13	0.5977E+01	0.2781E+13
208	0.2000E+01	0.9303E+12	0.2001E+01	0.9307E+12
209	0.2000E+01	0.9303E+12	0.2001E+01	0.9307E+12
210	0.2000E+01	0.9303E+12	0.2001E+01	0.9307E+12
211	0.2000E+01	0.9303E+12	0.2001E+01	0.9307E+12
212	0.2000E+01	0.9303E+12	0.2001E+01	0.9307E+12
213	0.2000E+01	0.9303E+12	0.2001E+01	0.9307E+12
214	0.2000E+01	0.9303E+12	0.2001E+01	0.9307E+12

215	0.2000E+01	0.9303E+12	0.2001E+01	0.9307E+12
305	0.2370E+02	0.1103E+14	0.2371E+02	0.1103E+14
306	0.1889E+02	0.8788E+13	0.1890E+02	0.8793E+13
307	0.1407E+02	0.6543E+13	0.1408E+02	0.6548E+13
308	0.9880E+01	0.4596E+13	0.9891E+01	0.4601E+13
309	0.8500E+01	0.3954E+13	0.8511E+01	0.3959E+13
310	0.8500E+01	0.3954E+13	0.8511E+01	0.3959E+13
311	0.8500E+01	0.3954E+13	0.8511E+01	0.3959E+13
312	0.8500E+01	0.3954E+13	0.8511E+01	0.3959E+13
313	0.8500E+01	0.3954E+13	0.8511E+01	0.3959E+13
314	0.8500E+01	0.3954E+13	0.8511E+01	0.3959E+13
315	0.8500E+01	0.3954E+13	0.8511E+01	0.3959E+13
500	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
501	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
502	0.1870E+03	0.8679E+14	0.1550E+03	0.7210E+14
503	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
504	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
505	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
506	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
507	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
508	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
510	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
511	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
512	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
513	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
514	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
515	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14
516	0.1870E+03	0.8699E+14	0.1550E+03	0.7210E+14

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MATERIAL SUMMARY

NAME	MATL	NODES	TOT VOL	TOT CAP	TOT FLUID
SAND	1	74	0.26966E+05	0.20875E+03	0.65407E+04
MRD	2	36	0.15917E+05	0.85218E+02	0.73590E+04
CLAY	3	16	0.29433E+04	0.12235E+02	0.12728E+04
CLAY	4	10	0.91631E+03	0.83244E+00	0.48350E+03
MINE	5	50	0.25171E+05	0.12706E+02	0.17304E+05

SYSTEM TOTAL	186	0.71914E+05	0.31974E+03	0.32960E+05

TRUST OUTPUT DATA DATA DECK 1

* MINE TAILING CASE

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PRINTOUT	CYCLE	DF	MGS	KWIT	DELTMX	SMALL	PSIVARY	DPRES	DPMAXS	NUTS
1	0	0	0	0	0.20154E-04	0.10000E-08	0.10000E-01	0.36617E-07	0.00000E+00	0

TOTAL TIME	TIME STEP	FLUID FLOW	PSI FROM FLUX	FLUX RATE	PSI RATE,
0.10009E-11	0.10000E-11	-0.13414E-24	-0.41954E-27	-0.13414E-12	-0.41954E-15

AVG PSI	FLUID CAPACITY	FLUID CONTENT	GEN RATE	FLUID GEN	PSI FROM GEN ,
-0.17060E+01	0.31974E+03	0.32960E+05	0.00000E+00	0.00000E+00	0.00000E+00

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TDF = 0.0000E+00

NODE	Z	PSI	PHI	UPSI	DDPSI	G	W	H	F
3	0.1053E+03	-0.7332E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6246E+02	0.0000E+00	0.0000E+00
4	0.6544E+02	-0.3344E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1318E+03	0.0000E+00	0.0000E+00
5	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1083E+02	0.0000E+00	0.0000E+00
6	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1105E+03	0.0000E+00	0.0000E+00
7	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1520E+04	0.0000E+00	0.0000E+00
12	0.1204E+03	-0.8844E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4274E+02	0.0000E+00	0.0000E+00
13	0.9179E+02	-0.5979E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1095E+03	0.0000E+00	0.0000E+00
14	0.6086E+02	-0.2886E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1118E+03	0.0000E+00	0.0000E+00
15	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1164E+02	0.0000E+00	0.0000E+00
16	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1549E+03	0.0000E+00	0.0000E+00
17	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4554E+03	0.0000E+00	0.0000E+00
21	0.1227E+03	-0.9067E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4648E+02	0.0000E+00	0.0000E+00
22	0.1034E+03	-0.7136E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4385E+02	0.0000E+00	0.0000E+00
23	0.8119E+02	-0.4919E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6501E+02	0.0000E+00	0.0000E+00
24	0.5726E+02	-0.2526E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4484E+02	0.0000E+00	0.0000E+00
25	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5955E+01	0.0000E+00	0.0000E+00
26	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6520E+02	0.0000E+00	0.0000E+00
27	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2330E+03	0.0000E+00	0.0000E+00
28	0.1343E+03	-0.1023E+03	0.3200E+02	0.4737E-10	0.4737E+02	0.0000E+00	0.9657E+02	0.9824E-11	0.9824E-11
29	0.1272E+03	-0.9524E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4973E+02	0.0000E+00	0.0000E+00
30	0.1296E+03	-0.8856E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2695E+02	0.0000E+00	0.0000E+00
31	0.1080E+03	-0.7597E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2950E+02	0.0000E+00	0.0000E+00
32	0.9232E+02	-0.6032E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3008E+02	0.0000E+00	0.0000E+00
33	0.7435E+02	-0.4235E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3141E+02	0.0000E+00	0.0000E+00
34	0.5499E+02	-0.2299E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3333E+02	0.0000E+00	0.0000E+00
35	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5414E+01	0.0000E+00	0.0000E+00
36	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5927E+02	0.0000E+00	0.0000E+00
37	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2118E+03	0.0000E+00	0.0000E+00
38	0.1155E+03	-0.8351E+02	0.3200E+02	0.1217E-07	0.1217E+05	0.0000E+00	0.9374E+02	0.2145E-08	0.2145E-08
39	0.1095E+03	-0.7746E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5490E+02	0.0000E+00	0.0000E+00
40	0.1038E+03	-0.7177E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2304E+02	0.0000E+00	0.0000E+00
41	0.9398E+02	-0.6193E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2330E+02	0.0000E+00	0.0000E+00
42	0.8180E+02	-0.4780E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2400E+02	0.0000E+00	0.0000E+00
43	0.6782E+02	-0.3582E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2480E+02	0.0000E+00	0.0000E+00
44	0.5273E+02	-0.2073E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2614E+02	0.0000E+00	0.0000E+00
45	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5414E+01	0.0000E+00	0.0000E+00
46	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5927E+02	0.0000E+00	0.0000E+00
47	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2118E+03	0.0000E+00	0.0000E+00
48	0.9670E+02	-0.6470E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.7074E+02	0.0000E+00	0.0000E+00
49	0.7168E+02	-0.5968E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5639E+02	0.0000E+00	0.0000E+00
50	0.8698E+02	-0.5098E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1693E+02	0.0000E+00	0.0000E+00
51	0.7999E+02	-0.4799E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1722E+02	0.0000E+00	0.0000E+00
52	0.7129E+02	-0.3929E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1758E+02	0.0000E+00	0.0000E+00

53	0.5930E+02	-0.2730E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1808E+02	0.0000E+00	0.0000E+00

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
54	0.5052E+02	-0.1852E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1882E+02	0.0000E+00	0.0000E+00
55	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5414E+01	0.0000E+00	0.0000E+00
56	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5927E+02	0.0000E+00	0.0000E+00
57	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2118E+03	0.0000E+00	0.0000E+00
58	0.7790E+02	-0.4590E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4664E+02	0.0000E+00	0.0000E+00
59	0.7390E+02	-0.4190E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5851E+02	0.0000E+00	0.0000E+00
60	0.7019E+02	-0.3819E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1057E+02	0.0000E+00	0.0000E+00
61	0.6598E+02	-0.3398E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1067E+02	0.0000E+00	0.0000E+00
62	0.6077E+02	-0.2877E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1087E+02	0.0000E+00	0.0000E+00
63	0.5478E+02	-0.2278E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1112E+02	0.0000E+00	0.0000E+00
64	0.4832E+02	-0.1632E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1138E+02	0.0000E+00	0.0000E+00
65	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5414E+01	0.0000E+00	0.0000E+00
66	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5927E+02	0.0000E+00	0.0000E+00
67	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2118E+03	0.0000E+00	0.0000E+00
68	0.5910E+02	-0.2710E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1852E+02	0.0000E+00	0.0000E+00
69	0.5600E+02	-0.2400E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4679E+02	0.0000E+00	0.0000E+00
70	0.5339E+02	-0.2139E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3726E+01	0.0000E+00	0.0000E+00
71	0.5200E+02	-0.2000E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3745E+01	0.0000E+00	0.0000E+00
72	0.5026E+02	-0.1826E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3769E+01	0.0000E+00	0.0000E+00
73	0.4826E+02	-0.1626E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3796E+01	0.0000E+00	0.0000E+00
74	0.4611E+02	-0.1411E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3848E+01	0.0000E+00	0.0000E+00
75	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5414E+01	0.0000E+00	0.0000E+00
76	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5927E+02	0.0000E+00	0.0000E+00
77	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2118E+03	0.0000E+00	0.0000E+00
78	0.4970E+02	-0.1770E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3803E+01	0.0000E+00	0.0000E+00
79	0.4724E+02	-0.1524E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3909E+01	0.0000E+00	0.0000E+00
80	0.4400E+02	-0.1200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5337E-24	0.0000E+00	0.0000E+00
81	0.4400E+02	-0.1200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5337E-24	0.0000E+00	0.0000E+00
85	0.4350E+02	-0.1150E+02	0.3200E+02	0.7705E-13	0.7705E-01	0.0000E+00	0.1557E+02	0.1143E-13	0.1143E-13
86	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3313E+02	0.0000E+00	0.0000E+00
87	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1184E+03	0.0000E+00	0.0000E+00
90	0.1394E+03	0.5637E+01	0.1450E+03	-0.1370E-09	-0.1370E+03	0.0000E+00	0.1814E+03	-0.1368E-10	-0.1368E-10
91	0.1195E+03	0.2550E+02	0.1450E+03	-0.3662E-07	-0.3662E+05	0.0000E+00	0.2935E+03	-0.3757E-08	-0.3757E-08
92	0.9963E+02	-0.6763E+02	0.3200E+02	0.1432E-07	0.1432E+05	0.0000E+00	0.7040E+02	0.2148E-08	0.2148E-08
93	0.7977E+02	-0.4776E+02	0.3200E+02	0.4793E-08	0.4793E+04	0.0000E+00	0.4642E+02	0.5362E-09	0.5362E-09
94	0.5990E+02	-0.2790E+02	0.3200E+02	0.4109E-08	0.4109E+04	0.0000E+00	0.1843E+02	0.4022E-09	0.4022E-09
95	0.4997E+02	-0.1797E+02	0.3200E+02	0.7120E-08	0.7120E+04	0.0000E+00	0.3792E+01	0.2682E-09	0.2682E-09
99	0.1394E+03	0.5637E+01	0.1450E+03	-0.1406E-09	-0.1406E+03	0.0000E+00	0.1726E+03	-0.1336E-10	-0.1336E-10
100	0.1195E+03	0.2550E+02	0.1450E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.3408E+03	0.0000E+00	0.0000E+00
101	0.9963E+02	0.4537E+02	0.1450E+03	-0.4488E-08	-0.4488E+04	0.0000E+00	0.3394E+03	-0.5362E-09	-0.5362E-09
102	0.7977E+02	0.6523E+02	0.1450E+03	-0.4474E-08	-0.4474E+04	0.0000E+00	0.3381E+03	-0.5362E-09	-0.5362E-09
103	0.5990E+02	0.8510E+02	0.1450E+03	-0.4460E-08	-0.4460E+04	0.0000E+00	0.2526E+03	-0.4022E-09	-0.4022E-09
104	0.5000E+02	0.9500E+02	0.1450E+03	-0.4454E-08	-0.4454E+04	0.0000E+00	0.1680E+03	-0.2682E-09	-0.2682E-09
105	0.4350E+02	0.1015E+03	0.1450E+03	-0.1347E-10	-0.1347E+02	0.0000E+00	0.3194E+02	-0.3116E-11	-0.3116E-11
106	0.3360E+02	-0.1600E+01	0.3200E+02	0.8446E-12	0.8446E+00	0.0000E+00	0.1820E+03	0.3105E-11	0.3105E-11
107	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1839E+03	0.0000E+00	0.0000E+00
109	0.1394E+03	-0.1074E+03	0.3200E+02	0.3166E-08	0.3166E+04	0.0000E+00	0.8397E+02	0.5463E-09	0.5463E-09
110	0.1195E+03	0.2550E+02	0.1450E+03	-0.4501E-08	-0.4501E+04	0.0000E+00	0.3408E+03	-0.5362E-09	-0.5362E-09
111	0.9963E+02	0.4537E+02	0.1450E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.3394E+03	0.0000E+00	0.0000E+00
112	0.7977E+02	0.6523E+02	0.1450E+03	0.1758E-24	0.1758E-12	0.0000E+00	0.3381E+03	0.2107E-25	0.2107E-25
113	0.5990E+02	0.8510E+02	0.1450E+03	-0.4674E-24	-0.4674E-12	0.0000E+00	0.2526E+03	-0.4215E-25	-0.4215E-25
114	0.5000E+02	0.9500E+02	0.1450E+03	0.3500E-24	0.3500E-12	0.0000E+00	0.1680E+03	0.2107E-25	0.2107E-25
115	0.4350E+02	0.1015E+03	0.1450E+03	-0.1342E-10	-0.1342E+02	0.0000E+00	0.3194E+02	-0.3105E-11	-0.3105E-11
116	0.3360E+02	-0.1600E+01	0.3200E+02	0.8446E-12	0.8446E+00	0.0000E+00	0.1820E+03	0.3105E-11	0.3105E-11
117	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1839E+03	0.0000E+00	0.0000E+00
119	0.1394E+03	-0.1074E+03	0.3200E+02	0.3108E-08	0.3108E+04	0.0000E+00	0.1260E+03	0.8044E-09	0.8044E-09
120	0.1195E+03	0.2550E+02	0.1450E+03	-0.4501E-08	-0.4501E+04	0.0000E+00	0.5111E+03	-0.8044E-09	-0.8044E-09
121	0.9963E+02	0.4537E+02	0.1450E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.5091E+03	0.0000E+00	0.0000E+00

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
122	0.7977E+02	0.6523E+02	0.1450E+03	0.1758E-24	0.1758E-12	0.0000E+00	0.5071E+03	0.3161E-25	0.3161E-25
123	0.5990E+02	0.8510E+02	0.1450E+03	-0.4674E-24	-0.4674E-12	0.0000E+00	0.3788E+03	-0.6322E-25	-0.6322E-25
124	0.5000E+02	0.9500E+02	0.1450E+03	0.3500E-24	0.3500E-12	0.0000E+00	0.2521E+03	0.3161E-25	0.3161E-25
125	0.4350E+02	0.1015E+03	0.1450E+03	-0.1342E-10	-0.1342E+02	0.0000E+00	0.4791E+02	-0.4657E-11	-0.4657E-11
126	0.3360E+02	-0.1600E+01	0.3200E+02	0.8446E-12	0.8446E+00	0.0000E+00	0.2730E+03	0.4657E-11	0.4657E-11
127	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2759E+03	0.0000E+00	0.0000E+00
129	0.1394E+03	-0.1074E+03	0.3200E+02	0.3108E-08	0.3108E+04	0.0000E+00	0.1679E+03	0.1072E-08	0.1072E-08
130	0.1195E+03	0.2550E+02	0.1450E+03	-0.4502E-08	-0.4502E+04	0.0000E+00	0.6815E+03	-0.1072E-08	-0.1072E-08
131	0.9963E+02	0.4537E+02	0.1450E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.6788E+03	0.0000E+00	0.0000E+00
132	0.7976E+02	0.6524E+02	0.1450E+03	0.2344E-24	0.2344E-12	0.0000E+00	0.5071E+03	0.4215E-25	0.4215E-25
133	0.5990E+02	0.8510E+02	0.1450E+03	-0.4674E-24	-0.4674E-12	0.0000E+00	0.5051E+03	-0.8430E-25	-0.8430E-25
134	0.5000E+02	0.9500E+02	0.1450E+03	0.3500E-24	0.3500E-12	0.0000E+00	0.3361E+03	0.4215E-25	0.4215E-25
135	0.4350E+02	0.1015E+03	0.1450E+03	-0.1342E-10	-0.1342E+02	0.0000E+00	0.6388E+02	-0.6209E-11	-0.6209E-11
136	0.3360E+02	-0.1600E+01	0.3200E+02	0.8446E-12	0.8446E+00	0.0000E+00	0.3640E+03	0.6209E-11	0.6209E-11
137	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3678E+03	0.0000E+00	0.0000E+00
139	0.1394E+03	-0.1074E+03	0.3200E+02	0.3108E-08	0.3108E+04	0.0000E+00	0.1679E+03	0.1072E-08	0.1072E-08
140	0.1195E+03	0.2550E+02	0.1450E+03	-0.4502E-08	-0.4502E+04	0.0000E+00	0.6815E+03	-0.1072E-08	-0.1072E-08
141	0.9963E+02	0.4537E+02	0.1450E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.6788E+03	0.0000E+00	0.0000E+00
142	0.7977E+02	0.6523E+02	0.1450E+03	0.1758E-24	0.1758E-12	0.0000E+00	0.6762E+03	0.4215E-25	0.4215E-25
143	0.5990E+02	0.8510E+02	0.1450E+03	-0.4674E-24	-0.4674E-12	0.0000E+00	0.5051E+03	-0.8430E-25	-0.8430E-25
144	0.5000E+02	0.9500E+02	0.1450E+03	0.3500E-24	0.3500E-12	0.0000E+00	0.3361E+03	0.4215E-25	0.4215E-25
145	0.4350E+02	0.1015E+03	0.1450E+03	-0.1342E-10	-0.1342E+02	0.0000E+00	0.6388E+02	-0.6209E-11	-0.6209E-11
146	0.3360E+02	-0.1600E+01	0.3200E+02	0.8446E-12	0.8446E+00	0.0000E+00	0.3640E+03	0.6209E-11	0.6209E-11
147	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3678E+03	0.0000E+00	0.0000E+00
149	0.1394E+03	-0.1074E+03	0.3200E+02	0.3108E-08	0.3108E+04	0.0000E+00	0.2519E+03	0.1609E-08	0.1609E-08
150	0.1195E+03	0.2550E+02	0.1450E+03	-0.1050E-07	-0.1050E+05	0.0000E+00	0.1022E+04	-0.3754E-08	-0.3754E-08
151	0.9963E+02	0.4537E+02	0.1450E+03	-0.5984E-08	-0.5984E+04	0.0000E+00	0.1018E+04	-0.2145E-08	-0.2145E-08
152	0.7977E+02	0.6523E+02	0.1450E+03	-0.5965E-08	-0.5965E+04	0.0000E+00	0.1014E+04	-0.2145E-08	-0.2145E-08
153	0.5990E+02	0.8510E+02	0.1450E+03	-0.5947E-08	-0.5947E+04	0.0000E+00	0.7577E+03	-0.1609E-08	-0.1609E-08
154	0.5000E+02	0.9500E+02	0.1450E+03	-0.5938E-08	-0.5938E+04	0.0000E+00	0.5041E+03	-0.1072E-08	-0.1072E-08
155	0.4350E+02	0.1015E+03	0.1450E+03	-0.1348E-10	-0.1348E+02	0.0000E+00	0.9582E+02	-0.9352E-11	-0.9352E-11
156	0.3360E+02	-0.1600E+01	0.3200E+02	0.8446E-12	0.8446E+00	0.0000E+00	0.5460E+03	0.9314E-11	0.9314E-11
157	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5517E+03	0.0000E+00	0.0000E+00
159	0.1394E+03	-0.1074E+03	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2519E+03	0.0000E+00	0.0000E+00
160	0.1195E+03	-0.8750E+02	0.3200E+02	0.3642E-08	0.3642E+04	0.0000E+00	0.3243E+03	0.2145E-08	0.2145E-08
161	0.9963E+02	-0.6763E+02	0.3200E+02	0.3010E-08	0.3010E+04	0.0000E+00	0.3344E+03	0.2145E-08	0.2145E-08
162	0.7977E+02	-0.4776E+02	0.3200E+02	0.2569E-08	0.2569E+04	0.0000E+00	0.3464E+03	0.2145E-08	0.2145E-08
163	0.5990E+02	-0.2790E+02	0.3200E+02	0.1101E-08	0.1101E+04	0.0000E+00	0.2751E+03	0.1609E-08	0.1609E-08
164	0.5000E+02	-0.1800E+02	0.3200E+02	0.5461E-09	0.5461E+03	0.0000E+00	0.1980E+03	0.1072E-08	0.1072E-08
165	0.4350E+02	-0.1150E+02	0.3200E+02	0.4738E-13	0.4738E-01	0.0000E+00	0.8356E+02	0.3772E-13	0.3772E-13
166	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5460E+03	0.0000E+00	0.0000E+00
167	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5517E+03	0.0000E+00	0.0000E+00
201	0.1335E+03	-0.1015E+03	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1282E+02	0.0000E+00	0.0000E+00
202	0.1335E+03	-0.1015E+03	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3286E+02	0.0000E+00	0.0000E+00
203	0.1335E+03	-0.1015E+03	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3513E+02	0.0000E+00	0.0000E+00
204	0.1394E+03	-0.1074E+03	0.3200E+02	0.2473E-10	0.2473E+02	0.0000E+00	0.2944E+02	0.1496E-11	0.1496E-11
205	0.1434E+03	-0.8000E-02	0.1434E+03	-0.1098E-10	-0.1098E+02	0.0000E+00	0.8458E+02	-0.1604E-10	-0.1604E-10
206	0.1490E+03	-0.5643E+01	0.1434E+03	-0.4097E-12	-0.4097E+00	0.0000E+00	0.3264E+02	-0.6303E-12	-0.6303E-12
207	0.1490E+03	-0.4023E+01	0.1450E+03	-0.9640E-12	-0.9640E+00	0.0000E+00	0.8039E+02	-0.4480E-11	-0.4480E-11
208	0.1530E+03	-0.8000E+01	0.1450E+03	-0.1765E-12	-0.1765E+00	0.0000E+00	0.5831E+02	-0.3803E-12	-0.3803E-12
209	0.1530E+03	-0.8000E+01	0.1450E+03	-0.2025E-12	-0.2025E+00	0.0000E+00	0.4358E+02	-0.3262E-12	-0.3262E-12
210	0.1530E+03	-0.8000E+01	0.1450E+03	-0.2025E-12	-0.2025E+00	0.0000E+00	0.4326E+02	-0.3238E-12	-0.3238E-12
211	0.1530E+03	-0.8000E+01	0.1450E+03	-0.2025E-12	-0.2025E+00	0.0000E+00	0.6488E+02	-0.4856E-12	-0.4856E-12
212	0.1530E+03	-0.8000E+01	0.1450E+03	-0.2025E-12	-0.2025E+00	0.0000E+00	0.8651E+02	-0.6475E-12	-0.6475E-12
213	0.1530E+03	-0.8000E+01	0.1450E+03	-0.2025E-12	-0.2025E+00	0.0000E+00	0.8651E+02	-0.6475E-12	-0.6475E-12
214	0.1530E+03	-0.8000E+01	0.1450E+03	-0.2025E-12	-0.2025E+00	0.0000E+00	0.1298E+03	-0.9713E-12	-0.9713E-12
215	0.1530E+03	-0.8000E+01	0.1450E+03	-0.2025E-12	-0.2025E+00	0.0000E+00	0.1298E+03	-0.9713E-12	-0.9713E-12
305	0.1313E+03	-0.9929E+02	0.3200E+02	0.6251E-09	0.6251E+03	0.0000E+00	0.1535E+02	0.1454E-10	0.1454E-10

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
306	0.1361E+03	-0.1041E+03	0.3200E+02	0.1368E-10	0.1368E+02	0.0000E+00	0.2734E+02	0.6409E-12	0.6409E-12
307	0.1409E+03	-0.1049E+03	0.3200E+02	0.6400E-10	0.6400E+02	0.0000E+00	0.4066E+02	0.4470E-11	0.4470E-11
308	0.1451E+03	-0.1131E+03	0.3200E+02	0.7019E-10	0.7019E+02	0.0000E+00	0.3511E+02	0.4238E-11	0.4238E-11
309	0.1465E+03	-0.1145E+03	0.3200E+02	0.6691E-10	0.6691E+02	0.0000E+00	0.3180E+02	0.3667E-11	0.3667E-11
310	0.1465E+03	-0.1145E+03	0.3200E+02	0.5929E-11	0.5929E+01	0.0000E+00	0.3169E+02	0.3238E-12	0.3238E-12
311	0.1465E+03	-0.1145E+03	0.3200E+02	0.5929E-11	0.5929E+01	0.0000E+00	0.4754E+02	0.4856E-12	0.4856E-12
312	0.1465E+03	-0.1145E+03	0.3200E+02	0.5930E-11	0.5930E+01	0.0000E+00	0.6337E+02	0.6475E-12	0.6475E-12
313	0.1465E+03	-0.1145E+03	0.3200E+02	0.5930E-11	0.5930E+01	0.0000E+00	0.6337E+02	0.6475E-12	0.6475E-12
314	0.1465E+03	-0.1145E+03	0.3200E+02	0.5930E-11	0.5930E+01	0.0000E+00	0.9506E+02	0.9713E-12	0.9713E-12
315	0.1465E+03	-0.1145E+03	0.3200E+02	0.1186E-10	0.1186E+02	0.0000E+00	0.4754E+02	0.9713E-12	0.9713E-12
500	0.1000E-02	0.3200E+02	0.3200E+02	-0.1077E-33	-0.1077E-21	0.0000E+00	0.2104E+03	-0.1324E-34	-0.1324E-34
501	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2262E+03	0.0000E+00	0.0000E+00
502	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1157E+03	0.0000E+00	0.0000E+00
503	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
504	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
505	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
506	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
507	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
508	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5880E+02	0.0000E+00	0.0000E+00
510	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
511	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6706E+02	0.0000E+00	0.0000E+00
512	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1006E+03	0.0000E+00	0.0000E+00
513	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1341E+03	0.0000E+00	0.0000E+00
514	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1341E+03	0.0000E+00	0.0000E+00
515	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2012E+03	0.0000E+00	0.0000E+00
516	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2012E+03	0.0000E+00	0.0000E+00

MATERIAL DATA

NAME	MATL	TOT CAP	TOT FLUID
SAND	1	0.20875E+03	0.65407E+04
MUD	2	0.85218E+02	0.73590E+04
CLAY	3	0.12235E+02	0.12728E+04
CLAY	4	0.83244E+00	0.48350E+03
MINE	5	0.12706E+02	0.17304E+05

NODE DATA. CHECK TOTAL CONDUCTANCES (ZIP) AND TIME CONSTANTS (SLIM).
LARGE DIFFERENCES BETWEEN NODES MAY BE DUE TO POOR ZONING, AND MAY PRODUCE POOR RESULTS.

NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLIM	THETA	SATURATION	PC
3	1	0	0.8351E+03	0.1937E+01	0.1289E+00	0.1029E-18	0.6869E-05	0.1877E+05	0.5071E+00	0.1148E+00	0.2311E+14
4	1	1	0.1625E+04	0.1937E+01	0.4753E+00	0.5074E-19	0.4550E-04	0.1045E+05	0.4960E+00	0.1263E+00	0.4166E+14
5	1	1	0.1200E+03	0.1937E+01	0.1585E+00	0.5701E-17	0.2959E-01	0.5357E+01	0.4899E+00	0.1417E+00	0.5187E+14
6	1	1	0.6720E+03	0.1937E+01	0.3577E+02	0.7356E-14	0.3251E+03	0.1100E+00	0.4871E+00	0.2780E+00	0.5647E+14
7	1	1	0.2412E+04	0.1937E+01	0.8796E+00	0.8113E-10	0.2667E+04	0.3298E-03	0.4824E+00	0.1000E+01	0.6429E+14
12	1	0	0.5751E+03	0.1937E+01	0.6789E-01	0.7753E-19	0.3681E-05	0.1844E+05	0.5114E+00	0.1121E+00	0.1608E+14
13	1	0	0.1438E+04	0.1937E+01	0.2683E+00	0.1495E-18	0.1309E-04	0.2064E+05	0.5034E+00	0.1175E+00	0.2941E+14
14	1	0	0.1355E+04	0.1937E+01	0.4303E+00	0.7462E-18	0.7217E-04	0.5962E+04	0.4947E+00	0.1286E+00	0.4379E+14
15	1	0	0.1299E+03	0.1937E+01	0.1704E+00	0.5701E-17	0.3182E-01	0.5355E+01	0.4899E+00	0.1417E+00	0.5187E+14
16	1	0	0.8779E+03	0.1937E+01	0.4673E+02	0.7356E-14	0.3843E+03	0.1216E+00	0.4871E+00	0.2780E+00	0.5647E+14
17	1	0	0.7224E+03	0.1937E+01	0.2635E+00	0.8113E-10	0.3495E+04	0.7538E-04	0.4824E+00	0.1000E+01	0.6429E+14
21	1	0	0.6346E+03	0.1937E+01	0.7326E-01	0.7380E-19	0.1060E-04	0.6910E+04	0.5120E+00	0.1117E+00	0.1504E+14
22	1	0	0.5847E+03	0.1937E+01	0.9506E-01	0.1062E-18	0.4876E-05	0.1909E+05	0.5066E+00	0.1151E+00	0.2403E+14
23	1	0	0.8316E+03	0.1937E+01	0.1759E+00	0.2930E-18	0.1570E-04	0.1121E+05	0.5004E+00	0.1210E+00	0.3433E+14
24	1	0	0.5365E+03	0.1937E+01	0.1808E+00	0.1337E-17	0.6175E-04	0.2928E+04	0.4937E+00	0.1306E+00	0.4547E+14
25	1	0	0.6600E+02	0.1937E+01	0.8718E-01	0.5701E-17	0.1629E-01	0.5351E+01	0.4899E+00	0.1417E+00	0.5187E+14
26	1	0	0.3696E+03	0.1937E+01	0.1967E+02	0.7356E-14	0.1789E+03	0.1100E+00	0.4871E+00	0.2780E+00	0.5647E+14
27	1	0	0.3696E+03	0.1937E+01	0.1348E+00	0.8113E-10	0.2437E+04	0.5532E-04	0.4824E+00	0.1000E+01	0.6429E+14
28	2	0	0.3423E+03	0.1937E+01	0.2074E+00	0.9292E-18	0.8696E-01	0.2385E+01	0.4212E+00	0.4915E+00	0.9627E+13
29	2	0	0.1743E+03	0.1937E+01	0.1131E+00	0.1968E-17	0.2367E-04	0.4779E+04	0.4195E+00	0.4984E+00	0.1292E+14

NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLIM	THETA	SATURATION	PC
30	1	0	0.3679E+03	0.1937E+01	0.4322E-01	0.7734E-19	0.1028E-04	0.4205E+04	0.5118E+00	0.1120E+00	0.1603E+14
31	1	0	0.3956E+03	0.1937E+01	0.5857E-01	0.9843E-19	0.3675E-05	0.1594E+05	0.5079E+00	0.1143E+00	0.2188E+14
32	1	0	0.3953E+03	0.1937E+01	0.7328E-01	0.1424E-18	0.5755E-05	0.1273E+05	0.5035E+00	0.1173E+00	0.2916E+14
33	1	0	0.3953E+03	0.1937E+01	0.9624E-01	0.3865E-18	0.1521E-04	0.6327E+04	0.4985E+00	0.1233E+00	0.3752E+14
34	1	0	0.3953E+03	0.1937E+01	0.1556E+00	0.1564E-17	0.6015E-04	0.2587E+04	0.4931E+00	0.1318E+00	0.4652E+14
35	1	0	0.6000E+02	0.1937E+01	0.7925E-01	0.5701E-17	0.1482E-01	0.5349E+01	0.4899E+00	0.1417E+00	0.5187E+14
36	1	0	0.3360E+03	0.1937E+01	0.1788E+02	0.7356E-14	0.1626E+03	0.1100E+00	0.4871E+00	0.2780E+00	0.5647E+14
37	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8113E-10	0.2339E+04	0.5238E-04	0.4824E+00	0.1000E+01	0.6429E+14
38	5	0	0.3447E+03	0.1937E+01	0.1763E+00	0.1284E-17	0.1898E+02	0.9288E-02	0.7840E+00	0.3195E+00	0.1837E+14
39	5	0	0.2000E+03	0.1937E+01	0.1086E+00	0.1398E-17	0.3751E-04	0.2895E+04	0.7823E+00	0.3229E+00	0.2119E+14
40	1	0	0.3075E+03	0.1937E+01	0.4862E-01	0.1055E-18	0.1408E-04	0.3453E+04	0.5067E+00	0.1150E+00	0.2383E+14
41	1	0	0.3075E+03	0.1937E+01	0.5579E-01	0.1219E-18	0.4607E-05	0.1211E+05	0.5040E+00	0.1168E+00	0.2839E+14
42	1	0	0.3075E+03	0.1937E+01	0.6462E-01	0.2852E-18	0.8378E-05	0.7713E+04	0.5006E+00	0.1208E+00	0.3405E+14
43	1	0	0.3075E+03	0.1937E+01	0.8589E-01	0.4750E-18	0.1799E-04	0.4773E+04	0.4967E+00	0.1255E+00	0.4055E+14
44	1	0	0.3075E+03	0.1937E+01	0.1621E+00	0.1830E-17	0.6005E-04	0.2681E+04	0.4925E+00	0.1330E+00	0.4757E+14
45	1	0	0.6000E+02	0.1937E+01	0.7925E-01	0.5701E-17	0.1482E-01	0.5349E+01	0.4899E+00	0.1417E+00	0.5187E+14
46	1	0	0.3360E+03	0.1937E+01	0.1788E+02	0.7356E-14	0.1626E+03	0.1100E+00	0.4871E+00	0.2780E+00	0.5647E+14
47	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8113E-10	0.2339E+04	0.5238E-04	0.4824E+00	0.1000E+01	0.6429E+14
48	5	0	0.2528E+03	0.1937E+01	0.1539E+00	0.1640E-17	0.5355E-04	0.2874E+04	0.7788E+00	0.3300E+00	0.2712E+14
49	5	0	0.2000E+03	0.1937E+01	0.1269E+00	0.1735E-17	0.4985E-04	0.2547E+04	0.7774E+00	0.3328E+00	0.2946E+14
50	1	0	0.2196E+03	0.1937E+01	0.4548E-01	0.2149E-18	0.1867E-04	0.2329E+04	0.5020E+00	0.1191E+00	0.3164E+14
51	1	0	0.2196E+03	0.1937E+01	0.4709E-01	0.3098E-18	0.8278E-05	0.5689E+04	0.5001E+00	0.1214E+00	0.3490E+14
52	1	0	0.2196E+03	0.1937E+01	0.5717E-01	0.4280E-18	0.1301E-04	0.4376E+04	0.4976E+00	0.1243E+00	0.3894E+14
53	1	0	0.2196E+03	0.1937E+01	0.6920E-01	0.8974E-18	0.2487E-04	0.2783E+04	0.4948E+00	0.1284E+00	0.4359E+14
54	1	0	0.2196E+03	0.1937E+01	0.1444E+00	0.2070E-17	0.6116E-04	0.2361E+04	0.4918E+00	0.1342E+00	0.4860E+14
55	1	0	0.6000E+02	0.1937E+01	0.7925E-01	0.5701E-17	0.1482E-01	0.5348E+01	0.4899E+00	0.1417E+00	0.5187E+14
56	1	0	0.3360E+03	0.1937E+01	0.1788E+02	0.7356E-14	0.1626E+03	0.1100E+00	0.4871E+00	0.2780E+00	0.5647E+14
57	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8113E-10	0.2339E+04	0.5238E-04	0.4824E+00	0.1000E+01	0.6429E+14
58	5	0	0.1609E+03	0.1937E+01	0.1135E+00	0.3763E-17	0.1115E-03	0.1018E+04	0.7736E+00	0.3431E+00	0.3586E+14
59	5	0	0.2000E+03	0.1937E+01	0.1625E+00	0.4616E-17	0.1500E-03	0.1055E+04	0.7725E+00	0.3465E+00	0.3773E+14
60	1	0	0.1318E+03	0.1937E+01	0.3510E-01	0.4430E-18	0.4512E-04	0.7781E+03	0.4973E+00	0.1247E+00	0.3945E+14
61	1	0	0.1318E+03	0.1937E+01	0.3814E-01	0.5001E-18	0.1374E-04	0.2777E+04	0.4962E+00	0.1261E+00	0.4141E+14
62	1	0	0.1318E+03	0.1937E+01	0.4190E-01	0.9553E-18	0.2177E-04	0.1925E+04	0.4947E+00	0.1287E+00	0.4383E+14
63	1	0	0.1318E+03	0.1937E+01	0.5351E-01	0.1607E-17	0.3683E-04	0.1453E+04	0.4930E+00	0.1319E+00	0.4662E+14
64	1	0	0.1318E+03	0.1937E+01	0.1038E+00	0.2310E-17	0.6228E-04	0.1666E+04	0.4912E+00	0.1354E+00	0.4963E+14
65	1	0	0.6000E+02	0.1937E+01	0.7925E-01	0.5701E-17	0.1492E-01	0.5347E+01	0.4899E+00	0.1417E+00	0.5187E+14
66	1	0	0.3360E+03	0.1937E+01	0.1788E+02	0.7356E-14	0.1626E+03	0.1100E+00	0.4871E+00	0.2780E+00	0.5647E+14
NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLIM	THETA	SATURATION	PC
67	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8113E-10	0.2339E+04	0.5238E-04	0.4824E+00	0.1000E+01	0.6429E+14
68	5	0	0.6033E+02	0.1937E+01	0.1807E+00	0.3131E-16	0.5570E-03	0.1808E+03	0.7685E+00	0.3647E+00	0.4461E+14
69	5	0	0.1500E+03	0.1937E+01	0.3324E+00	0.4670E-16	0.9753E-03	0.3408E+03	0.7676E+00	0.3709E+00	0.4605E+14
70	1	0	0.4393E+02	0.1937E+01	0.2144E-01	0.1758E-17	0.3026E-03	0.7085E+02	0.4926E+00	0.1327E+00	0.4726E+14
71	1	0	0.4393E+02	0.1937E+01	0.2507E-01	0.1910E-17	0.5913E-04	0.6406E+03	0.4923E+00	0.1334E+00	0.4791E+14
72	1	0	0.4393E+02	0.1937E+01	0.2758E-01	0.2099E-17	0.4357E-04	0.6788E+03	0.4918E+00	0.1343E+00	0.4872E+14
73	1	0	0.4393E+02	0.1937E+01	0.3479E-01	0.2316E-17	0.5021E-04	0.6918E+03	0.4912E+00	0.1354E+00	0.4965E+14
74	1	0	0.4393E+02	0.1937E+01	0.4031E-01	0.3168E-17	0.6718E-04	0.6000E+03	0.4906E+00	0.1374E+00	0.5066E+14
75	1	0	0.6000E+02	0.1937E+01	0.7925E-01	0.5701E-17	0.1483E-01	0.5340E+01	0.4899E+00	0.1417E+00	0.5187E+14
76	1	0	0.3360E+03	0.1937E+01	0.1788E+02	0.7356E-14	0.1626E+03	0.1100E+00	0.4871E+00	0.2780E+00	0.5647E+14
77	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8113E-10	0.2339E+04	0.5238E-04	0.4824E+00	0.1000E+01	0.6429E+14
78	5	0	0.1149E+02	0.1937E+01	0.3820E-01	0.1366E-15	0.1454E-02	0.2628E+02	0.7659E+00	0.3942E+00	0.4898E+14
79	5	0	0.1149E+02	0.1937E+01	0.4821E-01	0.1815E-15	0.1927E-02	0.2501E+02	0.7652E+00	0.4051E+00	0.5013E+14
80	3	2	0.1000E-23	0.1937E+01	0.3851E-26	0.1492E-16	0.0000E+00	0.1000E+25	0.3804E+00	0.1000E+01	0.5163E+14
81	3	2	0.1000E-23	0.1937E+01	0.3851E-26	0.1492E-16	0.0000E+00	0.1000E+25	0.3804E+00	0.1000E+01	0.5163E+14
85	3	0	0.3354E+02	0.1937E+01	0.1983E+00	0.1572E-16	0.9245E-02	0.1604E+02	0.3790E+00	0.8721E+00	0.5187E+14
86	1	0	0.1978E+03	0.1937E+01	0.9996E+01	0.7356E-14	0.9097E+02	0.1099E+00	0.4871E+00	0.2780E+00	0.5647E+14
87	1	0	0.1878E+03	0.1937E+01	0.6849E-01	0.8113E-10	0.1773E+04	0.3863E-04	0.4824E+00	0.1000E+01	0.6429E+14
90	2	0	0.3153E+03	0.1937E+01	0.9988E-01	0.1476E-13	0.5011E+01	0.1993E-01	0.4224E+00	0.1000E+01	0.7274E+13
91	5	0	0.3445E+03	0.1937E+01	0.1026E+00	0.2370E-11	0.6175E+02	0.1661E-02	0.7851E+00	0.1000E+01	0.1651E+14
92	5	0	0.2527E+03	0.1937E+01	0.1500E+00	0.1585E-17	0.1901E+02	0.7891E-02	0.7796E+00	0.3284E+00	0.2576E+14
93	5	0	0.1603E+03	0.1937E+01	0.1119E+00	0.3367E-17	0.4746E+01	0.2358E-01	0.7742E+00	0.3416E+00	0.3500E+14

94	5	0	0.6030E+02	0.1937E+01	0.9788E-01	0.2736E-16	0.3560E+01	0.2750E-01	0.7687E+00	0.3632E+00	0.4424E+14
95	5	0	0.1149E+02	0.1937E+01	0.3767E-01	0.1318E-15	0.2374E+01	0.1587E-01	0.7660E+00	0.3930E+00	0.4886E+14
99	2	0	0.3000E+03	0.1937E+01	0.9503E-01	0.1476E-13	0.5093E+01	0.1866E-01	0.4224E+00	0.1000E+01	0.7274E+13
100	5	0	0.4000E+03	0.1937E+01	0.1191E+00	0.2370E-11	0.7605E+02	0.1566E-02	0.7851E+00	0.1000E+01	0.1651E+14
101	5	0	0.4000E+03	0.1937E+01	0.1195E+00	0.2370E-11	0.7593E+02	0.1574E-02	0.7796E+00	0.1000E+01	0.2576E+14
102	5	0	0.4000E+03	0.1937E+01	0.1199E+00	0.2370E-11	0.7593E+02	0.1579E-02	0.7742E+00	0.1000E+01	0.3500E+14
103	5	0	0.3000E+03	0.1937E+01	0.9018E-01	0.2370E-11	0.6881E+02	0.1311E-02	0.7687E+00	0.1000E+01	0.4424E+14
104	5	0	0.2000E+03	0.1937E+01	0.6020E-01	0.2370E-11	0.5695E+02	0.1057E-02	0.7660E+00	0.1000E+01	0.4884E+14
105	3	0	0.6000E+02	0.1937E+01	0.2313E+00	0.2739E-15	0.1901E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
106	2	0	0.3360E+03	0.1937E+01	0.3676E+01	0.1263E-13	0.3351E+00	0.1097E+02	0.3978E+00	0.9826E+00	0.5647E+14
107	2	0	0.3360E+03	0.1937E+01	0.1086E+00	0.1479E-13	0.7087E+03	0.1532E-03	0.3939E+00	0.1000E+01	0.6429E+14
109	2	0	0.3000E+03	0.1937E+01	0.1725E+00	0.8413E-18	0.4834E+01	0.3569E-01	0.4224E+00	0.4866E+00	0.7279E+13
110	5	0	0.4000E+03	0.1937E+01	0.1191E+00	0.2370E-11	0.7593E+02	0.1569E-02	0.7851E+00	0.1000E+01	0.1651E+14
111	5	0	0.4000E+03	0.1937E+01	0.1195E+00	0.2370E-11	0.9491E+02	0.1259E-02	0.7796E+00	0.1000E+01	0.2576E+14
112	5	0	0.4000E+03	0.1937E+01	0.1199E+00	0.2370E-11	0.9491E+02	0.1263E-02	0.7742E+00	0.1000E+01	0.3500E+14
113	5	0	0.3000E+03	0.1937E+01	0.9018E-01	0.2370E-11	0.8305E+02	0.1086E-02	0.7687E+00	0.1000E+01	0.4424E+14
114	5	0	0.2000E+03	0.1937E+01	0.6020E-01	0.2370E-11	0.6644E+02	0.9062E-03	0.7660E+00	0.1000E+01	0.4884E+14
115	3	0	0.6000E+02	0.1937E+01	0.2313E+00	0.2739E-15	0.1901E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
116	2	0	0.3360E+03	0.1937E+01	0.3676E+01	0.1263E-13	0.3706E+00	0.9919E+01	0.3978E+00	0.9826E+00	0.5647E+14
117	2	0	0.3360E+03	0.1937E+01	0.1086E+00	0.1479E-13	0.4984E+00	0.2179E+00	0.3939E+00	0.1000E+01	0.6429E+14
119	2	0	0.4500E+03	0.1937E+01	0.2588E+00	0.8413E-18	0.7118E+01	0.3636E-01	0.4224E+00	0.4866E+00	0.7279E+13
120	5	0	0.6000E+03	0.1937E+01	0.1787E+00	0.2370E-11	0.9016E+02	0.1982E-02	0.7851E+00	0.1000E+01	0.1651E+14
121	5	0	0.6000E+03	0.1937E+01	0.1792E+00	0.2370E-11	0.1186E+03	0.1511E-02	0.7796E+00	0.1000E+01	0.2576E+14
122	5	0	0.6000E+03	0.1937E+01	0.1798E+00	0.2370E-11	0.1186E+03	0.1515E-02	0.7742E+00	0.1000E+01	0.3500E+14
123	5	0	0.4500E+03	0.1937E+01	0.1353E+00	0.2370E-11	0.1068E+03	0.1267E-02	0.7687E+00	0.1000E+01	0.4424E+14
124	5	0	0.3000E+03	0.1937E+01	0.9031E-01	0.2370E-11	0.8779E+02	0.1029E-02	0.7660E+00	0.1000E+01	0.4884E+14
125	3	0	0.9000E+02	0.1937E+01	0.3470E+00	0.2739E-15	0.2852E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
126	2	0	0.5040E+03	0.1937E+01	0.5514E+01	0.1263E-13	0.4497E+00	0.1226E+02	0.3978E+00	0.9826E+00	0.5647E+14
127	2	0	0.5000E+03	0.1937E+01	0.1629E+00	0.1479E-13	0.6233E+00	0.2614E+00	0.3939E+00	0.1000E+01	0.6429E+14
129	2	0	0.6000E+03	0.1937E+01	0.3451E+00	0.8413E-18	0.9491E+01	0.3636E-01	0.4224E+00	0.4866E+00	0.7279E+13
130	5	0	0.8000E+03	0.1937E+01	0.2382E+00	0.2370E-11	0.1044E+03	0.2282E-02	0.7851E+00	0.1000E+01	0.1651E+14
131	5	0	0.8000E+03	0.1937E+01	0.2390E+00	0.2370E-11	0.1429E+03	0.1679E-02	0.7796E+00	0.1000E+01	0.2576E+14
132	5	0	0.6000E+03	0.1937E+01	0.1798E+00	0.2370E-11	0.1429E+03	0.1263E-02	0.7742E+00	0.1000E+01	0.3500E+14
133	5	0	0.6000E+03	0.1937E+01	0.1803E+00	0.2370E-11	0.1305E+03	0.1382E-02	0.7687E+00	0.1000E+01	0.4424E+14
134	5	0	0.4000E+03	0.1937E+01	0.1204E+00	0.2370E-11	0.1091E+03	0.1103E-02	0.7660E+00	0.1000E+01	0.4884E+14

NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLIM	THETA	SATURATION	PC
135	3	0	0.1200E+03	0.1937E+01	0.4626E+00	0.2739E-15	0.3802E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
136	2	0	0.6720E+03	0.1937E+01	0.7352E+01	0.1263E-13	0.5288E+00	0.1390E+02	0.3978E+00	0.9826E+00	0.5647E+14
137	2	0	0.6720E+03	0.1937E+01	0.2172E+00	0.1479E-13	0.7481E+00	0.2903E+00	0.3939E+00	0.1000E+01	0.6429E+14
139	2	0	0.6000E+03	0.1937E+01	0.3451E+00	0.8413E-18	0.9491E+01	0.3636E-01	0.4224E+00	0.4866E+00	0.7279E+13
140	5	0	0.8000E+03	0.1937E+01	0.2382E+00	0.2370E-11	0.1044E+03	0.2282E-02	0.7851E+00	0.1000E+01	0.1651E+14
141	5	0	0.8000E+03	0.1937E+01	0.2390E+00	0.2370E-11	0.1429E+03	0.1679E-02	0.7796E+00	0.1000E+01	0.2576E+14
142	5	0	0.8000E+03	0.1937E+01	0.2397E+00	0.2370E-11	0.1429E+03	0.1684E-02	0.7742E+00	0.1000E+01	0.3500E+14
143	5	0	0.6000E+03	0.1937E+01	0.1803E+00	0.2370E-11	0.1305E+03	0.1382E-02	0.7687E+00	0.1000E+01	0.4424E+14
144	5	0	0.4000E+03	0.1937E+01	0.1204E+00	0.2370E-11	0.1091E+03	0.1103E-02	0.7660E+00	0.1000E+01	0.4884E+14
145	3	0	0.1200E+03	0.1937E+01	0.4626E+00	0.2739E-15	0.3802E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
146	2	0	0.6720E+03	0.1937E+01	0.7352E+01	0.1263E-13	0.5288E+00	0.1390E+02	0.3978E+00	0.9826E+00	0.5647E+14
147	2	0	0.6720E+03	0.1937E+01	0.2172E+00	0.1479E-13	0.7481E+00	0.2903E+00	0.3939E+00	0.1000E+01	0.6429E+14
149	2	0	0.9000E+03	0.1937E+01	0.5176E+00	0.8413E-18	0.1424E+02	0.3636E-01	0.4224E+00	0.4866E+00	0.7279E+13
150	5	0	0.1200E+04	0.1937E+01	0.3574E+00	0.2370E-11	0.1281E+03	0.2789E-02	0.7851E+00	0.1000E+01	0.1651E+14
151	5	0	0.1200E+04	0.1937E+01	0.3585E+00	0.2370E-11	0.1851E+03	0.1937E-02	0.7796E+00	0.1000E+01	0.2576E+14
152	5	0	0.1200E+04	0.1937E+01	0.3596E+00	0.2370E-11	0.1851E+03	0.1943E-02	0.7742E+00	0.1000E+01	0.3500E+14
153	5	0	0.9000E+03	0.1937E+01	0.2705E+00	0.2370E-11	0.1744E+03	0.1551E-02	0.7687E+00	0.1000E+01	0.4424E+14
154	5	0	0.6000E+03	0.1937E+01	0.1806E+00	0.2370E-11	0.1495E+03	0.1209E-02	0.7660E+00	0.1000E+01	0.4884E+14
155	3	0	0.1800E+03	0.1937E+01	0.6939E+00	0.2739E-15	0.5703E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
156	2	0	0.1008E+04	0.1937E+01	0.1103E+02	0.1263E-13	0.6870E+00	0.1605E+02	0.3978E+00	0.9826E+00	0.5647E+14
157	2	0	0.1008E+04	0.1937E+01	0.3258E+00	0.1479E-13	0.9978E+00	0.3265E+00	0.3939E+00	0.1000E+01	0.6429E+14
159	2	0	0.9000E+03	0.1937E+01	0.5176E+00	0.8413E-18	0.4116E-04	0.1258E+05	0.4224E+00	0.4866E+00	0.7279E+13
160	5	0	0.1200E+04	0.1937E+01	0.5989E+00	0.1208E-17	0.1898E+02	0.3102E-01	0.7851E+00	0.3173E+00	0.1652E+14
161	5	0	0.1200E+04	0.1937E+01	0.7125E+00	0.1585E-17	0.1893E+02	0.3754E-01	0.7796E+00	0.3284E+00	0.2576E+14

162	5	0	0.1200E+04	0.1937E+01	0.4351E+00	0.3367E-17	0.1898E+02	0.4399E-01	0.7742E+00	0.3416E+00	0.3500E+14
163	5	0	0.9900E+03	0.1937E+01	0.1461E+01	0.2736E-16	0.1424E+02	0.1026E+00	0.7687E+00	0.3632E+00	0.4428E+14
164	5	0	0.6000E+03	0.1937E+01	0.1969E+01	0.1311E-15	0.9496E+01	0.2068E+00	0.7660E+00	0.3929E+00	0.4884E+14
165	3	0	0.1800E+03	0.1937E+01	0.7961E+00	0.1572E-16	0.7980E-01	0.9977E+01	0.3770E+00	0.8721E+00	0.5187E+14
166	2	0	0.1008E+04	0.1937E+01	0.1103E+02	0.1263E-13	0.5786E+00	0.1919E+02	0.3978E+00	0.9826E+00	0.5647E+14
167	2	0	0.1008E+04	0.1937E+01	0.3258E+00	0.1479E-13	0.8715E+00	0.3730E+00	0.3939E+00	0.1000E+01	0.6429E+14
201	1	0	0.1778E+03	0.1937E+01	0.1923E-01	0.5569E-19	0.1342E-05	0.1433E+05	0.5150E+00	0.1098E+00	0.1002E+14
202	1	0	0.4547E+03	0.1937E+01	0.4929E-01	0.5569E-19	0.1794E-05	0.2748E+05	0.5150E+00	0.1098E+00	0.1002E+14
203	1	0	0.4861E+03	0.1937E+01	0.5270E-01	0.5569E-19	0.2168E-05	0.2430E+05	0.5150E+00	0.1098E+00	0.1002E+14
204	2	0	0.1052E+03	0.1937E+01	0.6049E-01	0.8413E-18	0.1344E-01	0.4502E+01	0.4224E+00	0.4866E+00	0.7280E+13
205	2	0	0.1483E+03	0.1937E+01	0.1461E+01	0.1476E-13	0.1846E+00	0.7915E+01	0.4233E+00	0.9902E+00	0.5402E+13
206	2	0	0.6861E+02	0.1937E+01	0.1538E+01	0.1406E-14	0.5204E-01	0.2906E+02	0.4246E+00	0.8240E+00	0.2781E+13
207	2	0	0.1551E+03	0.1937E+01	0.4648E+01	0.4149E-14	0.5679E-01	0.8183E+02	0.4246E+00	0.8979E+00	0.2781E+13
208	2	0	0.1348E+03	0.1937E+01	0.2155E+01	0.3577E-15	0.1494E-01	0.1443E+03	0.4255E+00	0.7481E+00	0.9307E+12
209	2	0	0.1007E+03	0.1937E+01	0.1610E+01	0.3577E-15	0.4677E-02	0.3443E+03	0.4255E+00	0.7481E+00	0.9307E+12
210	2	0	0.1000E+03	0.1937E+01	0.1599E+01	0.3577E-15	0.4656E-02	0.3434E+03	0.4255E+00	0.7481E+00	0.9307E+12
211	2	0	0.1500E+03	0.1937E+01	0.2398E+01	0.3577E-15	0.6088E-02	0.3938E+03	0.4255E+00	0.7481E+00	0.9307E+12
212	2	0	0.2000E+03	0.1937E+01	0.3197E+01	0.3577E-15	0.7521E-02	0.4251E+03	0.4255E+00	0.7481E+00	0.9307E+12
213	2	0	0.2000E+03	0.1937E+01	0.3197E+01	0.3577E-15	0.7521E-02	0.4251E+03	0.4255E+00	0.7481E+00	0.9307E+12
214	2	0	0.3000E+03	0.1937E+01	0.4796E+01	0.3577E-15	0.1039E-01	0.4618E+03	0.4255E+00	0.7481E+00	0.9307E+12
215	2	0	0.3000E+03	0.1937E+01	0.4796E+01	0.3577E-15	0.9491E-02	0.5054E+03	0.4255E+00	0.7481E+00	0.9307E+12
305	1	0	0.2118E+03	0.1937E+01	0.2326E-01	0.5934E-19	0.1305E+00	0.1782E+00	0.5144E+00	0.1101E+00	0.1103E+14
306	4	0	0.5223E+02	0.1937E+01	0.4684E-01	0.1442E-18	0.5757E-02	0.8136E+01	0.6331E+00	0.6971E+00	0.8793E+13
307	4	0	0.7733E+02	0.1937E+01	0.6983E-01	0.1196E-18	0.3956E-01	0.1765E+01	0.6464E+00	0.6914E+00	0.6548E+13
308	4	0	0.6655E+02	0.1937E+01	0.6038E-01	0.1021E-18	0.3751E-01	0.1610E+01	0.6579E+00	0.6864E+00	0.4601E+13
309	4	0	0.6022E+02	0.1937E+01	0.5480E-01	0.9629E-19	0.3285E-01	0.1689E+01	0.6616E+00	0.6848E+00	0.3959E+13
310	4	0	0.6000E+02	0.1937E+01	0.5460E-01	0.9629E-19	0.2868E-02	0.1904E+02	0.6616E+00	0.6848E+00	0.3959E+13
311	4	0	0.9000E+02	0.1937E+01	0.8190E-01	0.9629E-19	0.4302E-02	0.1904E+02	0.6616E+00	0.6848E+00	0.3959E+13
312	4	0	0.1200E+03	0.1937E+01	0.1092E+00	0.9629E-19	0.5735E-02	0.1904E+02	0.6616E+00	0.6848E+00	0.3959E+13
313	4	0	0.1200E+03	0.1937E+01	0.1092E+00	0.9629E-19	0.5735E-02	0.1904E+02	0.6616E+00	0.6848E+00	0.3959E+13
314	4	0	0.1800E+03	0.1937E+01	0.1638E+00	0.9629E-19	0.8603E-02	0.1904E+02	0.6616E+00	0.6848E+00	0.3959E+13
315	4	0	0.9000E+02	0.1937E+01	0.8190E-01	0.9629E-19	0.8603E-02	0.9521E+01	0.6616E+00	0.6848E+00	0.3959E+13
500	1	1	0.3360E+03	0.1937E+01	0.1229E+00	0.8114E-10	0.2001E+04	0.6142E-04	0.4777E+00	0.1000E+01	0.7210E+14

NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLTH	THETA	SATURATION	PC
501	1	0	0.3612E+03	0.1937E+01	0.1321E+00	0.8114E-10	0.2429E+04	0.5440E-04	0.4777E+00	0.1000E+01	0.7210E+14
502	1	0	0.1848E+03	0.1937E+01	0.6760E-01	0.8114E-10	0.1576E+04	0.4290E-04	0.4777E+00	0.1000E+01	0.7210E+14
503	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8114E-10	0.1495E+04	0.4112E-04	0.4777E+00	0.1000E+01	0.7210E+14
504	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8114E-10	0.1495E+04	0.4112E-04	0.4777E+00	0.1000E+01	0.7210E+14
505	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8114E-10	0.1495E+04	0.4112E-04	0.4777E+00	0.1000E+01	0.7210E+14
506	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8114E-10	0.1495E+04	0.4112E-04	0.4777E+00	0.1000E+01	0.7210E+14
507	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8114E-10	0.1495E+04	0.4112E-04	0.4777E+00	0.1000E+01	0.7210E+14
508	1	0	0.9390E+02	0.1937E+01	0.3435E-01	0.8114E-10	0.1116E+04	0.3023E-04	0.4777E+00	0.1000E+01	0.7210E+14
510	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8114E-10	0.7767E+03	0.7913E-04	0.4777E+00	0.1000E+01	0.7210E+14
511	3	0	0.1680E+03	0.1937E+01	0.7090E+00	0.2739E-15	0.2730E+03	0.2597E-02	0.2596E+00	0.1000E+01	0.7210E+14
512	3	0	0.2520E+03	0.1937E+01	0.1063E+01	0.2739E-15	0.1808E+00	0.5883E+01	0.2596E+00	0.1000E+01	0.7210E+14
513	3	0	0.3360E+03	0.1937E+01	0.1418E+01	0.2739E-15	0.2403E+00	0.5902E+01	0.2596E+00	0.1000E+01	0.7210E+14
514	3	0	0.3360E+03	0.1937E+01	0.1418E+01	0.2739E-15	0.2403E+00	0.5902E+01	0.2596E+00	0.1000E+01	0.7210E+14
515	3	0	0.5040E+03	0.1937E+01	0.2127E+01	0.2739E-15	0.3592E+00	0.5921E+01	0.2596E+00	0.1000E+01	0.7210E+14
516	3	0	0.5040E+03	0.1937E+01	0.2127E+01	0.2739E-15	0.3581E+00	0.5940E+01	0.2596E+00	0.1000E+01	0.7210E+14

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TOTAL VOLUME CHANGE OVER ENTIRE FLOW REGION = 0.00000E+00

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INTERNAL CONNECTION DATA. CHECK CONDUCTANCES (TRAN).

LARGE DIFFERENCES BETWEEN CONNECTIONS MAY BE DUE TO POOR ZONING, AND MAY PRODUCE POOR RESULTS.

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
201	202	0.1288E+02	0.3592E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
201	3	0.3015E+02	0.9830E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	4	0.4000E+02	0.3680E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	5	0.4000E+02	0.3096E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

5	6	0.4000E+02	0.2955E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	7	0.4000E+02	0.3259E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	500	0.4087E+02	0.1669E+04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
202	203	0.1443E+01	0.4023E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
202	3	0.1113E+02	0.3627E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
202	13	0.1078E+02	0.4019E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
202	12	0.2095E+02	0.6301E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
203	12	0.3138E+02	0.9436E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	13	0.3154E+02	0.1451E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	14	0.4300E+02	0.6648E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	15	0.4300E+02	0.4084E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	16	0.4300E+02	0.3176E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	17	0.4728E+02	0.3841E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	501	0.4300E+02	0.1746E+04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
203	204	0.2878E+01	0.3066E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
203	21	0.1879E+02	0.5578E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
203	22	0.9718E+01	0.3200E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
204	21	0.2295E+02	0.7902E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
21	22	0.2027E+02	0.8145E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
22	23	0.2200E+02	0.1582E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
23	24	0.3286E+02	0.8259E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
24	25	0.2200E+02	0.2434E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
25	26	0.2200E+02	0.1625E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
26	27	0.2200E+02	0.1787E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
27	502	0.2200E+02	0.8934E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
204	205	0.9086E+01	0.1343E-01	0.1496E-11	0.1496E+01	0.1496E-11	0.1496E+01
205	206	0.6713E+01	0.4062E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
205	305	0.2209E+02	0.1305E+00	-0.1454E-10	-0.1454E+02	-0.1454E-10	-0.1454E+02
206	306	0.1022E+02	0.5754E-02	-0.6409E-12	-0.6409E+00	-0.6409E-12	-0.6409E+00
305	30	0.2189E+02	0.6896E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
306	29	0.1004E+02	0.1652E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
207	307	0.2384E+02	0.3955E-01	-0.4470E-11	-0.4470E+01	-0.4470E-11	-0.4470E+01
307	28	0.2354E+02	0.3317E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
208	308	0.2349E+02	0.3365E-02	-0.3803E-12	-0.3803E+00	-0.3803E-12	-0.3803E+00
90	26	0.1471E+02	0.8694E-01	-0.9824E-11	-0.9824E+01	-0.9824E-11	-0.9824E+01
28	29	0.1733E+02	0.8301E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
29	30	0.1846E+02	0.8037E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
30	31	0.2002E+02	0.8172E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
31	32	0.2000E+02	0.1073E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
32	33	0.2000E+02	0.1914E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
33	34	0.2000E+02	0.6267E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
34	35	0.2000E+02	0.2410E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
35	36	0.2000E+02	0.1477E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
36	37	0.2000E+02	0.1625E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
37	503	0.2000E+02	0.8122E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
91	36	0.2000E+02	0.1894E+02	-0.2145E-08	-0.2145E+04	-0.2145E-08	-0.2145E+04
38	39	0.2000E+02	0.1308E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
39	40	0.2000E+02	0.1141E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
40	41	0.2000E+02	0.1089E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
41	42	0.2000E+02	0.1547E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
42	43	0.2000E+02	0.3235E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
43	44	0.2000E+02	0.7469E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
44	45	0.2000E+02	0.2607E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
46	47	0.2000E+02	0.1625E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
47	504	0.2000E+02	0.8122E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
48	49	0.2000E+02	0.1661E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
92	48	0.2000E+02	0.1598E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
49	50	0.2000E+02	0.1433E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
50	51	0.2000E+02	0.2341E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

51	52	0.2000E+02	0.5339E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
52	53	0.2000E+02	0.5225E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
53	54	0.2000E+02	0.1133E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
54	55	0.2000E+02	0.2800E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
55	56	0.2000E+02	0.1477E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
56	57	0.2000E+02	0.1625E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
45	46	0.2000E+02	0.1477E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
57	505	0.2000E+02	0.8122E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
93	58	0.2000E+02	0.3450E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
58	59	0.2000E+02	0.3938E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
59	60	0.2000E+02	0.3785E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
60	61	0.2000E+02	0.4549E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
61	62	0.2000E+02	0.5918E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
62	63	0.2000E+02	0.1087E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
63	64	0.2000E+02	0.1750E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
64	65	0.2000E+02	0.2992E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
65	66	0.2000E+02	0.1477E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
66	67	0.2000E+02	0.1625E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
67	506	0.2000E+02	0.8122E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
94	68	0.1500E+02	0.2114E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
68	69	0.1500E+02	0.2582E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
69	70	0.1500E+02	0.2832E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
70	71	0.2000E+02	0.1790E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
71	72	0.2000E+02	0.1950E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
72	73	0.2000E+02	0.2145E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
73	74	0.2000E+02	0.2490E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
74	75	0.2000E+02	0.3679E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
75	76	0.2000E+02	0.1477E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
76	77	0.2000E+02	0.1625E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
77	507	0.2000E+02	0.8122E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
95	78	0.1000E+02	0.6644E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
78	79	0.1000E+02	0.7287E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
79	85	0.1118E+02	0.8300E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
85	86	0.1118E+02	0.8303E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
86	87	0.1118E+02	0.9085E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
87	508	0.1118E+02	0.4540E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
209	309	0.2015E+02	0.2866E-02	-0.3262E-12	-0.3262E+00	-0.3262E-12	-0.3262E+00
309	99	0.2000E+02	0.2956E-01	0.3340E-11	0.3340E+01	0.3340E-11	0.3340E+01
99	100	0.2000E+02	0.4864E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
100	101	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
101	102	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
102	103	0.2000E+02	0.2373E+02	0.2107E-25	0.2107E-13	0.2107E-25	0.2107E-13
103	104	0.2000E+02	0.2373E+02	-0.2107E-25	-0.2107E-13	-0.2107E-25	-0.2107E-13
104	105	0.2000E+02	0.1898E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
105	106	0.2000E+02	0.2747E-01	-0.3105E-11	-0.3105E+01	-0.3105E-11	-0.3105E+01
106	107	0.2000E+02	0.1307E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
107	510	0.2000E+02	0.1626E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
210	310	0.2000E+02	0.2465E-02	-0.3238E-12	-0.3238E+00	-0.3238E-12	-0.3238E+00
310	109	0.2000E+02	0.2456E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
109	110	0.2000E+02	0.4745E+01	0.5362E-09	0.5362E+03	0.5362E-09	0.5362E+03
110	111	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFT	DFT/TIME
111	112	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
112	113	0.2000E+02	0.2373E+02	0.2107E-25	0.2107E-13	0.2107E-25	0.2107E-13
113	114	0.2000E+02	0.2373E+02	-0.2107E-25	-0.2107E-13	-0.2107E-25	-0.2107E-13
114	115	0.2000E+02	0.1898E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
115	116	0.2000E+02	0.2747E-01	-0.3105E-11	-0.3105E+01	-0.3105E-11	-0.3105E+01
116	117	0.2000E+02	0.1307E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
117	511	0.2000E+02	0.1190E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
211	311	0.3000E+02	0.4298E-02	-0.4856E-12	-0.4856E+00	-0.4856E-12	-0.4856E+00

311	119	0.3000E+02	0.3684E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
119	120	0.3000E+02	0.7118E+01	0.8044E-09	0.8044E+03	0.8044E-09	0.8044E+03
120	121	0.3000E+02	0.3559E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
121	122	0.3000E+02	0.3559E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
122	123	0.3000E+02	0.3559E+02	0.3161E-25	0.3161E-13	0.3161E-25	0.3161E-13
123	124	0.3000E+02	0.3559E+02	-0.3161E-25	-0.3161E-13	-0.3161E-25	-0.3161E-13
124	125	0.3000E+02	0.2847E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
125	126	0.3000E+02	0.4121E-01	-0.4657E-11	-0.4657E+01	-0.4657E-11	-0.4657E+01
126	127	0.3000E+02	0.1961E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
127	512	0.3000E+02	0.1785E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
212	312	0.4000E+02	0.5730E-02	-0.6475E-12	-0.6475E+00	-0.6475E-12	-0.6475E+00
312	129	0.4000E+02	0.4911E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
129	130	0.4000E+02	0.9491E+01	0.1072E-08	0.1072E+04	0.1072E-08	0.1072E+04
130	131	0.4000E+02	0.4745E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
131	132	0.4000E+02	0.4745E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
132	133	0.4000E+02	0.4745E+02	0.4215E-25	0.4215E-13	0.4215E-25	0.4215E-13
133	134	0.4000E+02	0.4745E+02	-0.4215E-25	-0.4215E-13	-0.4215E-25	-0.4215E-13
134	135	0.4000E+02	0.3796E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
135	136	0.4000E+02	0.5495E-01	-0.6209E-11	-0.6209E+01	-0.6209E-11	-0.6209E+01
136	137	0.4000E+02	0.2615E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
137	513	0.4000E+02	0.2380E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
213	313	0.4000E+02	0.5730E-02	-0.6475E-12	-0.6475E+00	-0.6475E-12	-0.6475E+00
313	139	0.4000E+02	0.4911E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
139	140	0.4000E+02	0.9491E+01	0.1072E-08	0.1072E+04	0.1072E-08	0.1072E+04
140	141	0.4000E+02	0.4745E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
141	142	0.4000E+02	0.4745E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
142	143	0.4000E+02	0.4745E+02	0.4215E-25	0.4215E-13	0.4215E-25	0.4215E-13
143	144	0.4000E+02	0.4745E+02	-0.4215E-25	-0.4215E-13	-0.4215E-25	-0.4215E-13
144	145	0.4000E+02	0.3796E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
145	146	0.4000E+02	0.5495E-01	-0.6209E-11	-0.6209E+01	-0.6209E-11	-0.6209E+01
146	147	0.4000E+02	0.2615E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
147	514	0.4000E+02	0.2380E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
214	314	0.6000E+02	0.8595E-02	-0.9713E-12	-0.9713E+00	-0.9713E-12	-0.9713E+00
314	149	0.6000E+02	0.7367E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
149	150	0.6000E+02	0.1424E+02	0.1609E-08	0.1609E+04	0.1609E-08	0.1609E+04
150	151	0.6000E+02	0.7118E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
151	152	0.6000E+02	0.7118E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
152	153	0.6000E+02	0.7118E+02	0.6322E-25	0.6322E-13	0.6322E-25	0.6322E-13
153	154	0.6000E+02	0.7118E+02	-0.6322E-25	-0.6322E-13	-0.6322E-25	-0.6322E-13
154	155	0.6000E+02	0.5695E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
155	156	0.6000E+02	0.8242E-01	-0.9314E-11	-0.9314E+01	-0.9314E-11	-0.9314E+01
156	157	0.6000E+02	0.3922E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
157	515	0.6000E+02	0.3569E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
215	315	0.6000E+02	0.8595E-02	-0.9713E-12	-0.9713E+00	-0.9713E-12	-0.9713E+00
315	159	0.6000E+02	0.7367E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
159	160	0.6000E+02	0.2747E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
160	161	0.6000E+02	0.3855E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
161	162	0.6000E+02	0.5850E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
162	163	0.6000E+02	0.2452E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
163	164	0.6000E+02	0.1445E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
164	165	0.6000E+02	0.3246E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
165	166	0.6000E+02	0.7622E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
166	167	0.6000E+02	0.3922E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
167	516	0.6000E+02	0.3569E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	14	0.3646E+02	0.1086E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	24	0.2696E+02	0.1382E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
24	34	0.2210E+02	0.1533E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
34	44	0.1768E+02	0.1495E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
44	54	0.1326E+02	0.1246E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

54	64	0.8839E+01	0.9372E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
64	74	0.4420E+01	0.5491E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
74	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	15	0.3282E+02	0.1843E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	25	0.2696E+02	0.2406E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
25	35	0.2210E+02	0.3452E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
35	45	0.1768E+02	0.3577E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
45	55	0.1326E+02	0.3714E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
55	65	0.8839E+01	0.4598E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
65	75	0.4420E+01	0.3869E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
75	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	22	0.1575E+02	0.6563E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
22	32	0.2210E+02	0.1255E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
32	42	0.1768E+02	0.1513E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
42	52	0.1326E+02	0.2082E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
52	62	0.8839E+01	0.2360E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
62	72	0.4420E+01	0.2620E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
72	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
21	31	0.2211E+02	0.8714E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
31	41	0.1768E+02	0.9126E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
41	51	0.1326E+02	0.1059E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
51	61	0.8839E+01	0.1539E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
61	71	0.4420E+01	0.1730E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
71	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
30	40	0.1768E+02	0.7342E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
40	50	0.1326E+02	0.8454E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
50	60	0.8839E+01	0.1153E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
60	70	0.4420E+01	0.1562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
70	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
29	39	0.1000E+02	0.5676E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
39	49	0.1000E+02	0.7337E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
49	59	0.1000E+02	0.1157E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
59	69	0.1000E+02	0.6524E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
69	79	0.1000E+02	0.3687E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
28	38	0.1967E+02	0.9845E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
38	48	0.1504E+02	0.1020E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
48	58	0.1041E+02	0.1076E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
58	68	0.5784E+01	0.2685E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
68	78	0.2312E+01	0.6061E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
78	91	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
90	91	0.1965E+02	0.4780E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
91	92	0.1503E+02	0.1426E+02	-0.1612E-08	-0.1612E+04	-0.1612E-08	-0.1612E+04
92	93	0.1041E+02	0.1011E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
93	94	0.5781E+01	0.2363E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
94	95	0.2312E+01	0.5583E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
508	90	0.2310E+02	0.3414E-01	0.3858E-11	0.3858E+01	0.3858E-11	0.3858E+01
95	81	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
500	501	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
501	502	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
502	503	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
503	504	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
504	505	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
505	506	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
506	507	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
507	508	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
508	510	0.8399E+01	0.3412E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
510	511	0.8399E+01	0.2729E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
511	512	0.8399E+01	0.1152E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
512	513	0.8399E+01	0.1152E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

513	514	0.8397E+01	0.1152E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
514	515	0.8399E+01	0.1152E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
515	516	0.8399E+01	0.1132E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	17	0.1680E+02	0.6822E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	27	0.1680E+02	0.6822E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
27	37	0.1680E+02	0.6822E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
37	47	0.1680E+02	0.6822E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
47	57	0.1680E+02	0.6822E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
57	67	0.1680E+02	0.6822E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
67	77	0.1680E+02	0.6822E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
77	87	0.1680E+02	0.6822E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
87	107	0.1680E+02	0.5459E+03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
107	117	0.1680E+02	0.1243E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
117	127	0.1680E+02	0.1243E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
127	137	0.1680E+02	0.1243E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
137	147	0.1680E+02	0.1243E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
147	157	0.1680E+02	0.1243E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
157	167	0.1680E+02	0.1243E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	16	0.1680E+02	0.6186E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	26	0.1680E+02	0.6186E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
26	36	0.1680E+02	0.6186E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
36	46	0.1680E+02	0.6186E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
46	56	0.1680E+02	0.6186E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
56	66	0.1680E+02	0.6186E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
66	76	0.1680E+02	0.6186E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
76	86	0.1680E+02	0.6186E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
86	106	0.1680E+02	0.7072E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
106	116	0.1680E+02	0.1062E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
116	126	0.1680E+02	0.1062E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
126	136	0.1680E+02	0.1062E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
136	146	0.1680E+02	0.1062E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
146	156	0.1680E+02	0.1062E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
156	166	0.1680E+02	0.1062E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	15	0.3000E+01	0.8562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	25	0.3000E+01	0.8562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
25	35	0.3000E+01	0.8562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
35	45	0.3000E+01	0.8562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
45	55	0.3000E+01	0.8562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
55	65	0.3000E+01	0.8562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
65	75	0.3000E+01	0.8562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
75	85	0.3000E+01	0.1157E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
85	105	0.3000E+01	0.1011E-03	0.1143E-13	0.1143E-01	0.1143E-13	0.1143E-01
105	115	0.3000E+01	0.4113E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
115	125	0.3000E+01	0.4113E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
125	135	0.3000E+01	0.4113E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
135	145	0.3000E+01	0.4113E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
145	155	0.3000E+01	0.4113E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
155	165	0.3000E+01	0.3334E-03	-0.3772E-13	-0.3772E-01	-0.3772E-13	-0.3772E-01
95	104	0.1000E+02	0.2373E+01	0.2682E-09	0.2682E+03	0.2682E-09	0.2682E+03
104	114	0.1000E+02	0.1166E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
114	124	0.1000E+02	0.1186E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
124	134	0.1000E+02	0.1186E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
134	144	0.1000E+02	0.1186E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
144	154	0.1000E+02	0.1186E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
154	164	0.1000E+02	0.9491E+01	-0.1072E-08	-0.1072E+04	-0.1072E-08	-0.1072E+04
94	103	0.1500E+02	0.3559E+01	0.4022E-09	0.4022E+03	0.4022E-09	0.4022E+03
103	113	0.1500E+02	0.1780E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
113	123	0.1500E+02	0.1780E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
123	133	0.1500E+02	0.1780E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

133	143	0.1500E+02	0.1780E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
143	153	0.1500E+02	0.1780E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
153	163	0.1500E+02	0.1424E+02	-0.1609E-08	-0.1609E+04	-0.1609E-08	-0.1609E+04
93	102	0.2000E+02	0.4745E+01	0.5362E-09	0.5362E+03	0.5362E-09	0.5362E+03
102	112	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
112	122	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
122	132	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
132	142	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
142	152	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
152	162	0.2000E+02	0.1898E+02	-0.2145E-08	-0.2145E+04	-0.2145E-08	-0.2145E+04
92	101	0.2000E+02	0.4745E+01	0.5362E-09	0.5362E+03	0.5362E-09	0.5362E+03
101	111	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
111	121	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
121	131	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
131	141	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
141	151	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
151	161	0.2000E+02	0.1898E+02	-0.2145E-08	-0.2145E+04	-0.2145E-08	-0.2145E+04
91	100	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
100	110	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
110	120	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
120	130	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
130	140	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
140	150	0.2000E+02	0.2373E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
150	160	0.2000E+02	0.1898E+02	-0.2145E-08	-0.2145E+04	-0.2145E-08	-0.2145E+04
90	99	0.1500E+02	0.1109E+06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
99	109	0.1500E+02	0.8869E-01	-0.1002E-10	-0.1002E+02	-0.1002E-10	-0.1002E+02
109	119	0.1500E+02	0.6317E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
119	129	0.1500E+02	0.6317E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
129	139	0.1500E+02	0.6317E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
139	149	0.1500E+02	0.6317E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
149	159	0.1500E+02	0.6317E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
21	305	0.1286E+02	0.4565E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
305	306	0.6602E+01	0.2522E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
306	307	0.3814E+01	0.2659E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
307	308	0.2724E+01	0.1583E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
308	309	0.3004E+01	0.1517E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
309	310	0.3000E+01	0.1446E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
310	311	0.3000E+01	0.1446E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
311	312	0.3000E+01	0.1446E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
312	313	0.3000E+01	0.1446E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
313	314	0.3000E+01	0.1446E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
314	315	0.3000E+01	0.1446E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
206	207	0.6714E+01	0.5646E-02	0.1063E-13	0.1063E-01	0.1063E-13	0.1063E-01

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
207	208	0.6298E+01	0.1068E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
208	209	0.5000E+01	0.8953E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
209	210	0.5000E+01	0.8953E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
210	211	0.5000E+01	0.8953E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
211	212	0.5000E+01	0.8953E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
212	213	0.5000E+01	0.8953E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
213	214	0.5000E+01	0.8953E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
214	215	0.5000E+01	0.8953E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	22	0.3531E+01	0.2489E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

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BOUNDARY NODE DATA

NODB	POTENTIAL	FLUID FLOW	AVG RATE	DFB	DFB/TIME
1000	0.3200E+02	-0.1324E-34	-0.1324E-22	-0.1324E-34	-0.1324E-22
SYSTEM TOTAL		-0.1324E-34	-0.1324E-22	-0.1324E-34	-0.1324E-22

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EXTERNAL CONNECTION DATA

NODS	NODSB	AREAS	HSURE	TRANS	FLUID FLOW	AVG RATE	DFS	DFS/TIME
4	1000	0.4088E+02	0.1700E-15	0.1346E-13	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	1000	0.3000E+01	0.1970E-14	0.1087E-13	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	1000	0.1680E+02	0.2600E-11	0.8461E-10	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	1000	0.1680E+02	0.7400E-08	0.2408E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
500	1000	0.8400E+01	0.7390E-08	0.1202E-06	-0.1324E-34	-0.1324E-22	-0.1324E-34	-0.1324E-22

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KCYC = 0, ITERATIONS... TOTAL = 0, AVERAGE = 0, MAXIMUM = 0, FOR = 0.570 ,

TRUST OUTPUT DATA DATA DECK 1

* MINE TAILING CASE

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PRINTOUT CYCLE	ME	MSS	KWIT	DELTMX	SMALL	PSIVARY	DPPES	DPMAXS	NUTS
2 1	0	0	0	0.20186E-04	0.10000E-08	0.10000E-01	0.10000E-01	0.00000E+00	0

TOTAL TIME	TIME STEP	FLUID FLOW	PSI FROM FLUX	FLUX RATE	PSI RATE,
0.27310E-06	0.27310E-06	-0.59729E-19	-0.18749E-21	-0.21871E-12	-0.68653E-15

AVG PSI	FLUID CAPACITY	FLUID CONTENT	GEN RATE	FLUID GEN	PSI FROM GEN ,
-0.14825E+01	0.31857E+03	0.32960E+05	0.00000E+00	0.00000E+00	0.00000E+00

****

IDF = 0.0000E+00

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
3	0.1053E+03	-0.7332E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6246E+02	0.0000E+00	0.0000E+00
4	0.6544E+02	-0.3344E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1318E+03	0.0000E+00	0.0000E+00
5	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1083E+02	0.0000E+00	0.0000E+00
6	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1185E+03	0.0000E+00	-0.4356E-36
7	0.1680E+02	0.1520E+02	0.3200E+02	-0.8625E-32	-0.3156E-25	0.0000E+00	0.1520E+04	-0.7586E-32	-0.7568E-32
12	0.1204E+03	-0.8844E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4224E+02	0.0000E+00	0.0000E+00
13	0.9179E+02	-0.5979E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1095E+03	0.0000E+00	0.0000E+00
14	0.6086E+02	-0.2886E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1118E+03	0.0000E+00	0.0000E+00
15	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1164E+02	0.0000E+00	0.0000E+00
16	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1549E+03	0.0000E+00	0.0000E+00
17	0.1680E+02	0.1529E+02	0.3200E+02	-0.3471E-35	-0.1271E-28	0.0000E+00	0.4554E+03	-0.9145E-36	-0.9145E-36
21	0.1227E+03	-0.9067E+02	0.3200E+02	0.1885E-20	0.6904E-14	0.0000E+00	0.4648E+02	0.1313E-21	0.1313E-21
22	0.1034E+03	-0.7136E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4385E+02	0.0000E+00	0.0000E+00
23	0.8119E+02	-0.4919E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6501E+02	0.0000E+00	0.0000E+00
24	0.5726E+02	-0.2526E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4484E+02	0.0000E+00	0.0000E+00
25	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5955E+01	0.0000E+00	0.0000E+00
26	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6520E+02	0.0000E+00	0.0000E+00
27	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2330E+03	0.0000E+00	0.0000E+00
28	0.1343E+03	-0.1023E+03	0.3200E+02	0.1371E-04	0.5020E+02	0.0000E+00	0.9657E+02	0.2683E-05	0.2683E-05
29	0.1272E+03	-0.9520E+02	0.3200E+02	0.1069E-20	0.3882E-14	0.0000E+00	0.4973E+02	0.1136E-21	0.1136E-21
30	0.1206E+03	-0.8856E+02	0.3200E+02	0.2862E-20	0.1048E-13	0.0000E+00	0.2695E+02	0.1177E-21	0.1177E-21
31	0.1080E+03	-0.7597E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2950E+02	0.0000E+00	0.0000E+00
32	0.9232E+02	-0.6032E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3008E+02	0.0000E+00	0.0000E+00
33	0.7435E+02	-0.4235E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3141E+02	0.0000E+00	0.0000E+00
34	0.5499E+02	-0.2299E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3333E+02	0.0000E+00	0.0000E+00
35	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5414E+01	0.0000E+00	0.0000E+00
36	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5927E+02	0.0000E+00	0.0000E+00
37	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2118E+03	0.0000E+00	0.0000E+00
38	0.1155E+03	-0.8351E+02	0.3200E+02	0.3422E-02	0.1253E+05	0.0000E+00	0.9374E+02	0.5858E-03	0.5858E-03
39	0.1095E+03	-0.7746E+02	0.3200E+02	0.4115E-18	0.1507E-11	0.0000E+00	0.5490E+02	0.4346E-19	0.4346E-19
40	0.1038E+03	-0.7177E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2304E+02	0.0000E+00	0.0000E+00
41	0.9398E+02	-0.6198E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2330E+02	0.0000E+00	0.0000E+00
42	0.8180E+02	-0.4980E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2400E+02	0.0000E+00	0.0000E+00
43	0.6782E+02	-0.3582E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2480E+02	0.0000E+00	0.0000E+00
44	0.5273E+02	-0.2073E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2614E+02	0.0000E+00	0.0000E+00
45	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5414E+01	0.0000E+00	0.0000E+00
46	0.3360E+02	-0.1600E+01	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5927E+02	0.0000E+00	0.0000E+00
47	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2118E+03	0.0000E+00	0.0000E+00
48	0.9670E+02	-0.6470E+02	0.3200E+02	0.6408E-18	0.2346E-11	0.0000E+00	0.7074E+02	0.9637E-19	0.9637E-19
49	0.9168E+02	-0.5968E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5639E+02	0.0000E+00	0.0000E+00
50	0.8698E+02	-0.5498E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1693E+02	0.0000E+00	0.0000E+00
51	0.7929E+02	-0.4729E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1722E+02	0.0000E+00	0.0000E+00
52	0.7129E+02	-0.3929E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1758E+02	0.0000E+00	0.0000E+00

53	0,6130E+02	-0,2930E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1808E+02	0,0000E+00	0,0000E+00
NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
54	0,5052E+02	-0,1852E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1882E+02	0,0000E+00	0,0000E+00
55	0,4350E+02	-0,1150E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,5414E+01	0,0000E+00	0,0000E+00
56	0,3360E+02	-0,1600E+01	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,5927E+02	0,0000E+00	0,0000E+00
57	0,1680E+02	0,1520E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,2118E+03	0,0000E+00	0,0000E+00
58	0,7790E+02	-0,4590E+02	0,3200E+02	0,4046E-18	0,1481E-11	0,0000E+00	0,4664E+02	0,4516E-19	0,4516E-19
59	0,7390E+02	-0,4190E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,5851E+02	0,0000E+00	0,0000E+00
60	0,7019E+02	-0,3819E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1057E+02	0,0000E+00	0,0000E+00
61	0,6598E+02	-0,3398E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1067E+02	0,0000E+00	0,0000E+00
62	0,6077E+02	-0,2877E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1087E+02	0,0000E+00	0,0000E+00
63	0,5478E+02	-0,2278E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1112E+02	0,0000E+00	0,0000E+00
64	0,4832E+02	-0,1632E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1138E+02	0,0000E+00	0,0000E+00
65	0,4350E+02	-0,1150E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,5414E+01	0,0000E+00	0,0000E+00
66	0,3360E+02	-0,1600E+01	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,5927E+02	0,0000E+00	0,0000E+00
67	0,1680E+02	0,1520E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,2118E+03	0,0000E+00	0,0000E+00
68	0,5910E+02	-0,2710E+02	0,3200E+02	0,2378E-17	0,8708E-11	0,0000E+00	0,1852E+02	0,2372E-18	0,2372E-18
69	0,5600E+02	-0,2400E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,4679E+02	0,0000E+00	0,0000E+00
70	0,5339E+02	-0,2139E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,3726E+01	0,0000E+00	0,0000E+00
71	0,5200E+02	-0,2000E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,3745E+01	0,0000E+00	0,0000E+00
72	0,5026E+02	-0,1826E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,3769E+01	0,0000E+00	0,0000E+00
73	0,4826E+02	-0,1626E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,3796E+01	0,0000E+00	0,0000E+00
74	0,4611E+02	-0,1411E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,3848E+01	0,0000E+00	0,0000E+00
75	0,4350E+02	-0,1150E+02	0,3200E+02	0,3092E-23	0,1132E-16	0,0000E+00	0,5414E+01	0,2434E-24	0,2434E-24
76	0,3360E+02	-0,1600E+01	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,5927E+02	0,0000E+00	0,0000E+00
77	0,1680E+02	0,1520E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,2118E+03	0,0000E+00	0,0000E+00
78	0,4970E+02	-0,1770E+02	0,3200E+02	0,3404E-16	0,1246E-09	0,0000E+00	0,3803E+01	0,1292E-17	0,1292E-17
79	0,4724E+02	-0,1524E+02	0,3200E+02	0,3643E-21	0,1334E-14	0,0000E+00	0,3909E+01	0,1746E-22	0,1746E-22
80	0,4400E+02	-0,1200E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,5337E-24	0,0000E+00	0,0000E+00
81	0,4400E+02	-0,1200E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,5337E-24	0,0000E+00	0,0000E+00
85	0,4350E+02	-0,1150E+02	0,3200E+02	0,2295E-07	0,8405E-01	0,0000E+00	0,1557E+02	0,3121E-08	0,3121E-08
86	0,3360E+02	-0,1600E+01	0,3200E+02	0,1651E-20	0,6045E-14	0,0000E+00	0,3313E+02	0,1649E-19	0,1649E-19
87	0,1680E+02	0,1520E+02	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1184E+03	0,0000E+00	0,0000E+00
90	0,1394E+03	0,5637E+01	0,1450E+03	-0,3740E-04	-0,1370E+03	0,0000E+00	0,1814E+03	-0,3736E-05	-0,3736E-05
91	0,1195E+03	0,2549E+02	0,1450E+03	-0,1000E-01	-0,3662E+05	0,0000E+00	0,2935E+03	-0,1026E-02	-0,1026E-02
92	0,9963E+02	-0,6763E+02	0,3200E+02	0,4006E-02	0,1467E+05	0,0000E+00	0,7080E+02	0,5867E-03	0,5867E-03
93	0,7977E+02	-0,4776E+02	0,3200E+02	0,1331E-02	0,4875E+04	0,0000E+00	0,4642E+02	0,1464E-03	0,1464E-03
94	0,5990E+02	-0,2790E+02	0,3200E+02	0,1133E-02	0,4150E+04	0,0000E+00	0,1843E+02	0,1098E-03	0,1098E-03
95	0,4997E+02	-0,1796E+02	0,3200E+02	0,1957E-02	0,7166E+04	0,0000E+00	0,3792E+01	0,7324E-04	0,7324E-04
99	0,1394E+03	0,5637E+01	0,1450E+03	-0,3839E-04	-0,1406E+03	0,0000E+00	0,1726E+03	-0,3649E-05	-0,3649E-05
100	0,1195E+03	0,2550E+02	0,1450E+03	-0,2482E-11	-0,9090E-05	0,0000E+00	0,3408E+03	-0,2957E-12	-0,2957E-12
101	0,9963E+02	0,4537E+02	0,1450E+03	-0,1226E-02	-0,4488E+04	0,0000E+00	0,3394E+03	-0,1464E-03	-0,1464E-03
102	0,7977E+02	0,6523E+02	0,1450E+03	-0,1222E-02	-0,4474E+04	0,0000E+00	0,3381E+03	-0,1464E-03	-0,1464E-03
103	0,5990E+02	0,8510E+02	0,1450E+03	-0,1218E-02	-0,4460E+04	0,0000E+00	0,2526E+03	-0,1098E-03	-0,1098E-03
104	0,5000E+02	0,9500E+02	0,1450E+03	-0,1216E-02	-0,4454E+04	0,0000E+00	0,1680E+03	-0,7324E-04	-0,7324E-04
105	0,4350E+02	0,1015E+03	0,1450E+03	-0,3679E-05	-0,1347E+02	0,0000E+00	0,3194E+02	-0,8510E-06	-0,8510E-06
106	0,3360E+02	-0,1600E+01	0,3200E+02	0,2309E-06	0,8454E+00	0,0000E+00	0,1820E+03	0,8479E-06	0,8479E-06
107	0,1680E+02	0,1520E+02	0,3200E+02	0,2776E-18	0,1016E-11	0,0000E+00	0,1839E+03	0,3015E-19	0,3015E-19
109	0,1394E+03	-0,1074E+03	0,3200E+02	0,9189E-03	0,3365E+04	0,0000E+00	0,8397E+02	0,1492E-03	0,1492E-03
110	0,1195E+03	0,2550E+02	0,1450E+03	-0,1229E-02	-0,4501E+04	0,0000E+00	0,3408E+03	-0,1464E-03	-0,1464E-03
111	0,9963E+02	0,4537E+02	0,1450E+03	-0,4875E-12	-0,1785E-05	0,0000E+00	0,3394E+03	-0,5825E-13	-0,5825E-13
112	0,7977E+02	0,6523E+02	0,1450E+03	-0,2419E-12	-0,8857E-30	0,0000E+00	0,3381E+03	-0,2899E-13	-0,2899E-13
113	0,5990E+02	0,8510E+02	0,1450E+03	-0,2404E-12	-0,8802E-06	0,0000E+00	0,2526E+03	-0,2168E-13	-0,2168E-13
114	0,5000E+02	0,9500E+02	0,1450E+03	-0,2409E-12	-0,8820E-30	0,0000E+00	0,1680E+03	-0,1450E-13	-0,1450E-13
115	0,4350E+02	0,1015E+03	0,1450E+03	-0,3666E-05	-0,1342E+02	0,0000E+00	0,3194E+02	-0,8479E-06	-0,8479E-06
116	0,3360E+02	-0,1600E+01	0,3200E+02	0,2309E-06	0,8454E+00	0,0000E+00	0,1820E+03	0,8479E-06	0,8479E-06
117	0,1680E+02	0,1520E+02	0,3200E+02	0,2776E-18	0,1016E-11	0,0000E+00	0,1839E+03	0,3015E-19	0,3015E-19
119	0,1394E+03	-0,1074E+03	0,3200E+02	0,9021E-03	0,3303E+04	0,0000E+00	0,1260E+03	0,2197E-03	0,2197E-03
120	0,1195E+03	0,2550E+02	0,1450E+03	-0,1229E-02	-0,4501E+04	0,0000E+00	0,5111E+03	-0,2197E-03	-0,2197E-03
121	0,9963E+02	0,4537E+02	0,1450E+03	-0,2441E-12	-0,8938E-06	0,0000E+00	0,5091E+03	-0,4375E-13	-0,4375E-13

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
122	0.7977E+02	0.6523E+02	0.1450E+03	0.4802E-19	0.1758E-12	0.0000E+00	0.5071E+03	0.8633E-20	0.8633E-20
123	0.5990E+02	0.8510E+02	0.1450E+03	-0.1277E-18	-0.4674E-12	0.0000E+00	0.3788E+03	-0.1727E-19	-0.1727E-19
124	0.5000E+02	0.9500E+02	0.1450E+03	-0.1156E-14	-0.4231E-32	0.0000E+00	0.2521E+03	-0.1044E-15	-0.1044E-15
125	0.4350E+02	0.1015E+03	0.1450E+03	-0.3665E-05	-0.1342E+02	0.0000E+00	0.4791E+02	-0.1272E-05	-0.1272E-05
126	0.3360E+02	-0.1600E+01	0.3200E+02	0.2309E-06	0.8454E+00	0.0000E+00	0.2730E+03	0.1272E-05	0.1272E-05
127	0.1680E+02	0.1520E+02	0.3200E+02	0.2776E-18	0.1016E-11	0.0000E+00	0.2759E+03	0.4522E-19	0.4522E-19
129	0.1394E+03	-0.1074E+03	0.3200E+02	0.9021E-03	0.3303E+04	0.0000E+00	0.1679E+03	0.2929E-03	0.2929E-03
130	0.1195E+03	0.2550E+02	0.1450E+03	-0.1229E-02	-0.4502E+04	0.0000E+00	0.6815E+03	-0.2929E-03	-0.2929E-03
131	0.9963E+02	0.4537E+02	0.1450E+03	-0.2441E-12	-0.8939E-06	0.0000E+00	0.6788E+03	-0.5834E-13	-0.5834E-13
132	0.7976E+02	0.6524E+02	0.1450E+03	0.6402E-19	0.2344E-12	0.0000E+00	0.5071E+03	0.1151E-19	0.1151E-19
133	0.5990E+02	0.8510E+02	0.1450E+03	-0.1277E-18	-0.4674E-12	0.0000E+00	0.5051E+03	-0.2302E-19	-0.2302E-19
134	0.5000E+02	0.9500E+02	0.1450E+03	-0.1156E-14	-0.4232E-32	0.0000E+00	0.3361E+03	-0.1392E-15	-0.1392E-15
135	0.4350E+02	0.1015E+03	0.1450E+03	-0.3666E-05	-0.1342E+02	0.0000E+00	0.6388E+02	-0.1696E-05	-0.1696E-05
136	0.3360E+02	-0.1600E+01	0.3200E+02	0.2309E-06	0.8454E+00	0.0000E+00	0.3640E+03	0.1696E-05	0.1696E-05
137	0.1680E+02	0.1520E+02	0.3200E+02	0.2776E-18	0.1016E-11	0.0000E+00	0.3678E+03	0.6029E-19	0.6029E-19
139	0.1394E+03	-0.1074E+03	0.3200E+02	0.9021E-03	0.3303E+04	0.0000E+00	0.1679E+03	0.2929E-03	0.2929E-03
140	0.1195E+03	0.2550E+02	0.1450E+03	-0.1229E-02	-0.4502E+04	0.0000E+00	0.6815E+03	-0.2929E-03	-0.2929E-03
141	0.9963E+02	0.4537E+02	0.1450E+03	-0.4064E-12	-0.1488E-05	0.0000E+00	0.6788E+03	-0.9711E-13	-0.9711E-13
142	0.7977E+02	0.6523E+02	0.1450E+03	-0.1613E-12	-0.5905E-30	0.0000E+00	0.6762E+03	-0.3865E-13	-0.3865E-13
143	0.5990E+02	0.8510E+02	0.1450E+03	-0.1603E-12	-0.5868E-06	0.0000E+00	0.5051E+03	-0.2890E-13	-0.2890E-13
144	0.5000E+02	0.9500E+02	0.1450E+03	-0.1607E-12	-0.5893E-30	0.0000E+00	0.3361E+03	-0.1938E-13	-0.1938E-13
145	0.4350E+02	0.1015E+03	0.1450E+03	-0.3666E-05	-0.1342E+02	0.0000E+00	0.6388E+02	-0.1696E-05	-0.1696E-05
146	0.3360E+02	-0.1600E+01	0.3200E+02	0.2309E-06	0.8454E+00	0.0000E+00	0.3640E+03	0.1696E-05	0.1696E-05
147	0.1680E+02	0.1520E+02	0.3200E+02	0.2776E-18	0.1016E-11	0.0000E+00	0.3678E+03	0.6029E-19	0.6029E-19
149	0.1394E+03	-0.1074E+03	0.3200E+02	0.9021E-03	0.3303E+04	0.0000E+00	0.2519E+03	0.4393E-03	0.4393E-03
150	0.1195E+03	0.2550E+02	0.1450E+03	-0.2868E-02	-0.1050E+05	0.0000E+00	0.1022E+04	-0.1025E-02	-0.1025E-02
151	0.9963E+02	0.4537E+02	0.1450E+03	-0.1634E-02	-0.5984E+04	0.0000E+00	0.1018E+04	-0.5858E-03	-0.5858E-03
152	0.7977E+02	0.6523E+02	0.1450E+03	-0.1629E-02	-0.5965E+04	0.0000E+00	0.1014E+04	-0.5858E-03	-0.5858E-03
153	0.5990E+02	0.8510E+02	0.1450E+03	-0.1624E-02	-0.5947E+04	0.0000E+00	0.7577E+03	-0.4393E-03	-0.4393E-03
154	0.5000E+02	0.9500E+02	0.1450E+03	-0.1022E-02	-0.3938E+04	0.0000E+00	0.5041E+03	-0.2929E-03	-0.2929E-03
155	0.4350E+02	0.1015E+03	0.1450E+03	-0.3681E-05	-0.1348E+02	0.0000E+00	0.9582E+02	-0.2554E-05	-0.2554E-05
156	0.3360E+02	-0.1600E+01	0.3200E+02	0.2309E-06	0.8454E+00	0.0000E+00	0.5460E+03	0.2544E-05	0.2544E-05
157	0.1680E+02	0.1520E+02	0.3200E+02	0.2776E-18	0.1016E-11	0.0000E+00	0.5517E+03	0.9044E-19	0.9044E-19
159	0.1394E+03	-0.1074E+03	0.3200E+02	0.6717E-19	0.2460E-12	0.0000E+00	0.2519E+03	0.3271E-19	0.3271E-19
160	0.1195E+03	-0.8750E+02	0.3200E+02	0.1026E-02	0.3757E+04	0.0000E+00	0.3243E+03	0.5858E-03	0.5858E-03
161	0.9963E+02	-0.6765E+02	0.3200E+02	0.8422E-03	0.3084E+04	0.0000E+00	0.3344E+03	0.5858E-03	0.5858E-03
162	0.7977E+02	-0.4776E+02	0.3200E+02	0.7135E-03	0.2613E+04	0.0000E+00	0.3464E+03	0.5858E-03	0.5858E-03
163	0.5990E+02	-0.2790E+02	0.3200E+02	0.3037E-03	0.1112E+04	0.0000E+00	0.2751E+03	0.4393E-03	0.4393E-03
164	0.5000E+02	-0.1800E+02	0.3200E+02	0.1501E-03	0.5476E+03	0.0000E+00	0.1780E+03	0.2929E-03	0.2929E-03
165	0.4350E+02	-0.1150E+02	0.3200E+02	0.1411E-07	0.5168E-01	0.0000E+00	0.8356E+02	0.1030E-07	0.1030E-07
166	0.3360E+02	-0.1600E+01	0.3200E+02	0.2312E-20	0.8467E-14	0.0000E+00	0.5460E+03	0.2548E-19	0.2548E-19
167	0.1680E+02	0.1520E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5517E+03	0.0000E+00	0.0000E+00
201	0.1335E+03	-0.1015E+03	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1282E+02	0.0000E+00	0.0000E+00
202	0.1335E+03	-0.1015E+03	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3286E+02	0.0000E+00	0.0000E+00
203	0.1335E+03	-0.1015E+03	0.3200E+02	0.4158E-22	0.1522E-15	0.0000E+00	0.3513E+02	0.2070E-23	0.2070E-23
204	0.1394E+03	-0.1074E+03	0.3200E+02	0.7177E-05	0.2628E+02	0.0000E+00	0.2944E+02	0.4085E-06	0.4085E-06
205	0.1434E+03	-0.8003E+02	0.1434E+03	-0.2997E-05	-0.1098E+02	0.0000E+00	0.8458E+02	-0.4379E-05	-0.4379E-05
206	0.1490E+03	-0.5643E+01	0.1434E+03	-0.1122E-06	-0.4110E+00	0.0000E+00	0.3264E+02	-0.1721E-06	-0.1721E-06
207	0.1490E+03	-0.4023E+01	0.1450E+03	-0.2638E-06	-0.9661E+00	0.0000E+00	0.8039E+02	-0.1224E-05	-0.1224E-05
208	0.1530E+03	-0.8000E+01	0.1450E+03	-0.4840E-07	-0.1772E+00	0.0000E+00	0.5831E+02	-0.1038E-06	-0.1038E-06
209	0.1530E+03	-0.8000E+01	0.1450E+03	-0.5555E-07	-0.2034E+00	0.0000E+00	0.4358E+02	-0.8907E-07	-0.8907E-07
210	0.1530E+03	-0.8000E+01	0.1450E+03	-0.5555E-07	-0.2034E+00	0.0000E+00	0.4326E+02	-0.8842E-07	-0.8842E-07
211	0.1530E+03	-0.8000E+01	0.1450E+03	-0.5556E-07	-0.2034E+00	0.0000E+00	0.6488E+02	-0.1326E-06	-0.1326E-06
212	0.1530E+03	-0.8000E+01	0.1050E+03	-0.5555E-07	-0.2034E+00	0.0000E+00	0.8651E+02	-0.1768E-06	-0.1768E-06
213	0.1530E+03	-0.8000E+01	0.1450E+03	-0.5555E-07	-0.2034E+00	0.0000E+00	0.8651E+02	-0.1768E-06	-0.1768E-06
214	0.1530E+03	-0.8000E+01	0.1450E+03	-0.5555E-07	-0.2034E+00	0.0000E+00	0.1298E+03	-0.2653E-06	-0.2653E-06
215	0.1530E+03	-0.8000E+01	0.1450E+03	-0.5555E-07	-0.2034E+00	0.0000E+00	0.1298E+03	-0.2653E-06	-0.2653E-06
305	0.1313E+03	-0.9929E+02	0.3200E+02	0.1804E-03	0.5607E+03	0.0000E+00	0.1535E+02	0.3971E-05	0.3971E-05

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
306	0.1361E+03	-0.1041E+03	0.3200E+02	0.6810E-05	0.2494E+02	0.0000E+00	0.2734E+02	0.1750E-06	0.1750E-06
307	0.1409E+03	-0.1089E+03	0.3200E+02	0.3252E-04	0.1191E+03	0.0000E+00	0.4066E+02	0.1221E-05	0.1221E-05
308	0.1451E+03	-0.1131E+03	0.3200E+02	0.3629E-04	0.1329E+03	0.0000E+00	0.3511E+02	0.1157E-05	0.1157E-05
309	0.1465E+03	-0.1145E+03	0.3200E+02	0.3479E-08	0.1274E+03	0.0000E+00	0.3180E+02	0.1001E-05	0.1001E-05
310	0.1465E+03	-0.1145E+03	0.3200E+02	0.3084E-05	0.1129E+02	0.0000E+00	0.3169E+02	0.8842E-07	0.8842E-07
311	0.1465E+03	-0.1145E+03	0.3200E+02	0.3084E-05	0.1129E+02	0.0000E+00	0.4754E+02	0.1326E-06	0.1326E-06
312	0.1465E+03	-0.1145E+03	0.3200E+02	0.3084E-05	0.1129E+02	0.0000E+00	0.6337E+02	0.1768E-06	0.1768E-06
313	0.1465E+03	-0.1145E+03	0.3200E+02	0.3084E-05	0.1129E+02	0.0000E+00	0.6337E+02	0.1768E-06	0.1768E-06
314	0.1465E+03	-0.1145E+03	0.3200E+02	0.3084E-05	0.1129E+02	0.0000E+00	0.9506E+02	0.2653E-06	0.2653E-06
315	0.1465E+03	-0.1145E+03	0.3200E+02	0.6168E-05	0.2258E+02	0.0000E+00	0.4754E+02	0.2653E-06	0.2653E-06
500	0.1000E-02	0.3200E+02	0.3200E+02	-0.2935E-28	-0.1070E-21	0.0000E+00	0.2104E+03	-0.3607E-29	-0.3607E-29
501	0.1000E-02	0.3200E+02	0.3200E+02	-0.1178E-31	-0.4313E-25	0.0000E+00	0.2262E+03	-0.1556E-32	-0.1556E-32
502	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1157E+03	0.0000E+00	0.0000E+00
503	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
504	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
505	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
506	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
507	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
508	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5880E+02	0.0000E+00	0.0000E+00
510	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1052E+03	0.0000E+00	0.0000E+00
511	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6706E+02	0.0000E+00	0.0000E+00
512	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1006E+03	0.0000E+00	0.0000E+00
513	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1341E+03	0.0000E+00	0.0000E+00
514	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1341E+03	0.0000E+00	0.0000E+00
515	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2012E+03	0.0000E+00	0.0000E+00
516	0.1000E-02	0.3200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2012E+03	0.0000E+00	0.0000E+00

MATERIAL DATA

NAME	MATL	TOT CAP	TOT FLUID
SAND	1	0.20847E+03	0.65907E+04
MRO	2	0.84904E+02	0.73590E+04
CLAY	3	0.12157E+02	0.12728E+04
CLAY	4	0.43927E+00	0.48350E+03
MINE	5	0.12600E+02	0.17304E+05

TOTAL VOLUME CHANGE OVER ENTIRE FLOW REGION = 0.00000E+00

BOUNDARY NODE DATA

NODB	POTENTIAL	FLUID FLOW	AVG RATE	DFB	DFB/TIME
1000	0.3200E+02	-0.3616E-29	-0.1324E-22	-0.3616E-29	-0.1324E-22
SYSTEM TOTAL		-0.3616E-29	-0.1324E-22	-0.3616E-29	-0.1324E-22

KCYC = 1, ITERATIONS... TOTAL = 0, AVERAGE = 0, MAXIMUM = 0, FOR = 0.570 ,

TRUST OUTPUT DATA   DATA DECK 1

* MINE TAILING CASE

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PRINTOUT CYCLE	MF	MSS	KWIT	DELTMX	SMALL	PSIVARY	DPRES	DPMAXS	NUTS
3 1000	0	0	7	0.20186E-04	0.10000E-06	0.10000E-01	0.99952E-02	0.22931E-04	0

TOTAL TIME	TIME STEP	FLUID FLOW	PSI FROM FLUX	FLUX RATE	PSI RATE,
0.30375E-03	0.33911E+06	0.27546E-15	0.86443E-18	0.90684E-12	0.28458E-14

AVG PSI	FLUID CAPACITY	FLUID CONTENT	GEN RATE	FLUID GEN	PSI FROM GEN ,
-0.14980E+01	0.31866E+03	0.32960E+05	0.00000E+00	0.00000E+00	0.00000E+00

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TDF = 0.0000E+00

FINAL FLUID = 0.32960E+05FINAL FLOW = 0.27546E-15

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
3	0.1053E+03	-0.7332E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6246E+02	0.0000E+00	0.0000E+00
4	0.6544E+02	-0.3344E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1318E+03	0.0000E+00	0.0000E+00
5	0.4350E+02	-0.1150E+02	0.3200E+02	0.8621E-30	0.2542E-23	0.0000E+00	0.1083E+02	0.1033E-28	0.1046E-28
6	0.3360E+02	-0.1600E+01	0.3200E+02	0.2398E-22	0.7071E-16	0.0000E+00	0.1185E+03	0.6639E-19	0.6723E-19
7	0.1680E+02	0.1520E+02	0.3200E+02	0.1379E-16	0.4064E-10	0.0000E+00	0.1520E+04	0.9562E-15	0.9562E-15
12	0.1204E+03	-0.8844E+02	0.3200E+02	0.3677E-22	0.1084E-15	0.0000E+00	0.4224E+02	0.7078E-21	0.7078E-21
13	0.9179E+02	-0.5979E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1095E+03	0.0000E+00	0.0000E+00
14	0.6086E+02	-0.2886E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1118E+03	0.0000E+00	0.0000E+00
15	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1164E+02	0.0000E+00	0.0000E+00
16	0.3360E+02	-0.1600E+01	0.3200E+02	0.1460E-18	0.4304E-12	0.0000E+00	0.1549E+03	0.5374E-15	0.5374E-15
17	0.1680E+02	0.1520E+02	0.3200E+02	0.4661E-15	0.1374E-08	0.0000E+00	0.4554E+03	0.1436E-13	0.1436E-13
21	0.1227E+03	-0.9067E+02	0.3200E+02	0.7522E-12	0.2218E-05	0.0000E+00	0.4648E+02	0.2347E-10	0.2347E-10
22	0.1034E+03	-0.7136E+02	0.3200E+02	0.1048E-20	0.3089E-14	0.0000E+00	0.4385E+02	0.2797E-19	0.2797E-19
23	0.8119E+02	-0.4919E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.6501E+02	0.0000E+00	0.0000E+00
24	0.5726E+02	-0.2526E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.4484E+02	0.0000E+00	0.0000E+00
25	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5955E+01	0.0000E+00	0.0000E+00
26	0.3360E+02	-0.1600E+01	0.3200E+02	0.1980E-17	0.5837E-11	0.0000E+00	0.6520E+02	0.4395E-14	0.4395E-14
27	0.1680E+02	0.1520E+02	0.3200E+02	0.4841E-14	0.1427E-07	0.0000E+00	0.2330E+03	0.8737E-13	0.8737E-13
28	0.1343E+03	-0.1023E+03	0.3202E+02	0.1700E-04	0.5012E+02	0.0000E+00	0.9657E+02	0.2982E-02	0.2982E-02
29	0.1272E+03	-0.9524E+02	0.3200E+02	0.4397E-12	0.1296E-05	0.0000E+00	0.4973E+02	0.2110E-10	0.2110E-10
30	0.1206E+03	-0.8856E+02	0.3200E+02	0.1143E-11	0.3369E-05	0.0000E+00	0.2695E+02	0.2104E-10	0.2104E-10
31	0.1080E+03	-0.7597E+02	0.3200E+02	0.4289E-20	0.1264E-13	0.0000E+00	0.2950E+02	0.7188E-19	0.7188E-19
32	0.9232E+02	-0.6032E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3008E+02	0.0000E+00	0.0000E+00
33	0.7435E+02	-0.4235E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3141E+02	0.0000E+00	0.0000E+00
34	0.5499E+02	-0.2299E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3333E+02	0.0000E+00	0.0000E+00
35	0.4350E+02	-0.1150E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5414E+01	0.0000E+00	0.0000E+00
36	0.3360E+02	-0.1600E+01	0.3200E+02	0.1297E-16	0.3824E-10	0.0000E+00	0.5927E+02	0.2962E-13	0.2962E-13
37	0.1680E+02	0.1520E+02	0.3200E+02	0.2752E-13	0.8114E-07	0.0000E+00	0.2118E+03	0.5195E-12	0.5195E-12
38	0.1155E+03	-0.8001E+02	0.3551E+02	0.3607E-02	0.1063E+05	0.0000E+00	0.9435E+02	0.6113E+00	0.6113E+00
39	0.1075E+03	-0.7746E+02	0.3200E+02	0.1531E-09	0.4513E-03	0.0000E+00	0.5490E+02	0.7345E-08	0.7345E-08
40	0.1038E+03	-0.7177E+02	0.3200E+02	0.5753E-17	0.1696E-10	0.0000E+00	0.2304E+02	0.8079E-16	0.8079E-16
41	0.9398E+02	-0.6198E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2330E+02	0.0000E+00	0.0000E+00
42	0.8180E+02	-0.4980E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2400E+02	0.0000E+00	0.0000E+00
43	0.6782E+02	-0.3582E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2480E+02	0.0000E+00	0.0000E+00
44	0.5273E+02	-0.2073E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.2614E+02	0.0000E+00	0.0000E+00
45	0.4350E+02	-0.1150E+02	0.3200E+02	0.5934E-21	0.1750E-14	0.0000E+00	0.5414E+01	0.4622E-20	0.4622E-20
46	0.3360E+02	-0.1600E+01	0.3200E+02	0.7197E-16	0.2122E-09	0.0000E+00	0.5927E+02	0.1869E-12	0.1869E-12
47	0.1680E+02	0.1520E+02	0.3200E+02	0.1306E-12	0.3850E-06	0.0000E+00	0.2118E+03	0.2882E-11	0.2882E-11
48	0.9670E+02	-0.6470E+02	0.3200E+02	0.2383E-09	0.7026E-03	0.0000E+00	0.7074E+02	0.1626E-07	0.1626E-07
49	0.9168E+02	-0.5968E+02	0.3200E+02	0.6281E-17	0.1852E-10	0.0000E+00	0.5639E+02	0.2346E-15	0.2346E-15
50	0.8698E+02	-0.5498E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1693E+02	0.0000E+00	0.0000E+00
51	0.7999E+02	-0.4799E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1722E+02	0.0000E+00	0.0000E+00

52	0.7129E+02	-0.3929E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1758E+02	0.0000E+00	0.0000E+00
53	0.6130E+02	-0.2930E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1808E+02	0.0000E+00	0.0000E+00

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
54	0.5052E+02	-0.1852E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1882E+02	0.0000E+00	0.0000E+00
55	0.4350E+02	-0.1150E+02	0.3200E+02	0.3815E-20	0.1125E-13	0.0000E+00	0.5414E+01	0.3998E-19	0.3998E-19
56	0.3360E+02	-0.1600E+01	0.3200E+02	0.3633E-15	0.1071E-08	0.0000E+00	0.5927E+02	0.1088E-11	0.1088E-11
57	0.1680E+02	0.1520E+02	0.3200E+02	0.5516E-12	0.1626E-05	0.0000E+00	0.2118E+03	0.1453E-10	0.1453E-10
58	0.7790E+02	-0.4590E+02	0.3200E+02	0.1632E-09	0.4812E-03	0.0000E+00	0.4664E+02	0.8027E-08	0.8027E-08
59	0.7390E+02	-0.4190E+02	0.3200E+02	0.5987E-17	0.1765E-10	0.0000E+00	0.5851E+02	0.2838E-15	0.2838E-15
60	0.7019E+02	-0.3819E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1057E+02	0.0000E+00	0.0000E+00
61	0.6598E+02	-0.3398E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1067E+02	0.0000E+00	0.0000E+00
62	0.6077E+02	-0.2877E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1087E+02	0.0000E+00	0.0000E+00
63	0.5478E+02	-0.2278E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1112E+02	0.0000E+00	0.0000E+00
64	0.4832E+02	-0.1632E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.1138E+02	0.0000E+00	0.0000E+00
65	0.4350E+02	-0.1150E+02	0.3200E+02	0.2071E-19	0.6105E-13	0.0000E+00	0.5414E+01	0.2555E-18	0.2555E-18
66	0.3360E+02	-0.1600E+01	0.3200E+02	0.1669E-14	0.4921E-08	0.0000E+00	0.5927E+02	0.5850E-11	0.5850E-11
67	0.1680E+02	0.1520E+02	0.3200E+02	0.2067E-11	0.6090E-05	0.0000E+00	0.2118E+03	0.6672E-10	0.6672E-10
68	0.5910E+02	-0.2710E+02	0.3200E+02	0.1020E-08	0.3008E-02	0.0000E+00	0.1852E+02	0.4404E-07	0.4404E-07
69	0.5600E+02	-0.2400E+02	0.3200E+02	0.1171E-15	0.3452E-09	0.0000E+00	0.4679E+02	0.1130E-13	0.1130E-13
70	0.5339E+02	-0.2139E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3726E+01	0.0000E+00	0.0000E+00
71	0.5200E+02	-0.2000E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3745E+01	0.0000E+00	0.0000E+00
72	0.5026E+02	-0.1826E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3769E+01	0.0000E+00	0.0000E+00
73	0.4826E+02	-0.1626E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.3796E+01	0.0000E+00	0.0000E+00
74	0.4611E+02	-0.1411E+02	0.3200E+02	0.1765E-21	0.5205E-15	0.0000E+00	0.3848E+01	0.2091E-20	0.2091E-20
75	0.4550E+02	-0.1150E+02	0.3200E+02	0.1271E-14	0.3746E-08	0.0000E+00	0.5414E+01	0.4482E-13	0.4482E-13
76	0.3360E+02	-0.1600E+01	0.3200E+02	0.7014E-10	0.2068E-07	0.0000E+00	0.5927E+02	0.2922E-10	0.2922E-10
77	0.1680E+02	0.1520E+02	0.3200E+02	0.6883E-11	0.2029E-04	0.0000E+00	0.2118E+03	0.2801E-09	0.2801E-09
78	0.4970E+02	-0.1770E+02	0.3200E+02	0.1474E-07	0.4345E-01	0.0000E+00	0.3803E+01	0.2410E-06	0.2410E-06
79	0.4724E+02	-0.1524E+02	0.3200E+02	0.1823E-12	0.5376E-06	0.0000E+00	0.3909E+01	0.3673E-11	0.3673E-11
80	0.4400E+02	-0.1200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5337E-24	0.0000E+00	0.0000E+00
81	0.4400E+02	-0.1200E+02	0.3200E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.5337E-24	0.0000E+00	0.0000E+00
85	0.4350E+02	-0.1150E+02	0.3200E+02	0.2850E-07	0.8401E-01	0.0000E+00	0.1557E+02	0.3471E-05	0.3471E-05
86	0.3360E+02	-0.1600E+01	0.3200E+02	0.6498E-12	0.1916E-05	0.0000E+00	0.3313E+02	0.2862E-08	0.2862E-08
87	0.1680E+02	0.1520E+02	0.3200E+02	0.2077E-10	0.6125E-04	0.0000E+00	0.1184E+03	0.6124E-09	0.6124E-09
90	0.1394E+03	0.5521E+01	0.1449E+03	-0.2065E-03	-0.6089E+03	0.0000E+00	0.1814E+03	-0.1160E-01	-0.1160E-01
91	0.1195E+03	0.1551E+02	0.1350E+03	-0.9995E-02	-0.2947E+05	0.0000E+00	0.2925E+03	-0.1026E+01	-0.1026E+01
92	0.9963E+02	-0.6350E+02	0.3613E+02	0.4285E-02	0.1263E+05	0.0000E+00	0.7101E+02	0.6169E+00	0.6169E+00
93	0.7977E+02	-0.4631E+02	0.3345E+02	0.1595E-02	0.4701E+04	0.0000E+00	0.4658E+02	0.1609E+00	0.1609E+00
94	0.5990E+02	-0.2669E+02	0.3321E+02	0.1282E-02	0.3778E+04	0.0000E+00	0.1859E+02	0.1208E+00	0.1208E+00
95	0.4997E+02	-0.1593E+02	0.3403E+02	0.2126E-02	0.6267E+04	0.0000E+00	0.3873E+01	0.8026E-01	0.8026E-01
99	0.1394E+03	0.5593E+01	0.1490E+03	-0.5296E-04	-0.1561E+03	0.0000E+00	0.1726E+03	-0.4199E-02	-0.4199E-02
100	0.1195E+03	0.2519E+02	0.1446E+03	-0.7675E-03	-0.2263E+04	0.0000E+00	0.3407E+03	-0.4377E-01	-0.4377E-01
101	0.9963E+02	0.4411E+02	0.1437E+03	-0.1312E-02	-0.3868E+04	0.0000E+00	0.3393E+03	-0.1508E+00	-0.1508E+00
102	0.7977E+02	0.6393E+02	0.1437E+03	-0.1393E-02	-0.4105E+04	0.0000E+00	0.3379E+03	-0.1561E+00	-0.1561E+00
103	0.5990E+02	0.8380E+02	0.1437E+03	-0.1389E-02	-0.4096E+04	0.0000E+00	0.2525E+03	-0.1172E+00	-0.1172E+00
104	0.5000E+02	0.9376E+02	0.1438E+03	-0.1265E-02	-0.3729E+04	0.0000E+00	0.1680E+03	-0.7453E-01	-0.7453E-01
105	0.4350E+02	0.1015E+03	0.1450E+03	-0.3849E-04	-0.1133E+03	0.0000E+00	0.3194E+02	-0.4575E-02	-0.4575E-02
106	0.3360E+02	-0.1600E+01	0.3200E+02	0.2867E-06	0.8453E+00	0.0000E+00	0.1820E+03	0.9430E-03	0.9430E-03
107	0.1680E+02	0.1520E+02	0.3200E+02	0.5616E-10	0.1656E-03	0.0000E+00	0.1839E+03	0.3267E-08	0.3267E-08
109	0.1394E+03	-0.1064E+03	0.3301E+02	0.1105E-02	0.3259E+04	0.0000E+00	0.8414E+02	0.1642E+00	0.1642E+00
110	0.1195E+03	0.2422E+02	0.1437E+03	-0.1354E-02	-0.3992E+04	0.0000E+00	0.3406E+03	-0.1530E+00	-0.1530E+00
111	0.9963E+02	0.4530E+02	0.1449E+03	-0.1566E-03	-0.4617E+03	0.0000E+00	0.3394E+03	-0.8832E-02	-0.8832E-02
112	0.7977E+02	0.6520E+02	0.1450E+03	-0.8451E-04	-0.2491E+03	0.0000E+00	0.3351E+03	-0.4655E-02	-0.4655E-02
113	0.5990E+02	0.8506E+02	0.1450E+03	-0.8172E-04	-0.2409E+03	0.0000E+00	0.2526E+03	-0.3418E-02	-0.3418E-02
114	0.5000E+02	0.9496E+02	0.1450E+03	-0.7485E-04	-0.2207E+03	0.0000E+00	0.1680E+03	-0.2152E-02	-0.2152E-02
115	0.4350E+02	0.1015E+03	0.1450E+03	-0.5424E-05	-0.1599E+02	0.0000E+00	0.3194E+02	-0.1002E-02	-0.1002E-02
116	0.3360E+02	-0.1600E+01	0.3200E+02	0.2868E-06	0.8454E+00	0.0000E+00	0.1820E+03	0.9431E-03	0.9431E-03
117	0.1680E+02	0.1520E+02	0.3200E+02	0.1047E-09	0.3085E-03	0.0000E+00	0.1839E+03	0.5091E-08	0.5091E-08
119	0.1394E+03	-0.1064E+03	0.3299E+02	0.1085E-02	0.3190E+04	0.0000E+00	0.1262E+03	0.2418E+00	0.2418E+00
120	0.1195E+03	0.2419E+02	0.1437E+03	-0.1408E-02	-0.4151E+04	0.0000E+00	0.5109E+03	-0.2347E+00	-0.2347E+00

121	0,9963E+02	0,4533E+02	0,1450E+03	-0,8474E-04	-0,2498E+03	0,0000E+00	0,5091E+03	-0,6994E-02	-0,6994E-02

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
122	0,7977E+02	0,6523E+02	0,1450E+03	-0,4160E-05	-0,1226E+02	0,0000E+00	0,5071E+03	-0,2289E-03	-0,2289E-03
123	0,5990E+02	0,8510E+02	0,1450E+03	-0,1731E-05	-0,5105E+01	0,0000E+00	0,3788E+03	-0,7089E-04	-0,7089E-04
124	0,5000E+02	0,9500E+02	0,1450E+03	-0,1894E-05	-0,5585E+01	0,0000E+00	0,2521E+03	-0,5874E-04	-0,5874E-04
125	0,4350E+02	0,1015E+03	0,1450E+03	-0,4458E-05	-0,1314E+02	0,0000E+00	0,4791E+02	-0,1399E-02	-0,1399E-02
126	0,3360E+02	-0,1600E+01	0,3200E+02	0,2867E-06	0,8454E+00	0,0000E+00	0,2730E+03	0,1915E-02	0,1415E-02
127	0,1680E+02	0,1520E+02	0,3200E+02	0,1047E-09	0,3085E-03	0,0000E+00	0,2759E+03	0,7637E-08	0,7637E-08
129	0,1394E+03	-0,1064E+03	0,3299E+02	0,1085E-02	0,3199E+04	0,0000E+00	0,1683E+03	0,3224E+00	0,3224E+00
130	0,1195E+03	0,2419E+02	0,1437E+03	-0,1410E-02	-0,4158E+04	0,0000E+00	0,6812E+03	-0,3131E+00	-0,3131E+00
131	0,9963E+02	0,4533E+02	0,1450E+03	-0,8416E-04	-0,2481E+03	0,0000E+00	0,6788E+03	-0,9278E-02	-0,9278E-02
132	0,7976E+02	0,6524E+02	0,1450E+03	-0,4397E-05	-0,1296E+02	0,0000E+00	0,5071E+03	-0,2425E-03	-0,2425E-03
133	0,5990E+02	0,8510E+02	0,1450E+03	-0,9780E-06	-0,2883E+01	0,0000E+00	0,5051E+03	-0,5202E-04	-0,5202E-04
134	0,5000E+02	0,9500E+02	0,1450E+03	-0,1186E-05	-0,3496E+01	0,0000E+00	0,3361E+03	-0,5127E-04	-0,5127E-04
135	0,4350E+02	0,1015E+03	0,1450E+03	-0,4452E-05	-0,1313E+02	0,0000E+00	0,6387E+02	-0,1864E-02	-0,1864E-02
136	0,3360E+02	-0,1600E+01	0,3200E+02	0,2867E-06	0,8454E+00	0,0000E+00	0,3640E+03	0,1886E-02	0,1886E-02
137	0,1680E+02	0,1520E+02	0,3200E+02	0,1047E-09	0,3085E-03	0,0000E+00	0,3678E+03	0,1018E-07	0,1018E-07
139	0,1394E+03	-0,1064E+03	0,3299E+02	0,1085E-02	0,3198E+04	0,0000E+00	0,1683E+03	0,3224E+00	0,3224E+00
140	0,1195E+03	0,2016E+02	0,1437E+03	-0,1467E-02	-0,4324E+04	0,0000E+00	0,6912E+03	-0,3193E+00	-0,3193E+00
141	0,9963E+02	0,4530E+02	0,1449E+03	-0,1412E-03	-0,4164E+03	0,0000E+00	0,6788E+03	-0,1553E-01	-0,1553E-01
142	0,7977E+02	0,6521E+02	0,1450E+03	-0,6021E-04	-0,1775E+03	0,0000E+00	0,6761E+03	-0,6487E-02	-0,6487E-02
143	0,5990E+02	0,8507E+02	0,1450E+03	-0,5738E-04	-0,1692E+03	0,0000E+00	0,5051E+03	-0,4716E-02	-0,4716E-02
144	0,5000E+02	0,9498E+02	0,1450E+03	-0,5286E-04	-0,1558E+03	0,0000E+00	0,3361E+03	-0,2983E-02	-0,2983E-02
145	0,4350E+02	0,1015E+03	0,1450E+03	-0,5122E-05	-0,1510E+02	0,0000E+00	0,6387E+02	-0,1959E-02	-0,1959E-02
146	0,3360E+02	-0,1600E+01	0,3200E+02	0,2867E-06	0,8454E+00	0,0000E+00	0,3640E+03	0,1886E-02	0,1886E-02
147	0,1680E+02	0,1520E+02	0,3200E+02	0,1047E-09	0,3085E-03	0,0000E+00	0,3678E+03	0,1018E-07	0,1018E-07
149	0,1594E+03	-0,1064E+03	0,3298E+02	0,1068E-02	0,3148E+04	0,0000E+00	0,2524E+03	0,4798E+00	0,4798E+00
150	0,1195E+03	0,2243E+02	0,1419E+03	-0,3308E-02	-0,9752E+04	0,0000E+00	0,1021E+04	-0,1099E+01	-0,1099E+01
151	0,9963E+02	0,4355E+02	0,1432E+03	-0,2023E-02	-0,5963E+04	0,0000E+00	0,1018E+04	-0,6509E+00	-0,6509E+00
152	0,7977E+02	0,6346E+02	0,1432E+03	-0,1941E-02	-0,5721E+04	0,0000E+00	0,1014E+04	-0,6380E+00	-0,6380E+00
153	0,5990E+02	0,8333E+02	0,1432E+03	-0,1934E-02	-0,5701E+04	0,0000E+00	0,7572E+03	-0,4788E+00	-0,4788E+00
154	0,5000E+02	0,9331E+02	0,1433E+03	-0,1776E-02	-0,5239E+04	0,0000E+00	0,5038E+03	-0,3058E+00	-0,3058E+00
155	0,4350E+02	0,1015E+03	0,1450E+03	-0,5093E-04	-0,1502E+03	0,0000E+00	0,9580E+02	-0,1762E-01	-0,1762E-01
156	0,3360E+02	-0,1600E+01	0,3200E+02	0,2867E-06	0,8452E+00	0,0000E+00	0,5460E+03	0,2829E-02	0,2829E-02
157	0,1680E+02	0,1520E+02	0,3200E+02	0,1046E-09	0,3085E-03	0,0000E+00	0,5517E+03	0,1527E-07	0,1527E-07
159	0,1394E+03	-0,1074E+03	0,3200E+02	0,2577E-10	0,7599E-04	0,0000E+00	0,2519E+03	0,5657E-08	0,5657E-08
160	0,1195E+03	-0,8658E+02	0,3311E+02	0,1212E-02	0,3573E+04	0,0000E+00	0,3250E+03	0,6393E+00	0,6393E+00
161	0,9963E+02	-0,6671E+02	0,3292E+02	0,1012E-02	0,2983E+04	0,0000E+00	0,3350E+03	0,6436E+00	0,6436E+00
162	0,7977E+02	-0,4698E+02	0,3278E+02	0,8607E-03	0,2537E+04	0,0000E+00	0,3471E+03	0,6441E+00	0,6441E+00
163	0,5990E+02	-0,2757E+02	0,3233E+02	0,3657E-03	0,1078E+04	0,0000E+00	0,2756E+03	0,4841E+00	0,4841E+00
164	0,5000E+02	-0,1784E+02	0,3216E+02	0,1817E-03	0,5356E+03	0,0000E+00	0,1984E+03	0,3230E+00	0,3230E+00
165	0,4350E+02	-0,1150E+02	0,3200E+02	0,1777E-07	0,5246E-01	0,0000E+00	0,8356E+02	0,1154E-04	0,1154E-04
166	0,3360E+02	-0,1600E+01	0,3200E+02	0,8754E-12	0,2581E-05	0,0000E+00	0,5460E+03	0,4320E-08	0,4320E-08
167	0,1680E+02	0,1520E+02	0,3200E+02	0,6202E-14	0,1828E-07	0,0000E+00	0,5517E+03	0,6035E-12	0,6035E-12
201	0,1335E+03	-0,1015E+03	0,3200E+02	0,0000E+00	0,0000E+00	0,0000E+00	0,1282E+02	0,0000E+00	0,0000E+00
202	0,1335E+03	-0,1015E+03	0,3200E+02	0,2175E-23	0,6411E-37	0,0000E+00	0,3286E+02	0,3018E-22	0,3018E-22
203	0,1335E+03	-0,1015E+03	0,3200E+02	0,1665E-13	0,4908E+07	0,0000E+00	0,3513E+02	0,3714E-12	0,3714E-12
204	0,1394E+03	-0,1074E+03	0,3201E+03	0,8910E-05	0,2627E+02	0,0000E+00	0,2944E+02	0,4543E-03	0,4543E-03
205	0,1434E+03	-0,1133E-01	0,1434E+03	-0,3716E-05	-0,1095E+02	0,0000E+00	0,8458E+02	-0,4867E-02	-0,4867E-02
206	0,1490E+03	-0,5643E+01	0,1434E+03	-0,1394E-06	-0,4109E+00	0,0000E+00	0,3264E+02	-0,1915E-03	-0,1915E-03
207	0,1490E+03	-0,4023E+01	0,1450E+03	-0,3274E-06	-0,9653E+00	0,0000E+00	0,8039E+02	-0,1361E-02	-0,1361E-02
208	0,1530E+03	-0,8000E+01	0,1450E+03	-0,6008E-07	-0,1771E+00	0,0000E+00	0,5831E+02	-0,1155E-03	-0,1155E-03
209	0,1530E+03	-0,8000E+01	0,1450E+03	-0,6875E-07	-0,2033E+00	0,0000E+00	0,4358E+02	-0,9905E-04	-0,9905E-04
210	0,1530E+03	-0,8000E+01	0,1450E+03	-0,6398E-07	-0,2034E+00	0,0000E+00	0,4326E+02	-0,9834E-04	-0,9834E-04
211	0,1530E+03	-0,8000E+01	0,1450E+03	-0,6898E-07	-0,2034E+00	0,0000E+00	0,6488E+02	-0,1475E-03	-0,1475E-03
212	0,1530E+03	-0,8000E+01	0,1450E+03	-0,6898E-07	-0,2034E+00	0,0000E+00	0,8651E+02	-0,1967E-03	-0,1967E-03
213	0,1530E+03	-0,8000E+01	0,1450E+03	-0,6878E-07	-0,2034E+00	0,0000E+00	0,8651E+02	-0,1967E-03	-0,1967E-03
214	0,1530E+03	-0,8000E+01	0,1450E+03	-0,6897E-07	-0,2033E+00	0,0000E+00	0,1298E+03	-0,2950E-03	-0,2950E-03
215	0,1530E+03	-0,8000E+01	0,1450E+03	-0,6897E-07	-0,2033E+00	0,0000E+00	0,1298E+03	-0,2950E-03	-0,2950E-03
305	0,1313E+03	-0,2909E+02	0,3220E+02	0,2233E-03	0,6585E+03	0,0000E+00	0,1535E+02	0,4413E-02	0,4413E-02

NODE	Z	PSI	PHI	DPSI	DDPSI	G	W	H	F
306	0.1561E+03	-0.1041E+03	0.3201E+02	0.9455E-05	0.2493E+02	0.0000E+00	0.2734E+02	0.1947E-03	0.1947E-03
307	0.1409E+03	-0.1089E+03	0.3204E+02	0.4034E-04	0.1189E+03	0.0000E+00	0.4066E+02	0.1357E-02	0.1357E-02
308	0.1451E+03	-0.1131E+03	0.3204E+02	0.4499E-04	0.1326E+03	0.0000E+00	0.3511E+02	0.1287E-02	0.1287E-02
309	0.1465E+03	-0.1145E+03	0.3204E+02	0.4316E-04	0.1272E+03	0.0000E+00	0.3181E+02	0.1113E-02	0.1113E-02
310	0.1465E+03	-0.1145E+03	0.3200E+02	0.3829E-05	0.1129E+02	0.0000E+00	0.3169E+02	0.9834E-04	0.9834E-04
311	0.1465E+03	-0.1145E+03	0.3200E+02	0.3829E-05	0.1129E+02	0.0000E+00	0.4754E+02	0.1475E-03	0.1475E-03
312	0.1465E+03	-0.1145E+03	0.3200E+02	0.3829E-05	0.1129E+02	0.0000E+00	0.6338E+02	0.1967E-03	0.1967E-03
313	0.1465E+03	-0.1145E+03	0.3200E+02	0.3829E-05	0.1129E+02	0.0000E+00	0.6338E+02	0.1967E-03	0.1967E-03
314	0.1465E+03	-0.1145E+03	0.3200E+02	0.3829E-05	0.1129E+02	0.0000E+00	0.9506E+02	0.2950E-03	0.2950E-03
315	0.1465E+03	-0.1145E+03	0.3201E+02	0.7657E-05	0.2257E+02	0.0000E+00	0.4754E+02	0.2950E-03	0.2950E-03
500	0.1000E-02	0.3200E+02	0.3200E+02	0.5726E-16	0.1688E-09	0.0000E+00	0.2104E+03	0.4821E-15	0.4821E-15
501	0.1000E-02	0.3200E+02	0.3200E+02	0.4259E-15	0.1256E-08	0.0000E+00	0.2262E+03	0.7375E-14	0.7375E-14
502	0.1000E-02	0.3200E+02	0.3200E+02	0.5017E-14	0.1479E-07	0.0000E+00	0.1157E+03	0.4419E-13	0.4419E-13
503	0.1000E-02	0.3200E+02	0.3200E+02	0.2829E-13	0.8341E-07	0.0000E+00	0.1052E+03	0.2608E-12	0.2608E-12
504	0.1000E-02	0.3200E+02	0.3200E+02	0.1322E-12	0.3899E-06	0.0000E+00	0.1052E+03	0.1411E-11	0.1411E-11
505	0.1000E-02	0.3200E+02	0.3200E+02	0.5437E-12	0.1603E-05	0.0000E+00	0.1052E+03	0.6825E-11	0.6825E-11
506	0.1000E-02	0.3200E+02	0.3200E+02	0.1931E-11	0.5692E-05	0.0000E+00	0.1052E+03	0.2897E-10	0.2897E-10
507	0.1000E-02	0.3200E+02	0.3200E+02	0.5699E-11	0.1680E-04	0.0000E+00	0.1052E+03	0.1037E-09	0.1037E-09
508	0.1000E-02	0.3200E+02	0.3200E+02	0.1251E-10	0.3689E-04	0.0000E+00	0.5880E+02	0.1552E-09	0.1552E-09
510	0.1000E-02	0.3200E+02	0.3200E+02	0.1348E-10	0.3975E-04	0.0000E+00	0.1052E+03	0.3189E-09	0.3189E-09
511	0.1000E-02	0.3200E+02	0.3200E+02	0.6547E-12	0.1930E-05	0.0000E+00	0.6706E+02	0.1219E-09	0.1219E-09
512	0.1000E-02	0.3200E+02	0.3200E+02	0.2658E-14	0.7835E-08	0.0000E+00	0.1006E+03	0.8441E-12	0.8441E-12
513	0.1000E-02	0.3200E+02	0.3200E+02	0.2658E-14	0.7835E-08	0.0000E+00	0.1341E+03	0.1125E-11	0.1125E-11
514	0.1000E-02	0.3200E+02	0.3200E+02	0.2658E-14	0.7835E-08	0.0000E+00	0.1341E+03	0.1125E-11	0.1125E-11
515	0.1000E-02	0.3200E+02	0.3200E+02	0.2657E-14	0.7834E-08	0.0000E+00	0.2012E+03	0.1688E-11	0.1688E-11
516	0.1000E-02	0.3200E+02	0.3200E+02	0.1049E-18	0.3092E-12	0.0000E+00	0.2012E+03	0.4974E-16	0.4974E-16

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MATERIAL DATA

NAME	MATL	TOT CAP	TOT FLUID
SAND	1	0.20847E+03	0.65407E+04
MRO	2	0.84914E+02	0.73605E+04
CLAY	3	0.12157E+02	0.12727E+04
CLAY	4	0.43931E+00	0.48350E+03
MINE	5	0.12678E+02	0.17302E+05

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NODE DATA, CHECK TOTAL CONDUCTANCES (ZIP) AND TIME CONSTANTS (SLIM),
LARGE DIFFERENCES BETWEEN NODES MAY BE DUE TO POOR ZONING, AND MAY PRODUCE POOR RESULTS.

NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLIM	THETA	SATURATION	PC
3	1	0	0.8351E+03	0.1937E+01	0.1237E+00	0.1029E-18	0.6869E-05	0.1801E+05	0.4867E+00	0.1148E+00	0.5722E+14
4	1	1	0.1625E+04	0.1937E+01	0.4663E+00	0.5074E-18	0.4550E-04	0.1025E+05	0.4867E+00	0.1263E+00	0.5722E+14
5	1	1	0.1200E+03	0.1937E+01	0.1575E+00	0.5701E-17	0.2959E-01	0.5322E+01	0.4867E+00	0.1417E+00	0.5722E+14
6	1	1	0.6720E+03	0.1937E+01	0.3574E+02	0.7356E-14	0.3246E+03	0.1101E+00	0.4867E+00	0.2780E+00	0.5722E+14
7	1	1	0.2412E+04	0.1937E+01	0.8796E+00	0.8109E-10	0.2663E+04	0.3303E-03	0.4824E+00	0.1000E+01	0.6429E+14
12	1	0	0.5751E+03	0.1937E+01	0.6462E-01	0.7753E-19	0.3681E-05	0.1755E+05	0.4867E+00	0.1121E+00	0.5722E+14
13	1	0	0.1438E+04	0.1937E+01	0.2594E+00	0.1495E-18	0.1300E-04	0.1995E+05	0.4867E+00	0.1175E+00	0.5722E+14
14	1	0	0.1355E+04	0.1937E+01	0.4233E+00	0.9462E-18	0.7217E-04	0.5865E+04	0.4867E+00	0.1286E+00	0.5722E+14
15	1	0	0.1290E+03	0.1937E+01	0.1693E+00	0.5701E-17	0.3182E-01	0.5320E+01	0.4867E+00	0.1417E+00	0.5722E+14
16	1	0	0.8779E+03	0.1937E+01	0.4668E+02	0.7356E-14	0.3837E+03	0.1217E+00	0.4867E+00	0.2780E+00	0.5722E+14
17	1	0	0.7224E+03	0.1937E+01	0.2635E+00	0.8100E-10	0.3489E+04	0.7550E-04	0.4824E+00	0.1000E+01	0.6429E+14
21	1	0	0.6348E+03	0.1937E+01	0.6964E-01	0.7380E-19	0.1060E-04	0.6568E+04	0.4867E+00	0.1117E+00	0.5722E+14
22	1	0	0.5849E+03	0.1937E+01	0.8940E-01	0.1062E-18	0.4876E-05	0.1834E+05	0.4867E+00	0.1151E+00	0.5722E+14
23	1	0	0.8318E+03	0.1937E+01	0.1711E+00	0.2934E-18	0.1570E-04	0.1090E+05	0.4867E+00	0.1210E+00	0.5722E+14
24	1	0	0.5363E+03	0.1937E+01	0.1782E+00	0.1337E-17	0.6175E-04	0.2886E+04	0.4867E+00	0.1306E+00	0.5722E+14
25	1	0	0.6600E+02	0.1937E+01	0.8660E-01	0.5701E-17	0.1629E-01	0.5315E+01	0.4867E+00	0.1417E+00	0.5722E+14
26	1	0	0.3696E+03	0.1937E+01	0.1965E+02	0.7356E-14	0.1786E+03	0.1100E+00	0.4867E+00	0.2780E+00	0.5722E+14
27	1	0	0.3696E+03	0.1937E+01	0.1348E+00	0.8109E-10	0.2433E+04	0.5540E-04	0.4820E+00	0.1000E+01	0.6429E+14
28	2	0	0.3423E+03	0.1037E+01	0.1957E+00	0.9295E-18	0.8695E-01	0.2251E+01	0.3970E+00	0.4915E+00	0.5721E+14

29	2	0	0.1743E+03	0.1937E+01	0.1071E+00	0.1068E-17	0.2367E-04	0.4526E+04	0.3974E+00	0.4984E+00	0.5722E+14
30	1	0	0.3670E+03	0.1937E+01	0.4113E-01	0.7734E-19	0.1028E-04	0.4001E+04	0.4867E+00	0.1120E+00	0.5722E+14
31	1	0	0.3956E+03	0.1937E+01	0.5613E-01	0.9843E-19	0.3675E-05	0.1527E+05	0.4867E+00	0.1143E+00	0.5722E+14
32	1	0	0.3955E+03	0.1937E+01	0.7083E-01	0.1424E-18	0.5755E-05	0.1231E+05	0.4867E+00	0.1173E+00	0.5722E+14
33	1	0	0.3953E+03	0.1937E+01	0.9396E-01	0.3865E-18	0.1521E-04	0.6177E+04	0.4867E+00	0.1233E+00	0.5722E+14
34	1	0	0.3953E+03	0.1937E+01	0.1536E+00	0.1584E-17	0.6015E-04	0.2553E+04	0.4867E+00	0.1318E+00	0.5722E+14
35	1	0	0.6000E+02	0.1937E+01	0.7873E-01	0.5701E-17	0.1482E-01	0.5314E+01	0.4867E+00	0.1417E+00	0.5722E+14
36	1	0	0.3360E+03	0.1937E+01	0.1787E+02	0.7356E-14	0.1624E+03	0.1100E+00	0.4867E+00	0.2780E+00	0.5722E+14
37	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8100E-10	0.2335E+04	0.5247E-04	0.4824E+00	0.1000E+01	0.6429E+14
38	5	0	0.3447E+03	0.1937E+01	0.1776E+00	0.1350E-17	0.1898E+02	0.9356E-02	0.7620E+00	0.3215E+00	0.5559E+14
39	5	0	0.2000E+03	0.1937E+01	0.1056E+00	0.1398E-17	0.3809E-04	0.2777E+04	0.7610E+00	0.3229E+00	0.5722E+14
40	1	0	0.3075E+03	0.1937E+01	0.4670E-01	0.1055E-18	0.1408E-04	0.3317E+04	0.4867E+00	0.1150E+00	0.5722E+14
41	1	0	0.3075E+03	0.1937E+01	0.5387E-01	0.1219E-18	0.4607E-05	0.1169E+05	0.4867E+00	0.1168E+00	0.5722E+14
42	1	0	0.3075E+03	0.1937E+01	0.6282E-01	0.2852E-18	0.8378E-05	0.7499E+04	0.4867E+00	0.1208E+00	0.5722E+14
43	1	0	0.3075E+03	0.1937E+01	0.8416E-01	0.4750E-18	0.1799E-04	0.4677E+04	0.4867E+00	0.1255E+00	0.5722E+14
44	1	0	0.3075E+03	0.1937E+01	0.1602E+00	0.1830E-17	0.6045E-04	0.2650E+04	0.4867E+00	0.1330E+00	0.5722E+14
45	1	0	0.6000E+02	0.1937E+01	0.7873E-01	0.5701E-17	0.1482E-01	0.5314E+01	0.4867E+00	0.1417E+00	0.5722E+14
46	1	0	0.3360E+03	0.1937E+01	0.1787E+02	0.7356E-14	0.1624E+03	0.1100E+00	0.4867E+00	0.2780E+00	0.5722E+14
47	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8100E-10	0.2335E+04	0.5247E-04	0.4824E+00	0.1000E+01	0.6429E+14
48	5	0	0.2528E+03	0.1937E+01	0.1504E+00	0.1640E-17	0.5458E-04	0.2756E+04	0.7610E+00	0.3300E+00	0.5722E+14
49	5	0	0.2000E+03	0.1937E+01	0.1243E+00	0.1735E-17	0.4985E-04	0.2493E+04	0.7610E+00	0.3328E+00	0.5722E+14
50	1	0	0.2196E+03	0.1937E+01	0.4215E-01	0.2149E-18	0.1867E-04	0.2258E+04	0.4867E+00	0.1191E+00	0.5722E+14
51	1	0	0.2196E+03	0.1937E+01	0.4583E-01	0.3098E-18	0.8278E-05	0.5536E+04	0.4867E+00	0.1214E+00	0.5722E+14
52	1	0	0.2196E+03	0.1937E+01	0.5591E-01	0.4280E-18	0.1301E-04	0.4299E+04	0.4867E+00	0.1243E+00	0.5722E+14
53	1	0	0.2196E+03	0.1937E+01	0.6806E-01	0.8974E-18	0.2487E-04	0.2737E+04	0.4867E+00	0.1284E+00	0.5722E+14
54	1	0	0.2196E+03	0.1937E+01	0.1429E+00	0.2070E-17	0.6116E-04	0.2336E+04	0.4867E+00	0.1342E+00	0.5722E+14
55	1	0	0.6000E+02	0.1937E+01	0.7873E-01	0.5701E-17	0.1482E-01	0.5313E+01	0.4867E+00	0.1417E+00	0.5722E+14
56	1	0	0.3360E+03	0.1937E+01	0.1787E+02	0.7356E-14	0.1624E+03	0.1100E+00	0.4867E+00	0.2780E+00	0.5722E+14
57	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8100E-10	0.2335E+04	0.5247E-04	0.4824E+00	0.1000E+01	0.6429E+14
58	5	0	0.1609E+03	0.1937E+01	0.1116E+00	0.3763E-17	0.1140E-03	0.9794E+03	0.7610E+00	0.3431E+00	0.5722E+14
59	5	0	0.2000E+03	0.1937E+01	0.1601E+00	0.4616E-17	0.1540E-03	0.1039E+04	0.7610E+00	0.3465E+00	0.5722E+14
60	1	0	0.1318E+03	0.1937E+01	0.3435E-01	0.4430E-18	0.4512E-04	0.7614E+03	0.4867E+00	0.1247E+00	0.5722E+14
61	1	0	0.1318E+03	0.1937E+01	0.3741E-01	0.5001E-18	0.1374E-04	0.2724E+04	0.4867E+00	0.1261E+00	0.5722E+14
62	1	0	0.1318E+03	0.1937E+01	0.4122E-01	0.9553E-18	0.2177E-04	0.1894E+04	0.4867E+00	0.1287E+00	0.5722E+14
63	1	0	0.1318E+03	0.1937E+01	0.5282E-01	0.1607E-17	0.3683E-04	0.1430E+04	0.4867E+00	0.1319E+00	0.5722E+14
64	1	0	0.1318E+03	0.1937E+01	0.1028E+00	0.2310E-17	0.6228E-04	0.1651E+04	0.4867E+00	0.1354E+00	0.5722E+14
65	1	0	0.6000E+02	0.1937E+01	0.7873E-01	0.5701E-17	0.1482E-01	0.5312E+01	0.4867E+00	0.1417E+00	0.5722E+14
66	1	0	0.3360E+03	0.1937E+01	0.1787E+02	0.7356E-14	0.1624E+03	0.1100E+00	0.4867E+00	0.2780E+00	0.5722E+14

NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLIM	THETA	SATURATION	PC
67	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8100E-10	0.2335E+04	0.5247E-04	0.4824E+00	0.1000E+01	0.6429E+14
68	5	0	0.6033E+02	0.1937E+01	0.9974E-01	0.3131E-16	0.5932E-03	0.1681E+03	0.7610E+00	0.3647E+00	0.5722E+14
69	5	0	0.1500E+03	0.1937E+01	0.3296E+00	0.4670E-16	0.9753E-03	0.3379E+03	0.7610E+00	0.3709E+00	0.5722E+14
70	1	0	0.4393E+02	0.1937E+01	0.2118E-01	0.1758E-17	0.3026E-03	0.6999E+02	0.4867E+00	0.1327E+00	0.5722E+14
71	1	0	0.4393E+02	0.1937E+01	0.2478E-01	0.1910E-17	0.3913E-04	0.6333E+03	0.4867E+00	0.1334E+00	0.5722E+14
72	1	0	0.4393E+02	0.1937E+01	0.2927E-01	0.2099E-17	0.4397E-04	0.6718E+03	0.4867E+00	0.1343E+00	0.5722E+14
73	1	0	0.4393E+02	0.1937E+01	0.3442E-01	0.2316E-17	0.5021E-04	0.6854E+03	0.4867E+00	0.1350E+00	0.5722E+14
74	1	0	0.4393E+02	0.1937E+01	0.3998E-01	0.3168E-17	0.6718E-04	0.5952E+03	0.4867E+00	0.1374E+00	0.5722E+14
75	1	0	0.6000E+02	0.1937E+01	0.7873E-01	0.5701E-17	0.1483E-01	0.5309E+01	0.4867E+00	0.1417E+00	0.5722E+14
76	1	0	0.3360E+03	0.1937E+01	0.1787E+02	0.7356E-14	0.1624E+03	0.1100E+00	0.4867E+00	0.2780E+00	0.5722E+14
77	1	0	0.3360E+03	0.1937E+01	0.1225E+00	0.8100E-10	0.2335E+04	0.5207E-04	0.4824E+00	0.1000E+01	0.6429E+14
78	5	0	0.1149E+02	0.1937E+01	0.3796E-01	0.1366E-15	0.1602E-02	0.2370E+02	0.7610E+00	0.3942E+00	0.5722E+14
79	5	0	0.1149E+02	0.1937E+01	0.4794E-01	0.1815E-15	0.1927E-02	0.2488E+02	0.7610E+00	0.4051E+00	0.5722E+14
80	3	2	0.1000E-23	0.1937E+01	0.3851E-26	0.1492E-16	0.0000E+00	0.1000E+25	0.3474E+00	0.1000E+01	0.5722E+14
81	3	2	0.1000E-23	0.1937E+01	0.3851E-26	0.1492E-16	0.0000E+00	0.1000E+25	0.3474E+00	0.1000E+01	0.5722E+14
85	3	0	0.3354E+02	0.1937E+01	0.1360E+00	0.1572E-16	0.9245E-02	0.1471E+02	0.3474E+00	0.8721E+00	0.5722E+14
86	1	0	0.1878E+03	0.1937E+01	0.9987E+01	0.7356E-14	0.9082E+02	0.1100E+00	0.4867E+00	0.2780E+00	0.5722E+14
87	1	0	0.1878E+03	0.1937E+01	0.6849E-01	0.8100E-10	0.1770E+04	0.3869E-04	0.4824E+00	0.1000E+01	0.6429E+14
90	2	0	0.3153E+03	0.1937E+01	0.9988E-01	0.1476E-13	0.5011E+01	0.1993E-01	0.4223E+00	0.1000E+01	0.7328E+13
91	5	0	0.3305E+03	0.1937E+01	0.1026E+00	0.2370E-11	0.6175E+02	0.1661E-02	0.7823E+00	0.1000E+01	0.2116E+14
92	5	0	0.2527E+03	0.1937E+01	0.1520E+00	0.1663E-17	0.1901E+02	0.7998E-02	0.7622E+00	0.3307E+00	0.5529E+14

93	5	0	0.1608E+03	0.1937E+01	0.1113E+00	0.3677E-17	0.4746E+01	0.2345E-01	0.7614E+00	0.3428E+00	0.5654E+14
94	5	0	0.6039E+02	0.1937E+01	0.1041E+00	0.3338E-16	0.3560E+01	0.2923E-01	0.7614E+00	0.3656E+00	0.5665E+14
95	5	0	0.1142E+02	0.1937E+01	0.4155E-01	0.1687E-15	0.2374E+01	0.1750E-01	0.7616E+00	0.4020E+00	0.5627E+14
99	2	0	0.3000E+03	0.1937E+01	0.9503E-01	0.1476E-13	0.5003E+01	0.1866E-01	0.4224E+00	0.1000E+01	0.7294E+13
100	5	0	0.4000E+03	0.1937E+01	0.1191E+00	0.2370E-11	0.7605E+02	0.1566E-02	0.7850E+00	0.1000E+01	0.1669E+14
101	5	0	0.4000E+03	0.1937E+01	0.1195E+00	0.2370E-11	0.7503E+02	0.1574E-02	0.7793E+00	0.1000E+01	0.2634E+14
102	5	0	0.4000E+03	0.1937E+01	0.1199E+00	0.2370E-11	0.7503E+02	0.1579E-02	0.7738E+00	0.1000E+01	0.3560E+14
103	5	0	0.3000E+03	0.1937E+01	0.9018E-01	0.2370E-11	0.6881E+02	0.1311E-02	0.7683E+00	0.1000E+01	0.4484E+14
104	5	0	0.2000E+03	0.1937E+01	0.6020E-01	0.2370E-11	0.5695E+02	0.1057E-02	0.7656E+00	0.1000E+01	0.4942E+14
105	3	0	0.6000E+02	0.1937E+01	0.2313E+00	0.2739E-15	0.1901E+02	0.1217E-01	0.3789E+00	0.1000E+01	0.5188E+14
106	2	0	0.3360E+03	0.1937E+01	0.3672E+01	0.1263E-13	0.3351E+00	0.1096E+02	0.3974E+00	0.9826E+00	0.5722E+14
107	2	0	0.3360E+03	0.1937E+01	0.1086E+00	0.1476E-13	0.7075E+03	0.1535E-03	0.3939E+00	0.1000E+01	0.6429E+14
109	2	0	0.3000E+03	0.1937E+01	0.1642E+00	0.8588E-18	0.4834E+01	0.3397E-01	0.3976E+00	0.4876E+00	0.5675E+14
110	5	0	0.4000E+03	0.1937E+01	0.1191E+00	0.2370E-11	0.7593E+02	0.1569E-02	0.7847E+00	0.1000E+01	0.1711E+14
111	5	0	0.4000E+03	0.1937E+01	0.1195E+00	0.2370E-11	0.9491E+02	0.1259E-02	0.7796E+00	0.1000E+01	0.2579E+14
112	5	0	0.4000E+03	0.1937E+01	0.1199E+00	0.2370E-11	0.9491E+02	0.1263E-02	0.7741E+00	0.1000E+01	0.3502E+14
113	5	0	0.3000E+03	0.1937E+01	0.9018E-01	0.2370E-11	0.8305E+02	0.1086E-02	0.7687E+00	0.1000E+01	0.4426E+14
114	5	0	0.2000E+03	0.1937E+01	0.6020E-01	0.2370E-11	0.6644E+02	0.9062E-03	0.7660E+00	0.1000E+01	0.4886E+14
115	3	0	0.6000E+02	0.1937E+01	0.2313E+00	0.2739E-15	0.1901E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
116	2	0	0.3360E+03	0.1937E+01	0.3672E+01	0.1263E-13	0.3705E+00	0.9908E+01	0.3974E+00	0.9826E+00	0.5722E+14
117	2	0	0.3360E+03	0.1937E+01	0.1086E+00	0.1476E-13	0.4978E+00	0.2182E+00	0.3939E+00	0.1000E+01	0.6429E+14
119	2	0	0.4500E+03	0.1937E+01	0.2463E+00	0.8585E-18	0.7118E+01	0.3460E-01	0.3976E+00	0.4876E+00	0.5676E+14
120	5	0	0.6000E+03	0.1937E+01	0.1787E+00	0.2370E-11	0.9016E+02	0.1982E-02	0.7847E+00	0.1000E+01	0.1713E+14
121	5	0	0.6000E+03	0.1937E+01	0.1792E+00	0.2370E-11	0.1186E+03	0.1511E-02	0.7796E+00	0.1000E+01	0.2577E+14
122	5	0	0.6000E+03	0.1937E+01	0.1798E+00	0.2370E-11	0.1186E+03	0.1515E-02	0.7742E+00	0.1000E+01	0.3500E+14
123	5	0	0.4500E+03	0.1937E+01	0.1353E+00	0.2370E-11	0.1068E+03	0.1267E-02	0.7687E+00	0.1000E+01	0.4424E+14
124	5	0	0.3000E+03	0.1937E+01	0.9031E-01	0.2370E-11	0.8779E+02	0.1029E-02	0.7660E+00	0.1000E+01	0.4884E+14
125	3	0	0.9000E+02	0.1937E+01	0.3470E+00	0.2739E-15	0.2852E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
126	2	0	0.5040E+03	0.1937E+01	0.5508E+01	0.1263E-13	0.4496E+00	0.1225E+02	0.3974E+00	0.9826E+00	0.5722E+14
127	2	0	0.5040E+03	0.1937E+01	0.1629E+00	0.1476E-13	0.6225E+00	0.2617E+00	0.3939E+00	0.1000E+01	0.6429E+14
129	2	0	0.6000E+03	0.1937E+01	0.3284E+00	0.8585E-18	0.9491E+01	0.3460E-01	0.3976E+00	0.4876E+00	0.5676E+14
130	5	0	0.8000E+03	0.1937E+01	0.2382E+00	0.2370E-11	0.1044E+03	0.2282E-02	0.7847E+00	0.1000E+01	0.1713E+14
131	5	0	0.8000E+03	0.1937E+01	0.2390E+00	0.2370E-11	0.1424E+03	0.1679E-02	0.7796E+00	0.1000E+01	0.2577E+14
132	5	0	0.6000E+03	0.1937E+01	0.1798E+00	0.2370E-11	0.1424E+03	0.1263E-02	0.7741E+00	0.1000E+01	0.3500E+14
133	5	0	0.6000E+03	0.1937E+01	0.1803E+00	0.2370E-11	0.1305E+03	0.1382E-02	0.7687E+00	0.1000E+01	0.4424E+14
134	5	0	0.4000E+03	0.1937E+01	0.1204E+00	0.2370E-11	0.1091E+03	0.1103E-02	0.7660E+00	0.1000E+01	0.4884E+14

NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLIM	THETA	SATURATION	PC
135	3	0	0.1200E+03	0.1937E+01	0.4626E+00	0.2739E-15	0.3802E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
136	2	0	0.6720E+03	0.1937E+01	0.7343E+01	0.1263E-13	0.5287E+00	0.1389E+02	0.3974E+00	0.9826E+00	0.5722E+14
137	2	0	0.6720E+03	0.1937E+01	0.2172E+00	0.1476E-13	0.7973E+00	0.2907E+00	0.3939E+00	0.1000E+01	0.6429E+14
139	2	0	0.6000E+03	0.1937E+01	0.3284E+00	0.8585E-18	0.9491E+01	0.3460E-01	0.3976E+00	0.4876E+00	0.5676E+14
140	5	0	0.8000E+03	0.1937E+01	0.2382E+00	0.2370E-11	0.1044E+03	0.2282E-02	0.7847E+00	0.1000E+01	0.1714E+14
141	5	0	0.8000E+03	0.1937E+01	0.2390E+00	0.2370E-11	0.1424E+03	0.1679E-02	0.7796E+00	0.1000E+01	0.2579E+14
142	5	0	0.8000E+03	0.1937E+01	0.2397E+00	0.2370E-11	0.1424E+03	0.1684E-02	0.7741E+00	0.1000E+01	0.3501E+14
143	5	0	0.6000E+03	0.1937E+01	0.1803E+00	0.2370E-11	0.1305E+03	0.1382E-02	0.7687E+00	0.1000E+01	0.4425E+14
144	5	0	0.4000E+03	0.1937E+01	0.1204E+00	0.2370E-11	0.1091E+03	0.1103E-02	0.7660E+00	0.1000E+01	0.4885E+14
145	3	0	0.1200E+03	0.1937E+01	0.4626E+00	0.2739E-15	0.3802E+02	0.1217E-01	0.3790E+00	0.1000E+01	0.5187E+14
146	2	0	0.6720E+03	0.1937E+01	0.7343E+01	0.1263E-13	0.5287E+00	0.1389E+02	0.3974E+00	0.9826E+00	0.5722E+14
147	2	0	0.6720E+03	0.1937E+01	0.2172E+00	0.1476E-13	0.7473E+00	0.2907E+00	0.3939E+00	0.1000E+01	0.6429E+14
149	2	0	0.9000E+03	0.1937E+01	0.4925E+00	0.8584E-18	0.1424E+02	0.3460E-01	0.3976E+00	0.4876E+00	0.5676E+14
150	5	0	0.1200E+04	0.1937E+01	0.3574E+00	0.2370E-11	0.1281E+03	0.2789E-02	0.7842E+00	0.1000E+01	0.1794E+14
151	5	0	0.1200E+04	0.1937E+01	0.3585E+00	0.2370E-11	0.1851E+03	0.1937E-02	0.7791E+00	0.1000E+01	0.2660E+14
152	5	0	0.1200E+04	0.1937E+01	0.3596E+00	0.2370E-11	0.1851E+03	0.1943E-02	0.7737E+00	0.1000E+01	0.3582E+14
153	5	0	0.9000E+03	0.1937E+01	0.2705E+00	0.2370E-11	0.1744E+03	0.1551E-02	0.7682E+00	0.1000E+01	0.4506E+14
154	5	0	0.6000E+03	0.1937E+01	0.1806E+00	0.2370E-11	0.1495E+03	0.1208E-02	0.7655E+00	0.1000E+01	0.4963E+14
155	3	0	0.1800E+03	0.1937E+01	0.6939E+00	0.2739E-15	0.5703E+02	0.1217E-01	0.3789E+00	0.1000E+01	0.5188E+14
156	2	0	0.1008E+04	0.1937E+01	0.1102E+02	0.1263E-13	0.6869E+00	0.1604E+02	0.3974E+00	0.9826E+00	0.5722E+14
157	2	0	0.1008E+04	0.1937E+01	0.3258E+00	0.1476E-13	0.9968E+00	0.3269E+00	0.3939E+00	0.1000E+01	0.6429E+14
159	2	0	0.9000E+03	0.1937E+01	0.4870E+00	0.6413E-18	0.4139E-04	0.1177E+05	0.3974E+00	0.4966E+00	0.5722E+14
160	5	0	0.1200E+04	0.1937E+01	0.5740E+00	0.1229E-17	0.1808E+02	0.3045E-01	0.7613E+00	0.3179E+00	0.5670E+14

161	5	0	0.1200E+04	0.1937E+01	0.7015E+00	0.1602E-17	0.1898E+02	0.3695E-01	0.7613E+00	0.3289E+00	0.5679E+14
162	5	0	0.1200E+04	0.1937E+01	0.8260E+00	0.3534E-17	0.1898E+02	0.4352E-01	0.7613E+00	0.3422E+00	0.5685E+14
163	5	0	0.9000E+03	0.1937E+01	0.1464E+01	0.2901E-16	0.1424E+02	0.1029E+00	.0.7611E+00	0.3638E+00	0.5706E+14
164	5	0	0.6000E+03	0.1937E+01	0.1969E+01	0.1341E-15	0.9496E+01	0.2073E+00	0.7611E+00	0.3936E+00	0.5714E+14
165	3	0	0.1800E+03	0.1937E+01	0.7298E+00	0.1572E-16	0.7987E-01	0.9138E+01	0.3474E+00	0.8721E+00	0.5722E+14
166	2	0	0.1008E+04	0.1937E+01	0.1102E+02	0.1263E-13	0.5745E+00	0.1918E+02	0.3974E+00	0.9826E+00	0.5722E+14
167	2	0	0.1008E+04	0.1937E+01	0.3258E+00	0.1476E-13	0.8726E+00	0.3734E+00	0.3939E+00	0.1000E+01	0.6429E+14
201	1	0	0.1774E+03	0.1937E+01	0.1818E-01	0.5569E-19	0.1342E-05	0.1354E+05	0.4867E+00	0.1098E+00	0.5722E+14
202	1	0	0.4507E+03	0.1937E+01	0.4658E-01	0.5569E-19	0.1794E-05	0.2596E+05	0.4867E+00	0.1098E+00	0.5722E+14
203	1	0	0.4861E+03	0.1937E+01	0.4980E-01	0.5569E-19	0.2168E-05	0.2297E+05	0.4867E+00	0.1098E+00	0.5722E+14
204	2	0	0.1352E+03	0.1937E+01	0.5692E-01	0.8415E-18	0.1344E-01	0.4236E+01	0.3974E+00	0.4866E+00	0.5721E+14
205	2	0	0.1483E+03	0.1937E+01	0.1461E+01	0.1476E-13	0.1846E+00	0.7915E+01	0.4233E+00	0.9902E+00	0.5407E+13
206	2	0	0.6801E+02	0.1937E+01	0.1534E+01	0.1005E-14	0.5294E-01	0.2897E+02	0.4233E+00	0.8240E+00	0.5405E+13
207	2	0	0.1551E+03	0.1937E+01	0.4638E+01	0.4143E-14	0.5678E-01	0.8167E+02	0.4237E+00	0.8979E+00	0.4652E+13
208	2	0	0.1508E+03	0.1937E+01	0.2145E+01	0.3577E-15	0.1493E-01	0.1437E+03	0.4237E+00	0.7481E+00	0.4652E+13
209	2	0	0.1007E+03	0.1937E+01	0.1603E+01	0.3577E-15	0.4677E-02	0.3428E+03	0.4237E+00	0.7481E+00	0.4652E+13
210	2	0	0.1000E+03	0.1937E+01	0.1592E+01	0.3577E-15	0.4656E-02	0.3419E+03	0.4237E+00	0.7481E+00	0.4652E+13
211	2	0	0.1500E+03	0.1937E+01	0.2387E+01	0.3577E-15	0.6088E-02	0.3921E+03	0.4237E+00	0.7481E+00	0.4652E+13
212	2	0	0.2000E+03	0.1937E+01	0.3183E+01	0.3577E-15	0.7521E-02	0.4233E+03	0.4237E+00	0.7481E+00	0.4652E+13
213	2	0	0.2000E+03	0.1937E+01	0.3183E+01	0.3577E-15	0.7521E-02	0.4233E+03	0.4237E+00	0.7481E+00	0.4657E+13
214	2	0	0.3000E+03	0.1937E+01	0.4775E+01	0.3577E-15	0.1039E-01	0.4598E+03	0.4237E+00	0.7481E+00	0.4652E+13
215	2	0	0.3000E+03	0.1937E+01	0.4775E+01	0.3577E-15	0.9490E-02	0.5032E+03	0.4237E+00	0.7481E+00	0.4652E+13
305	1	0	0.2118E+03	0.1937E+01	0.2204E-01	0.5967E-19	0.1305E+00	0.1688E+00	0.4867E+00	0.1102E+00	0.5712E+14
306	4	0	0.5223E+02	0.1937E+01	0.2570E-01	0.1442E-18	0.5756E-02	0.4465E+01	0.3474E+00	0.6971E+00	0.5721E+14
307	4	0	0.7733E+02	0.1937E+01	0.3755E-01	0.1197E-18	0.3955E-01	0.9494E+00	0.3475E+00	0.6914E+00	0.5720E+14
308	4	0	0.6655E+02	0.1937E+01	0.3190E-01	0.1022E-18	0.3750E-01	0.8506E+00	0.3475E+00	0.6865E+00	0.5720E+14
309	4	0	0.6022E+02	0.1937E+01	0.2878E-01	0.9645E-19	0.3244E-01	0.8872E+00	0.3475E+00	0.6848E+00	0.5720E+14
310	4	0	0.6000E+02	0.1937E+01	0.2867E-01	0.9630E-19	0.2868E-02	0.9998E+01	0.3474E+00	0.6848E+00	0.5721E+14
311	4	0	0.9000E+02	0.1937E+01	0.4301E-01	0.9630E-19	0.4302E-02	0.9998E+01	0.3474E+00	0.6848E+00	0.5721E+14
312	4	0	0.1200E+03	0.1937E+01	0.5734E-01	0.9630E-19	0.5735E-02	0.9997E+01	0.3474E+00	0.6848E+00	0.5721E+14
313	4	0	0.1200E+03	0.1937E+01	0.5734E-01	0.9630E-19	0.5735E-02	0.9997E+01	0.3474E+00	0.6848E+00	0.5721E+10
314	4	0	0.1800E+03	0.1937E+01	0.8601E-01	0.9630E-19	0.8603E-02	0.9998E+01	0.3474E+00	0.6848E+00	0.5721E+14
315	4	0	0.9000E+02	0.1937E+01	0.4301E-01	0.9632E-19	0.8603E-02	0.5000E+01	0.3474E+00	0.6848E+00	0.5721E+14
500	1	1	0.3360E+03	0.1937E+01	0.1229E+00	0.8101E-10	0.1998E+04	0.6152E-04	0.4777E+00	0.1000E+01	0.7210E+14

NODE	MATL	NTYPE	VOLUME	RHO	CAPACITY	CONDUCTIVITY	ZIP	SLIM	THETA	SATURATION	PC
501	1	0	0.3612E+03	0.1937E+01	0.1321E+00	0.8101E-10	0.2425E+04	0.5449E-04	0.4777E+00	0.1000E+01	0.7210E+14
502	1	0	0.1848E+03	0.1937E+01	0.6760E-01	0.8101E-10	0.1573E+04	0.4297E-04	0.4777E+00	0.1000E+01	0.7210E+14
503	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8101E-10	0.1492E+04	0.4119E-04	0.4777E+00	0.1000E+01	0.7210E+14
504	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8101E-10	0.1492E+04	0.4119E-04	0.4777E+00	0.1000E+01	0.7210E+14
505	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8101E-10	0.1492E+04	0.4119E-04	0.4777E+00	0.1000E+01	0.7210E+14
506	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8101E-10	0.1492E+04	0.4119E-04	0.4777E+00	0.1000E+01	0.7210E+14
507	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8101E-10	0.1492E+04	0.4119E-04	0.4777E+00	0.1000E+01	0.7210E+14
508	1	0	0.9390E+02	0.1937E+01	0.3435E-01	0.8101E-10	0.1134E+04	0.3028E-04	0.4777E+00	0.1000E+01	0.7210E+14
510	1	0	0.1680E+03	0.1937E+01	0.6146E-01	0.8101E-10	0.7754E+03	0.7926E-04	0.4777E+00	0.1000E+01	0.7210E+14
511	3	0	0.1680E+03	0.1937E+01	0.7090E+00	0.2739E-15	0.2726E+03	0.2601E-02	0.2596E+00	0.1000E+01	0.7210E+14
512	3	0	0.2520E+03	0.1937E+01	0.1063E+01	0.2739E-15	0.1805E+01	0.5892E+01	0.2596E+00	0.1000E+01	0.7210E+14
513	3	0	0.3360E+03	0.1937E+01	0.1418E+01	0.2739E-15	0.2399E+00	0.5911E+01	0.2596E+00	0.1000E+01	0.7210E+14
514	3	0	0.3360E+03	0.1937E+01	0.1418E+01	0.2739E-15	0.2399E+00	0.5911E+01	0.2596E+00	0.1000E+01	0.7210E+14
515	3	0	0.5040E+03	0.1937E+01	0.2127E+01	0.2739E-15	0.3587E+00	0.5930E+01	0.2596E+00	0.1000E+01	0.7210E+14
516	3	0	0.5040E+03	0.1937E+01	0.2127E+01	0.2739E-15	0.3575E+00	0.5949E+01	0.2596E+00	0.1000E+01	0.7210E+14

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TOTAL VOLUME CHANGE OVER ENTIRE FLOW REGION = 0.00000E+00

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INTERNAL CONNECTION DATA. CHECK CONDUCTANCES (TRAN).
LARGE DIFFERENCES BETWEEN CONNECTIONS MAY BE DUE TO POOR ZONING, AND MAY PRODUCE POOR RESULTS.

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
201	202	0.1288E+02	0.3592E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
211	3	0.3015E+02	0.9830E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	4	0.4300E+02	0.5680E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	5	0.4000E+02	0.5096E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	6	0.4000E+02	0.2955E-01	0.1046E-28	0.3445E-25	0.1370E-30	0.4039E-24
6	7	0.4000E+02	0.3245E+03	0.6723E-19	0.2213E-15	0.6646E-21	0.2550E-14
7	500	0.4087E+02	0.1657E+04	0.8996E-18	0.2962E-14	0.1393E-19	0.4107E-13
202	203	0.1443E+01	0.4023E-07	0.3018E-22	0.9934E-19	0.1013E-24	0.2987E-18
202	3	0.1113E+02	0.3627E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
202	13	0.1078E+02	0.4018E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
202	12	0.2096E+02	0.6301E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
203	12	0.3138E+02	0.9436E-06	-0.7078E-21	-0.2330E-17	-0.2376E-23	-0.7006E-17
12	13	0.3154E+02	0.1451E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	14	0.4300E+02	0.6648E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	15	0.4300E+02	0.4084E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	16	0.4300E+02	0.3176E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	17	0.4728E+02	0.3535E+03	0.5374E-15	0.1769E-11	0.6815E-17	0.2010E-10
17	501	0.4300E+02	0.1743E+04	0.4278E-16	0.1408E-12	0.5251E-17	0.1549E-10
203	204	0.2878E+01	0.3066E-06	0.3714E-12	0.1223E-08	0.8291E-15	0.2445E-08
203	21	0.1879E+02	0.5578E-06	0.1858E-19	0.6115E-16	0.6219E-22	0.1834E-15
203	22	0.9718E+01	0.3200E-06	-0.2401E-21	-0.7903E-18	-0.8059E-24	-0.2376E-17
204	21	0.2295E+02	0.7903E-05	-0.9571E-11	-0.3151E-07	-0.2137E-13	-0.6301E-07
21	22	0.2027E+02	0.8145E-06	-0.2773E-19	-0.9131E-16	-0.9286E-22	-0.2738E-15
22	23	0.2200E+02	0.1582E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
23	24	0.3286E+02	0.8259E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
24	25	0.2200E+02	0.2434E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
25	26	0.2200E+02	0.1625E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
26	27	0.2200E+02	0.1785E+03	0.4395E-14	0.1447E-10	0.3892E-16	0.1148E-09
27	502	0.2200E+02	0.8920E+03	0.1207E-16	0.3975E-13	0.3493E-17	0.1030E-10
204	205	0.9086E+01	0.1343E-01	0.4543E-03	0.1496E+01	0.5072E-06	0.1496E+01
205	206	0.6713E+01	0.4062E-01	0.1977E-07	0.6508E-04	0.4412E-10	0.1301E-03
205	305	0.2209E+02	0.1305E+00	-0.4413E-02	-0.1453E+02	-0.4922E-05	-0.1451E+02
206	306	0.1022E+02	0.5754E-02	-0.1947E-03	-0.6409E+00	-0.2173E-06	-0.6408E+00
305	30	0.2189E+02	0.6925E-06	-0.2104E-10	-0.6925E-07	-0.4700E-13	-0.1386E-06
306	29	0.1004E+02	0.1653E-05	-0.1899E-11	-0.6252E-08	-0.4240E-14	-0.1250E-07
207	307	0.2384E+02	0.3955E-01	-0.1357E-02	-0.4468E+01	-0.1515E-05	-0.4467E+01
307	28	0.2354E+02	0.3319E-05	-0.1053E-10	-0.3467E-07	-0.2351E-13	-0.6934E-07
208	308	0.2349E+02	0.3365E-02	-0.1155E-03	-0.3802E+00	-0.1289E-06	-0.3801E+00
90	28	0.1471E+02	0.8693E-01	-0.2982E-02	-0.9818E+01	-0.3327E-05	-0.9811E+01
28	29	0.1733E+02	0.8303E-05	-0.1920E-10	-0.6321E-07	-0.4286E-13	-0.1264E-06
29	30	0.1846E+02	0.8037E-05	0.2551E-18	0.8400E-15	0.8550E-21	0.2521E-14
30	31	0.2002E+02	0.8172E-06	-0.4221E-19	-0.1389E-15	-0.1414E-21	-0.4169E-15
31	32	0.2000E+02	0.1073E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
32	33	0.2000E+02	0.1914E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
33	34	0.2000E+02	0.6267E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
34	35	0.2000E+02	0.2410E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
35	36	0.2000E+02	0.1477E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
36	37	0.2000E+02	0.1622E+03	0.2962E-13	0.9750E-10	0.2318E-15	0.6834E-09
37	503	0.2000E+02	0.8109E+03	-0.3992E-14	-0.1314E-10	0.6106E-18	0.1801E-11
91	38	0.2000E+02	0.1598E+02	-0.6113E+00	-0.2013E+04	-0.6406E-03	-0.1889E+04
38	39	0.2000E+02	0.1361E-04	-0.7345E-08	-0.2418E-04	-0.1617E-10	-0.4768E-04
39	40	0.2000E+02	0.1141E-04	-0.8076E-16	-0.2659E-12	-0.2685E-18	-0.7918E-12
40	41	0.2000E+02	0.1089E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
41	42	0.2000E+02	0.1547E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
42	43	0.2000E+02	0.3233E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
43	44	0.2000E+02	0.7468E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
44	45	0.2000E+02	0.2607E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
46	47	0.2000E+02	0.1622E+03	0.1869E-12	0.6154E-09	0.1286E-14	0.3792E-08
47	504	0.2000E+02	0.8109E+03	-0.5518E-13	-0.1816E-09	-0.1512E-15	-0.4458E-09
48	49	0.2000E+02	0.1661E-04	-0.1827E-15	-0.6015E-12	-0.6079E-18	-0.1793E-11
92	48	0.2000E+02	0.1660E-04	-0.1059E-07	-0.3471E-04	-0.2325E-10	-0.6857E-04
93	50	0.2000E+02	0.1933E+04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

50	51	0.2000E+02	0.2341E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
51	52	0.2000E+02	0.3339E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
52	53	0.2000E+02	0.5225E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
53	54	0.2000E+02	0.1135E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
54	55	0.2000E+02	0.2800E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
55	56	0.2000E+02	0.1477E-01	0.3998E-19	0.1316E-15	0.3004E-21	0.8857E-15
56	57	0.2000E+02	0.1622E+03	0.1088E-11	0.3582E-08	0.6492E-14	0.1914E-07
45	46	0.2000E+02	0.1477E-01	0.4622E-20	0.1522E-16	0.4672E-22	0.1378E-15
57	505	0.2000E+02	0.8109E+03	-0.5966E-12	-0.1964E-08	-0.2076E-14	-0.6121E-08
93	58	0.2000E+02	0.3698E-04	-0.8027E-08	-0.2643E-04	-0.1822E-10	-0.5372E-04
58	59	0.2000E+02	0.3938E-04	-0.2838E-15	-0.9342E-12	-0.9582E-18	-0.2826E-11
59	60	0.2000E+02	0.3785E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
60	61	0.2000E+02	0.4549E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
61	62	0.2000E+02	0.5918E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
62	63	0.2000E+02	0.1087E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
63	64	0.2000E+02	0.1750E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
64	65	0.2000E+02	0.2992E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
65	66	0.2000E+02	0.1477E-01	0.2550E-18	0.8396E-15	0.1629E-20	0.4803E-14
66	67	0.2000E+02	0.1622E+03	0.5850E-11	0.1926E-07	0.2982E-13	0.8795E-07
67	506	0.2000E+02	0.8109E+03	-0.5616E-11	-0.1849E-07	-0.2005E-13	-0.5913E-07
94	68	0.1500E+02	0.2475E-03	-0.4404E-07	-0.1450E-03	-0.1018E-09	-0.3001E-03
68	69	0.1500E+02	0.2582E-03	-0.1130E-13	-0.3720E-10	-0.3857E-16	-0.1137E-09
69	70	0.1500E+02	0.2832E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
70	71	0.2000E+02	0.1770E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
71	72	0.2000E+02	0.1950E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
72	73	0.2000E+02	0.2145E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
73	74	0.2000E+02	0.2490E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
74	75	0.2000E+02	0.3679E-04	0.2091E-20	0.6885E-17	0.7059E-23	0.2081E-16
75	76	0.2000E+02	0.1477E-01	0.6360E-18	0.2094E-14	0.5323E-20	0.1570E-13
76	77	0.2000E+02	0.1622E+03	0.2922E-10	0.9620E-07	0.1253E-12	0.3695E-06
77	507	0.2000E+02	0.8109E+03	-0.4811E-10	-0.1584E-06	-0.1642E-12	-0.4842E-06
95	78	0.1000E+02	0.8125E-03	-0.2410E-06	-0.7933E-03	-0.5594E-09	-0.1650E-02
78	79	0.1000E+02	0.7287E-03	-0.4576E-12	-0.1507E-08	-0.1565E-14	-0.4615E-08
79	85	0.1118E+02	0.8309E-03	0.3215E-11	0.1058E-07	0.7177E-14	0.2116E-07
85	86	0.1118E+02	0.8303E-02	-0.3216E-10	-0.1059E-06	-0.7180E-13	-0.2117E-06
86	87	0.1118E+02	0.7065E+02	0.7990E-10	0.2449E-06	0.2655E-12	0.7830E-06
87	508	0.1118E+02	0.4533E+03	-0.2145E-09	-0.7061E-06	-0.6786E-12	-0.2001E-05
209	309	0.2015E+02	0.2986E-02	-0.9905E-04	-0.3261E+00	-0.1106E-06	-0.3260E+00
307	99	0.2000E+02	0.2956E-01	0.1014E-02	0.3339E+01	0.1132E-05	0.3338E+01
99	100	0.2000E+02	0.4864E+01	-0.1546E-03	-0.5090E+00	-0.5320E-06	-0.1569E+01
100	101	0.2000E+02	0.2373E+02	-0.3745E-02	-0.1233E+02	-0.7193E-05	-0.2121E+02
101	102	0.2000E+02	0.2373E+02	-0.1004E-03	-0.3304E+00	-0.3255E-06	-0.9599E+00
102	103	0.2000E+02	0.2373E+02	0.1222E-04	0.4023E-01	0.2547E-07	0.7510E-01
103	104	0.2000E+02	0.2373E+02	0.1549E-03	0.5098E+00	0.4922E-06	0.1452E+01
104	105	0.2000E+02	0.1598E+02	0.3629E-02	0.1195E+02	0.7834E-05	0.2310E+02
105	106	0.2000E+02	0.2748E-01	-0.9430E-03	-0.3105E+01	-0.1053E-05	-0.3104E+01
106	107	0.2000E+02	0.1307E+00	-0.5092E-08	-0.1676E-04	-0.1137E-10	-0.3352E-04
107	510	0.2000E+02	0.1623E+03	-0.4678E-09	-0.1540E-05	-0.1368E-11	-0.4035E-05
210	310	0.2000E+02	0.2865E-02	-0.9834E-04	-0.3237E+00	-0.1098E-06	-0.3237E+00
310	109	0.2000E+02	0.2491E-05	0.3791E-09	0.1248E-05	0.8458E-12	0.2494E-05
109	110	0.2000E+02	0.4745E+01	0.1612E+00	0.5307E+03	0.1782E-03	0.5254E+03
110	111	0.2000E+02	0.2373E+02	0.4533E-02	0.1492E+02	0.9727E-05	0.2868E+02

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFT	DFT/TIME
111	112	0.2000E+02	0.2373E+02	0.8761E-04	0.2884E+00	0.2816E-06	0.8304E+00
112	113	0.2000E+02	0.2373E+02	0.1867E-05	0.6145E-02	0.7542E-08	0.2224E-01
113	114	0.2000E+02	0.2373E+02	0.3977E-05	0.1309E-01	0.1731E-07	0.5103E-01
114	115	0.2000E+02	0.1898E+02	0.5869E-04	0.1932E+00	0.2018E-06	0.5950E+00
115	116	0.2000E+02	0.2748E-01	-0.9431E-03	-0.3105E+01	-0.1053E-05	-0.3105E+01
116	117	0.2000E+02	0.1307E+00	-0.5092E-08	-0.1676E-04	-0.1137E-10	-0.3352E-04
117	511	0.2000E+02	0.1188E+00	-0.5614E-12	-0.1848E-08	-0.1877E-14	-0.5536E-08

211	311	0.3000E+02	0.4298E-02	-0.1475E-03	-0.4856E+00	-0.1647E-06	-0.4856E+00
311	119	0.3000E+02	0.3735E-05	0.5581E-09	0.1837E-05	0.1245E-11	0.3672E-05
119	120	0.3000E+02	0.7119E+01	0.2418E+00	0.7961E+03	0.2672E-03	0.7880E+03
120	121	0.3000E+02	0.3557E+02	0.7046E-02	0.2320E+02	0.1937E-04	0.4531E+02
121	122	0.3000E+02	0.3559E+02	0.1388E-03	0.4569E+00	0.4546E-06	0.1341E+01
122	123	0.3000E+02	0.3559E+02	0.2057E-05	0.6772E-02	0.9008E-08	0.2656E-01
123	124	0.3000E+02	0.3559E+02	-0.5379E-06	-0.1771E-02	-0.1522E-08	-0.4488E-02
124	125	0.3000E+02	0.2847E+02	-0.1591E-04	-0.5237E-01	-0.3262E-07	-0.9619E-01
125	126	0.3000E+02	0.4122E-01	-0.1415E-02	-0.4657E+01	-0.1579E-05	-0.4657E+01
126	127	0.3000E+02	0.1960E+00	-0.7637E-08	-0.2514E-04	-0.1705E-10	-0.5028E-04
127	512	0.3000E+02	0.1782E+00	-0.8441E-12	-0.2779E-08	-0.2826E-14	-0.8334E-08
212	312	0.4000E+02	0.5730E-02	-0.1967E-03	-0.6475E+00	-0.2196E-06	-0.6475E+00
312	129	0.4000E+02	0.4981E-05	0.7441E-09	0.2450E-05	0.1660E-11	0.4895E-05
129	130	0.4000E+02	0.9491E+01	0.3224E+00	0.1061E+04	0.3563E-03	0.1051E+04
130	131	0.4000E+02	0.4745E+02	0.9398E-02	0.3094E+02	0.2050E-04	0.6046E+02
131	132	0.4000E+02	0.4745E+02	0.1840E-03	0.6058E+00	0.6018E-06	0.1775E+01
132	133	0.4000E+02	0.4745E+02	0.3896E-05	0.1283E-01	0.1701E-07	0.5016E-01
133	134	0.4000E+02	0.4745E+02	-0.7511E-06	-0.2473E-02	-0.2206E-08	-0.6506E-02
134	135	0.4000E+02	0.3796E+02	-0.2188E-04	-0.7203E-01	-0.4636E-07	-0.1367E+00
135	136	0.4000E+02	0.5495E-01	-0.1886E-02	-0.6209E+01	-0.2106E-05	-0.6210E+01
136	137	0.4000E+02	0.2614E+00	-0.1018E-07	-0.3352E-04	-0.2273E-10	-0.6704E-04
137	513	0.4000E+02	0.2376E+00	-0.1125E-11	-0.3705E-08	-0.3768E-14	-0.1111E-07
213	313	0.4000E+02	0.5730E-02	-0.1967E-03	-0.6475E+00	-0.2196E-06	-0.6475E+00
313	139	0.4000E+02	0.4981E-05	0.7441E-09	0.2450E-05	0.1660E-11	0.4895E-05
139	140	0.4000E+02	0.9491E+01	0.3224E+00	0.1061E+04	0.3562E-03	0.1050E+04
140	141	0.4000E+02	0.4745E+02	0.9399E-02	0.3094E+02	0.2050E-04	0.6045E+02
141	142	0.4000E+02	0.4745E+02	0.1859E-03	0.6119E+00	0.6090E-06	0.1796E+01
142	143	0.4000E+02	0.4745E+02	0.3494E-05	0.1150E-01	0.1460E-07	0.4306E-01
143	144	0.4000E+02	0.4745E+02	0.4982E-05	0.1640E-01	0.2217E-07	0.6536E-01
144	145	0.4000E+02	0.3796E+02	0.7330E-04	0.2413E+00	0.2637E-06	0.7778E+00
145	146	0.4000E+02	0.5495E-01	-0.1886E-02	-0.6209E+01	-0.2106E-05	-0.6210E+01
146	147	0.4000E+02	0.2614E+00	-0.1018E-07	-0.3352E-04	-0.2273E-10	-0.6704E-04
147	514	0.4000E+02	0.2376E+00	-0.1125E-11	-0.3705E-08	-0.3768E-14	-0.1111E-07
214	314	0.6000E+02	0.8595E-02	-0.2950E-03	-0.9712E+00	-0.3294E-06	-0.9712E+00
314	149	0.6000E+02	0.7470E-05	0.1110E-08	0.3655E-05	0.2470E-11	0.7284E-05
149	150	0.6000E+02	0.1424E+02	0.4798E+00	0.1580E+04	0.5260E-03	0.1551E+04
150	151	0.6000E+02	0.7118E+02	0.1399E-01	0.4607E+02	0.3035E-04	0.8951E+02
151	152	0.6000E+02	0.7118E+02	0.3248E-03	0.1069E+01	0.9974E-06	0.2941E+01
152	153	0.6000E+02	0.7118E+02	0.4767E-04	0.1569E+00	0.1087E-06	0.3207E+00
153	154	0.6000E+02	0.7118E+02	0.5816E-03	0.1715E+01	0.1855E-05	0.5471E+01
154	155	0.6000E+02	0.5695E+02	0.1477E-01	0.4864E+02	0.3217E-04	0.9486E+02
155	156	0.6000E+02	0.8243E-01	-0.2829E-02	-0.9313E+01	-0.3158E-05	-0.9313E+01
156	157	0.6000E+02	0.3921E+00	-0.1527E-07	-0.5029E-04	-0.3410E-10	-0.1006E-03
157	515	0.6000E+02	0.3564E+00	-0.1688E-11	-0.5557E-08	-0.5652E-14	-0.1667E-07
215	315	0.6000E+02	0.8595E-02	-0.2950E-03	-0.9712E+00	-0.3293E-06	-0.9712E+00
315	159	0.6000E+02	0.7368E-05	-0.7668E-11	-0.2524E-07	-0.1712E-13	-0.5048E-07
159	160	0.6000E+02	0.2760E-04	0.4692E-08	0.1545E-04	0.1040E-10	0.3068E-04
160	161	0.6000E+02	0.3916E-09	-0.1157E-08	-0.3809E-05	-0.2541E-11	-0.7492E-05
161	162	0.6000E+02	0.5972E-04	-0.1263E-08	-0.4159E-05	-0.2817E-11	-0.8308E-05
162	163	0.6000E+02	0.2591E-03	-0.1744E-07	-0.5742E-04	-0.3946E-10	-0.1164E-03

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
163	164	0.6000E+02	0.1503E-02	-0.3801E-07	-0.1251E-03	-0.8594E-10	-0.2520E-03
164	165	0.6000E+02	0.3318E-02	-0.8270E-07	-0.2723E-03	-0.1852E-09	-0.5461E-03
165	166	0.6000E+02	0.7622E-01	-0.1824E-09	-0.6005E-06	-0.4082E-12	-0.1204E-05
166	167	0.6000E+02	0.3920E+00	-0.1548E-13	-0.5095E-10	-0.5176E-16	-0.1526E-09
167	516	0.6000E+02	0.3564E+00	-0.4967E-16	-0.1635E-12	-0.2229E-18	-0.6569E-12
4	14	0.3646E+02	0.1086E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	24	0.2696E+02	0.1382E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
24	34	0.2210E+02	0.1553E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
34	44	0.1768E+02	0.1945E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

44	54	0.1326E+02	0.1246E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
54	64	0.8839E+01	0.9372E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
64	74	0.4420E+01	0.5491E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
74	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	13	0.3282E+02	0.1843E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	23	0.2696E+02	0.2406E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
23	33	0.2210E+02	0.3052E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
33	43	0.1768E+02	0.3577E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
43	53	0.1326E+02	0.3714E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
53	63	0.8839E+01	0.4598E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
63	73	0.4420E+01	0.3869E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
73	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	22	0.1575E+02	0.6563E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
22	32	0.2210E+02	0.1255E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
32	42	0.1768E+02	0.1513E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
42	52	0.1326E+02	0.2082E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
52	62	0.8839E+01	0.2360E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
62	72	0.4420E+01	0.2620E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
72	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
21	31	0.2211E+02	0.8714E-06	-0.2967E-19	-0.9768E-16	-0.9934E-22	-0.2930E-15
31	41	0.1768E+02	0.9126E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
41	51	0.1326E+02	0.1059E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
51	61	0.8839E+01	0.1539E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
61	71	0.4420E+01	0.1730E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
71	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
30	40	0.1768E+02	0.7342E-06	-0.3792E-19	-0.1248E-15	-0.1270E-21	-0.3746E-15
40	50	0.1326E+02	0.8454E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
50	60	0.8839E+01	0.1153E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
60	70	0.4420E+01	0.1562E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
70	80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
29	39	0.1000E+02	0.5676E-05	0.4006E-16	0.1319E-12	0.1332E-18	0.3927E-12
39	49	0.1000E+02	0.7337E-05	-0.5193E-16	-0.1709E-12	-0.1726E-18	-0.5091E-12
49	59	0.1000E+02	0.1157E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
59	69	0.1000E+02	0.6524E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
69	79	0.1000E+02	0.5687E-03	0.2761E-17	0.9089E-14	0.9554E-20	0.2817E-13
28	38	0.1967E+02	0.9978E-05	0.5406E-08	0.1780E-04	0.1180E-10	0.3479E-04
38	48	0.1504E+02	0.1060E-04	-0.5722E-08	-0.1884E-04	-0.1259E-10	-0.3712E-04
48	58	0.1041E+02	0.1076E-04	-0.4083E-16	-0.1344E-12	-0.1319E-18	-0.3891E-12
58	68	0.5784E+01	0.2685E-04	0.9814E-15	0.3231E-11	0.3357E-17	0.9900E-11
68	78	0.2312E+01	0.6061E-04	0.3541E-13	0.1166E-09	0.1211E-15	0.3571E-09
78	81	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
90	91	0.1965E+02	0.4780E+01	-0.7444E-02	-0.2451E+02	-0.1600E-04	-0.4717E+02
91	92	0.1503E+02	0.1426E+02	-0.4580E+00	-0.1508E+04	-0.4783E-03	-0.1411E+04
92	93	0.1041E+02	0.1076E-04	-0.4438E-08	-0.1461E-04	-0.9767E-11	-0.2880E-04
93	94	0.5781E+01	0.2783E-04	-0.9300E-09	-0.3062E-05	-0.2267E-11	-0.6686E-05
94	95	0.2312E+01	0.6996E-04	0.8386E-08	0.2761E-04	0.1941E-10	0.5723E-04
308	90	0.2310E+02	0.3419E+01	0.1171E-02	0.3855E+01	0.1306E-05	0.3852E+01
95	81	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
500	501	0.8399E+01	0.3406E+03	0.4830E-15	0.1590E-11	0.7052E-17	0.2079E-10
501	502	0.8399E+01	0.3406E+03	0.7901E-14	0.2601E-10	0.6858E-16	0.2022E-09
502	503	0.8399E+01	0.3406E+03	0.5211E-13	0.1715E-09	0.4112E-15	0.1213E-08
503	504	0.8399E+01	0.3406E+03	0.3089E-12	0.1017E-08	0.2150E-14	0.6341E-08
504	505	0.8399E+01	0.3406E+03	0.1665E-11	0.5481E-08	0.1013E-13	0.2986E-07
505	506	0.8399E+01	0.3406E+03	0.7893E-11	0.2599E-07	0.4147E-13	0.1223E-06
506	507	0.8399E+01	0.3406E+03	0.3125E-10	0.1029E-06	0.1401E-12	0.4131E-06
507	508	0.8399E+01	0.3406E+03	0.8688E-10	0.2860E-06	0.3261E-12	0.9617E-06
508	510	0.8399E+01	0.3406E+03	0.2761E-10	0.9091E-07	0.7729E-13	0.2279E-06
510	511	0.8399E+01	0.2725E+03	-0.1214E-09	-0.3996E-06	-0.4623E-12	-0.1363E-05
511	512	0.8399E+01	0.1152E-02	-0.1329E-16	-0.4374E-13	-0.6661E-19	-0.1964E-12

512	513	0,8399E+01	0,1152E-02	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
513	514	0,8399E+01	0,1152E-02	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
514	515	0,8399E+01	0,1152E-02	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
515	516	0,8399E+01	0,1152E-02	-0,6549E-19	-0,2156E-15	-0,3045E-21	-0,8980E-15
7	17	0,1680E+02	0,6812E+03	0,9554E-15	0,3145E-11	0,1211E-16	0,3572E-10
17	27	0,1680E+02	0,6812E+03	0,1581E-13	0,5206E-10	0,1365E-15	0,4025E-09
27	37	0,1680E+02	0,6812E+03	0,1076E-12	0,3541E-09	0,8245E-15	0,2431E-08
37	47	0,1680E+02	0,6812E+03	0,6607E-12	0,2175E-08	0,4428E-14	0,1306E-07
47	57	0,1680E+02	0,6812E+03	0,3784E-11	0,1246E-07	0,2187E-13	0,6449E-07
57	67	0,1680E+02	0,6812E+03	0,2000E-10	0,6585E-07	0,9802E-13	0,2891E-06
67	77	0,1680E+02	0,6812E+03	0,9818E-10	0,3232E-06	0,4012E-12	0,1183E-05
77	87	0,1680E+02	0,6812E+03	0,4556E-09	0,1500E-05	0,1534E-11	0,4524E-05
87	107	0,1680E+02	0,5449E+03	0,1357E-08	0,4467E-05	0,3901E-11	0,1150E-04
107	117	0,1680E+02	0,1242E+00	0,1736E-12	0,5715E-09	0,7050E-15	0,2079E-08
117	127	0,1680E+02	0,1242E+00	-0,3199E-16	-0,1053E-12	-0,8283E-19	-0,2442E-12
127	137	0,1680E+02	0,1242E+00	0,2525E-17	0,8313E-14	0,8376E-20	0,2470E-13
137	147	0,1680E+02	0,1242E+00	-0,6223E-19	-0,2049E-15	-0,4113E-21	-0,1213E-14
147	157	0,1680E+02	0,1242E+00	-0,2411E-16	-0,7936E-13	-0,1250E-18	-0,3687E-12
157	167	0,1680E+02	0,1242E+00	-0,5881E-12	-0,1936E-08	-0,1969E-14	-0,5806E-08
6	16	0,1680E+02	0,6186E-01	0,1357E-24	0,4468E-21	0,1745E-26	0,5146E-20
16	26	0,1680E+02	0,6186E-01	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
26	36	0,1680E+02	0,6186E-01	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
36	46	0,1680E+02	0,6186E-01	0,1926E-19	0,6342E-16	0,1968E-21	0,5803E-15
46	56	0,1680E+02	0,6186E-01	0,1479E-18	0,4870E-15	0,1058E-20	0,3121E-14
56	66	0,1680E+02	0,6186E-01	0,9005E-18	0,2965E-14	0,5565E-20	0,1641E-13
66	76	0,1680E+02	0,6186E-01	0,5111E-17	0,1683E-13	0,2733E-19	0,8060E-13
76	86	0,1680E+02	0,6186E-01	0,1771E-14	0,5831E-11	0,5964E-17	0,1759E-10
86	100	0,1680E+02	0,7073E-01	0,2756E-08	0,9072E-05	0,6153E-11	0,1814E-04
100	116	0,1680E+02	0,1062E+00	0,1054E-12	0,3469E-09	0,4557E-15	0,1344E-08
116	126	0,1680E+02	0,1062E+00	-0,1561E-12	-0,5139E-09	-0,3448E-15	-0,1017E-08
126	136	0,1680E+02	0,1062E+00	0,8645E-14	0,2846E-10	0,1931E-16	0,5695E-10
136	146	0,1680E+02	0,1062E+00	-0,7700E-15	-0,2535E-11	-0,4250E-17	-0,1253E-10
146	156	0,1680E+02	0,1062E+00	-0,1199E-12	-0,3946E-09	-0,5608E-15	-0,1654E-08
156	166	0,1680E+02	0,1062E+00	-0,4137E-08	-0,1362E-04	-0,9237E-11	-0,2724E-04
5	15	0,3000E+01	0,8562E-05	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
15	25	0,3000E+01	0,8562E-05	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
25	35	0,3000E+01	0,8562E-05	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
35	45	0,3000E+01	0,8562E-05	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
45	55	0,3000E+01	0,8562E-05	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
55	65	0,3000E+01	0,8562E-05	0,0000E+00	0,0000E+00	0,0000E+00	0,0000E+00
65	75	0,3000E+01	0,8562E-05	0,4867E-21	0,1602E-17	0,1643E-23	0,4844E-17
75	85	0,3000E+01	0,1157E-04	0,4481E-13	0,1475E-09	0,1000E-15	0,2950E-09
85	105	0,3000E+01	0,1011E-03	0,3472E-05	0,1143E-01	0,3875E-08	0,1143E-01
105	115	0,3000E+01	0,4113E-03	0,6565E-09	0,2161E-05	0,2150E-11	0,6341E-05
115	125	0,3000E+01	0,4113E-03	0,9548E-11	0,3143E-07	0,4166E-13	0,1229E-06
125	135	0,3000E+01	0,4113E-03	0,7273E-14	0,2394E-10	0,1347E-15	0,3971E-09

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
135	145	0,3000E+01	0,4113E-03	-0,6514E-11	-0,2105E-07	-0,2861E-13	-0,8436E-07
145	155	0,3000E+01	0,4113E-03	-0,8928E-09	-0,2939E-05	-0,2744E-11	-0,8681E-05
155	165	0,3000E+01	0,3338E-03	-0,1146E-04	-0,3771E-01	-0,1279E-07	-0,3771E-01
95	104	0,1000E+02	0,2373E+01	0,8026E-01	0,2642E+03	0,8832E-04	0,2604E+03
104	114	0,1000E+02	0,1186E+02	0,2250E-02	0,7408E+01	0,4832E-05	0,1425E+02
114	124	0,1000E+02	0,1186E+02	0,4358E-04	0,1435E+00	0,1409E-06	0,4155E+00
124	134	0,1000E+02	0,1186E+02	0,2091E-06	0,6884E-03	0,9010E-09	0,2657E-02
134	144	0,1000E+02	0,1186E+02	-0,2993E-04	-0,9854E-01	-0,9773E-07	-0,2882E+00
144	154	0,1000E+02	0,1186E+02	-0,3081E-02	-0,1014E+02	-0,6704E-05	-0,1977E+02
154	164	0,1000E+02	0,9491E+01	-0,3230E+00	-0,1064E+04	-0,3577E-03	-0,1055E+04
94	103	0,1500E+02	0,3559E+01	0,1268E+00	0,3977E+03	0,1334E-03	0,3933E+03
103	113	0,1500E+02	0,1780E+02	0,3488E-02	0,1148E+02	0,7604E-05	0,2242E+02
113	123	0,1500E+02	0,1780E+02	0,6862E-04	0,2259E+00	0,2251E-06	0,6637E+00

123	133	0.1500E+02	0.1780E+02	0.3264E-06	0.1075E-02	0.1418E-08	0.4181E-02
133	143	0.1500E+02	0.1780E+02	-0.4705E-04	-0.1549E+00	-0.1557E-06	-0.4593E+00
143	153	0.1500E+02	0.1780E+02	-0.4765E-02	-0.1569E+02	-0.1051E-04	-0.3100E+02
153	163	0.1500E+02	0.1424E+02	-0.4841E+00	-0.1594E+04	-0.5354E-03	-0.1579E+04
93	102	0.2000E+02	0.4745E+01	0.1609E+00	0.5296E+03	0.1774E-03	0.5232E+03
102	112	0.2000E+02	0.2373E+02	0.4662E-02	0.1535E+02	0.1016E-04	0.2995E+02
112	122	0.2000E+02	0.2373E+02	0.9199E-04	0.3029E+00	0.3016E-06	0.8895E+00
122	132	0.2000E+02	0.2373E+02	-0.1418E-06	-0.4667E-03	-0.6083E-09	-0.1794E-02
132	142	0.2000E+02	0.2373E+02	-0.6253E-04	-0.2058E+00	-0.2064E-06	-0.6088E+00
142	152	0.2000E+02	0.2373E+02	-0.6367E-02	-0.2096E+02	-0.1404E-04	-0.4142E+02
152	162	0.2000E+02	0.1898E+02	-0.6441E+00	-0.2121E+04	-0.7109E-03	-0.2096E+04
92	101	0.2000E+02	0.4745E+01	0.1589E+00	0.5231E+03	0.1732E-03	0.5107E+03
101	111	0.2000E+02	0.2373E+02	0.4474E-02	0.1473E+02	0.9549E-05	0.2816E+02
111	121	0.2000E+02	0.2373E+02	0.8709E-04	0.2867E+00	0.2802E-06	0.8262E+00
121	131	0.2000E+02	0.2373E+02	0.3764E-06	0.1239E-02	0.1576E-08	0.4648E-02
131	141	0.2000E+02	0.2373E+02	-0.6346E-04	-0.2089E+00	-0.2101E-06	-0.6195E+00
141	151	0.2000E+02	0.2373E+02	-0.6383E-02	-0.2101E+02	-0.1407E-04	-0.4150E+02
151	161	0.2000E+02	0.1898E+02	-0.6436E+00	-0.2119E+04	-0.7098E-03	-0.2093E+04
91	100	0.2000E+02	0.2373E+02	0.3638E-01	0.1198E+03	0.7740E-04	0.2282E+03
100	110	0.2000E+02	0.2373E+02	-0.3804E-02	-0.1252E+02	-0.7370E-05	-0.2173E+02
110	120	0.2000E+02	0.2373E+02	-0.7725E-04	-0.2543E+00	-0.2366E-06	-0.6976E+00
120	130	0.2000E+02	0.2373E+02	-0.1384E-05	-0.4556E-02	-0.5644E-08	-0.1664E-01
130	140	0.2000E+02	0.2373E+02	-0.6328E-04	-0.2083E+00	-0.2089E-06	-0.6160E+00
140	150	0.2000E+02	0.2373E+02	-0.6349E-02	-0.2090E+02	-0.1394E-04	-0.4111E+02
150	160	0.2000E+02	0.1898E+02	-0.6393E+00	-0.2105E+04	-0.7004E-03	-0.2066E+04
90	99	0.1500E+02	0.1108E+00	0.8206E-06	0.2701E-02	0.2697E-08	0.7954E-02
99	109	0.1500E+02	0.8867E-01	-0.3029E-02	-0.9973E+01	-0.3366E-05	-0.9927E+01
109	119	0.1500E+02	0.6408E-05	-0.1794E-10	-0.5908E-07	-0.4016E-13	-0.1184E-06
119	129	0.1500E+02	0.6446E-05	-0.2711E-13	-0.8926E-10	-0.6248E-16	-0.1842E-09
129	139	0.1500E+02	0.6446E-05	-0.3781E-13	-0.1245E-09	-0.1676E-15	-0.4941E-09
139	149	0.1500E+02	0.6446E-05	-0.5049E-11	-0.1662E-07	-0.1680E-13	-0.4954E-07
149	159	0.1500E+02	0.6419E-05	-0.9567E-09	-0.3150E-05	-0.2130E-11	-0.6282E-05
21	305	0.1286E+02	0.4570E-06	0.1390E-10	0.4575E-07	0.3102E-13	0.9146E-07
305	306	0.6602E+01	0.2531E-06	-0.7399E-11	-0.2436E-07	-0.1653E-13	-0.4870E-07
306	307	0.3814E+01	0.2660E-06	0.1153E-11	0.3797E-08	0.2575E-14	0.7594E-08
307	308	0.2724E+01	0.1585E-06	0.1007E-12	0.3316E-09	0.2247E-15	0.6625E-09
308	309	0.3004E+01	0.1520E-06	-0.3832E-13	-0.1261E-09	-0.8537E-16	-0.2517E-09
309	310	0.3000E+01	0.1448E-06	-0.7742E-12	-0.2549E-08	-0.1729E-14	-0.5099E-08
310	311	0.3000E+01	0.1446E-06	-0.2007E-17	-0.6606E-14	-0.4484E-20	-0.1322E-13
311	312	0.3000E+01	0.1446E-06	0.8849E-17	0.2913E-13	0.1976E-19	0.5826E-13
312	313	0.3000E+01	0.1446E-06	-0.4445E-23	-0.1463E-19	-0.2448E-25	-0.7219E-19
313	314	0.3000E+01	0.1446E-06	-0.1624E-17	-0.5346E-14	-0.3627E-20	-0.1070E-13
314	315	0.3000E+01	0.1446E-06	0.7525E-13	0.2477E-09	0.1680E-15	0.4954E-09
206	207	0.6714E+01	0.6564E-02	0.3230E-05	0.1063E-01	0.3605E-08	0.1063E-01

NOD1	NOD2	AREA	TRAN	FLUID FLOW	AVG RATE	DFI	DFI/TIME
207	208	0.6298E+01	0.1067E-01	0.3880E-09	0.1277E-05	0.8661E-12	0.2554E-05
208	209	0.5000E+01	0.8953E-03	-0.1080E-11	-0.3554E-08	-0.2410E-14	-0.7107E-08
209	210	0.5000E+01	0.8953E-03	-0.9850E-15	-0.3243E-11	-0.3171E-17	-0.9350E-11
210	211	0.5000E+01	0.8953E-03	-0.6150E-15	-0.2025E-11	-0.1373E-17	-0.4049E-11
211	212	0.5000E+01	0.8953E-03	0.4540E-15	0.1495E-11	0.1014E-17	0.2989E-11
212	213	0.5000E+01	0.8953E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
213	214	0.5000E+01	0.8954E-03	0.6377E-15	0.2099E-11	0.1424E-17	0.4198E-11
214	215	0.5000E+01	0.8954E-03	0.8470E-16	0.2788E-12	0.2836E-18	0.8363E-12
13	22	0.3531E+01	0.2489E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

****

BOUNDARY NODE DATA

NODB	POTENTIAL	FLUID FLOW	AVG RATE	DFB	DFB/TIME
1000	0.3200E+02	-0.4022E-26	-0.1324E-22	-0.4490E-29	-0.1324E-22
SYSTEM TOTAL		-0.4022E-26	-0.1324E-22	-0.4490E-29	-0.1324E-22

EXTERNAL CONNECTION DATA

NODS	NODSB	AREAS	HSURE	TRANS	FLUID FLOW	AVG RATE	DFS	DFS/TIME
4	1000	0.4048E+02	0.1700E-15	0.1346E-13	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	1000	0.5000E+01	0.1870E-14	0.1087E-13	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	1000	0.1680E+02	0.2600E-11	0.8461E-10	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	1000	0.1680E+02	0.7400E-08	0.2408E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
500	1000	0.8400E+01	0.7390E-08	0.1202E-06	-0.4022E-26	-0.1324E-22	-0.4490E-29	-0.1324E-22

KCYC = 1000, ITERATIONS... TOTAL = 0, AVERAGE = 0, MAXIMUM = 0, FOR = 0.570 .

REASON FOR ENDING PROBLEM -

THE NUMBER OF TIME STEPS REACHED MCYC.

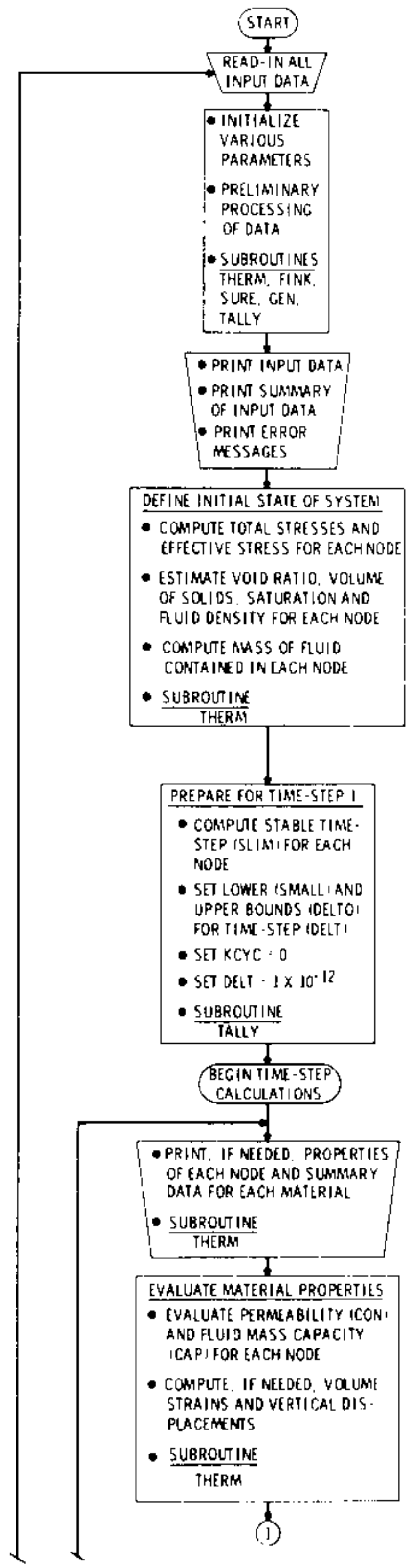
KWIT,NSTOP,KCYC,N 4 1 1000 35

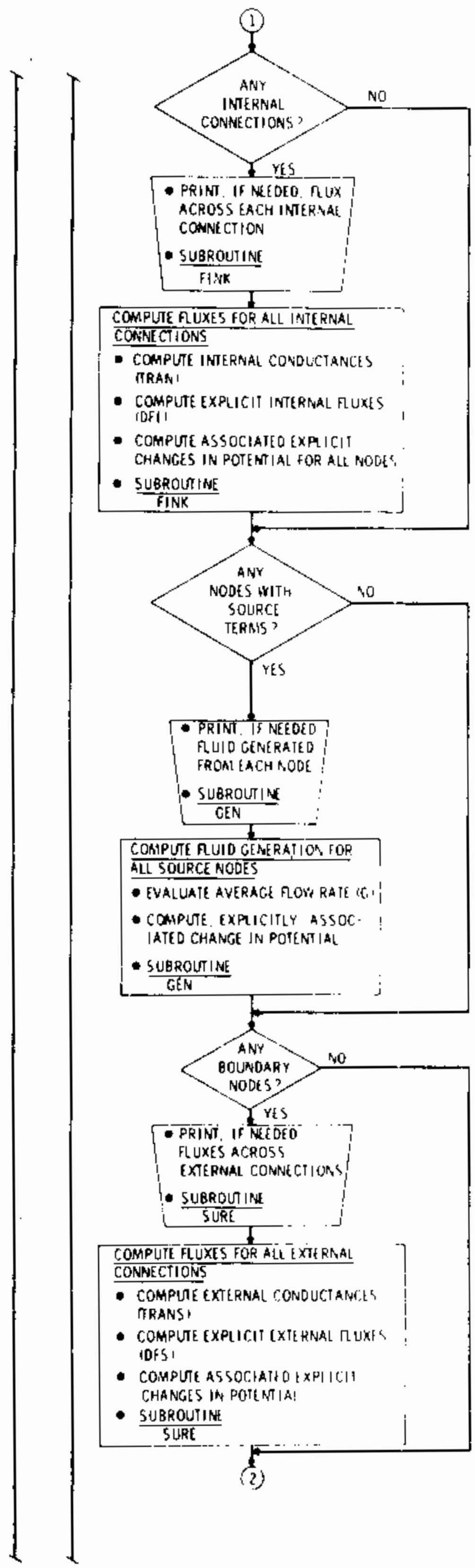
ELAPSED TIME SINCE START OF TRUST JOB = 401.190 SECONDS.

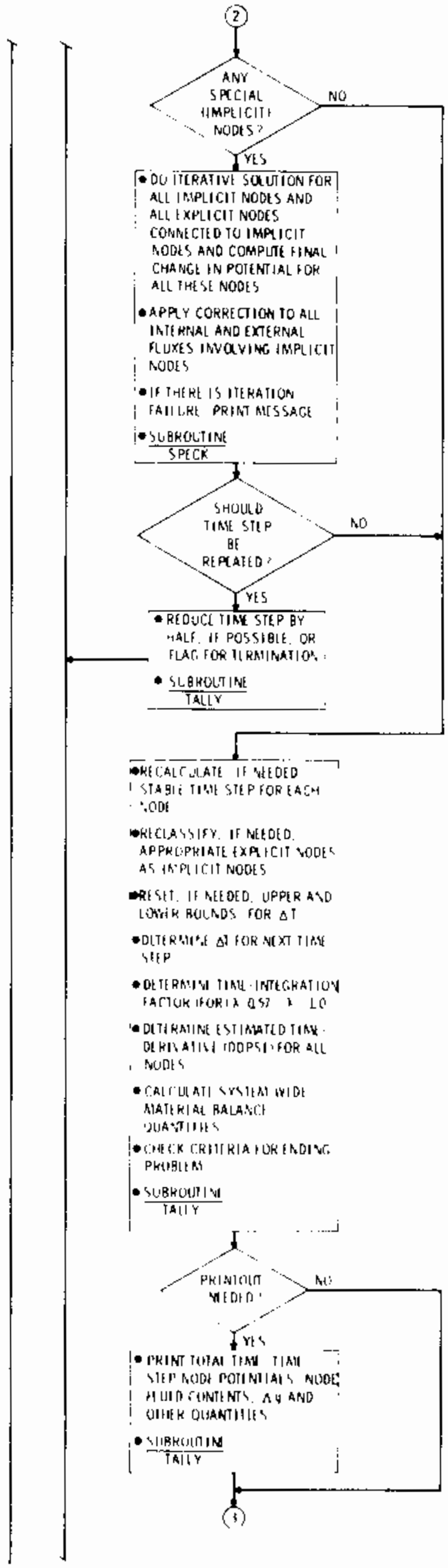
END OF TRUST JOB.

APPENDIX C

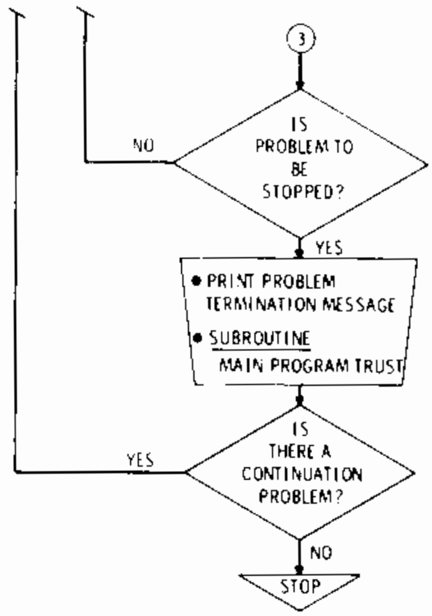
TRUST PROGRAM FLOW-CHART


START
READ-IN ALL INPUT DATA
• INITIALIZE VARIOUS PARAMETERS
• PRELIMINARY PROCESSING OF DATA
• SUBROUTINES THERM, FINK, SURE, GEN, TALLY
• PRINT INPUT DATA
• PRINT SUMMARY OF INPUT DATA
• PRINT ERROR MESSAGES
DEFINE INITIAL STATE OF SYSTEM
• COMPUTE TOTAL STRESSES AND EFFECTIVE STRESS FOR EACH NODE
• ESTIMATE VOID RATIO, VOLUME OF SOLIDS, SATURATION AND FLUID DENSITY FOR EACH NODE
• COMPUTE MASS OF FLUID CONTAINED IN EACH NODE
• SUBROUTINE THERM
PREPARE FOR TIME-STEP 1
• COMPUTE STABLE TIME-STEP (SLIM) FOR EACH NODE
• SET LOWER (SMALL) AND UPPER BOUNDS (DELTO) FOR TIME-STEP (DELT)
• SET KCYC = 0
• SET DELT = 1 X 10^-12
• SUBROUTINE TALLY
BEGIN TIME-STEP CALCULATIONS
• PRINT, IF NEEDED, PROPERTIES OF EACH NODE AND SUMMARY DATA FOR EACH MATERIAL
• SUBROUTINE THERM
EVALUATE MATERIAL PROPERTIES
• EVALUATE PERMEABILITY (CON) AND FLUID MASS CAPACITY (CAP) FOR EACH NODE
• COMPUTE, IF NEEDED, VOLUME STRAINS AND VERTICAL DISPLACEMENTS
• SUBROUTINE THERM
1


1
ANY INTERNAL CONNECTIONS ?
NO
YES
• PRINT, IF NEEDED, FLUX ACROSS EACH INTERNAL CONNECTION
• SUBROUTINE FINK
COMPUTE FLUXES FOR ALL INTERNAL CONNECTIONS
• COMPUTE INTERNAL CONDUCTANCES (TRAN)
• COMPUTE EXPLICIT INTERNAL FLUXES (DFI)
• COMPUTE ASSOCIATED EXPLICIT CHANGES IN POTENTIAL FOR ALL NODES
• SUBROUTINE FINK
ANY NODES WITH SOURCE TERMS ?
NO
YES
• PRINT, IF NEEDED FLUID GENERATED FROM EACH NODE
• SUBROUTINE GEN
COMPUTE FLUID GENERATION FOR ALL SOURCE NODES
• EVALUATE AVERAGE FLOW RATE (G)
• COMPUTE, EXPLICITLY, ASSOCIATED CHANGE IN POTENTIAL
• SUBROUTINE GEN
ANY BOUNDARY NODES ?
NO
YES
• PRINT, IF NEEDED FLUXES ACROSS EXTERNAL CONNECTIONS
• SUBROUTINE SURF
COMPUTE FLUXES FOR ALL EXTERNAL CONNECTIONS
• COMPUTE EXTERNAL CONDUCTANCES (TRANS)
• COMPUTE EXPLICIT EXTERNAL FLUXES (DFS)
• COMPUTE ASSOCIATED EXPLICIT CHANGES IN POTENTIAL
• SUBROUTINE SURF
2



2
ANY SPECIAL (IMPLICIT) NODES?
NO
YES
• DO ITERATIVE SOLUTION FOR ALL IMPLICIT NODES AND ALL EXPLICIT NODES CONNECTED TO IMPLICIT NODES AND COMPUTE FINAL CHANGE IN POTENTIAL FOR ALL THESE NODES
• APPLY CORRECTION TO ALL INTERNAL AND EXTERNAL FLUXES INVOLVING IMPLICIT NODES
• IF THERE IS ITERATION FAILURE, PRINT MESSAGE
• SUBROUTINE SPECK
SHOULD TIME STEP BE REPEATED?
NO
YES
• REDUCE TIME STEP BY HALF, IF POSSIBLE, OR FLAG FOR TERMINATION
• SUBROUTINE TALLY
• RECALCULATE, IF NEEDED, STABLE TIME STEP FOR EACH NODE
• RECLASSIFY, IF NEEDED, APPROPRIATE EXPLICIT NODES AS IMPLICIT NODES
• RESET, IF NEEDED, UPPER AND LOWER BOUNDS FOR ΔT
• DETERMINE ΔT FOR NEXT TIME STEP
• DETERMINE TIME-INTEGRATION FACTOR
• DETERMINE ESTIMATED TIME-DERIVATIVE (DDPSI) FOR ALL NODES
• CALCULATE SYSTEM WIDE MATERIAL BALANCE QUANTITIES
• CHECK CRITERIA FOR ENDING PROBLEM
• SUBROUTINE TALLY
PRINTOUT NEEDED?
NO
YES
• PRINT TOTAL TIME, TIME STEP, NODE POTENTIALS, NODE FLUID CONTENTS, Δψ AND OTHER QUANTITIES
• SUBROUTINE TALLY
3


3
IS PROBLEM TO BE STOPPED?
NO
YES
• PRINT PROBLEM TERMINATION MESSAGE
• SUBROUTINE
MAIN PROGRAM TRUST
IS THERE A CONTINUATION PROBLEM?
YES
NO
STOP

APPENDIX D

TRUST PROGRAM LISTING

```
CCOMDECK AGEN
CCC    ARRAYS FOR SOURCES

       COMMON/AGEN/DFG(300),FG(300),G(300),GG(300),GT(12,10),LTABG(10),
     $        NODG(10),NOXG(10),SLOG(12,10),TVARG(12,10)

CCC    END AGEN


CCOMDECK AREA
CCC    ARRAYS FOR COMPUTING CONDUCTANCE

       COMMON/AREA/AREA(600),DEL1(600),DEL2(600),NOX1(600),NOX2(600)

CCC    END AREA


CCOMDECK ASORES
CCC    ARRAYS FOR BOUNDARY CONDITIONS

       COMMON/ASORES/DFS(20),NODS(20),TRANS(20)

CCC    END ASORES


CCOMDECK BLARE
CCC    REAL VARIABLES

       COMMON ADATA(2),ADD,AFLUID(10),APATH,BET,BETA,BETW,BPRIME,CAPMS,
     $        CAPS,CAPT,CONST,DAY,DELT,DELTS,DELTSS,DEX,DLONG,DNDP,
     $        DPMAXS,DPRES,DPSIMAX,DRAD,DRADS,DWIDE,EAVG,EC,ELT,ESTRESS,
     $        ESTRIN,EX,FEX,FLEX,FLUID,FLUX,FLUXS,FLX,FOR,FORD,FX,
     $        GBYMU,GEE,GENS,GEOM,GMASS,GONE,GX,HONE,HX,PCONE,PHIBS,
     $        PHIONE,PORS,PSIVARY,PSI1,PSI2,RD,RHOZ,SAVG,SCALE,SET,
     $        SETO,SET1,SMALL,SUMTIM,TAU,THICK,TIME,TZERO,VISC,VOLMS,
     $       VOLS,WMS

CCC    END BLARE


CCOMDECK BLARY
CCC    ARRAYED VARIABLES

       COMMON CAP(300),CON(300),CONT(100,6),DDPSI(300),DF(300),DFI(600),
     $        DPSI(300),DPSIS(300),E(300),FI(600),F1(12),F2(12),F3(12),
     $        ITEMS(15),LTABK(6),NAME(24),NAMES(24),NEWBL(15),
     $        NODE(300),NODMAT(300),NOD1(600),NOD2(600),NOXMAT(300),
     $        NTYPE(300),NX1(10),NX2(10),PC(300),PCH(300),PHI(300),
     $        PPHI(300),PSI(300),RHO(300),S(300),SLIM(300),TOTSTRS(300),
     $        TRAN(600),VOL(300),W(300),Z(300),ZIP(300)

CCC    END BLARY


CCOMDECK BLINK
CCC    INTEGER VARIABLES

       COMMON NOSPEC,NMAT,NFLUID,NODES,NOCON,NOSCON,NODBS,NOGEN,NIT,
     $        NVARC,NVARG,NVARK,NVARH,NVART,NZ

       COMMON IBLOCK,KCYC,KDATA,KS,KSECS,KSYM,KWIT,LABEL,LTAB,LXX,
     $        MAX,MID,MODE,NADD,NADG,NADS,NADSB,NAD1,NAD2,NCHECK,NODMS,
     $        NOW,NPROB,NSAVE,NSEQ,NSTOP,NUTS,KSTDATA

CCC    END BLINK
```

```
CCOMDECK BLISC
CCC   TEMPORARY VALUES OF INTEGER VARIABLES

      COMMON A1,DX,II,J,JJ,KK,K1,K2,L,L1,L2,L3,L4,NND,N1,N2,
     $        P1,P2,P3,P4,P5,TX,X1,X2,X3

CCC   END BLISC


CCOMDECK CHI
CCC   ARRAYS FOR BISHOPS PARAMETER CHI

      COMMON/CHI/CHI(12,10),CHIVARP(12,10),CHIVARS(12,10),SLOCHI(12,10),
     $        CHIMID(12,10),LTABCHI(10),NVARCHI

CCC   END CHI


CCOMDECK CURVE
CCC   VARIABLES FOR PSI - S AND PSI - COND CURVES

      COMMON A(10),B(10),ALPHA(10),ETA(10),SR(10),PSIAIR(10)

CCC   END CURVE


CCOMDECK M
CCC    BLOCK SIZES

      COMMON/M/M1,M2,M3,M4,M5,M6,M7,M8,M9,M10,M11,M12,M13


CCC   END M


CCOMDECK NMIN1
CCC   FUNCTION NMIN1

      NMIN1(I) = MINO(I,N-1)

CCC   END NMIN1


CCOMDECK NODIM
CCC   VARIABLES FOR DIMENSIONLESS PARRAMETERS TD, PD

      COMMON/NODIM/NODIM,NODTD(300),PLUMP,QOVERH,R(300),TLUMP,XF

CCC   END NODIM


CCOMDECK UNSAT
CCC   ARRAYS FOR UNSATURATED FLOW

      COMMON/UNSAT/CAPM(300),CK(6),IPATH(300),LTABSC(6),LTABSK(6),
     $      NODREF,PSIMIDC(100,6),PSIVARC(100,6),PSIVARK(100,6),
     $      LTABC(6),PZ(6),CONTD(100,6),CONTW(100,6),SLOCD(100,6),
     $      SLOCW(100,6),SD(100,6),SW(100,6),SLOK(100,6)

CCC   END UNSAT
```

```
CCOMDECK STRAIN
CCC   VARIABLES FOR STRAIN COMPUTATION

      COMMON/STRAIN/VSOLID(300),DELVOL(300)

CCC   END STRAIN



CDECK TRUST
C     PROGRAM TRUST(INPUT,OUTPUT,PUNCH=101,TAPE4)
CCC
CCC   TRUST IS A MODIFICATION OF PROGRAM TRUMP. THE FOLLOWING PROGRAM
CCC   IS BASED ON THE TRUMP MASTER FORTRAN LIST AS OF 5/20/69
C     VERSION 5/20/69.
C     DEVELOPED BY ARTHUR L. EDWARDS, LAWRENCE RADIATION LABORATORY,
C     P.O. BOX 808, LIVERMORE, CALIFORNIA, L-437, BLDG T102, RM 115,
C     PHONE 447-1100 EXTENSION 7886.
C
C     ADAPTED TO STANDARD FORTRAN AND SCOPE OPERATING SYSTEM BY
C     TOM LASSETER, UNIV. OF CALIF., DEPT. OF CIVIL ENG, 472 DAVIS HALL,R
C     BERKELEY, CALIF. 94720, PHONE (415) 642-5525.
C
C     REVISED 6/73 BY ANDREW E. ALLEN, LAWRENCE RADIATION LABORATORY,
C     BERKELEY, CALIFORNIA, 94720, BLDG. 50B, RM. 101A,
C     PHONE (415) 843-2740, EXT. 5222.
C
CCC   TRUST SOLVES FOR TRANSIENT FLUID FLOW IN SATURATED-UNSATURATED,
CCC   MULTIDIMENSIONAL POROUS MEDIA BY CONSIDERING RELEASE OF FLUID FROMH
CCC   STORAGE DUE TO DEFORMATION AND DRAINAGE.   TRUST MODIFICATIONS
CCC   WRITTEN BY T.N.NARASIMHAN,DEPARTMENT OF CIVIL ENGINEERING,
CCC   UNIVERSITY OF CALIFORNIA,BERKELEY,94720. PHONE (415)642-5525
CCC
C*****
CCC   IN THIS VERSION THE MAIN FUNCTION OF CALLING VARIOUS SUB ROUTINES
CCC   IS ASSIGNED TO THE ORIGINAL TRUMP SUBROUTINE HEART, WHICH HAS
CCC   BEEN REDESIGNATED AS PROGRAM TRUST
CCC
CCC   IN THIS VERSION THE FOLLOWING SUBROTUINES ARE AVAILABLE
CCC   .....THERM, FINK,GEN, SURE,SPECK,TALLY,PATCH,REFER(SEEK1,SEEK2,
CCC   ADDITIONALLY, THE FOLLOWING NEW SUBROTUINES HAVE BEEN ADDED...
CCC   HYST,ENTER,SLOPE,MORTHAN AND LINE
C
C********LANGUAGE IS STANDARD CDC FORTRAN IV.
C
C********STATEMENTS MOST LIKELY REQUIRING CHANGES FOR OTHER DIALECTS...
C********     FORTRAN II STATEMENTS PRINT AND PUNCH,
C********     ENCODE/DECODE STATEMENTS,
C********     MULTIPLE ASSIGNMENT STATEMENTS (A=B=C=0.),
C********     IF STATEMENTS OF TYPE /IF(WORD .EQ. 6H*SPLIT) ... /,
C********     A10 FORMAT,
C********     AND DO-LOOP PARAMETERS USED OUTSIDE OF THE LOOP.
C
C********SYSTEM SUBROUTINES REFERENCED...
C********     SECOND, HOUR, DATE.
C
        IMPLICIT REAL*8 (A-H,O-Z)
      COMMON /ASSURES/DFS(20),NODS(20),TRANS(20)
      COMMON /PCHCOM/IA1(3),IA2(3),RA(6)
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
CCALL NODIM
      INCLUDE 'NODIM.INC'
CCALL STRAIN
```

```
      INCLUDE 'STRAIN.INC'
CCALL M
      INCLUDE 'M.INC'
C
CCC   ARRAY FOR CONDUCTANCES
CCC
      COMMON /AREA/AREA(600),DEL1(600),DELI(600),NOX1(600),NOX2(600)
CCC
      COMMON /NODTAP/NOXS,NOXSB
      DIMENSION NOXS(20),NOXSB(20)
      INTEGER ABLOCK(15)
C
C       DIMENSION KWITMSG(91),KWITLOC(13),NDUMMY(15)
        DIMENSION KWITLOC(13),NDUMMY(15)
        CHARACTER*10 KWITMSG(91)
      EQUIVALENCE (NDUMMY,NOSPEC)
      BYTE TIMEFL(14),FILNAM(14)
C
      DATA M1, M2, M3, M4, M5, M6, M7, M8, M9, M10, M11, M12
     $/0,10,1,300,600,20,20,100,100,0,0,0/
CCC
      DATA KWITLOC/0,4,9,15,19,26,35,39,49,60,74,81,91/
        DATA KWITMSG/'PROBLEM TI','ME *SUMTIM','* REACHED ','TIMAX.,   ',
        1'A PORE PRE','SSURE EXCE','EDED PSIMA','X + 0.001*','PSIVARY., ',
        2'A PORE PRE','SSURE WAS ','LESS THAN ','PSIMIN - 0','.001*PSIVA',
        3'RY.,      ','STEADY STA','TE CRITERI','A WERE SAT','ISFIED.,  ',
        4'AN UNSPECI','FIED MATER','IAL NODE  ','OR BOUNDAR','Y NODE WAS',
        5'REFERED   ','TO.,      ','-2 PUNCHED',' IN COL 6-','7 OF DATA ',
        6'END CARD O','R *CHECK C','ARD PRECED','ED PROBLEM',' NAME CARD',
        7'.,        ','THE NUMBER',' OF TIME S','TEPS REACH','ED MCYC., ',
        8'THE NUMBER',' OF SECOND','S OF ELAPS','ED MACHINE',' TIME USED',
        9' SINCE THE',' START OF ','THIS TRUST',' JOB REACH','ED MSEC., ',
        1'NO MATERIA','L LIST (BL','OCK 2) OR ','NODE LIST ','(BLOCK 4) ',
        1'WAS SPECIF','IED OR CAR','RIED OVER ','FROM THE P','RECEDING P',
        2'ROBLEM.,  ','ITERATIVE ','SCHEME FOR',' PRESSURE ','HEAD CHANG',
        3'ES IN CONN','ECTED SPEC','IAL NODES ','FAILED TO ','CONVERGE I',
        4'N 80 ITERA','TIONS BY U','SE OF A TI','ME STEP   ','=2*SMALL.,',
        5'THE NUMBER',' OF ITEMS ','IN A DATA ','BLOCK EXCE','EDED THE M',
        6'AXIMUM SIZ','E.        ','THE LENGTH',' OF A TABL','E FOR A TI',
        7'ME OR PRES','SURE DEPEN','DANT INPUT',' QUANTITY ','EXCEEDED T',
        8'HE MAXIMUM',' SIZE.,   '/
CCC
CCC
CCC
CCC
C********INITIALIZE DATE AND ELAPSED TIME.
CCC
      CALL DATE(DAY)
        CALL SECOND(TZERO)
      PRINT 5845, TZERO
CCC
C********START HERE FOR NEW SERIES OF PROBLEMS.
CCC
C2110  NPROB = NSAVE = 0
2110  NPROB=0
      NSAVE=0
        WRITE (6,*)'ENTER INPUT FILE NAME'
        READ (5,6001) FILNAM
        FILNAM(14)=0
C       THE ABOVE STATEMENT TAKES CARE OF JUMBLED-UP FILENAMES
 6001   FORMAT (14A1)
```

```
        WRITE (6,*)'ENTER NAME FOR OUTPUT FILE'
        READ (5,6001) TIMEFL
        TIMEFL(14)=0
        OPEN(UNIT=4,NAME=TIMEFL,TYPE='NEW',FORM='FORMATTED')
        OPEN(UNIT=1,NAME=FILNAM,TYPE='OLD',FORM='FORMATTED',READONLY)
CCC
CCC   INITIALIZE VOLUME CHANGE
CCC
      DO 2114 N = 1,300
 2114 DELVOL(N) = 0.
      NODIM = 0
CCC
CCC   START HERE FOR EACH ADDITIONAL PROBLEM IN A STACK OF DATA DECKS.
CCC
2115  NPROB = NPROB + 1
CCC
CCC   INITIALIZE CONTROL PARAMETERS.
CCC
C      IBLOCK = KWIT = NSTOP=NOW=NCHECK=0
      KCYC = -1
      IBLOCK = 0
      KWIT = 0
      NSTOP = 0
      NOW = 0
      NCHECK = 0
      DO 2120  N = 1,15
2120  NEWBL(N) = 0
C
C---------READ IN CONTROL CARDS AND PROBLEM NAME CARD.
C
2125  READ(1,5875) NAME
C
CCC
CCC   IGNORE IT IF THERE IS NO * IN COL. 1.
CCC
      IF(NAME(1).EQ.1H*) GO TO 2130
      PRINT 5875, NAME
      GO TO 2125
CCC
CCC   CHECK FOR *SPLIT CARD.
CCC
 2130 IF(NAME(2).EQ.4HSPLI) GO TO 4600
      IF(NAME(2).NE.4HCHEC) GO TO 2135
      NCHECK = 1
      GO TO 2125
C
C---------CONTINUE HERE WHEN A PROBLEM NAME CARD HAS BEEN READIN.
C
2135  CONTINUE
        CALL SECOND(ELT)
        ELT = ELT - TZERO
      PRINT 5830, TIME, DAY, NPROB, NAME
      READ(1,5920)NTAPE
        PRINT 5973, NTAPE
 5973 FORMAT(44H TAPE DATA WILL BE WRITTEN AT INTERVALS OF  ,I5,11H ITER
     1ATIONS)
      PRINT 5846, ELT
      CALL LINE
CCC
CCC   CONTROL CARRYOVER OF DATA FROM PRECEDING PROBLEM.
CCC
```

```
 2200 IF(NAME(20) .NE. 1H2) GO TO 2205
CCC
CCC    HERE, USE DATA AND INIT. COND. FROM PRECEDING PROBLEM.
CCC
       NOW = 2
       PRINT 5895
       GO TO 2230
 2205 IF(NAME(20) .NE. 1H3) GO TO 2210
CCC
CCC    HERE, USE DATA AND FINAL COND. FROM PRECEDING PROBLEM.
CCC
       NOW = 3
       GO TO 2215
 2210 IF(NAME(20) .NE. 1H4) GO TO 2220
CCC
CCC    HERE, USE DATA AND FINAL COND. FROM PRECEDING PROBLEM, W/ OLD TAU,H
CCC
       NOW = 4
       TAU = SUMTIM
 2215 PRINT 5900, TAU
       GO TO 2230
CCC
CCC    ZERO ALL COUNTERS WHEN NO DATA IS CARRIED OVER FROM LAST PROBLEM.
CCC
 2220 PRINT 5840
       DO 2225 N = 1,15
 2225 NDUMMY(N) = 0
CCC
CCC    SAVE INITIAL NUMBER OF ITEMS IN EACH BLOCK.
CCC
 2230 DO 2235  N = 1,14
 2235 ITEMS(N) = NDUMMY(N)
CCC
CCC    TEST CARRYOVER.
CCC
       IF(NOW .EQ. 0) GO TO 2245
CCC
CCC    CARRYOVER.
CCC
       IF(NAMES(1) .EQ. 1H*) GO TO 2240
       PRINT 5960
       GO TO 2220
 2240 PRINT 5935, NAMES
       CALL TALLY
       NOW = 0
C
C      THESE 2 CONTINUES ARE FROM THE COMPUTED GOTO, BELOW.
C
 2290 CONTINUE
 2315 CONTINUE
 2245 CALL LINE
C
C---------READ IN BLOCK NUMBER CARDS.
C
 2250 READ(1,5860) ADATA, IBLOCK, MODE, ABLOCK
CCC
CCC    TEST COLUMNS 6-7 BLANK OR ZERO.
CCC
       IF(IBLOCK .NE. 0) GO TO 2255
CCC
CCC    COLUMNS 8-80.
```

```
CCC
      PRINT 5870, ABLOCK
      GO TO 2250
 2255 PRINT 5865, ADATA, IBLOCK, MODE, ABLOCK
CCC
CCC   CHECK FOR DATA END CARD.
CCC
      IF(IBLOCK .LT. 0) GO TO 2320
CCC
CCC   NO DATA END CARD, CHECK FOR ADD/MODIFY.
CCC
      N = 0
      IF(MODE .NE. 1HA) GO TO 2260
CCC
CCC   DATA ADDS TO DATA ALREADY READ IN.
CCC
      N = 1
      PRINT 5850
      GO TO 2265
 2260 IF(MODE .NE. 1HB) GO TO 2265
CCC
CCC   DATA MODIFIES OR ADDS TO DATA ALREADY READ IN.
CCC
      N = -1
      PRINT 5855
 2265 MODE = N
      IF(MODE .EQ. 0) ITEMS(IBLOCK) = 0
      NEWBL(IBLOCK) = NEWBL(IBLOCK) + 1
C
C--------GO TO SUBROUTINES TO READ IN BLOCK ITEMS.
C
 2275 GO TO(2310,2280,2310,2280, 2295,2305,2305,2285,2310,2310),IBLOCK
CCC
CCC   BLOCK 2 OR 4
CCC
2280  CALL THERM
      GO TO 2245
CCC
CCC   BLOCK 8.
CCC
2285  CALL GEN
      GO TO 2245
CCC
CCC   BLOCK 5.
CCC
2295  CALL FINK
      GO TO 2245
CCC
CCC   BLOCK 6 OR 7.
CCC
2305  CALL SURE
      GO TO 2245
CCC
CCC   BLOCK 1,3 OR 9
CCC
2310  CALL TALLY
      GO TO 2245
C
C--------COME HERE AFTER ALL DATA AND DATA END CARD HAVE BEEN READ IN.
C--------INITIALIZE BEFORE FIRST TIME STEP.
C
```

```
 2320 CALL LINE
      CALL LINE
CCC
CCC   SAVE NAME FOR IDENTIFICATION OF DATA FOR CONTINUATION PROBLEMS.
CCC
      DO 2325  N = 1,24
2325  NAMES(N) = NAME(N)
CCC
CCC   FIND ELAPSED TIME FOR INPUT PHASE OF PROBLEM.
CCC
      CALL SECOND(ELT)
       ELT = ELT - TZERO
       PRINT 5846, ELT
CCC
CCC   SUMMARIZE INPUT DATA.
CCC
      CALL TALLY
CCC
CCC   CHECK FOR MISSING BLOCK 2 OR 4.
CCC
      IF(KWIT .EQ. 9) GO TO 4500
      CALL SPECK
C
C--------INCREMENT CYCLE COUNTER, DO NEXT TIME STEP.
C
4200  KCYC = KCYC + 1
CCC
CCC   GO TO SUBROUTINES TO DO TIME STEP CALCULATIONS AND WRITE OUT DATA.H
CCC
C--------RETURN HERE AFTER A TIME STEP IS REJECTED.
C
 4205 CALL THERM
      IF(NOGEN  .NE. 0) CALL GEN
      IF(NOCON  .NE. 0) CALL FINK
      IF(NOSCON .NE. 0) CALL SORE
      IF(NOSPEC .NE. 0) CALL SPECK
      IF(NSTOP)4600,4210,4500
 4210 CALL TALLY
C      NTCYC=NTCYC+1
C      IF(NTCYC.NE.NTAPE)GO TO 4211
        IF(MOD(KCYC, NTAPE) .NE. 0) GO TO 4211
C      NTCYC=0
      ISEQ=1
      CALL MOVEKA(0,IA1,12)
      RA(1)=SUMTIM
      RA(2)=DELT
      WRITE(4,5975)(RA(I),I=1,2)
      ISEQ=ISEQ+1
      IC=0
      DO 700 I=1,NODES
      IC=IC+1
      RA(IC)=PHI(I)
      IF(IC.LT.6) GO TO 700
      WRITE(4,5975)(RA(N),N=1,6),ISEQ
      ISEQ=ISEQ+1
      CALL MOVEKA(0,IA1,12)
      IC=0
  700 CONTINUE
      IF(MOD(NODES,6).NE.0)WRITE(4,5975)(RA(N),N=1,6),ISEQ
 5975 FORMAT (1P6E12.5,3X,I5)
      ISEQ=1
```

```
      CALL MOVEKA(0,IA1,12)
      IC=0
      DO 800 I=1,NOCON
      IC=IC+1
      IA1(IC)=NOX1(I)
      IA2(IC)=NOX2(I)
      RA(IC)=DFI(I)
      IF(IC.LT.3) GO TO800
      WRITE (4,5980)(IA1(K),IA2(K),RA(K),K=1,3),ISEQ
      ISEQ=ISEQ+1
      CALL MOVEKA(0,IA1,12)
      IC=0
  800 CONTINUE
 5980 FORMAT(3(2I5,1PE12.5),9X,I5)
      IF(MOD(NOCON,3).NE.0)WRITE(4,5980)(IA1(K),IA2(K),RA(K),K=1,3),ISEQ
      ISEQ=1
      CALL MOVEKA(0,IA1,12)
      IC=0
      DO 1000 I=1,NOSCON
      IC=IC+1
      IA1(IC)=NOXS(I)
      IA2(IC)=NOXSB(I)
      RA(IC)=DFS(I)
      IF(IC.LT.3) GO TO 1000
      WRITE (4,5980)(IA1(K),IA2(K),RA(K),K=1,3),ISEQ
      ISEQ=ISEQ+1
      CALL MOVEKA(0,IA1,12)
      IC=0
 1000 CONTINUE
      IF(MOD(NOCON,3).NE.0)WRITE(4,5980)(IA1(K),IA2(K),RA(K),K=1,3),ISEQ
        WRITE(4,1021)
 1021   FORMAT(' END OF FILE 4')
 4211 CONTINUE
      IF(KWIT) 4205,4300,4215
 4215 IF((KWIT - 5)*(KWIT - 9) .EQ. 0) GO TO 4500
 4220 NSTOP = 1
      GO TO 4200
C
C--------TEST FOR PROBLEM PREPROCESSING ONLY.
C
 4300 IF(NCHECK.LE.0) GO TO 4200
      KWIT = 6
      GO TO 4220
C
C---------COME HERE AT END OF PROBLEM.  (OTHERS MAY FOLLOW.)
C
4500  KCYC = KCYC - 1
      N = KWITLOC(KWIT)
      KWIT = KWITLOC(KWIT + 1) - N
      PRINT 5885, (KWITMSG(N + K), K = 1,KWIT)
      PRINT 5961,KWIT,NSTOP,KCYC,N
 5961 FORMAT (1X,17HKWIT,NSTOP,KCYC,N, 4I5)
CCC
CCC   GO BACK FOR ANOTHER PROBLEM.
CCC
      GO TO 2115
C
C---------COME HERE WHEN A /*SPLIT/ CARD HAS BEEN READ IN FROM DATA DECK.H
C
 4600 CALL SECOND(ELT)
        CONTINUE
```

```
      ELT = ELT - TZERO
      PRINT 5846, ELT
      PRINT 5955
        CLOSE(UNIT=4)
      STOP
CCC
CCC   END OF HEART, STOP PROCESSING.
CCC
 5825 FORMAT(/10X,10HENDED PROB,I15,5X,6HKCYC =,I16,5X,8HSUMTIM =,E13.5)H
 5830 FORMAT(1H1,9X,17HTRUST OUTPUT DATA,13X,12HPROGRAM DATA,2(2X,A10),
     1  20X,9HDATA DECK,I15//10X,A1,17A4,A2,A1,4A2)
 5840 FORMAT(/10X,42HNO DATA CARRY-OVER FROM PRECEDING PROBLEM.)
 5845 FORMAT(50H1          ELAPSED TIME BEFORE START OF TRUST JOB =,
     1  1F7.3,9H SECONDS.)
 5846 FORMAT(/10X,40HELAPSED TIME SINCE START OF TRUST JOB = ,1F7.3,
     $  9H SECONDS.)
 5850 FORMAT(38X,34HDATA ADDS TO DATA ALREADY READ IN.)
 5855 FORMAT(38X,46HDATA MODIFIES OR ADDS TO DATA ALREADY READ IN.)
 5860 FORMAT(A3,A2,I12,1A1,15A4)
 5865 FORMAT(10X,5HDATA ,A3,A2,I13,1A1,14X,15A4)
 5870 FORMAT(38X,15A4)
5875  FORMAT(1A1,17A4,A2,1A1,4A2)
 5880 FORMAT(10X,15A4)
 5885 FORMAT(/10X,27HREASON FOR ENDING PROBLEM -//10X,11A10,/10X,3A10)
 5895 FORMAT(/,10X,36HWILL USE DATA AND INITIAL CONDITIONS,
     1    43H FROM PRECEDING PROBLEM WITH NAME, DATE --- )
 5900 FORMAT(/,10X,46HWILL USE DATA AND FINAL CONDITIONS, WITH TAU =,
     1    E13.5,43H FROM PRECEDING PROBLEM WITH NAME, DATE ---)
 5920 FORMAT(1I4)
 5935 FORMAT(10X,1A1,17A4,A2,1A1,4A2)
 5955 FORMAT(/10X,17HEND OF TRUST JOB.)
 5960 FORMAT(32H **********NO DATA IS IN MEMORY.)
      END
      SUBROUTINE MOVEKA(K,IA,N)
      DIMENSION IA(1)
      DO 100 I=1,N
  100 IA(I)=K
      RETURN
      END
```

```
CDECK THERM
      SUBROUTINE THERM
        IMPLICIT REAL*8 (A-H,O-Z)
C
C********VERSION 5/20/69.
C********REVISED 3/73.
C
C********THERM IS A REQUIRED SUBROUTINE.
CCALL M
      INCLUDE 'M.INC'
       DIMENSION AMAT(10),AV(10),CC(10),CS(10),EK(10),CONZ(10),
     $      EZ(10),MAT(10),SS(10)
CCALL NODIM
      INCLUDE 'NODIM.INC'
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
CCALL AREA
      INCLUDE 'AREA.INC'
CCALL UNSAT
      INCLUDE 'UNSAT.INC'
CCALL CHI
      INCLUDE 'CHI.INC'
CCALL AGEN
      INCLUDE 'AGEN.INC'
CCALL STRAIN
      INCLUDE 'STRAIN.INC'
CCALL CURVE
      INCLUDE 'CURVE.INC'
CCALL NMIN1
      INCLUDE 'NMIN1.INC'
      IF(KCYC) 2000,3100,4200
 2000 IF(IBLOCK .EQ. 2) GO TO 2135
      IF(IBLOCK .EQ. 4) GO TO 2275
C
CCC INPUT DATA BLOCK  2.  MATERIAL PROPERTY LIST.
C
 2135 LABEL = 1
C       IF(MODE.EQ.0) NVARK = NVARC = NMAT = NVARCHI = 0
      IF(MODE.NE.0)GO TO 2136
      NVARK = 0
      NVARC = 0
      NMAT = 0
      NVARCHI = 0
2136  CONTINUE
      APATH = (4H    )
      N = NMAT
C
 2140 READ(1,5800)A1,N1,L1,L2,L3,L4,P1,P2,P3,P4,P5
      IF(A1.NE.4HSYST) GO TO 2150
      READ(1,5790)APATH,THICK,RD,XF,QOVERH
        IF (XF .EQ. 0.) XF=1.
      THICK = THICK * SCALE
        PRINT 5795
        PRINT 5796
        PRINT 5797
```

```
        PRINT 5798
      PRINT 5799,APATH,THICK,RD,XF,UOVERH
      CALL LINE
 2145 READ(1,5800)A1,N1,L1,L2,L3,L4,P1,P2,P3,P4,P5
C
 2150 IF(A1.EQ.4HCHI )GO TO 2190
      IF(N1.EQ.0) GO TO 2270
      IF(MODE .GE. 0) GO TO 2170
      CALL SEEK1(N, N1, MAT, NMAT, K)
      IF(K .EQ. 0) GO TO 2165
      IF(LTABC(N) .NE. 0) NVARC = NVARC - 1
      IF(LTABK(N) .NE. 0) NVARK = NVARK - 1
 2165 ITEMS(2) = NMIN1(ITEMS(2))
      GO TO 2175
C2170  N = NMAT = N + 1
2170  N=N+1
      NMAT=N
 2175 IF(N .GT. M2) CALL MORTHAN(N,NMAT,M2)
      AMAT(N) = A1
      MAT(N) = N1
      LTABC(N) = L1
      LTABSC(N) = L2
      LTABK(N) = L3
      LTABSK(N) = L4
      AV(N) = ABS(P1)
      EZ(N) = P2
      PZ(N) = P3
      CONT(1,N) = P4
      SS(N) = P5
      LTABCHI(N) = 0
      IF(SS(N).EQ.0.) GO TO 2180
      PRINT 5805,AMAT(N),MAT(N),N,LTABC(N),LTABK(N),CONT(1,N),SS(N)
      GO TO 2185
 2180 PRINT 5810,AMAT(N),MAT(N),N,LTABC(N),LTABSC(N),LTABK(N),LTABSK(N),T
     $AV(N),EZ(N),PZ(N),CONT(1,N)
CCC
CCC   INPUT PARAMETER FOR DEFORMATION OF SOIL SKELETON
CCC
C-----WHEN SS > 0) BOTH CONDUCTIVITY AND SPECIFIC STORAGE WILL BE MADE
C----- CONSTANT
 2185 IF(SS(N).NE.0.0) GO TO 2140
      NVARC = NVARC + 1
      IF(AV(N).GT.0.0) CONST1 = EZ(N) + AV(N) * PZ(N)
C      CK(N) = CS(N) = CC(N) = 0.0
      CK(N) = 0.0
      CS(N) = 0.0
      CC(N) = 0.0
      IF(AV(N).GT.0.0.AND.CONT(1,N).GT.0.0) GO TO 2220
CCC
CCC   E - LOG P CURVE DATA
CCC
      READ(1,5780)CS(N),CC(N),EZ(N),PZ(N),CK(N),EK(N),CONZ(N)
      CC(N) = ABS(CC(N))
      CS(N) = ABS(CS(N))
      CONST1 = EZ(N) + AV(N) * PZ(N)
      CONST2 = EZ(N) + CC(N) * DLOG10(PZ(N))
 5780 FORMAT(7E10.3)
      PRINT 5785,CS(N),CC(N),EZ(N),PZ(N),CK(N),EK(N),CONZ(N)
 5785 FORMAT(10X,84H      CS            CC             EZ            PZ
     $ CK            EK            CONZ      ,/,9X,7E12.4)
      IF(CK(N).GT.0.0)NVARK = NVARK + 1
```

```
      GO TO 2220
CCC
CCC   TABULATE CHI AS A FUNCTION OF SATURATION OR AS A FUNCTION OF
CCC   HEAD. LTABCHI IS GREATER THAN ZERO IF CHI IS A FUNCTION OF
CCC   SATURATION AND LTABCHI IS LESS THAN ZERO IF CHI IS A FUNCTION
CCC   OF PRESSURE HEAD
CCC
CCC   USE COLS 1 TO 3 FOR THE WORD CHI AND COLS 6 TO 10 FOR LTABCHI
 2190 CONTINUE
      IF(N1.LT.0) GO TO 2200
CCC   CHI IS TABULATED AS A FUNCTION OF SATURATION
C      LTABCHI(N) = LTAB = N1
        LTABCHI(N) = N1
        LTAB = N1
      IF(LTAB.GT.1) GO TO 2191
      LTABCHI(N) = 0
      GO TO 2140
 2191 NVARCHI = NVARCHI + 1
      READ(1,5815)(CHI(J,N),CHIVARS(J,N),J=1,LTAB)
CCC   DETERMINE CHIVARP CORRESPONDING TO CHI
      DO 2195 J = 1,LTAB
      SET = CHIVARS(J,N)
      MAX = LTABC(N)
      IF(MAX.GE.100) GO TO 2210
      IF(APATH.EQ.4HWET ) GO TO 2192
      CALL ENTER(SD(1,N))
      CHIVARP(J,N)=PSIVARC(MID,N)+(1./(SLOCD(MID+1,N)+1.D-12))*(SET-SD(
     $MID,N))
      GO TO 2195
 2192 CALL ENTER(SW(1,N))
      CHIVARP(J,N) = PSIVARC(MID,N)+(1./(SLOCW(MID+1,N)+1.D-12))*(SET-SWB
     $(MID,N))
      GO TO 2195
 2210 CONTINUE
      SET = CHIVARS(J,N)
      X1 = ALPHA(N)
      X2 = 1./ETA(N)
      X3 = SR(N)
      IF(SET.LE.X3) GO TO 2194
      IF(SET.GE..99999999999) GO TO 2211
 2193 X4 = ((1.-SR(N))/(SET-SR(N)))-1.
      X4 = (X1*X4)**X2
      CHIVARP(J,N) = -X4
      GO TO 2195
 2194 CHIVARS(J,N) = X3 * 1.01
      SET = CHIVARS(J,N)
      GO TO 2193
 2211 CHIVARP(J,N) = 0.
 2195 CONTINUE
      GO TO 2205
 2200 LTAB = -LTAB
      IF(LTAB.GT.1) GO TO 2201
      LTABCHI(N) = 0
      GO TO 2140
 2201 NVARCHI = NVARCHI + 1
      READ(1,5815)(CHI(J,N),CHIVARP(J,N),J=1,LTAB)
CCC   DETERMINE CHIVARS CORRESPONDING TO CHI
      DO 2203 J = 1,LTAB
      SET = CHIVARP(J,N)
      IF(MAX.GE.100) GO TO 2215
      CALL ENTER(PSIVARC(1,N))
```

```
      IF(APATH.EQ.4HWET ) GO TO 2202
      CHIVARS(J,N) = SD(MID,J)+SLOCD(MID+1,J)*(SET-PSIVARC(MID,J))
      GO TO 2203
 2202 CHIVARS(J,N) = SW(MID,J) + SLOCW(MID+1,J)*(SET-PSIVARC(MID,J))
      GO TO 2203
 2215 CONTINUE
      SET = CHIVARP(J,N)
      X1 = ALPHA(N)
      X2 = ETA(N)
      X3 = SR(N)
      IF(SET.GE.0.) GO TO 2216
      CHIVARS(J,N) = X3 + (1.-X3)*(X1/(X1+(ABS(SET))**X2))
      GO TO 2203
 2216 CHIVARS(J,N) = 1.
 2203 CONTINUE
 2205 DO 2206 J = 2,LTAB
      CHIMID(J,N) =(CHIVARP(J,N) + CHIVARP(J-1,N))/2.
 2206 CONTINUE
      CHIMID(1,N) = CHIVARP(1,N)
      CALL SLOPE(CHIVARP(1,N),CHI(1,N),SLOCHI(1,N))
      SLOCHI(1,N) = SLOCHI(2,N)
      CHIMID(LTAB+1,N) = CHIVARP(LTAB,N)
      SLOCHI(LTAB+1,N) = 0.
      PRINT 5900
 5900 FORMAT(40X,
     $ 51HTABULATION OF CHI WITH PRESSURE HEAD AND SATURATION,/,45X,
     $ 44H       CHI        PRESSURE HEAD      SATURATION,/)
      PRINT 5910,(CHI(J,N),CHIVARP(J,N),CHIVARS(J,N),J=1,LTAB)
 5910 FORMAT(45X,3E15.4)
      PRINT 5920
 5920 FORMAT(40X,
     $ 42HTABULATION OF DCHI/DPSI WITH PRESSURE HEAD,/,46X,
     $ 29H     DCHI/DPSI    PRESSURE HEAD /)
      JJ = LTAB + 1
      PRINT 5930,(SLOCHI(J,N),CHIMID(J,N),J=1,JJ)
 5930 FORMAT(46X,2E15.4)
      GO TO 2140
 2220 IF(APATH.EQ.4H    ) GO TO 2250
      CALL HYST
      GO TO 2140
CCC
CCC   CALCULATE SLOPES FOR CONDUCTIVITY TABLE WHEN FLOW REGION IS ALWAYST
CCC   TO REMAIN SATURATED
CCC
C
 2250 LTAB = IABS(LTABK(N))
      IF(LTAB .GT. 1) GO TO 2255
      LTABK(N) = 0
      GO TO 2140
2255  NVARK = NVARK + 1
       LABEL = 1
C
      READ (1,5815)(CONT(J,N),PSIVARK(J,N),J=1,LTAB)
      CALL SLOPE(PSIVARK(1,N),CONT(1,N),SLOK(1,N))
      PRINT 5880,(CONT(J,N),SLOK(J,N),PSIVARK(J,N),J=1,LTAB)
      IF(LTAB .GT. M9) KWIT = 12
      PRINT 5881,N
 5881 FORMAT(10X,12H***** LTABK(,I3,25H) EXCEEDS TABLE LENGTH M9)
      GO TO 2140
2270  NEWBL(4) = NEWBL(4) + 1000
      RETURN
```

```
C
C COMPLETED BLOCK 2.
C
CCC
CCC INPUT DATA BLOCK  4.  NODE LIST.
CCC
 2275 L = 0
C       IF(MODE .EQ. 0) NODES = NOSPEC = 0
      IF(MODE .EQ. 0) NOSPEC = 0
      IF(MODE .EQ. 0) NODES =0
      N = NODES
C
      KODEZ = 0
 2280 READ (1,5820)N1,NSEQ,NADD,N2,KS,DLONG,DWIDE,DRAD,P2,P1
C
      IF(N1 .EQ. 0) GO TO 2330
      DLONG = DLONG*SCALE
      DWIDE = DWIDE*SCALE
      DRAD  = DRAD *SCALE
      P1 = P1*SCALE
      P2 = P2*SCALE
      ADD = 0.0
      IF(DRAD .GE. 0.) GO TO 2285
      ADD  = -(DRAD + DRADS)
      DRAD =  DRADS
 2285 IF(MODE .GE. 0) GO TO 2295
      CALL SEEK1(N, N1, NODE, NODES, K)
      IF(K*NTYPE(N) .NE. 0) NOSPEC = NOSPEC - 1
      ITEMS(4) = NMIN1(ITEMS(4))
      GO TO 2300
C2295  N = NODES = N + 1
2295  N=N+1
      NODES = N
 2300 IF(N .GT. M4) CALL MORTHAN(N,NODES,M4)
C      NODMAT(N) = NOXMAT(N) = N2
        NODMAT(N) = N2
        NOXMAT(N) = N2
      NODE(N) = N1
      NTYPE(N) = 0
      IF(KODEZ.EQ.0)GO TO 2305
      Z(N) = Z(N-1) + P2
      GO TO 2308
 2305 Z(N) = P1
 2308 CONTINUE
      PHI(N) = PHIONE
      PSI(N) = PHI(N) - Z(N)
      G(N) = GONE
      PC(N) = PCONE
      IF(SS(N2).NE.0.0) GO TO 2317
CCC
CCC   INITIALIZE PRECONSOLIDATION PRESSURE AND SATURATION PATH
CCC
      IF(APATH.NE.4HDRY ) GO TO 2310
      IPATH(N) = 1
      DPSIS (N) = -1.
      GO TO 2317
 2310 IF(APATH.NE.4HWET )GO TO 2318
      IPATH(N) = 2
      DPSIS(N) = 1.
      GO TO 2317
 2318 IPATH(N) = 0
```

```
 2317 CONTINUE
C     DRADS = DRAD = DRAD + ADD
        DRAD=DRAD+ADD
        DRADS=DRAD
      VOL(N) = GEOM*DLONG*DWIDE*DRAD**KSYM
      IF(VOL(N) .NE. 0.) GO TO 2315
      VOL(N) = 1.D-24
      NTYPE(N) = 2
      GO TO 2319
2315  IF(KS .EQ. 0) GO TO 2320
      NTYPE(N) = 3
 2319 NOSPEC = NOSPEC + 1
 2320 IF(MOD(L, 57) .EQ. 0) PRINT 5825
      L = L + 1
      PRINT 5830,NODE(N),N,NODMAT(N),NTYPE(N),DLONG,DWIDE,DRAD,VOL(N),
     $Z(N)
      IF(NSEQ.LE.0) GO TO 2325
      NSEQ = NSEQ - 1
      N1 = N1 + NADD
      KODEZ = 1
      GO TO 2285
 2325 KODEZ = 0
      GO TO 2280
 2330 DO 2335  N = 5,12
 2335 NEWBL(N) = NEWBL(N) + 1000
      NEWBL(1) = NEWBL(1) + 1000
      NEWBL(7) = NEWBL(7) - 1000
      RETURN
C
C COMPLETED BLOCK 4.  RETURN TO HEART.
C
3100  IBLOCK = 4
      CALL REFER(NODMAT, NOXMAT, NODES, MAT, NMAT)
CCC
CCC   CALC. NODE MASSES, CAPACITIES, CONDUCTIVITIES.
CCC
CCC
CCC   COMPUTE TOTSTRS(N). TOSTRS(N) IS THE TOTAL STRESS IN METERS OF
CCC   WATER.  THIS CALCULATION ASSUMES THAT PRIOR TO TIME TZERO,
CCC   THE SYSTEM WAS SATURATED UPTO THE TOP
CCC
      IF(NAMES(20).NE.1H ) GO TO 3120
      CALL LINE
      PRINT 5760
      DO 3121 N = 1,NODES
      BURDEN = THICK - Z(N)
      TSTRSIN = BURDEN * RD
      DELTPSI = BURDEN - PSI(N)
        DELTPSI=(DMIN1(BURDEN, DELTPSI))*(RD-1.)
C      IF(DELTPSI.GT..5*TSTRSIN)DELTPSI = 0.
        IF (DELTPSI .LE. 0.) DELTPSI=0.
      TOTSTRS(N) = TSTRSIN - DELTPSI
 3121 CONTINUE
 3120 CONTINUE
      CALL LINE
CCC
CCC   COMPUTE LUMPED QUATITIES FOR DIMENSIONLESS TIME AND DIMENSIONLESS
CCC   PRESSURE
CCC
      IF(NODIM.LE.0)GO TO 2440
      TLUMP = CONT(1,1)*RHOZ*GEE/(VISC*SS(1))
```

```
      PLUMP = 2.*3.14159265*RHOZ*GEE/(QOVERH*VISC)
      PLUMP = PLUMP * CONT(1,1)
 2440 CONTINUE
 3115 DO 3125 N = 1,NODES
      ZIP(N) = 0.0
      NND = NODMAT(N)
      NODREF=N
      J = NODMAT(N)
      X1 = BPRIME*PSI(N)
      RHO(N) = RHOZ * EXP(X1)
      IF(SS(NND).NE.0.0) GO TO 6650
CCC
CCC   CALCULATE EFFECTIVE STRESS, VOID RATIO
CCC
C     CHIDASH = CHIAT = 1.
        CHIAT=1.
        CHIDASH=1.
      IF(PSI(N).GE.0.) GO TO 3116
C      IF(PSI(N).LT.0.)CHIDASH=CHIAT=0.
      IF(PSI(N).LT.0.)CHIDASH=0.
      IF(PSI(N).LT.0.)CHIAT=0.
CCC   EVALUATE CHI AT PSI(N)
      SET = PSI(N)
      MAX = IABS(LTABCHI(J))
      CALL ENTER(CHIVARP(1,J))
      IF(SET.GE.CHIVARP(MAX,J))MID = MAX
      CHIAT = CHI(MID,J) + SLOCHI(MID+1,J)*(SET-CHIVARP(MID,J))
      CHIAT = DMIN1(1.D+0,CHIAT)
      CHIAT = DMAX1(CHIAT,.0001D+0)
 3116 ESTRESS = TOTSTRS(N) - CHIAT * PSI(N)
      P1 = TOTSTRS(N)*RHOZ*GEE
      P2 = ESTRESS*RHOZ*GEE
      PRINT 5765,NODE(N),TOTSTRS(N),P1,ESTRESS,P2
 5765 FORMAT(10X,I5,5X,E13.4,7X,E13.4,5X,E13.4,7X,E13.4)
      IF(LTABCHI(J).EQ.0.OR.SET.GE.0.0) GO TO 3117
CCC   CALCULATE CRIDASH = CHI + PSI * DCHI/DPSI
      MAX = IABS(LTABCHI(J))
      CALL ENTER(CHIMID(1,J))
      DCHIDP = SLOCHI(MID,J)+((SET-CHIMID(MID,J))/(CHIMID(MID+1,J)-
     $CHIMID(MID,J)))*(SLOCHI(MID+1,J)-SLOCHI(MID,J))
      CHIDASH = CHIAT + SET * DCHIDP
      CHIDASH = DMIN1(1.D+0,CHIDASH)
      CHIDASH = DMAX1(CHIDASH,0.D+0)
 3117 CONTINUE
      IF(AV(J).EQ.0.) GO TO 6500
      CONST1 = EZ(J) + AV(J) * PZ(J)
C----- COMPUTE VOID RATIO USING AV
      E(N) = -AV(J) * RHO(N) * GEE * ESTRESS + CONST1
      PC(N) = ESTRESS*RHO(N)*GEE
      GO TO 6550
 6500 IF(PC(N).GT.0.) GO TO 6510
 6505 PC(N) = ESTRESS * RHO(N) * GEE
      PCH(N) = ESTRESS
      E(N) = -CC(J)*DLOG10(PC(N)) + CONST2
      A1 = CC(J)
      GO TO 6550
 6510 PCH(N) = PC(N)/(RHO(N)*GEE)
      IF(ESTRESS.GE.PCH(N)) GO TO 6505
      EC = EZ(J) - CC(J)*DLOG10(PC(N)/PZ(J))
      CONST = EC + CS(J)*DLOG10(PC(N))
        RHODPX=RHO(N)
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```
        GEED=GEE
       E(N) = -CS(J)*DLOG10(ESTRESS*RHODPX*GEED) + CONST
       X1 = CS(J)
 6550  CONTINUE
CCC
       VSOLID(N) = VOL(N)/(1. + E(N))
       VOL(N) = VSOLID(N)*(1.+E(N))
CCC    CALCULATE DERIVATIVE OF VOID RATIO WITH RESPECT TO PSI
       IF(AV(J).EQ.0.0) GO TO 6580
       DNDP = AV(J)*RHO(N)*GEE
       GO TO 6590
 6580  X2 = 1./(2.3025850994*ESTRESS)
       DNDP = X1*X2
CCC    CHECK FOR SATURATION
 6590  IF(PSI(N).GE.0.0.OR.NTYPE(N).EQ.2)GO TO 6600
C----- EVALUATE SATURATION AND SPECIFIC MOISTURE CAPACITY BY CALLING
CCC    SUBROUTINE HYST
       CALL HYST1
       GO TO 6610
 6600  CAPM(N) = 0.
       S(N) = 1.
 6610  CONTINUE
       IF(S(N).GE.1.)CHIDASH = 1.
       CAPT = E(N)*S(N)*RHO(N)**2*BETA*GEE
      $        +S(N)*RHO(N)*CHIDASH*DNDP
      $        +E(N)*RHO(N)*CAPM(N)
       CAP(N) = VSOLID(N)*CAPT
       IF(N.NE.166.OR.N.NE.167) GO TO 6680
       PRINT 9998
 9998  FORMAT (10X,38HN,CAP,E,S,RHO,CHIDASH,DNDP,CAPM,VSOLID)
       PRINT 5775, N,CAP(N),E(N),S(N),RHO(N),CHIDASH,DNDP,CAPM(N),VSOLID(
      $N)
       GO TO 6680
 6650  CONTINUE
       IF(NAMES(20).NE.' ')GO TO 6680
       CAPT=SS(NND)
       CAP(N)=VOL(N)*CAPT
 6680  IF(CAP(N).LE.0.)CAP(N) = 1.D-36
CCC
CCC    CALCULATE W(N)
CCC
       IF(SS(NND).EQ.0.0) GO TO 6690
       W(N) = CAP(N) * PSI(N)
       GO TO 6715
 6690  W(N) = VSOLID(N)*E(N)*S(N)*RHO(N)
CCC
CCC    EVALUATE CONDUCTIVITY
CCC
C----- CHECK TO SEE IF CONDUCTIVITY - EFFECTIVE STRESS OR
C----- CONDUCTIVITY-VOID RATIO RELATION IS TO BE USED
 6700  IF(CK(NND).NE.0.) GO TO 6750
       IF(APATH.EQ.4H    ) GO TO 6710
C------ EVALUATE CONDUCTIVITY BY CALLING SUBROUTINE HYST
       IF(LTABK(NND).GE.100) GO TO 6780
       IF(PSI(N).GE.0.) GO TO 6710
       CALL HYST2
       GO TO 6800
 6710  IF(LTABK(NND).GT.1) GO TO 6720
 6715  CON(N) = CONT(1,NND)
       GO TO 6800
CCC
```

```
CCC    FLOW REGION IS SATURATED.  K  IS TABULATED AS A FUNCTION OF
CCC    EFFECTIVE STRESS
CCC
 6720 CONTINUE
      IF(LTABK(NND).GE.100) GO TO 6780
      SET = ESTRESS
      MAX=IABS(LTABK(NND))
      CALL ENTER(PSIVARK(1,NND))
      CON(N) = CONT(MID,NND) + SLOK(MID+1,NND)*(SET-PSIVARK(MID,NND))
      GO TO 6800
CCC
CCC    THE FOLLOWING CARDS COULD BE USED LATER IF IT IS DESIRED TO USE
CCC    THE E  VERSUS  LOG  K RELATION FOR THE SATURATED ZONE AND THE
CCC    TABULATED VALUES OF  K  VERSUS  PSI  IN THE UNSATURATED ZONE
CCC
 6750 CONTINUE
      IF(PSI(N).GE.0.0) GO TO 6760
      IF(LTABK(NND).GE.100) GO TO 6800
 6760 CONST = EK(NND) - (CK(NND)/2.302585093)*DLOG(CONZ(NND))
      X1 = ((E(N)-CONST)/CK(NND))*2.302585093
      CON(N) = EXP(X1)
      GO TO 6800
 6780 IF(PSI(N).LT.0.) GO TO 6800
      CON(N) = CONT(1,NND)
 6800 IF(CON(N).LE.0.) CON(N) = 1.0D-24
3125  CONTINUE
      CALL LINE
CCC
CCC    FIND OUT AND WRITE TOTAL NODES, VOLUME, CAP OF EACH MATERIAL
CCC
      PRINT 5870
C       CAPS = FLUID = VOLS = 0.
        CAPS = 0.
        FLUID = 0.
        VOLS = 0.
      DO 3135  K = 1,NMAT
C       VOLMS = CAPMS = WMS = 0.0
        VOLMS = 0.
        CAPMS = 0.
        WMS = 0.
      NODMS = 0
      DO 3130  N = 1,NODES
      IF(NODMAT(N) .NE. K) GO TO 3130
      NODMS  = NODMS  + 1
      VOLMS  = VOLMS  + VOL(N)
      CAPMS  = CAPMS  + CAP(N)
      WMS    = WMS    + W(N)
3130  CONTINUE
      CAPS  = CAPS  + CAPMS
      VOLS  = VOLS  + VOLMS
      FLUID = FLUID + WMS
      IF(CAPMS.GT.0.)PRINT 5875,AMAT(K),MAT(K),NODMS,VOLMS,CAPMS,WMS
3135  CONTINUE
      PRINT 5890,NODES,VOLS,CAPS,FLUID
 4200 FORD = FOR + DELT
      IF(KWIT.LT.0.OR.NOW.LE.0.OR.KCYC.LT.1.OR.
     $  (KCYC .NE. 1 .AND. KDATA .LT. 0)) GO TO 4300
CCC
CCC    FIND, WRITE TOTAL CAPACITY, FLUID CONTENT OF EACH MATERIAL
CCC
      PRINT 5885
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```
      DO 4215  K = 1,NMAT
C      CAPMS = WMS = 0.
        CAPMS = 00.
        WMS = 0.
      DO 4210  N = 1,NODES
      IF(NODMAT(N) .NE. K) GO TO 4210
      CAPMS = CAPMS + CAP(N)
      WMS   = WMS   + W(N)
4210  CONTINUE
      IF(CAPMS .LE. 0.) GO TO 4215
      PRINT 5895,AMAT(K),MAT(K),CAPMS,WMS
4215  CONTINUE
      CALL LINE
CCC
CCC   WRITE OUT DATA FOR NODES ON PRINTOUT CYCLES.
CCC
      IF(KWIT .LE. 0 .AND. (KCYC .LT. 1 .OR. (KCYC .NE. 1 .AND. (KDATA
     1 .LE.0.OR.NVARC+NVARK+NVARH.LE.0)))) GO TO 4300
CCC
CCC   WRITE OUT PROPERTIES OF EACH NODE.
CCC
      PRINT 5840
      DO 4240  N = 1,NODES
      IF(MOD(N, 57) .EQ. 1) PRINT 5845
      PRINT 5850, NODE(N), NOXMAT(N), NTYPE(N),
     1VOL(N),RHO(N),CAP(N),CON(N),ZIP(N),SLIM(N),E(N),S(N),PC(N)
4240  CONTINUE
      CALL LINE
CCC
CCC
CCC INITIALIZE FLUID CONTENT, CHANGES IN PSI AND FLUX
CCC
CCC
4300  DO 4302  N = 1,NODES
C      DF(N) = DPSI(N) = ZIP(N) = 0.0
        DF(N) = 0.
        DPSI(N) = 0.
        ZIP(N) = 0.
      NND = NODMAT(N)
      IF(SS(NND).LE.0.0) GO TO 4302
      W(N) = CAP(N) * PSI(N)
 4302 CONTINUE
      IF(KCYC.EQ.0) RETURN
CCC
CCC   FIND NEW NODE CAPACITIES AND FLUID CONTENT WHEN AV OR E - LOG P
CCC   CURVE IS USED
CCC
      IF(KWIT.LT.0.OR.NOW.LE.0.OR.KCYC.LT.1.OR.
     $  (KCYC.NE.1.AND.KDATA.LT.0)) GO TO 4304
      IF(KSTDATA.LE.0)GO TO 4304
      JJ = KCYC - 1
      PRINT 5770,JJ
      PRINT 5771
      PRINT 5772
      PRINT 5773
 4304 DO 4348 N = 1,NODES
      NND = NODMAT(N)
      NODREF = N
      X1 = PSI(N)*BPRIME
      RHO(N) = RHOZ * EXP(X1)
      BETW = W(N)
```

```
      IF(SS(NND).NE.0.0) GO TO 7650
CCC
CCC   EVALUATE W(N) AT PSI(N)
CCC
C      CHIAT = CHIDASH = 1.
       CHIDASH = 1.
      CHIAT  = 1.
      IF(PSI(N).GE.0.) GO TO 7505
      IF(PSI(N).LT.0.)CHIDASH = 0.
      IF(LTABCHI(NND).EQ.0) GO TO 7505
      SET = PSI(N)
      MAX = IABS(LTABCHI(NND))
      CALL ENTER(CHIVARP(1,NND))
      IF(SET.GE.CHIVARP(MAX,NND))MID = MAX
      CHIAT = CHI(MID,NND) + SLOCHI(MID+1,NND)*(SET-CHIVARP(MID,NND))
 7505 ESTRIN = TOTSTRS(N) - CHIAT*PSI(N)
      IF(AV(NND).EQ.0.0)GO TO 7520
      CONST1 = EZ(NND) + AV(NND) * PZ(NND)
      E(N) = -AV(NND)*(ESTRIN*RHO(N)*GEE)+CONST1
      GO TO 7540
 7520 IF(ESTRIN.LT.PCH(N))GO TO 7530
      PCH(N) = ESTRIN
      PC(N) = PCH(N)*RHO(N)*GEE
      E(N) = -CC(NND)*DLOG10(PC(N)) + CONST2
      GO TO 7540
 7530 EC = -CC(NND)*DLOG10(PC(N))+CONST2
      CONST = EC + CS(NND)*DLOG10(PC(N))
      E(N) = -CS(NND)*DLOG10(ESTRIN*RHO(N)*GEE) + CONST
 7540 CONTINUE
CCC
CCC   CALCULATE NEW VOLUME AND CHANGE IN VOLUME
CCC
 7560 CONTINUE
      IF(KSTDATA.LE.0)GO TO 4305
      OLDVOL = VOL(N)
      VOL(N) = VSOLID(N)*(1. + E(N))
      DVOL = OLDVOL - VOL(N)
      DELVOL(N) = DELVOL(N) + DVOL
      EPSINCR = DVOL/OLDVOL
CCC
CCC   STRATE IS STRAIN RATE EXPRESSED IN PERCENT PER UNIT TIME
CCC
      STRATE = 100.*EPSINCR/DELTS
 4305 CONTINUE
      EX = FORD * DDPSI(N)
      SET = PSI(N) + EX
 4310 BET = CAP(N)
      COLD = CAPM(N)
      CAPS = CAPS - CAP(N)
      X1 = SET * BPRIME
      RHOMEAN = RHOZ*EXP(X1)
      IF(SET.GE.0.)GO TO 7600
C      CHIAT = CHIDASH = 1.
       CHIDASH = 1.
      CHIAT =  1.
      IF(SET.LT.0.)CHIDASH = 0.
      IF(LTABCHI(NND).EQ.0.OR.SET.GE.0.0) GO TO 7570
      MAX = IABS(LTABCHI(NND))
      CALL ENTER(CHIVARP(1,NND))
      CHIAT = CHI(MID,NND)+SLOCHI(MID+1,NND)*(SET-CHIVARP(MID,NND))
      CHIAT = DMIN1(1.D+0,CHIAT)
```

```
CCC    CALCULATE CHIDASH = CHI + PSI*DCHI/DPSI
       MAX = IABS(LTABCHI(NND))
       CALL ENTER (CHIMID(1,NND))
       DCHIDP = SLOCHI(MID,NND)+((SET-CHIMID(MID,NND))/(CHIMID(MID+1,
      $NND)-CHIMID(MID,NND)))*(SLOCHI(MID+1,NND)-SLOCHI(MID,NND))
       CHIDASH = CHIAT + SET*DCHIDP
       CHIDASH = DMIN1(1.D+0,CHIDASH)
 7570  CONTINUE
 7600  ESTRESS = TOTSTRS(N) - CHIAT*SET
       IF(AV(NND).EQ.0.0)GO TO 7620
       CONST1 = EZ(NND) + AV(NND) * PZ(NND)
       EAVG = -AV(NND)*ESTRESS*RHOMEAN*GEE+CONST1
       PC(N) = ESTRESS*RHO(N)*GEE
       GO TO 7640
 7620  IF(ESTRESS.LT.PCH(N))GO TO 7630
         DRHOMN=RHOMEAN
         GEED=GEE
       EDVG = -CC(NND)*DLOG10(ESTRESS*DRHOMN*GEED) + CONST2
       X1 = CC(NND)
       GO TO 7640
 7630  EC = -CC(NND)*DLOG10(PC(N)) + CONST2
       CONST = EC + CS(NND)*DLOG10(PC(N))
       EAVG = -CS(NND)*DLOG10(ESTRESS*DRHOMN*GEED)+CONST
       X1 = CS(NND)
 7640  CONTINUE
CCC
CCC    CALCULATE PSI-DERIVATIVE OF POROSITY
       IF(AV(NND).EQ.0.0) GO TO 7680
       DNDP = AV(NND)*RHOMEAN*GEE
       GO TO 7685
 7680  X2=1./(2.302585092994*ESTRESS)
       DNDP = X1*X2
 7685  IF(SET.GE.0.0.OR.NTYPE(N).EQ.2) GO TO 7690
       CALL HYST3
       GO TO 7695
 7690  SAVG = 1.
       CAPM(N) = 0.0
 7695  CONTINUE
       IF(SAVG.GE.1.)CHIDASH = 1.
       CAPT = EAVG*SAVG*RHOMEAN**2*BETA*GEE
      $         +SAVG*RHOMEAN*CHIDASH*DNDP
      $         +EAVG*RHOMEAN*CAPM(N)
       CAP(N) = VSOLID(N)*CAPT
       IF(KSIDATA.LE.0)GO TO 7700
       IF(KWIT.LT.0.OR.NOW.LE.0.OR.KCYC.LT.1.OR.
      $ (KCYC.NE.1.AND.KDATA.LT.0)) GO TO 7700
       IF(MOD(N+13,58).EQ.0) PRINT 5771
       IF(MOD(N+13,58).EQ.0) PRINT 5772
       IF(MOD(N+13,58).EQ.0) PRINT 5773
       PRINT 5775,NODE(N),DVOL,VOL(N),DELVOL(N),EPSINCR,STRATE,CHIAT,
      $CHIDASH,ESTRIN
       GO TO 7700
C----- CALCULATE CAPACITY WHEN SS IS THE INPUT PARAMETER
 7650  W(N)=CAP(N)*PSI(N)
 7700  IF(CAP(N).LE.0.) CAP(N) = 1.0D-36
       IF(SS(NND).NE.0.) GO TO 4400
4340   CAPS = CAPS + CAP(N)
       BETW = ABS(BETW-W(N))/BETW
       BET = 100.0*ABS(BET-CAP(N))/BET
       IF(COLD.LE.0.0) GO TO 4400
       DPSIMAX = DMAX1(DPSIMAX,BET*PSIVARY)
```

```
      DPSIMAX = DMAX1(DPSIMAX,BETW)
CCC
CCC   FIND NEW NODE CONDUCTIVITIES
CCC
 4400 IF(NOCON*NVARK.LE.0) GO TO 4348
      BET = CON(N)
      NND = NODMAT(N)
      IF(LTABK(NND).GE.100.AND.SET.LE.0.) GO TO 4348
      MAX = LTABK(NND)
      IF(MAX.GE.0) GO TO 4405
 4402 MAX = -MAX
      SET = SUMTIM + FORD
 4405 IF(CK(NND).GT.0.) GO TO 7750
      IF(LTABK(NND).GE.100) GO TO 4348
      IF(SET.GE.0.) GO TO 7710
      IF(APATH.EQ.4H    ) GO TO 7710
      CALL HYST4
      GO TO 7800
 7710 LTAB = IABS(LTABK(NND))
      IF(LTAB.LE.1) GO TO 4348
CCC
CCC   FLOW REGION IS SATURATED. K  IS TABULATED AS A FUNCTION OF
CCC   EFFECTIVE STRESS
CCC
      CALL ENTER(PSIVARK(1,NND))
      CON(N) = CONT(MID,NND) + SLOK(MID+1,NND)*(SET-PSIVARK(MID,NND))
      GO TO 7800
 7750 IF(SET.GE.0.) GO TO 7760
      CALL HYST4
      GO TO 7800
 7760 CONST = EK(NND)-(CK(NND)/2.302585093)*DLOG(CONZ(NND))
      X1 = ((EAVG-CONST)/CK(NND))*2.302585093
      CON(N) = EXP(X1)
 7800 IF(CON(N).LE.0.) CON(N) = 1.D-24
      BET = 100.0*ABS(BET-CON(N))/BET
      DPSIMAX = DMAX1(DPSIMAX,BET*PSIVARY)
 4348 CONTINUE
      IF(KWIT.LT.0.OR.NOW.LE.0.OR.KCYC.LT.1.OR.
     $ (KCYC.NE.1.AND.KDATA.LT.0))RETURN
CCC
CCC   THE FOLLOWING CARDS ARE FOR SCHIFFMAN-GIBSON CONSOLIDATION PROBLEML
CCC
      VLOST=0.0
      DO 4349 N = 1,NODES
 4349 VLOST=VLOST + DELVOL(N)
      PRINT 4360,VLOST
 4360 FORMAT(10X,46HTOTAL VOLUME CHANGE OVER ENTIRE FLOW REGION = ,
     $E12.5)
      CALL LINE
      RETURN
CCC
CCC   COMPLETED THERM2. RETURN TO HEART.
CCC
 5760 FORMAT(10X,57HINITIAL DISTRIBUTION OF TOTAL STRESS AND EFFECTIVE SB
     STRESS,/,21X,
     $ 72HTOTAL STRESS          TOTAL STRESS       INITIAL STRESS       INITB
     $IAL STRESS,/,10X,
     $ 91H NODE       IN UNITS OF LENGTH  IN UNITS OF PRESSURE  IN UNITS OB
     $F LENGTH  IN UNITS OF PRESSRE)
 5770 FORMAT(10X,36HGEOMETRICAL DATA AT THE END OF CYCLE,I5,/)
 5771 FORMAT(10X,106H NODE        VOL CHANGE    VOLUME AT   CUMULATIVE   INCRB
```

```
     $MENTAL   INCREMENTAL                                       EFF STRESS )
 5772 FORMAT(10X,106H                 DURING       END OF       VOLUME     VOLUB
     $METRIC  TIME RATE        CHI        CHIDASH      IN UNITS  )
 5773 FORMAT(10X,106H              TIME STEP   TIME STEP     CHANGE       STB
     $RAIN     OF STRAIN                                    OF HEAD    )
 5775 FORMAT(10X,I5,5X,8E12.4)
 5790 FORMAT(A4,6X,4E10.3)
5795     FORMAT(44X,'FLOW REGION PROPERTIES')
5796     FORMAT(28X,'SATURATION',6X,'THICKNESS',5X,'REL DEN')
5797     FORMAT(41X,'OF FLOW REGION   OF SATURATED',6X,'XF',10X,'QOVERH')
5798     FORMAT(65X,'SOIL')
5799     FORMAT(33X,A3,4E15.4)
 5800 FORMAT(A4,1X,5I5,5E10.3)
 5805 FORMAT(/,10X,60H  NAME  MATL INDEX LTABC LTABK  CONDUCTIVITY   SPET
     $C STORAGE ,/, 10X,A4,4I6,2E15.4)
 5810 FORMAT(10X,104H  AMAT  MATL INDEX LTABC LTABSC LTABK LTABSK
     $ AV                 EZ               PZ          CONDUCTIVITY,/,10X,A4,
     $3I6,I7,I6,I7,4E14.4,//)
 5815 FORMAT (8E10.3)
 5820 FORMAT(5I5,5X,5E10.3)
 5825 FORMAT(//,12X,22HNODE INDEX  MATL NTYPE,4X,5HDLONG,10X,5HDWIDE,
     $10X,4HDRAD,11X,6HVOLUME,11X,1HZ)
 5830 FORMAT(10X,4I6,5E14.5)
 5840 FORMAT(10X,69HNODE DATA.  CHECK TOTAL CONDUCTANCES (ZIP) AND TIME
     1CONSTANTS (SLIM).,/,15X,88HLARGE DIFFERENCES BETWEEN NODES MAY BE
     2DUE TO POOR ZONING, AND MAY PRODUCE POOR RESULTS.)
 5845 FORMAT(/,6X,123H NODE MATL NTYPE  VOLUME          RHO        CAPACITY
     $ CONDUCTIVITY      ZIP          SLIM      THETA    SATURATION
     $PC       )
 5850 FORMAT(5X,3I5,9E12.4)
 5855 FORMAT(//10X,30H NODP1 NODP2 INDEX NPROP  PROP)
 5860 FORMAT(7I5)
 5865 FORMAT(10X,4I6,2X,A6)
 5870 FORMAT(//,10X,16HMATERIAL SUMMARY,/,
     $12X,52HNAME  MATL NODES      TOT VOL       TOT CAP  TOT FLUID)
 5875 FORMAT(10X,A4,2I6,3E13.5)
 5880 FORMAT(/17X,12HCONDUCTIVITY,5X,5HSLOPE,7X,7HPSIVARK/15X,3E15.6)
 5885 FORMAT(10X,13HMATERIAL DATA,//,12X,10HNAME  MATL,5X,7HTOT CAP,
     $7X,9HTOT FLUID)
 5890 FORMAT(/,10X,12HSYSTEM TOTAL,I6,3E13.5)
 5895 FORMAT(10X,A4,I6,2E15.5)
 5905 FORMAT(/19X65HCAPACITY        SLOPE             ENERGY           SLOPE
     $          TVARC/,(15X,5E15.6))
      END
```

```
CDECK HYST
      SUBROUTINE HYST
        IMPLICIT REAL*8 (A-H,O-Z)
CCC    ** VERSION OCTOBER 30,1973
CCC

CCC   SUBROUTINE HYST IS FOR EVALUATING SATURATION AND PERMEABILITY
CCC   WHEN PRESSURE HEAD, PSI,IS LESS THAN ZERO (UNSATURATED ZONE).
CCC   BOTH SATURATION AND PERMEABILITY HAVE HYSTERETIC RELATIONSHIP WITHH
CCC   NEGATIVE PRESSURE HEAD
CCC
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
CCALL UNSAT
      INCLUDE 'UNSAT.INC'
CCALL CURVE
      INCLUDE 'CURVE.INC'
CCALL M
      INCLUDE 'M.INC'
CCALL STRAIN
      INCLUDE 'STRAIN.INC'
C
      DIMENSION DC(1,10),DCS(1,10),DK(1,10),DKLIM(1),DKS(1,10),DPLIM(1),D
     $          DPLIMK(1),DSLIM(1),SCAN(1,10),SKAN(1,10),SKOPE(1),
     $      SLOKD(100,10),SLOKW(100,10),WC(1,10),WCS(1,10),WK(1,10),
     $          WKLIM(1),WKS(1,10),WPLIM(1),WPLIMK(1),WSLIM(1)
CCC
      IF(KCYC)2100,3100,4200
CCC
CCC SATURATION AND PERMEABILITY VERSUS PSI
CCC
 2100 N = NMAT
CCC TABLE OF SATURATION VERSUS PSI
      LTAB = LTABC(N)
      IF(LTAB.GE.100) GO TO 2400
      IF(LTAB.GE.2) GO TO 2110
CCC   THIS MATERIAL WILL ALWAYS REMAIN SATURATED
      LTABC(N) = 0
      GO TO 2250
 2110 LABEL = 1
      READ(1, 5800)(PSIVARC(J,N),J=1,LTAB)
      READ(1, 5800)(SW(J,N),SD(J,N),J=1,LTAB)
CCC   COMPUTE SLOPES FOR WETTING AND DRYING CURVES
      PRINT 5820
      IF(LTAB.LE.M9) GO TO 5822
      PRINT 5821,N
 5821 FORMAT(10X,12H***** LTABC(,I3,25H) EXCEEDS TABLE LENGTH M9)
 5822 CONTINUE
      CALL SLOPE(PSIVARC(1,N),SW(1,N),SLOCW(1,N))
      CALL SLOPE(PSIVARC(1,N),SD(1,N),SLOCD(1,N))
      PRINT 5825,(J,PSIVARC(J,N),SW(J,N),SD(J,N),J=1,LTAB)

CCC   SET UP SPECIFIC MOISTURE CAPCITY TABLE
```

```
      DO 2130 J=2,LTAB
      PSIMIDC(J,N) = (PSIVARC(J,N)+PSIVARC(J-1,N))/2.
 2130 CONTINUE
      PSIMIDC(1,N) = PSIVARC(1,N)
      SLOCW(1,N) = SLOCW(2,N)
      SLOCD(1,N) = SLOCD(2,N)
      PSIMIDC(LTAB+1,N) = PSIVARC(LTAB,N)
C      SLOCW(LTAB+1,N) = SLOCD(LTAB+1,N) = 0.
        SLOCW(LTAB+1,N) = 0.
        SLOCD(LTAB+1,N) = 0.
      PRINT 5835
      JJ = LTAB + 1
      PRINT 5840,(J,PSIMIDC(J,N),SLOCW(J,N),SLOCD(J,N),J=1,JJ)
CCC
CCC   SCANNING CURVE DATA FOR SATURATION TABLE
CCC
      LTAB = LTABSC(N)
      IF(LTAB.GE.2) GO TO 2150
      GO TO 2250
 2150 READ(1, 5800)(DC(J,N),DCS(J,N),WC(J,N),WCS(J,N),J=1,LTAB)
      DO 2155 J = 1,LTAB
      SCAN(J,N) = (WCS(J,N) - DCS(J,N))/(WC(J,N) - DC(J,N))
 2155 CONTINUE
      PRINT 5850
      PRINT 5855,(J,SCAN(J,N),DC(J,N),DCS(J,N),WC(J,N),WCS(J,N),J=1,LTABL
     $)
      IF (LTAB.LE.M9) GO TO 5857
      PRINT 5856,N
 5856 FORMAT(10X,12H**** LTABSC(,I3,25H) EXCEEDS TABLE LENGTH M9)
 5857 CONTINUE
CCC
CCC   PERMEABILITY - PSI TABLE
CCC   FOR PSI LESS THAN ZERO, PERMEABILITY IS A FUNCTION OF PORE WATER
CCC   PRESSURE (PSI).  FOR PSI LARGER THAN ZERO, PERMEABILITY SHOULD BE
CCC   TABULATED AS A FUNCTION OF EFFECTIVE STRESS HEAD
CCC
 2250 LTAB = LTABK(N)
      IF(LTAB.GE.2) GO TO 2260
      LTABK(N) = 0
      GO TO 2500
 2260 IF(CK(N).EQ.0.0)NVARK = NVARK + 1
      READ(1, 5800)(PSIVARK(J,N),J=1,LTAB)
      READ(1, 5800)(CONTW(J,N),CONTD(J,N),J=1,LTAB)
      IF(PSIVARK(1,N).LE.0.0) GO TO 2270
      PRINT 5860
 2270 DO 2295 J = 1,LTAB
      IF(PSIVARK(J,N).LT.0.) GO TO 2295
      IF(CONTW(J,N).LE.0.)CONTW(J,N) = CONTD(J,N)
      IF(CONTD(J,N).LE.0.)CONTD(J,N) = CONTW(J,N)
 2295 CONTINUE
      CALL SLOPE(PSIVARK(1,N),CONTW(1,N),SLOKW(1,N))
      CALL SLOPE(PSIVARK(1,N),CONTD(1,N),SLOKD(1,N))
      SLOKW(1,N) = SLOKW(2,N)
      SLOKD(1,N) = SLOKD(2,N)
      PRINT 5865
      PRINT 5870,(J,PSIVARK(J,N),CONTW(J,N),SLOKW(J,N),CONTD(J,N),
     $SLOKD(J,N),J=1,LTAB)
      IF(LTAB.LE.M9) GO TO 5872
      PRINT 5871,N
 5871 FORMAT(10X,12H***** LTABK(,I3,25H) EXCEEDS TABLE LENGTH M9)
 5872 CONTINUE
```

```
CCC
C     WHEN PSI IS .GT.0., PSIVARK DENOTES EFFECTIVE STRESS
      DO 2296 J=1,LTAB
      CONT(J,N)=CONTD(J,N)
      SLOK(J,N)=SLOKD(J,N)
 2296 CONTINUE
CCC   PERMEABILITY SCANNING CURVE DATA
CCC
      LTAB = LTABSK(N)
      IF(LTAB.GE.2) GO TO 2340
      GO TO 2500
 2340 READ(1, 5800)(DK(J,N),DKS(J,N),WK(J,N),WKS(J,N),J=1,LTAB)
      DO 2350 J = 1,LTAB
      SKAN(J,N) = (WKS(J,N)-DKS(J,N))/(WK(J,N) - DK(J,N))
 2350 CONTINUE
      PRINT 5861
      IF (LTAB.LE.M9) GO TO 5867
      IF(LTAB.GT.M9)KWIT = 12
      PRINT 5866,N
 5866 FORMAT(10X,12H**** LTABSK(,I3,25H) EXCEEDS TABLE LENGTH M9)
 5867 CONTINUE
.     GO TO 2500
 2400 LTABK(N)=100
      NVARK=NVARK+1
      PRINT 5700
 5700 FORMAT (/,10X,82HPARAMETERS FOR EXPRESSING SATURATION AND PERMEABIN
     1LITY AS FUNCTION OF PRESSURE HEAD )
      PRINT 5720
 5720 FORMAT (/,20X,69H      A              B          SAT COND     ALPHA
     $  ETA         RESIDUAL,4X,8HAIRENTRY,/,
     $79X,10HSATURATION,5X,5HVALUE/)
      READ(1, 5725)P1,P2,P3,P4,P5,P6,P7
 5725 FORMAT(7E10.3)
      A(N)=P1
      B(N)=P2
      CONT(1,N)=P3
      ALPHA(N)=P4
      ETA(N)=P5
      SR(N)=P6
      PSIAIR(N) = P7
      PRINT 5730,P1,P2,P3,P4,P5,P6,P7
 5730 FORMAT(20X,7E12.4)
 2500 RETURN
      ENTRY HYST1
CCC
CCC   ENTER AT ENTRY HYST1 FOR EVALUATING SATURATION WHEN KCYC = 0
CCC
 3100 N = NODREF
      J = NODMAT(N)
      SET = PSI(N)
      IF (LTABC(J).GE.100) GO TO 3350
      IF(IPATH(N).GE.3) GO TO 3200
      MAX = LTABC(J)
      CALL ENTER(PSIVARC(1,J))
      II = IPATH(N)
      GO TO (3130,3140),II
 3130 S(N) = SD(MID,J) + SLOCD(MID+1,J)*(SET-PSIVARC(MID,J))
      GO TO 3300
 3140 S(N) = SW(MID,J) + SLOCW(MID+1,J) * (SET-PSIVARC(MID,J))
      GO TO 3300
CCC
```

```
CCC    START HERE WHEN THE INTIAL CONDITIONS OF THE PROBLEM ARE SUCH THATH
CCC    THE PATH OF SATURATION IS DIFFERENT IN DIFFERENT PARTS OF THE
CCC    FLOW REGION
CCC
 3200 IF(IPATH(N).GT.3) GO TO 3220
      S(N) = DSLIM(N) + (PSI(N)-DPLIM(N))*CAPM(N)
      GO TO 3400
 3220 S(N) = WSLIM(N) + (PSI(N) - WPLIM(N))*CAPM(N)
      GO TO 3400
CCC
CCC    CALCULATE INITIAL SPECIFIC MOISTURE CAPACITY
CCC
 3300 MAX = LTABC(J) + 1
      CALL ENTER(PSIMIDC(1,J))
      II = IPATH(N)
      GO TO (3310,3320),II
 3310 CAPM(N) = SLOCD(MID,J) + ((SET-PSIMIDC(MID,J))/(PSIMIDC(MID+1,J)-
     $PSIMIDC(MID,J)))*(SLOCD(MID+1,J)-SLOCD(MID,J))
      GO TO 3400
 3320 CAPM(N) = SLOCW(MID,J) + ((SET-PSIMIDC(MID,J))/(PSIMIDC(MID+1,J)-
     $PSIMIDC(MID,J)))*(SLOCW(MID+1,J)-SLOCW(MID,J))
      GO TO 3400
 3350 X1=ALPHA(J)
      IF(SET.GE.PSIAIR(J)) GO TO 3390
      SET=ABS(SET)
      SET = SET - ABS(PSIAIR(J))
      X2=ETA(J)
      S(N)=SR(J)+(1.-SR(J))*(X1/(X1+SET**X2))
      X3 = (1.-SR(J))*X1*X2*(SET**(X2-1))
      CAPM(N)=X3/((X1+SET**X2)**2)
      CON(N) = CONT(1,J)*(A(J)/(A(J)+SET**B(J)))
      GO TO 3400
 3390 S(N) = 1.
      CAPM(N) = 0.
      CON(N) = CONT(1,J)
 3400 RETURN
      ENTRY HYST2
CCC
CCC    ENTER AT HYST2 FOR EVALUATING PRESSURE DEPENDANT CONDUCTIVITY WHENH
CCC    KCYC = 0
CCC
      N = NODREF
      J = NODMAT(N)
      IF(LTABK(J).LE.1) RETURN
      IF(IPATH(N).GE.3) GO TO 3600
      SET = PSI(N)
      MAX = LTABK(J)
      CALL ENTER(PSIVARK(1,J))
      II = IPATN(N)
      GO TO (3530,3540),II
 3530 CON(N) = CONTD(MID,J)+SLOKD(MID+1,J)*(SET-PSIVARK(MID,J))
      GO TO 4000
 3540 CON(N) = CONTW(MID,J) + SLOKW(MID+1,J)*(SET-PSIVARK(MID,J))
      GO TO 4000
 3600 IF(IPATH(N).GT.3) GO TO 3620
      CON(N) = DKLIM(N) + (PSI(N) - DPLIMK(N))**SKOPE(N)
      GO TO 4000
 3620 CON(N) = WKLIM(N) + (PSI(N)-WPLIMK(N))*SKOPE(N)
 4000 RETURN
CCC
CCC
```

```
CCC   ENTER AT HYST3 FOR EVALUATING PRESSURE DEPENDANT SATURATION AND
CCC   SPECIFIC MOISTUTRE CAPACITY WHEN KCYC IS GREATER THAN 0
CCC
      ENTRY HYST3
CCC   CHECK FOR PATH REVERSAL
 4200 N = NODREF
      J = NODMAT(N)
      IF (LTABC(J).GE.100) GO TO 4650
      IF(LTABSC(J).EQ.0)GO TO 4400
      IF((DPSIS(N)/(DOPSI(N)+1.D-24)).GE.0) GO TO 4400
CCC
CCC   PATH HAS REVERSED
CCC
      IF(IPATH(N) - 3) 4230,4220,4225
 4220 IPATH(N) = 4
      GO TO 4500
 4225 IPATH(N) = 3
      GO TO 4500
 4230 IF(IPATH(N).GT.1) GO TO 4300
CCC
CCC   REVERSED PATH STARTS FROM DRYING CURVE.  COMPUTE THE SLOPE OF
CCC   THE SCANNING CURVE AND ITS INTERSECTIONS WITH THE DRYING AND
CCC   WETTING CURVES
CCC
 4240 DPLIM(N) = PSI(N)
      SET1 = SET
      SET = PSI(N)
      MAX = LTABC(J)
      CALL ENTER(PSIVARC(1,J))
      DSLIM(N) = SD(MID,J) + SLOCD(MID+1,J)*(SET-PSIVARC(MID,J))
      MAX = LTABSC(J)
      CALL ENTER(DC(1,J))
      CAPM(N) = SCAN(MID,J) + ((SET-DC(MID,J))/(DC(MAX,J)-DC(MID,J)))*
     $(SCAN(MAX,J)-SCAN(MID,J))
      WPLIM(N) = WC(MID,J) + ((SET-DC(MID,J))/(DC(MAX,J) - DC(MID,J)))*
     $(WC(MAX,J) - WC(MID,J))
      SET = WPLIM(N)
      MAX = LTABC(J)
      CALL ENTER(PSIVARC(1,J))
      WSLIM(N) = SW(MID,J) + SLOCW(MID+1,J) * (SET-PSIVARC(MID,J))
      SET = SET1
      IPATH(N)=3
      PRINT 5880,NODE(N),DPLIM(N),CAPM(N)
 5880 FORMAT(10X,4HNODE,I5,17HHAS REVERSED PATH,7HDPLIM =,E15.4,6HCAPM =L
     $,E15.4,9HIPATH = 3)
      GO TO 4500
CCC
CCC   REVERSED PATH STARTS FROM WETTING CURVE. COMPUTE SLOPE FOR
CCC   SCANNING CURVE AND ITS INTERSECTIONS WITH WETTING AND DRYING CURVEH
CCC
 4300 WPLIM(N) = PSI(N)
      SET1 = SET
      SET = PSI(N)
      MAX = LTABC(J)
      CALL ENTER(PSIVARC(1,J))
      WSLIM(N) = SW(MID,J) + SLOCW(MID+1,J) * (SET-PSIVARC(MID,J))
      MAX = LTABSC(J)
      CALL ENTER(WC(1,J))
      CAPM(N) = SCAN(MID,J)+((SET-WC(MID,J))/(WC(MAX,J)-WC(MID,J)))*
     $(SCAN(MAX,J)-SCAN(MID,J))
      DPLIM(N) = DC(MID,J) + ((SET-WC(MID,J))/(WC(MAX,J)-WC(MID,J)))*
```

```
     $(DC(MAX,J)-DC(MID,J))
      SET = DPLIM(N)
      MAX = LTABC(J)
      CALL ENTER(PSIVARC(1,J))
      SET = SET1
      IPATH(N) = 4
      PRINT 5885,NODE(N),WPLIM(N),CAPM(N)
 5885 FORMAT(10X,4HNODE,I5,17HHAS REVERSED PATH,7HWPLIM =,E15.4,6HCAPM =L
     $,E15.4,9HIPATH = 4)
      GO TO 4500
CCC
CCC   PATH HAS NOT REVERSED
CCC
 4400  IF(IPATH(N).GE.3) GO TO 4500
      MAX = LTABC(J)
      CALL ENTER(PSIVARC(1,J))
      II = IPATH(N)
      GO TO (4435,4465),II
 4435 SAVG = SD(MID,J)+SLOCD(MID+1,J)*(SET-PSIVARC(MID,J))
      IF(PSI(N).GE.PSIVARC(MID+1,J)) GO TO 4445
      S(N) = SD(MID,J)+SLOCD(MID+1,J)*(PSI(N)-PSIVARC(MID,J))
      GO TO 4600
 4445 IF(PSIVARC(MID+1,J).GE.0.) GO TO 4455
      S(N) = SD(MID+1,J) + SLOCD(MID+2,J)*(PSI(N)-PSIVARC(MID+1,J))
      GO TO 4600
 4455 S(N)=1.
      GO TO 4600
 4465 SAVG = SW(MID,J) + SLOCW(MID+1,J)*(SET-PSIVARC(MID,J))
      IF(PSI(N).LT.PSIVARC(MID,J)) GO TO 4475
      S(N) = SW(MID,J)+SLOCW(MID+1,J)*(PSI(N)-PSIVARC(MID,J))
      GO TO 4600
 4475 S(N) = SW(MID,J) + SLOCW(MID,J) * (PSI(N) - PSIVARC(MID,J))
      GO TO 4600
CCC
CCC   POINT IS ON THE SCANNING CURVE
CCC
 4500 IF(IPATH(N).GT.3) GO TO 4550
      IF(SET.GE.WPLIM(N)) GO TO 4520
      SAVG = DSLIM(N) + CAPM(N)*(SET-DPLIM(N))
      S(N)= DSLIM(N) + CAPM(N) * (PSI(N)-DPLIM(N))
      GO TO 4700
CCC   REACHED OR CROSSED WETTING CURVE
 4520 IPATH(N) = 2
      GO TO 4400
 4550 IF(SET.LT.DPLIM(N)) GO TO 4570
      SAVG = WSLIM(N)+CAPM(N)*(SET-WSLIM(N))
      S(N) = WSLIM(N) + CAPM(N)*(PSI(N)-WSLIM(N))
      GO TO 4700
CCC
CCC   REACHED OR CROSSED DRYING CURVE
CCC
 4570 IPATH(N) = 1
      GO TO 4400
CCC
CCC   CALCULATE SPECIFIC MOISTURE CAPACITY WHEN POINT IS ON EITHER
CCC   THE DRYING CURVE OR THE WETTING CURVE
 4600 IF(IPATH(N).GE.3) GO TO 4700
      MAX = LTABC(J) + 1
      CALL ENTER(PSIMIDC(1,J))
      II = IPATH(N)
      GO TO (4635,4640),II
```

```
4635 CAPM(N) = SLOCD(MID,J) + ((SET-PSIMIDC(MID,J))/(PSIMIDC(MID+1,J)-
    $PSIMIDC(MID,J)))*(SLOCD(MID+1,J)-SLOCD(MID,J))
     IF(DABS(SLOCD(MID+1,J)).LT.1.D-24)CAPM(N) = 0.
     GO TO 4700
4640 CAPM(N) = SLOCW(MID,J) + ((SET-PSIMIDC(MID,J))/(PSIMIDC(MID+1,J)-
    $PSIMIDC(MID,J)))*(SLOCW(MID+1,J)-SLOCW(MID,J))
     IF(DABS(SLOCW(MID+1,J)).LT.1.D-24)CAPM(N) = 0.
     GO TO 4700
4650 CONTINUE
     X1=ALPHA(J)
     SET1=ABS(PSI(N))
     IF(SET1.LE.ABS(PSIAIR(J))) GO TO 4655
     X2=ETA(J)
     S(N) = SR(J) + (1. - SR(J))*(X1/(X1 + SET1**X2))
     GO TO 4660
4655 S(N) = 1.
4660 CONTINUE
     IF(SET.GE.PSIAIR(J)) GO TO 4665
     SET=ABS(SET)
     SAVG = SR(J) + (1. - SR(J))*(X1/(X1 + SET**X2))
     X3 = (1.-SR(J))*X1*X2*(SET**(X2-1))
     CAPM(N) = X3/((X1+SET**X2)**2)
     CON(N) = CONT(1,J)*(A(J)/(A(J)+SET**B(J)))
     GO TO 4670
4665 SAVG = 1.
     CAPM(N) = 0.
     CON(N) = CONT(1,J)
4670 CONTINUE

4700 RETURN
CCC
CCC
CCC   ENTER AT HYST4 FOR COMPUTING PRESSURE DEPENDANT CONDUCTIVITY
CCC   WHEN KCYC IS GREATER THAN 0
CCC
     ENTRY HYST4
CCC
CCC   CHECK FOR PATH REVERSAL
CCC
     N = NODREF
     J = NODMAT(N)
     IF(LTABSK(J).EQ.0) GO TO 5000
     IF((DPSIS(N)/(DDPSI(N)+1.D-24)).GE.0) GO TO 5000
CCC
CCC   PATH HAS REVERSED
CCC
     IF(SET.LT.0.0) GO TO 4810
     IF(IPATH(N).EQ.1) IPATH(N) = 2
     IF(IPATH(N).EQ.2) IPATH(N) = 1
     GO TO 5175
4810 IF(IPATH(N))4830,4820,4825
4820 IPATH(N) = 4
     GO TO 5100
4825 IPATH(N) = 3
     GO TO 5100
4830 IF(IPATH(N).GT.1) GO TO 4900
CCC
CCC   REVERSED PATH STARTS FROM DRYING CURVE. COMPUTE SLOPE OF SCANNING
CCC   CURVE AND INTERSECTIONS WITH DRYING AND WETTING CURVES
CCC
4840 DPLINK(N) = PSI(N)
```

```
      SET1 = SET
      SET = PSI(N)
      MAX = LTABK(J)
      CALL ENTER(PSIVARK(1,J))
      DKLIM(N) = CONTD(MID,J)+SLOKD(MID+1,J)*(PSI(N)-PSIVARK(MID,J))
      MAX = LTABSK(J)
      CALL ENTER(DK(1,J))

      SKOPE(N) = SKAN(MID,J) + ((PSI(N)-DK(MID,J))/(DK(MAX,J)-DK(MID,J))H
     $)*(SKAN(MAX,J)-SKAN(MID,J))
      WPLIMK(N) = WK(MID,J)+((PSI(N)-DK(MID,J))/(DK(MAX,J)-DK(MID,J)))*
     $(WK(MAX,J)-WK(MID,J))
      MAX = LTABK(J)
      CALL ENTER(PSIVARK(1,J))
      WKLIM(N)=CONTW(MID,J)+SLOKW(MID+1,J)*(WPLIMK(N)-PSIVXRK(MID,J))
      IPATH(N) = 3
      SET = SET1
CCC
CCC   REVERSED PATH STARTS FROM WETTING CURVE. COMPUTE SLOPE
CCC   OF SCANNING CURVE AND ITS INTERSECTIONS WITH THE WETTING AND
CCC   THE SRYING CURVES
CCC
 4900 WPLIMK(N) = PSI(N)
      SET1 = SET
      SET = PSI(N)
      MAX = LTABK(N)
      CALL ENTER(PSIVARK(1,J))
      WKLIM(N) = CONTW(MID,J)+SLOKW(MID+1,J)*(PSI(N)-PSIVARK(MID,J))
      MAX = LTABSK(J)
      CALL ENTER(WK(1,J))
      SKOPE(N) = SKAN(MID,J) + ((PSI(N)-WK(MID,J))/(WK(MAX,J)-WK(MID,J))H
     $)*(SKAN(MAX,J) - SKAN(MID,J))
      MAX = LTABK(J)
      CALL ENTER(PSIVARK(1,J))
      DKLIM(N) = CONTD(MID,J) + SLOKD(MID+1,J)*(PSI(N)-PSIVARK(MID,J))
      IPATH(N) = 4
      SET = SET1
      GO TO 5100
CCC
CCC   PATH HAS NOT REVERSED
CCC
 5000 IF(SET.GE.0.0) GO TO 5175
      IF(IPATH(N).GE.3) GO TO 5100
      MAX = LTABK(J)
      CALL ENTER(PSIVARK(1,J))
      II = IPATH(N)
      GO TO (5035,5040),II
 5035 CON(N) = CONTD(MID,J)+SLOKD(MID+1,J)*(SET-PSIVARK(MID,J))
      GO TO 5200
 5040 CON(N) = CONTW(MID,J) + SLOKW(MID+1,J)*(SET-PSIVARK(MID,J))
      GO TO 5200
CCC
CCC   POINT IS ON THE SCANNING CURVE
 5100 IF (IPATH(N).GT.3) GO TO 5150
      IF(SET.GE.WPLIMK(N)) GO TO 5120
      CON(N) = DKLIM(N) + SKOPE(N)*(SET-DPLIMK(N))
      GO TO 5200
CCC   REACHED OR CROSSED WETTING CURVE
 5120 IPATH(N) = 2
      GO TO 5000
 5150 IF(SET.LT.DPLIMK(N)) GO TO 5170
```

```
      CON(N) = WKLIN(N) + SKOPE(N)*(SET-WPLINK(N))
      GO TO 5200
CCC   REACHED OR CROSSED DRYING CURVE
 5170 IPATH(N) = 1
      GO TO 5000
 5175 ESTRESS = (THICK - Z(N))*RD - SET
      SET1 = SET
      SET = ESTRESS
      MAX = LTABK(J)
      CALL ENTER(PSIVARK(1,J))
      II = IPATH(N)
      GO TO (5180,5185),II
 5180 CON(N) = CONTD(MID,J) + SLOKD(MID+1,J) * (SET-PSIVARK(MID,J))
      GO TO 5190
 5185 CON(N) = CONTW(MID,J) + SLOKW(MID+1,J) * (SET-PSIVARK(MID,J))
 5190 SET = SET1
 5800 FORMAT(8E10.3)
 5820 FORMAT(//,48X,22H   SATURATION TABLE   //,
     $32X,48H       PRESSURE HEAD  WETTING CURVE  DRYING CURVE,/,
     $43X,5H(PSI),9X,7H(  SW ),8X,7H(  SD ),//)
 5825 FORMAT(30X,I5,3E15.4)
 5835 FORMAT(//,42X,32HSPECIFIC MOISTURE CAPACITY TABLE,//,
     $34X,48H       PRESSURE HEAD  WETTING CURVE  DRYING CURVE/,
     $43X,5H(PSI),8X,7H(SLOCW)8X,7H(SLOCD)//)
 5840 FORMAT(30X,I5,1PE15.4,2D15.4)
 5850 FORMAT(//,40X,36H   SATURATION SCANNING CURVE DATA   //,
     $28X,67HSLOPE         PSI,DRYING       S,DRYING       PSI,WETTING      SH
     S,WETTING /,
     $28X,68H(SCAN)         CURVE (DC)     CURVE (DCS)      CURVE(WC)     CURH
     SVE(WCS)   //)
 5855 FORMAT(15X,I5,5E15.4)
 5860 FORMAT(10X,5(1H*),42HTHIS MATERIAL WILL ALWAYS REMAIN SATURATED)
 5865 FORMAT(46X,18HPERMEABILITY TABLE /,
     $18X,80H               PSIVARK            CONTW              SLOKW              CONTH
     $D              SLOKD        ,/)
 5870 FORMAT(15X,I5,1PE15.4,2D15.4,2E15.4)
 5861 FORMAT(//,10X,32HPERMEABILITY SCANNING CURVE DATA,/,
     $28X,67HSLOPE         PSI,DRYING       S,DRYING       PSI,WETTING      SH
     S,WETTING/,
     $28X,68H(SKAN)         CURVE(DK)     CURVE (DKS)      CURVE(WK)     CURVH
     SE (WKS)//)
 5200 RETURN
CCC   END OF HYST
      END
```

```
CDECK FINK
      SUBROUTINE FINK
        IMPLICIT REAL*8 (A-H,O-Z)
C
C********VERSION 5/20/69.
C********REVISED 6/73.
C
C********FINK IS A REQUIRED SUBROUTINE FOR HEAT CONDUCTION PROBLEMS.
C********A NUMBER OF PROBLEMS INVOLVING FLOW, CHEMICAL REACTION, HEAT
C********GENERATION, CONVECTIVE AND RADIATIVE TRANSPORT, ETC., MAY BE
C********SOLVED WHICH DO NOT REQUIRE FINK.
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
CCALL AREA
      INCLUDE 'AREA.INC'
CCALL M
      INCLUDE 'M.INC'
CCALL  NMIN1
      INCLUDE ' NMIN1.INC'
C
      IF(KCYC) 2000,3100,4200
CCC
CCC   INPUT DATA BLOCK 5. INTERNAL CONNECTION LIST
CCC
 2000 L = 0
C      IF(MODE.EQ.0)N=NOCON=0
      IF(MODE.EQ.0)NOCON=0
      IF(MODE.EQ.0)N=0
      N = NOCON
C
 2100 READ(1,5805)N1,N2,NSEQ,NAD1,NAD2,NZ,P1,P2,DLONG,DRAD
C
      IF(N1 .EQ. 0) RETURN
      P1 = P1*SCALE
      P2 = P2*SCALE
      DLONG = DLONG*SCALE
      DRAD = DRAD*SCALE
      IF(NZ .LE. 0) GO TO 2105
      NZ = 10**NZ
      NAD1 = NAD1*NZ
      NAD2 = NAD2*NZ
 2105 CONTINUE
2120  ADD = 0.0
      IF(DRAD.GE.0.) GO TO 2125
      ADD = -(DRAD + DRADS)
      DRAD = DRADS
 2125 IF(MODE .GE. 0) GO TO 2135
      CALL SEEK2(N, N1, N2, NOX1, NOX2, NOCON, K)
      ITEMS(5) = NMIN1(ITEMS(5))
      GO TO 2140
C2135  N = NOCON = N + 1
2135      N=N+1
      NOCON=N
 2140 IF(N .GT. M5) CALL MORTHAN(N,NOCON,M5)
C       NOD1(N) = NOX1(N) = N1
```

```
      NOD1(N) = N1
      NOX1(N) = N1
       NOD2(N) = NOX2(N) = N2
      NOD2(N) = N2
      NOX2(N) = N2
      DEL1(N) = P1
      DEL2(N) = P2
       DRAD = DRADS = DRAD + ADD
      DRAD =  DRAD + ADD
       DRADS= DRAD
      AREA(N) = GEOM*DLONG*DRAD**KSYM
      IF(MOD(L,57) .EQ. 0) PRINT 5810
      L = L + 1
      PRINT 5800,NOD1(N),NOD2(N),N,DEL1(N),DEL2(N),DLONG,DRAD,AREA(N)
      IF(NSEQ .LE. 0) GO TO 2100
      NSEQ = NSEQ - 1
      N1 = N1 + NAD1
      N2 = N2 + NAD2
      GO TO 2125
C
C COMPLETED BLOCK 5.
C
3100  IBLOCK = 5
      CALL REFER(NOD1, NOX1, NOCON, NODE, NODES)
      CALL REFER(NOD2, NOX2, NOCON, NODE, NODES)
      IF(KWIT .NE. 0) RETURN
CCC
CCC   INITIALIZE FLUX.
CCC
      DO 3102  N = 1,NOCON
C 3102 DFI(N) = FI(N) = 0.0
       DFI(N)=0.0
3102   FI(N)=0.0
CCC
CCC   CALCULATE CONDUCTANCE OF INTERNAL CONNECTIONS.
CCC
       DO 3105 N = 1,NOCON
      N1 = NOD1(N)
      N2 = NOD2(N)
      X1 = GUYMO * AREA(N)
      X2 = CON(N1)*CON(N2)*RHO(N1)*RHO(N2)/(CON(N1)*RHO(N1)*DEL2(N) +
     $CON(N2)*RHO(N2)*DEL1(N))
      X3 =(DEL2(N)*RHO(N1) + DEL1(N)*RHO(N2))/(DEL2(N) + DEL1(N))
      TRAN(N) = X1 * X2 * X3
 3105 CONTINUE
      GO TO 4210
CCC
CCC   FIND TOTAL FLUID FLUX ACROSS EACH INTERNAL CONNECTION
CCC
4200  DO 4205  N = 1,NOCON
4205  FI(N) = FI(N) + DFI(N)
 4210 IF(NOW .LE. 0 .OR. KCYC .LT. 1 .OR. (KCYC .NE. 1 .AND. KDATA .LE.
     $ 0)) GO TO 4300
CCC
CCC   WRITE OUT PROPERTIES OF EACH INTERNAL CONNECTION.
CCC
      PRINT 5820
      TX = DMAX1(SUMTIM - TAU, 1.D-12)
        IF(KCYC .LE. 1) TX=1.D-12
      DO 4220  N = 1,NOCON
      IF(MOD(N, 57) .EQ. 1) PRINT 5825
```

```
      FX = FI(N)/TX
      DFIX = DFI(N)/DELTS
      PRINT 5830,NOX1(N),NOX2(N),AREA(N),TRAN(N),FI(N),FX,DFI(N),DFIX

4220  CONTINUE
      CALL LINE
CCC
CCC   FIND NEW CONDUCTANCES OF INTERNAL CONNECTIONS.
CCC
 4300 IF(NVARK.LE.0) GO TO 4400
      DO 4310 N = 1,NOCON
      N1 = NOD1(N)
      N2 = NOD2(N)
      K1 = NODMAT(N1)
      K2 = NODMAT(N2)
 4305 X1 = GBYMU * AREA(N)
      X2 = RHO(N1) * (.8*CON(N1)+.2*CON(N2))
      X3 = (DEL1(N)*RHO(N2) + DEL2(N)*RHO(N1))/(DEL1(N) + DEL2(N))
      TRAN(N) = X1 * X2 * X3
4310  CONTINUE
CCC
CCC   FIND PRESSURE HEAD CHANGES IN NODES DUE TO FLUID FLOW
CCC
4400  DO 4405  N = 1,NOCON
      N1 = NOD1(N)
      ZIP(N1) = ZIP(N1) + TRAN(N)
      N2 = NOD2(N)
      ZIP(N2) = ZIP(N2) + TRAN(N)
CCC
CCC   FOR A VERTICAL SEEPAGE FACE MAKE EXTERNAL SURFACE IMPERMEABLE IF
CCC   THE INTERIOR NODE DEVELOPS SUCTION.  THE FOLLOWING STATEMENT
C     ASSUMES THAT THE ZERO VOLUME NODE AT THE EXTERNAL SURFACE IS GIVEN
C      A NEGATIVE IDENTIFICATION NUMBER.  IN BLOCK 5 PUNCH A ZERO
CCC   VOLUME NODE FIRST IN COLUMN 1 TO 5
CCC
      IF(NOX1(N).LT.0.AND.PHI(N1).GT.PHI(N2)) GO TO 4404
      IF(NOX1(N).LT.0)NTYPE(N1)=2
C      DFI(N) = FEX = DELT*TRAN(N)*((Z(N2)-Z(N1)) + (PSI(N2)-PSI(N1)))
        FEX=DELT*TRAN(N)*((Z(N2)-Z(N1))+(PSI(N2)-PSI(N1)))
        DFI(N)=FEX
      DF(N1) = DF(N1) + FEX
      DF(N2) = DF(N2) - FEX
      DPSI(N1) = DPSI(N1) + FEX/CAP(N1)
      DPSI(N2) = DPSI(N2) - FEX/CAP(N2)
      GO TO 4405
 4404 NTYPE(N1)=0
      PSI(N1)=0.0
 4405 CONTINUE
      RETURN
CCC
CCC   COMPLETED FINK, RETURN TO HEART.
CCC
 5800 FORMAT(10X,1I5,1I6,1I5,7E12.4)
 5805 FORMAT(2I5,3I3,I1,4E10.3)
 5810 FORMAT(//,11X,69HNOD1 NOD2 INDEX  DEL1          DEL2          DLONG
     $    DRAD         AREA)
 5820 FORMAT(10X,53HINTERNAL CONNECTION DATA.  CHECK CONDUCTANCES (TRAN)F
     1.,/,15X,94HLARGE DIFFERENCES BETWEEN CONNECTIONS MAY BE DUE TO POOF
     2R ZONING, AND MAY PRODUCE POOR RESULTS.)
 5825 FORMAT(/,10X,64H      NOD1  NOD2     AREA          TRAN          FLUID FF
     $LOW   AVG RATE ,22H    DFI         DFI/TIME)



 5830 FORMAT(13X,2I6,1X,7E12.4)
      END
```

```
CDECK GEN
      SUBROUTINE GEN
        IMPLICIT REAL*8 (A-H,O-Z)
C
C     REVISED 6/73.
C     REVISED 2/81.
C
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
CCALL AGEN
      INCLUDE 'AGEN.INC'
CCALL M
      INCLUDE 'M.INC'
CCALL NMIN1
      INCLUDE 'NMIN1.INC'
C
      IF(KCYC) 2000,3100,4200
CCC
CCC   INPUT DATA BLOCK 8. INTERNAL VARIABLE FLUID GENERATION LIST
CCC
 2000 LABEL = 1
C      IF(MODE .EQ. 0) NOGEN = NVARG = 0
      IF(MODE .EQ. 0)  NVARG = 0
      IF(MODE .EQ. 0) NOGEN =  0
      N = NOGEN
C
 2100 READ(1, 5815) N1, NSEQ, NADG, L1, (F1(J), F2(J), J = 1,3)
C
      IF(N1 .EQ. 0) RETURN
      LTAB = IABS(L1)
      IF(LTAB .NE. 0) GO TO 2105
      IF(F2(1) .EQ. 0.) F2(1) = 1.D-24
      GO TO 2125
 2105 IF(LTAB .LT. 4) GO TO 2115
      IF(LTAB .GT. M9) KWIT = 12
C
 2110 READ(1, 5800) (F1(J), F2(J), J = 4,LTAB)
C
 2115 CALL SLOPE(F2,F1,F3)
 2125 IF(MODE .GE. 0) GO TO 2130
      CALL SEEK1(N, N1, NOXG, NOGEN, K)
      ITEMS(8) = NMIN1(ITEMS(8))
      GO TO 2135
C 2130 N = NOGEN = N + 1
2130  N=N+1
      NOGEN=N
 2135 IF(N .GT. M8) CALL MORTMAN(N,NOGEN,M8)
C      NODG(N) = NOXG(N) = N1
        NODG(N)=N1
        NOXG(N)=N1
C      G(N) = GT(1,N) = F1(1)
        G(N) = F1(1)
        GT(1,N)=F1(1)
      TVARG(1,N) = F2(1)
      LTABG(N) = L1
```

```
      IF(L1 .NE. -1) GO TO 2145
      PRINT 5825
      GO TO 2146
 2145 IF(LABEL .EQ. 0) GO TO 2150
 2146 LABEL = 0
      PRINT 5820
 2150 PRINT 5805, N1, N, L1, F1(1), F2(1)
      IF(LTAB. LE. 1) GO TO 2160
      NVARG = NVARG + 1
      KK = 2
      DO 2155 J=2,LTAB
       GT(J,N) = F1(J)
       TVARG(J,N) = F2(J)
      SLOG(J,N) = F3(J)
 2155 CONTINUE
      PRINT 5810,(GT(J,N),SLOG(J,N),TVARG(J,N),J=2,LTAB)
CCC
CCC   TEST THROUGH WITH CARD.
CCC
 2160 IF(NSEQ .LE. 0) GO TO 2100
      NSEQ = NSEQ - 1
      N1 = N1 + NADG
      GO TO 2125
C
C COMPLETED BLOCK 8.
C
 3100 IF(NVARG.LE.0) GO TO 3105
      IBLOCK = 8
      CALL REFER(NODG, NOXG, NOGEN, NODE, NODES)
 3105 IF(KWIT .NE. 0) RETURN
      DO 3110 N = 1,NODES
C      FG(N) = DFG(N) = 0.0
        FG(N) = 0.0
       DFG(N) = 0.0
 3110 CONTINUE
 4200 IF (KWIT.LT.0) GO TO 4199
 4199 IF(NVARG.LE.0) GO TO 4300
CCC
CCC   FIND TOTAL FLUID GENERATION IN EACH NODE
CCC
      DO 4201  N = 1,NOGEN
 4201 FG(N) = FG(N) + DFG(N)
      IF(KCYC .LT. 1 .OR. NOW .LT. 1) GO TO 4300
CCC
CCC   PRINT NODE GENERATION DATA IF REQUIRED.
CCC
      PRINT 5865
      TX = DMAX1(SUMTIM - TAU, 1.D-12)
        IF(KCYC .LE. 1) TX=1.D-12
      FLUXS = 0.0
      DO 4202 N = 1,NOGEN
      FX = FG(N)/TX
      FLUXS = FLUXS + FG(N)
      PRINT 5870, NOXG(N), G(N), FG(N), FX
 4202 CONTINUE
        PRINT *,'KCYC=',KCYC,'SUMTIM=',SUMTIM,'TAU=',TAU,'TX=',TX,
     1 '**********FROM GEN 4202'
      FX = FLUXS/TX
      PRINT 5875, FLUXS, FX
      CALL LINF
CCC
```

```
CCC    FIND NEW FLUID GENERATION RATES
CCC
 4203 IF(NVARG.LE.0) GO TO 4300
      DO 4255 N = 1,NOGEN
      NND = NODG(N)
      MAX = LTABG(N)
      IF(MAX) 4204,4235,4205
 4204 MAX = -MAX
      SET = SUMTIM + FORD
      GO TO 4210
 4205 SET = PSI(NND) + DDPSI(NND) * FORD
 4210 BET = G(NND)
      CALL ENTER(TVARG(1,N))
      G(NND) = GT(MID,N)+SLOG(MID+1,N)*(SET-TVARG(MID,N))
      BET = 100.0*ABS((BET-G(NND))/(BET+1.0D-12))
      DPSIMAX = DMAX1(DPSIMAX,BET*PSIVARY)
      GO TO 4255
4235  SET = 0.69314718/TVARG(1,N)
        SST=SET
      EX = EXP(DMIN1(60.D+0, -DMIN1(60.D+0, SST*SUMTIM)))
      SETD = DMAX1(-60.D+0, DMIN1(SST*DELT, 60.D+0))
      IF(DABS(SETD) .GT. 1.D-5) GO TO 4240
      SET = EX*(1. - .5*SETD)
      GO TO 4245
 4240 SET = EX*(1. - EXP(-SETD))/(SST*DELT)
 4245 IF(SET .LE. 1.D-24) SET = 0.
      G(NND) = SET*GT(1,N)
4255  CONTINUE
CCC
CCC    FIND PRESSURE HEAD CHANGES DUE TO INTERNAL FLUID GENERATION
CCC
 4300 DO 4305 N = 1,NODES
      DX = DELT*G(N)
      GMASS = DX * RHO(N)
      DFG(N) = DFG(N) + DX
      DPSI(N) = DPSI(N) + GMASS/CAP(N)
 4305 CONTINUE
      RETURN
CCC
CCC    COMPLETED GEN, RETURN TO HEART
CCC
 5800 FORMAT (8E10.3)
 5805 FORMAT(10X,3I6,1E18.6,15X,1E15.6)
 5810 FORMAT(31X,3E15.6)
 5815 FORMAT (4I5,6E10.3)
 5820 FORMAT(//12X,16HNODG INDEX LTABG,6X,2HGT,12X,5HSLOPE,11X,5HTVARG)
 5825 FORMAT(/10X,65HFOLLOWING NODE HAS G(N) = GT(1,N)*EXP(-0.69315*SUMT
     SIM/TVARG(1,N)))
 5865 FORMAT(10X,5H NODG,4X,8HGEN RATE,5X,11HTOTAL FLUID,3X,8HAVG RATE)
 5870 FORMAT(10X,1I5,3E13.4)
 5875 FORMAT(/10X,12HSYSTEM TOTAL,6X,2E13.4)
      END
```

```
CDECK SURE
      SUBROUTINE SURE
        IMPLICIT REAL*8 (A-H,O-Z)
C
C*********VERSION 5/27/69.
C*********REVISED 6/73.
C
C*********SURE IS AN OPTIONAL SUBROUTINE.  IF NOT NEEDED, SET M6 = M7 = 0S
C*********(SEE USERS MANUAL FOR METHODS OF OBTAINING VARIOUS TYPES OF
C*********BOUNDARY CONDITIONS WITHOUT USING INPUT DATA BLOCKS 6 OR 7.)
C
      COMMON /NODTAP/NOXS,NOXSB
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
CCALL M
      INCLUDE 'M.INC'
CCALL ASURES
      INCLUDE 'ASURES.INC'
      DIMENSION AREAS(20),FD(20),FS(20),HSURE(20),HSURT(12,20),
     $          LTABH(20),LTABT(20),NODB(20),NODSB(20),NOXS(20),
     $          NOXSB(20),SLOH(12,20),SLOT(12,20),TIMEB(12,20),
     $          TVARH(12,20),DFB(20)
      DIMENSION PSIB(20),PSIBS(20),PHIB(12,20),ZB(20)
CCALL NMIN1
      INCLUDE 'NMIN1.INC'
C
      IF(KCYC) 2000,3100,4200
 2000 IF(IBLOCK .EQ. 7) GO TO 2200
      IF(IBLOCK .NE. 6) RETURN
CCC
CCC   INPUT DATA BLOCK 6. EXTERNAL CONNEXTION LIST
CCC
C      LABEL = L = 0
      LABEL = 0
      L = 0
C      IF(MODE.EQ.0)N=NOSCON=NVARH=0
      IF(MODE.NE.0)GO TO 2010
      N = 0
      NOSCON = 0
      NVARH = 0
2010  CONTINUE
      N = NOSCON
C
 2100 READ(1,5815),N1,N2,NSEQ,NADS,NADSB,L1,DLONG,DRAD,NX1
C
      IF(N1 .EQ. 0) RETURN
      DLONG = DLONG*SCALE
      DRAD = DRAD*SCALE
      ADD = 0.0
      IF(DRAD .GE. 0.) GO TO 2105
      ADD = -(DRAD + DRADS)
      DRAD = DRADS
 2105 CALL PATCH(NX1, HONE, HX, LXX)
      LTAB = IABS(L1)
      IF(LTAB .GT. 1) GO TO 2120
```

```
C       LTAB = L1 = 0
       LTAB =  0
       L1 = 0
       GO TO 2135
2120   NVARH = NVARH + 1 + NSEQ
       IF(LTAB .GT. N9) KWIT = 12
C
 2125 READ(1, 5800) (F1(J), F2(J), J = 1,LTAB)
C
       CALL SLOPE(F2,F1,F3)
 2135 IF(MODE .GE. 0)  GO TO 2155
       CALL SEEK2(N, N1, N2, NOXS, NOXSB, NOSCON, K)
       IF(K .EQ. 0) GO TO 2150
       IF(LTABH(N) .NE. 0 ) NVARH = NVARH - 1
 2150 ITEMS(6) = NMIN1(ITEMS(6))
       GO TO 2160
C2155  N = NOSCON = N + 1
2155   N =  N + 1
       NOSCON=N
 2160 IF(N .GT. M6) CALL MORTHAN(N,NOSCON,M6)
C       NODS(N) = NOXS(N) = N1
       NODS(N) =  N1
       NOXS(N) =  N1
C       NODSB(N) = NOXSB(N) = N2
       NODSB(N) =  N2
       NOXSB(N) =  N2
C       HSURT(1,N) = HSURE(N) = HX
       HSURE(N) =  HX
       HSURT(1,N) =  HX
       LTABH(N) = L1
C       DRAD = DRADS = DRAD + ADD
       DRAD =  DRAD + ADD
       DRADS=DRAD
       AREAS(N) = GEOM*DLONG*DRAD**KSYM
       IF(LABEL .EQ. 0) GO TO 2170
       LABEL = 0
       GO TO 2175
 2170 IF(MOD(L, 57) .NE. 0) GO TO 2180
 2175 PRINT 5820
 2180 PRINT 5825,N1,N2,N,L1,DLONG,DRAD,HX,AREAS(N)
       L = L + 1
       IF(LTAB .EQ. 0) GO TO 2190
       KK = 1
       DO 2185 J=1,LTAB
       HSURT(J,N) = F1(J)
       TVARH(J,N) = F2(J)
       SLOH(J,N) = F3(J)
 2185 CONTINUE
       LABEL = 1
       PRINT 5830,(HSURT(J,N),SLOH(J,N),TVARH(J,N),J=1,LTAB)
CCC
CCC    TEST THROUGH WITH CARD.
CCC
 2190 IF(NSEQ .LE. 0) GO TO 2100
       NSEQ = NSEQ - 1
       N1 = N1 + NADS
       N2 = N2 + NADSB
       GO TO 2135
C
C COMPLETED BLOCK 6.
C
```

```
CCC
CCC   INPUT DATA BLOCK 7. EXTERNAL POTENTIAL (BOUNDARY NODE) LIST
CCC
 2200 LABEL = 1
C      IF(MODE.EQ.0)NODBS = NVART = 0
      IF(MODE.EQ.0)NODBS =  0
      IF(MODE.EQ.0)NVART = 0
      N = NODBS
C
 2205 READ(1, 5835)N1,L1,P1,(F1(J),F2(J),J=1,3)
C
      IF(N1 .EQ. 0) GO TO 2265
      IF(MODE.GE.0) GO TO 2215
      CALL SEEK1(N, N1, NODB, NODBS, K)
      IF(K*LTABT(N) .NE. 0) NVART = NVART - 1
      ITEMS(7) = NMIN1(ITEMS(7))
      GO TO 2220
C2215  N = NODBS = N + 1
2215    N=N+1
        NODBS=N
 2220 IF(N .GT. M7) CALL MORTHAN(N,NODBS,M7)
      DO 2230  J = 1,3
      F1(J) = F1(J) * SCALE
      PHIB(J,N) = F1(J)
 2230 TIMEB(J,N) = F2(J)
      NODB(N) = N1
      ZB(N) = P1
      ZB(N) = ZB(N) * SCALE
C      PSIB(N) = PSIBS(N) = F1(1) - ZB(N)
        PSIB(N)=F1(1)-ZB(N)
        PSIBS(N)=PSIB(N)
C      LTABT(N) = LTAB = IABS(L1)
      LTABT(N) = IABS(L1)
      LTAB = IABS(L1)
      IF(LTAB .LT. 100) GO TO 2235
      LTAB = 2
      SLOT(2,N) = 0.0
      IF(TIMEB(1,N) .LE. 0.) TIMEB(1,N) = 1.E24
 2235 IF(LABEL .LE. 0) GO TO 2240
      LABEL = 0
      PRINT 5840
 2240 PRINT 5845,N1,N,LTAB,ZB(N),F1(1),TIMEB(1,N)
      IF(LTAB .GT. 1) GO TO 2245
      LTABT(N) = 0
      GO TO 2205
2245  NVART = NVART + 1
      IF(LTAB .LT. 4) GO TO 2250
      LABEL = 1
C
      READ(1, 5800)(PHIB(J,N),TIMEB(J,N),J=4,LTAB)
C
 2250 IF(LTABT(N) .GE. 100) GO TO 2256
      CALL SLOPE(TIMEB(1,N),PHIB(1,N),SLOT(1,N))
      PRINT 5850,(PHIB(J,N),SLOT(J,N),TIMEB(J,N),J=2,LTAB)
 2256 SLOT(1,N) = SLOT(2,N)
      IF(LTAB .GT. M9) KWIT = 12
      IF(LTABT(N) .GE. 100) PRINT 5880
      GO TO 2205
2265  NEWBL(6) = NEWBL(6) + 1000
      RETURN
C
```

```
C COMPLETED BLOCK 7.
C
3100  IBLOCK = 8
      CALL REFER(NODS, NOXS, NOSCON, NODE, NODES)
      CALL REFER(NODSB, NOXSB, NOSCON, NODB, NODBS)
      IF(KWIT .NE. 0) RETURN
CCC
CCC   INITIALIZE FLUX.
CCC
      DO 3102  N = 1,NOSCON
C      FS(N) = DFS(N) = 0.0
      FS(N) = 0.0
      DFS(N) = 0.0
      NND = NODSB(N)
 3102 FB(NND) = 0.0
CCC
CCC   CHANGE NTYPE TO 1, UNLESS ALREADY 2.
CCC
      DO 3105  N = 1,NOSCON
      N1 = NODS(N)
      N2 = NTYPE(N1)
      IF(N2 .EQ. 2) GO TO 3105
      IF(N2 .EQ. 0) NOSPEC = NOSPEC + 1
      NTYPE(N1) = 1
3105  CONTINUE
CCC
CCC   CALC CONDUCTANCE BETWEEN SURFACE AND BOUNDARY NODES.
CCC
      DO 3110  N = 1,NOSCON
      HSURE(N) = HSURT(1,N)
      N1 = NODS(N)
      N2 = NODSB(N)
      FB(N2) = 0.0
      TRANS(N) = RHOZ*AREAS(N)*HSURE(N)
3110  CONTINUE
 4200 IF(KWIT .LT. 0) GO TO 4300
CCC
CCC   FIND TOTAL FLUID FLUX ACROSS EACH EXTERNAL CONNECTION
CCC
      DO 4201  N=1,NOSCON
      N2=NODSB(N)
      DFB(N2)=0
 4201 CONTINUE
      DO 4205  N = 1,NOSCON
      DX = DFS(N)
      FS(N) = FS(N) + DX
      N2 = NODSB(N)
      DFB(N2)=DFB(N2)+DX
 4205 FB(N2) = FB(N2) + DX
      IF(KCYC .LT. 1 .OR. NOW .LT. 1) GO TO 4300
      PRINT 5865
      TX = DMAX1(SUMTIM - TAU, 1.D-12)
        IF(KCYC .LE. 1) TX=1.D-12
      FLUXS = 0.0
      DFBX=0
      SDFB=0
      DO 4210  N = 1,NODBS
      FX = FB(N)/TX
      FLUXS = FLUXS + FB(N)
      PHIBS = ZB(N) + PSIB(N)
      DFBX=DFB(N)/DELTS
```

```
      SDFB=SDFB+DFB(N)
      PRINT 5870,NODB(N),PHIBS,FB(N),FX,DFB(N),DFBX
4210  CONTINUE
      FX = FLUXS/TX
      SDFBX=SDFB/DELTS
      PRINT 5875,FLUXS,FX,SDFB,SDFBX
      CALL LINE
      IF(KCYC .LT. 1 .OR. (KCYC .NE. 1 .AND. KDATA .LT. 1)) GO TO 4300
      PRINT 5810
      DO 4225  N =1,NOSCON
      FX = FS(N)/TX
      IF(MOD(N, 57) .EQ. 1) PRINT 5855
      DFSX = DFS(N)/DELTS
      PRINT 5860,NOXS(N),NOXSB(N),AREAS(N),HSURE(N),TRANS(N),FS(N),FX,
     $DFS(N),DFSX
4225  CONTINUE
      CALL LINE
CCC
CCC   FIND NEW BOUNDARY NODE PRESSURE HEADS
CCC
 4300 IF(NVART .LE. 0) GO TO 4400
      DO 4335  N = 1,NODBS
      MAX = LTABT(N)
      IF(MAX .EQ. 0) GO TO 4335
      BET = PSIB(N)
      SET = SUMTIM + DELT
      IF(MAX .LT. 100) GO TO 4305
      PSIB(N) = SIN(6.28318531*(SET+TIMEB(2,N))/TIMEB(1,N))
      PSIB(N) = (PHIB(1,N)-ZB(N))+(PHIB(2,N)-ZB(N))*PSIB(N)
      GO TO 4331
 4305 CALL ENTER(TIMEB(1,N))
      PSIB(N) = (PHIB(MID,N)-ZB(N))+SLOT(MID+1,N)*(SET-TIMEB(MID,N))
 4331 PSIBS(N) = BET + FOR*(PSIB(N) - BET)
      DPSIMAX = DMAX1(DPSIMAX,DABS(PSIB(N)-BET))
4335  CONTINUE
CCC
CCC   FIND NEW SURFACE FLUID TRANSFER COEFFICIENTS
CCC
 4400 IF(NVARH .LE. 0) GO TO 4500
      DO 4435  N = 1,NOSCON
      MAX = LTABH(N)
      IF(MAX) 4402,4435,4405
 4402 MAX = -MAX
      SET = SUMTIM + FORD
      GO TO 4410
 4405 N1 = NODS(N)
      N2 = NODSB(N)
      SET = 0.5*(PSIBS(N2)+PSI(N1)+DOPSI(N1)*FORD)
 4410 BET = HSURE(N)
      CALL ENTER(TVARH(1,N))
      HSURE(N) = HSURT(MID,N) + SLOH(MID + 1,N)*(SET - TVARH(MID,N))
      BET = 100.0*DABS(BET-HSURE(N))/(DABS(BET+1.0D-12))
      DPSIMAX = DMAX1(DPSIMAX,BET*PSIVARY)
4435  CONTINUE
CCC
CCC   FIND NEW SURFACE BOUNDARY CONDUCTANCES.
CCC
 4500 IF(NVARH.LE.0) GO TO 4600
      DO 4510  N = 1,NOSCON
      IF(LTABH(N).EQ.0) GO TO 4510
      N1 = NODS(N)
```

```
      PSI1 = PSI(N1) + FORD * DDPSI(N1)
      N2 = NODSB(N)
      PSI2 = PSIBS(N2)
      TRANS(N) = AREAS(N) * HSURE(N) * RHOZ
 510  CONTINUE
CCC
CCC   FIND POTENTIAL CHANGES IN SURFACE NODES
CCC
 4600 DO 4605 N = 1,NOSCON
      N1 = NODS(N)
      ZIP(N1) = ZIP(N1) + TRANS(N)
      N2 = NODSB(N)
C       DX = DFS(N) = TRANS(N)*((ZB(N2)-Z(N1))+(PSIBS(N2)-PSI(N1)))*DELT
        DX=TRANS(N)*((ZB(N2)-Z(N1))+(PSIBS(N2)-PSI(N1)))*DELT
        DFS(N)=DX
      DF(N1) = DF(N1) + DX
      DPSI(N1) = DPSI(N1) + DX/CAP(N1)
 4605 CONTINUE
      RETURN
CCC
CCC   COMPLETED SURE, RETURN TO HEART.
CCC
 5800 FORMAT(8E10.3)
 5810 FORMAT(10X,24HEXTERNAL CONNECTION DATA)
 5815 FORMAT(6I5,2E10.3,10A1)
 5820 FORMAT(/,10X,69HNODS NODSB INDEX LTABH         DLONG      DRAD
     $  HSURE        AREAS)
 5825 FORMAT(8X,4I6,2X,4E12.4)
 5830 FORMAT(/,19X,5HHSURT,10X,5HSLOPE,10X,5HTVARH,/,(15X,3E15.6))
 5835 FORMAT(2I5,7E10.3)
 5840 FORMAT(//,12X,40HNODB INDEX LTABT        ZB            PHIB,10X,5HSLO
     $OPE,5X,5HTIMEB)
 5845 FORMAT(10X,3I6,2E15.6,15X,1E15.6)
 5850 FORMAT(28X,3E15.6)
 5855 FORMAT(/,10X,72H  NODS NODSB     AREAS        HSURE        TRANS
     $FLUID FLOW     AVG RATE  ,21H     DFS       DFS/TIME)
 5860 FORMAT(10X,2I6,7E12.4)
 5865 FORMAT(10X,18HBOUNDARY NODE DATA,/,11X,4HNODB,4X,9HPOTENTIAL,4X,
     $10HFLUID FLOW,3X,8HAVG RATE,6X,3HDFB,9X,8HDFB/TIME)
 5870 FORMAT(10X,1I5,5E13.4)
 5875 FORMAT(/10X,12HSYSTEM TOTAL,6X,4E13.4)
 5880 FORMAT(//18X,64HTB = TEMPB(1) + TEMPB(2)*SIN(2.*PI*(SUMTIM + TIMEBS
     $(2))/TIMEB(1)))
      END
```

```
CDECK SPECK
      SUBROUTINE SPECK
        IMPLICIT REAL*8 (A-H,O-Z)
C
C********VERSION 5/27/69.
C********SPECK IS A REQUIRED SUBROUTINE.
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
CCALL AREA
      INCLUDE 'AREA.INC'
CCALL ASURES
      INCLUDE 'ASURES.INC'
CCALL M
      INCLUDE 'M.INC'
      DIMENSION ERROR(300), ERRORX(300)
C
      IF(KCYC .GE. 0) GO TO 4200
C       NUTX = NUTSUM = NUTS = 0
        NUTX=0
        NUTSUM=0
        NUTS=0
CCC
CCC   SET LIMIT OF 80 ON NUMBER OF ITERATIONS.
CCC
      NUTMAX = 80
CCC
CCC   INITIALIZE CORRECTIONS TO PRESSURE HEAD CHANGES IN NODES
CCC
      DO 3100  N = 1,NODES
 3100 ERRORX(N) = 0.0
CCC
CCC   SET ACCELERATION FACTOR AND CONVERGENCE FACTOR.
CCC
       SPEED = 0.2
       ERRS = 5.D-5
       RETURN
 4200 IF(NOW .LE. 0) GO TO 4205
C
C     START HERE IF(KCYC .GE. 0 .AND. NOW .GT. 0).
C
      NCYC = KCYC - 1
      NUTAVG = NUTSUM/MAX0(1, NCYC)
      PRINT 5810, NCYC, NUTSUM, NUTAVG, NUTX, FCR
 4205 IF(KWIT .GT. 0) RETURN
CCC
CCC   INITIALIZE CORRECTION FACTORS.
CCC
      DO 4210  N = 1,NODES
      ERROR(N) = 0.0
      IF(NTYPE(N).NE.0) ERRORX(N) = DELT*DDPSI(N)
4210  CONTINUE
CCC
CCC   CALC CORRECTION FACTORS FOR SPECIAL NODES, COUNT SPEC-SPEC CONN.
CCC
      KNOCK = 0
```

```
      IF(NOCON .LT. 1) GO TO 4230
      DO 4225 N = 1,NOCON
      X1 = TRAN(N)
      N2 = NOD2(N)
      N1 = NOD1(N)
      IF(NOX1(N).LT.0.AND.NTYPE(N1).NE.2) GO TO 4225
      IF(NTYPE(N1) .NE. 0) GO TO 4215
      IF(NTYPE(N2).NE.0) ERROR(N2) = ERROR(N2) + X1 * DPSI(N1)
      GO TO 4225
 4215 IF(NTYPE(N2) .NE. 0) GO TO 4220
      ERROR(N1) = ERROR(N1) + X1*DPSI(N2)
      GO TO 4225
 4220 ERROR(N1) = ERROR(N1) + X1*ERRORX(N2)
      ERROR(N2) = ERROR(N2) + X1*ERRORX(N1)
      KNOCK = KNOCK + 1
4225  CONTINUE
 4230 CONTINUE
CCC
CCC   MAKE FIRST CORRECTION TO TEMP CHANGES IN SPECIAL NODES.
CCC
 4300 NUTS = 0
C       S1 = ESUM = 0.0
         ESUM=0.0
         S1=0.0
      HSUM = 1.D-12
      IF(KNOCK*KCYC.GE.1) S1 = SPEED
      S2 = S1 + 1.
      X1 = S2 * FORD
      DO 4310  N = 1,NODES
      IF(NTYPE(N) .EQ. 0) GO TO 4310
      EX = ERROR(N) + S1*ZIP(N)*ERRORX(N)
      DPSI(N) = (CAP(N)*DPSI(N)+FORD*EX)/(CAP(N)+FORD*S2*ZIP(N))
      ERRORX(N) = DPSI(N) - ERRORX(N)
      ESUM = ESUM + CAP(N)*DABS(ERRORX(N))
      HSUM = HSUM + CAP(N)
      ERROR(N) = 0.0
 4310 CONTINUE
CCC
CCC   CAPACITY OF SPECIAL NODES.
CCC
      HSUM=HSUM*PSIVARY
C
CCC   MAXIMUM CHANGE IN FLUID CONTENT
C
CCC
CCC   START ITERATING IF THERE ARE SPEC-SPEC CONNECTIONS, AND
CCC   RELATIVE CHANGE IN FLUID CONTENT IS GREATWR THAN ERRS
CCC
      IF(ESUM.LT.ERRS*HSUM.OR.KNOCK.LE.0) GO TO 4515
CCC
CCC   LOOP STARTS HERE. INCREMENT CYCLE COUNTER.
CCC
4400  NUTS = NUTS + 1
C
C CALC CORRECTIONS FOR SPECIAL NODES.
C
      IF(KNOCK .LE. 0) GO TO 4410
      DO 4405  N = 1,NOCON
      N1 = NOD1(N)
      N2 = NOD2(N)
      IF(NTYPE(N1)*NTYPE(N2) .EQ. 0) GO TO 4405
```

```
CCC
CCC    BOTH MUST BE SPECIAL.
CCC
       ERROR(N1) = ERROR(N1) + TRAN(N)*ERRORX(N2)
       ERROR(N2) = ERROR(N2) + TRAN(N)*ERRORX(N1)
 4405 CONTINUE
 4410 CONTINUE
CCC
CCC    CORRECT PSI CHANGES IN SPECIAL NODES
CCC
C 4500 ESUM = EMAX = 0.0
 4500 ESUM =  0.0
         EMAX=0.0
       DO 4505  N = 1,NODES
       IF(NTYPE(N) .EQ. 0) GO TO 4505
       ERRORX(N) = (ERRORX(N)*S1*ZIP(N)+ERROR(N))/(S2*ZIP(N)+CAP(N)/FORD)S
       DPSI(N) = DPSI(N) + ERRORX(N)
       EX = DABS(ERRORX(N))
       ESUM = ESUM + CAP(N)*EX
       IF(NTYPE(N) .NE. 2) EMAX = DMAX1(EMAX, EX)
       ERROR(N) = 0.
 4505 CONTINUE
CCC
CCC    STOP ITERATING AFTER NUTMAX CYCLES.
CCC
       IF(NUTS .LT. NUTMAX) GO TO 4510
       NUTS = 0
       DPSIMAX = DMAX1(DPSIMAX,2.*PSIVARY)
       PRINT 5800 ,KCYC
       IF(DELT .GT. 2.*SMALL) GO TO 4515
C
C ITERATION FAILURE.
C
       KWIT = 10
       PRINT 5805
       RETURN
CCC
CCC    STOP ITERATING WHEN RELATIVE ERROR IN HEAT CONTENT CHANGES _ ERRS.S
CCC
 4510 IF(ESUM.GT.ERRS*HSUM.OR.EMAX.GT.10.0*ERRS*PSIVARY) GO TO 4400
 4515 NUTSUM = NUTSUM + NUTS
       NUTX = MAX0(NUTX, NUTS)
       DPSIMAX = DMAX1(DPSIMAX,0.025D+0*FLOAT(NUTS)*PSIVARY)
CCC
CCC    CORRECT INTERNAL FLUXES AND FIND CORRECTION FACTORS FOR REG NODES.S
CCC
       IF(NOCON.LT.1) GO TO 4620
       DO 4610  N = 1,NOCON
       N2 = NOD2(N)
       N1 = NOD1(N)
       IF(NOX1(N).LT.0.AND.NTYPE(N1).NE.2) GO TO 4610
       IF(NTYPE(N1) .NE. 0) GO TO 4600
       IF(NTYPE(N2) .EQ. 0) GO TO 4610
       ERROR(N1) = ERROR(N1) + TRAN(N)*(DPSI(N2)-DPSI(N1))
       GO TO 4605
 4600 IF(NTYPE(N2).EQ.0)ERROR(N2)=ERROR(N2)+TRAN(N)*(DPSI(N1)-DPSI(N2))
 4605 FLEX = FORD * TRAN(N) * (DPSI(N2)-DPSI(N1))
       DFI(N) = DFI(N) + FLEX
       DF(N1) = DF(N1) + FLEX
       DF(N2) = DF(N2) - FLEX
 4610 CONTINUE
```

```
CCC   CALCULATE CORRECTED PRESSURE HEAD CHANGES IN REG NODES
CCC   CONNECTED TO SPECIAL NODES
CCC
 4620 DO 4630 N = 1,NODES
      IF(NTYPE(N).EQ.0)DPSI(N)=DPSI(N)+FORD*ERROR(N)/CAP(N)
      IF(NODE(N).LT.0.AND.NTYPE(N).EQ.0) DPSI(N)=0.0
4630  CONTINUE
      IF(NOSCON .LT. 1) RETURN
CCC
CCC   CORRECT FLUX OF EXTERNAL CONNECTIONS
CCC
      DO 4640  N = 1,NOSCON
      N1 = NODS(N)
      IF(NTYPE(N1).NE.2) GO TO 4640
      FLEX = FORD*TRANS(N)*DPSI(N1)
      DF(N1) = DF(N1) - FLEX
      DFS(N) = DFS(N) - FLEX
 4640 CONTINUE
      RETURN
CCC
CCC   COMPLETED SPECK, RETURN TO HEART.
CCC
 5800 FORMAT(/10X,6HKCYC =,I6,5X,84HMASS BALANCE ITERATION FAILED TO CONS
     1VERGE.  THIS MAY BE CAUSED BY A CONNECTED SERIES,/,10X,97HOF NODESS
     2 WITH TIME CONSTANTS MUCH SMALLER THAN DELT.  WILL TRY TO REPEAT CS
     3YCLE WITH SMALLER DELT,)
 5805 FORMAT(/10X,38HCAN NOT REDUCE DELT, WILL END PROBLEM,)
 5810 FORMAT(/,10X,6HKCYC =,I6,24H, ITERATIONS...  TOTAL =,I6,
     $    11H, AVERAGE =,I6,11H, MAXIMUM =,I6,8H.  FOR =,F6.3,2H .)
      END
```

```
CDECK TALLY
      SUBROUTINE TALLY
        IMPLICIT REAL*8 (A-H,O-Z)
C
C********VERSION 5/20/69.
C********REVISED 3/73.
C
C********TALLY IS A REQUIRED SUBROUTINE.
C
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
CCALL NODIM
      INCLUDE 'NODIM.INC'
CCALL AGEN
      INCLUDE 'AGEN.INC'
CCALL M
      INCLUDE 'M.INC'
      DIMENSION F(300),H(300),NOTE(300),NOXE(300),NTYPES(300)
      DIMENSION NDUMMY(15)
      EQUIVALENCE (NDUMMY,NOSPEC)
CCALL NMIN1
      INCLUDE 'NMIN1.INC'
C
      IF(KCYC) 2000,3100,4200
 2000 IF(IBLOCK) 2400,2005,2200
CCC
CCC   START HERE AFTER PROBLEM NAME CARD HAS BEEN READ IN WITH 2, 3, OR
CCC      4 IN COLUMN 72, FOR SAVING DATA FROM PRECEDING PROBLEM.
CCC
 2005 PRINT 5950,(I,I=2,9)
      NIT = NODES
CCC
CCC   FIND OUT IF NODE TYPES AND PHI WILL BE INITIAL OR FINAL
CCC      VALUES FROM PRECEDING PROBLEM (NAME(16) = 2, OR 3 OR 4, RESP.).T
CCC
      IF(NOW .NE. 2) GO TO 2105
      DO 2100 N = 1,NODES
      IF(NTYPE(N) .EQ. NTYPES(N)) GO TO 2100
      NTYPE(N) = NTYPES(N)
      NOSPEC = NOSPEC - 1
2100  CONTINUE
      RETURN
CCC
CCC   CHANGE INTERNAL BLOCK 9 TO FINAL PHI OF PREVIOUS PROBLEM
CCC
2105  DO 2110  N = 1,NODES
      PPHI(N) = PHI(N)
2110  CONTINUE
      RETURN
 2200 IF(IBLOCK .EQ. 9) GO TO 2300
      IF(IBLOCK.EQ.10)GO TO 2260
      IF(IBLOCK.EQ.3) GO TO 2350
      IF(IBLOCK.NE.1) GO TO 4700
CCC
CCC   START HERE AFTER THE BLOCK NUMBER CARD FOR BLOCK 1 IS READ IN.
```

```
CCC
CCC INPUT DATA BLOCK  1.  CALCULATION CONTROLS, LIMITS, AND CONSTANTS.
CCC
      READ(1,5865) IPRINT, NUM, KDATA, KSPEC, MCYC, MSEC, NPUNCH, NDOT,
     $ KSTDATA,TIMEP,SCALE
CCC
      NUMX = NUM
      KDATAX = KDATA
      IF(SCALE .LE. 0.0) SCALE = 1.0
      PRINT 5890, IPRINT, NUM, KDATA, KSPEC, MCYC, MSEC, NPUNCH, NDOT,
     $  TIMEP, SCALE
CCC
      READ(1,5870)KD,DELTO,SMALL,PSIVARY,TAU,TIMAX,PSIMIN,PSIMAX
CCC
      KD = MAX0(1, KD)
      KSYM = 1 + KD/3
        PI=3.1415927
        GEOM=1.
        IF (KD .EQ. 2) GEOM=2*PI
        IF (KD .EQ. 3) GEOM=4*PI
      IF((DELTO - 1.D-10)*(DELTO - 1.D12) .GT. 0.0) DELTO = 1.D12
C      SMALT = SMALL = DMAX1(SMALL, 1.D-12)
        SMALL = DMAX1(SMALL, 1.D-12)
      SMALT=SMALL
      IF(PSIMAX.GT.PSIMIN) GO TO 2225
      PSIMAX = 1.E12
      PSIMIN = -PSIMAX
 2225 IF(PSIVARY.LE.0.) PSIVARY = MIN(5.D+0,.005D+0*(PSIMAX-PSIMIN))
      X1 = PSIVARY*0.001
      PSIMIN = PSIMIN - X1
      PSIMAX = PSIMAX + X1
      PRINT 5875,KD,DELTO,SMALL,PSIVARY,TAU,TIMAX,PSIMIN,PSIMAX
      PRINT 5880,KD,KSYM,GEOM
C
C
      READ(1,5810)PHIONE,GONE,HONE,PCONE
      PHIONE = PHIONE * SCALE
      PRINT 5815,PHIONE,GONE,HONE,PCONE
      RETURN
C
C COMPLETED BLOCK 1.  RETURN TO HEART.
C
CCC
CCC   START HERE AFTER THE BLOCK NUMBER CARD FOR BLOCK 9 IS READ IN.
CCC
CCC INPUT DATA BLOCK  9.  INITIAL CONDITIONS LIST.
CCC
 2300 L = 0
      IF(MODE .EQ. 0) NIT = 0
      N = NIT
CCC
 2305 READ(1,5839)N1,NSEQ,NADD,PHIX,GX,PCX
 5839 FORMAT(3I5,5X,3F12.0)
CCC
      IF(N1 .EQ. 0) RETURN
      IF(LXX.EQ.1)PHIX = PHIX*SCALE
 2310 IF(MODE .GE. 0) GO TO 2315
      CALL SEEK1(N, N1, NOXE, NIT, K)
      ITEMS(9) = MMIN1(ITEMS(9))
      GO TO 2320
C2315  N = NIT = N + 1
```

```
2315  N=N+1
      NIT=N
 2320 IF(N .GT. M4) CALL MORTHAN(N,NIT,M4)
C      NOTE(N) = NOXE(N) = N1
       NOXE(N) = N1
       NOTE(N) = N1
      PPHI(N) = PHIX
      GG(N) = GX
      PC(N) = PCX
      IF(MOD(L, 57) .EQ. 0) PRINT 5845
      L = L + 1
      PRINT 5850,N1,N,PHIX,GX,PCX
CCC
CCC   TEST THROUGH WITH CARD.
CCC
      IF(NSEQ .LE. 0) GO TO 2305
      NSEQ = NSEQ - 1
      N1 = N1 + NADD
      GO TO 2310
CCC
CCC   START HERE AFTER BLOCK NUMBER CARD FOR BLOCK 3 HAS BEEN READ IN.
CCC   FLUID PROPERTIES
CCC
 2350 READ(1,5790)(AFLUID(IK),IK=1,10),VISC,BETA,RHOZ,GEE
 5790 FORMAT(10A1,4E10.3)
      GBYMU = GEE/VISC
      BPRIME = BETA * RHOZ * GEE
      PRINT 5795,(AFLUID(IK),IK=1,10),VISC,BETA,RHOZ,GEE,GBYMU,BPRIME
 5795 FORMAT(/,10X,99H   FLUID      VISOSITY          BETA                RHO
     SZ          GEE         G/VISCOSITY     BETA PRIME     ,/10X,10A1,6E15.5)
      NEWBL(2) = NEWBL(2) + 1000
      RETURN
C
C     COMPLETED BLOCK 3. RETURN TO TRUST
C

CCC
CCC   READ IN BLOCK 10. DATA FOR DIMENSIONLESS VARIABLES
CCC
 2260 PRINT 5775
 2265 READ(1,5780)N3,NSEQ,NADD,X1,X2,X3,DELX,DELY,DELZ
 5780 FORMAT(3I5,5X,6E10.3)
      IF(N3.EQ.0) RETURN
 2270 NODIM = NODIM + 1
      N2 = N3
      CALL REFER(N2,N3,1,NODE,NODES)
 5775 FORMAT(/,10X,57HNODTD INDEX       X               Y               Z
     S        R,/)
      NODTD(NODIM) = N2
      R(N2) = SQRT(X1**2 + X2**2 + X3**2)
      IF(MOD(NODIM+13,58).EQ.0)PRINT 5775
      PRINT 5785,NODTD(NODIM),NODIM,X1,X2,X3,R(N2)
 5785 FORMAT(10X,2I6,4E13.4)
      IF(NSEQ.LE.0)GO TO 2265
      NSEQ = NSEQ - 1
      N3 = N3 + NADD
      X1 = X1 + DELX
      X2 = X2 + DELY
      X3 = X3 + DELZ
      GO TO 2270
CCC
```

```
CCC    COMPLETED BLOCK 10
CCC
CCC    START HERE AFTER THE DATA END CARD IS READ IN.
CCC    SUMMARIZE INPUT DATA, AND INITIALIZE PRIOR TO TIME STEP ZERO.
CC
 2400 PRINT 5950,(I,I=2,9)
      PRINT 5985,(NEWBL(I),I=2,9)
      PRINT 5975
      PRINT 5955,M2,M3,M4,M5,M6,M7,M8,M9
      PRINT 5965,(ITEMS(I),I=2,9)
      PRINT 5970,(NDUMMY(I),I=2,9)
      NTABLE = NVARC+NVARK+NVARH+NVART+NVARG
      PRINT 5945,NVARC,NVARK,NVARH,NVART,NVARG,NTABLE
      PRINT 5930, M9
      IF(NMAT*NODES .GE. 1) GO TO 2410
C
C MISSING BLOCK 2 OR 4.  RETURN TO HEART.
C
      PRINT 5805, NMAT, NODES
      KWIT = 9
      RETURN
 2410 IF(NUM .EQ. 0) GO TO 2415
      IBLOCK = 1
      CALL REFER(NUM, NUMX, 1, NODE, NODES)
 2415 IF(NIT .LE. 0) GO TO 2425
      IBLOCK = 9
      CALL REFER(NOTE, NOXE, NIT, NODE, NODES)
      IF(KWIT .NE. 0) GO TO 2500
C
C ASSIGN INITIAL CONDITIONS TO NODES.
C
      DO 2420  N = 1,NIT
      NND = NOTE(N)
      G(NND) = GG(N)
 2420 PSI(NND) = PPHI(N) - Z(NND)
CCC
CCC    SET UP INTERNAL BLOCK 9 WITH INITIAL CONDITIONS OF THIS PROBLEM.
CCC
 2425 DO 2430  N = 1,NODES
      NOTE(N) = N
      NOXE(N) = NODE(N)
      PPHI(N) = PSI(N) + Z(N)
CCC
CCC    THIS CARD WOULD HAVE TO BE CONNECTED LATER IF NEEDED
CCC
C     PPC(N) = PC(N)
      GG(N) = G(N)
 2430 NTYPES(N) = NTYPE(N)
C
C MAKE ALL NODES SPECIAL IF KSPEC IS POSITIVE.
C
      IF(KSPEC .LE. 0) GO TO 2500
      DO 2435 N = 1,NODES
      IF(NTYPE(N) .NE. 0) GO TO 2435
      NTYPE(N) = 5
      NOSPEC = NOSPEC + 1
2435  CONTINUE
CCC
CCC    INITIALIZE BEFORE FIRST TIME INCREMENT
CCC
 2500 NOGEN = 0
```

```
      DO 2515  N = 1,NODES
C      F(N) = H(N) = 0.0
      F(N) =  0.0
      H(N) =  0.0
      IF(G(N).EQ.0) GO TO 2515
      NOGEN = NOGEN + 1
2515  CONTINUE
      NOGEN = NOGEN + NVARG
CCC
CCC   CALCULATE STORAGE REQUIREMENTS FOR PARAMETER-ADJUSTED ARRAYS.
CCC
CCC   LEFT OUT, 6/73. USEFUL ONLY AS COMPILE-TIME DIRECTIVES.
CCC
      PRINT 5980,NOSPEC,NOGEN
CCC
CCC   INITIALIZE BEFORE FIRST TIME STEP (KCYC = 0,  DELT = 1.0D-12).
CCC
      SUMTIN = TAU
      FOR = 1.
      DELT = 1.0D-12
      FORD = FOR*DELT
C      DELTS = DPSIMAX = 0.
       DPSIMAX = 0.
      DELTS =  0.
      GO TO 4820
CCC
CCC   START HERE AT THE END OF TIME STEP ZERO (DELT = 1.0D-12).
CCC
 3100 IF(KWIT .GT. 0) RETURN
C      KGOOD = MF = MS = MSS = NPRINT = 0
        KGOOD=0
        MF=0
        MS=0
        MSS=0
        NPRINT=0
C      DELTG = DPSIMAX = GENS = 0.
        DELTG=0.
        DPSIMAX=0.
        GENS=0.
      RATG = 1.0
      IF(KCYC.LE.1) DPSIMAX = 0.0
      KDATA = KDATAX
      DELTMX = DMAX1(1.D-10, DELTO)
      BIG = 0.99999999E12
      GO TO 4210
CCC
CCC   START HERE WHEN KCYC = 1 OR MORE, TALLY RESULTS OF CALCULATIONS.
CCC
 4200 IF(KCYC.LE.1)DPSIMAX = 0.0
      IF(KWIT .GT. 0) GO TO 4710
C      KWIT = NOW = 0
        KWIT=0
        NOW=0
CCC
CCC   FIND MAXIMUM STABLE TIME STEP.
CCC
      IF(DELTMX .GE. BIG .OR. ((KCYC - 1)*(1 - NTABLE) .GT. 0 .AND.
     $ KSPEC .LT. 0)) GO TO 4235
 4210 DELTMX = 1.5E12
      NREG = 0
      DO 4220  N = 1,NODES
```

```
      SLIM(N) = 1.D24
      IF(ZIP(N) .GT. 0.0) SLIM(N) = DMAX1(1.D-24, CAP(N)/ZIP(N))
      IF(NTYPE(N) .NE. 0) GO TO 4220
CCC
CCC   SKIP ZERO VOLUME NODE WITH NTYPE SET TO ZERO INSTATEMENT 4404 OF
CCC   SUBROUTINE FINK
CCC
      IF(NODE(N).LT.0) GO TO 4220
      NREG = NREG + 1
      DELTMX = MIN(DELTMX, SLIM(N))
4220  CONTINUE
CCC
CCC   SET MAXIMUM TIME STEP TO 2/3 OF STABILITY LIMIT, OR DELTO,
CCC      WHICHEVER IS SMALLER, BUT NO SMALLER THAN 1.0D-10.
CCC
      DELTMX = DMAX1(DELTMX*.66666666667D+0, 1.D-10)
      IF(DELTMX .LT. DELTO) GO TO 4225
      DELTMX = DELTO
      GO TO 4235
CCC
CCC   CHANGE NODES TO SPECIAL NODES IF NECESSARY TO INCREASE DELTMX.
CCC
 4225 IF(NS*NREG .EQ. 0 .OR. KSPEC .LT. 0) GO TO 4235
      NEWS = 0
      X1 = 1.8*DELTMX
      DO 4230  N = 1,NODES
      IF(NTYPE(N).NE.0.OR.X1.LT.SLIM(N))GO TO 4230
CCC
CCC   SKIP ZERO VOLUME NODE WITH NTYPE SET TO ZERO IN STATEMENT 4404
CCC   OF SUBROUTINE FINK
CCC
      IF(NODE(N).LT.0) GO TO 4230
      NTYPE(N) = 4
      NUSPEC = NUSPEC + 1
      NEWS = 1
      PRINT 5800, KCYC, NODE(N)
 4230 CONTINUE
CCC
CCC   RECALCULATE DELTMX IF ANY NODES RECLASSIFIED.
CCC
      IF(NEWS.EQ.0) GO TO 4235
C      KGOOD = NS = 0
       NS = 0
      KGOOD  = 0
      GO TO 4210
CCC
CCC   RESTORE SMALL TO SMALT, IF SMALL HAS DECREASED BELOW SMALT.
CCC
 4235 SMALL = DMAX1(SMALL, SMALT)
CCC
CCC   CALC SMALL IF NOT READ IN, DELTMX NOT 1.E12, NREG NOT _ 1/4 NODES.T
CCC
      IF(SMALL .GE. DELTMX) SMALL = DELTMX*.99999999
      IF(BIG*SMALT .LE. 1. .AND. NODES .LE. 4*NREG .AND. DELTMX .LE. BIGT
     $ ) SMALL = DELTMX*.01
CCC
CCC   FIND LARGEST TEMPERATURE CHANGE, EXCLUDING Z-V NODES IF KCYC 0 OR
CCC
 4300 DPRES = 1.0D-24
      DO 4310  N = 1,NODES
CCC
```

```
CCC    CALCULATE MAXIMUM PRESSURE HEAD CHANGE IGNORING ZERO VOLUME NODES
CCC
       IF(NTYPE(N).NE.2.OR.NODE(N).GT.0.OR.KCYC.GT.1)DPRES=DMAX1(DPRES,
      $DABS(DPSI(N)))
4310   CONTINUE
       DELTSS = DELTG
       DELTS = DELT
       RAT2 = RATG
       RAT1 = PSIVARY/DPRES
CCC    ALLOW 20 PER CENT VARIATION IN NONLINEAR PROPERTIES
CCC
       DPSIMAX = DPSIMAX/10.
         DPRESXX=DPRES
       RATIO = PSIVARY/DMAX1(DPSIMAX,DPRESXX)
       RATIOS = RATIO
CCC
CCC    REPEAT CYCLE IF MAX TEMP CHANGE MORE THAN DOUBLE TVARY.
CCC
       IF(RATIO .GT. .501 .OR. DELT .LT. 1.01*SMALL) GO TO 4315
       PRINT 5990,KCYC,DPRES,DPSIMAX,DELT,SUMTIM
       KWIT = -1
       KGOOD = 0
       FOR = 1.0
       GO TO 4320
CCC
CCC    INCREMENT PROBLEM TIME, GOOD CYCLE COUNTER ON ACCEPTED TIME STEPS.T
CCC
4315   KGOOD = KGOOD + 1
       SUMTIM = SUMTIM + DELT
       DELTG = DELTS
       RATG = RAT1
       DPMAXS = DPSIMAX
 4320  DPSIMAX = 0.0
CCC
CCC    USE 1 PERCENT OF CALCULATED TIME STEP, IF ALL NODES ARE SPECIAL.
CCC
       IF(KCYC .GT. 0) GO TO 4325
       IF(NREG .LE. 0) RATIO = RATIO*.01
       GO TO 4335
CCC
CCC    CHANGE DELT TO MAKE NEXT DPSIMAX CLOSER TO PSIVARY
CCC
CCC
 4325  IF(RATIO .GT. 1.) GO TO 4330
       RATIO = DMAX1(RATIO*RATIO, .5D+0)
       GO TO 4335
 4330  RATIO = MIN((RATIO + 1.D+0)*.5D+0, 2.D+0)
 4335  DELT = DELTS*RATIO
CCC
CCC    KEEP TIME STEP IN RANGE FROM SMALL TO DELTMX OR DELTO.
CCC
       IF(DELT .GE. SMALL) GO TO 4340
       DELT = SMALL
       MF = MF + 1
       GO TO 4400
 4340  IF(DELT .LE. DELTMX) GO TO 4400
       DELT = DELTMX
       MSS = MSS + 1
       MS = MS + 1
CCC
CCC    RETURN AND REPEAT REJECTED TIME STEPS.
```

```
CCC
 4400 FORD = FOR*DELT
      IF(KWIT .LT. 0) RETURN
CCC
CCC   ADJUST DELT IN RANGE SMALL TO DELTMX TO GET DESIRED PRINTOUT TIMEST
CCC
      IF(TIMEP .LE. 0.0) GO TO 4425
      TIMS = TIMEP - DMOD(SUMTIM, TIMEP)
CCC
CCC   ADJUST DELT BY FACTOR BETWEEN 2/3 AND 3/2 TO GET PRINTOUT TIME.
CCC
      TIM = TIMS+TIMEP*FLOAT(INT(1.D+0+(2.D+0/3.D+0*DELT-TIMS)/TIMEP))
      PIX = FLOAT(INT(TIM/DELT + .5))
      DELT = TIM/PIX
CCC
CCC   IF DELT OUTSIDE BOUNDS, ADJUST TO NEXT INTEGER FIT TO TIM.
CCC
      IF(DELT .LT. SMALL)  DELT = TIM/DMAX1(PIX - 1.D+0, 1.D+0)
      IF(DELT .GT. DELTMX) DELT = TIM/(PIX + 1.)
      DELT = DMAX1(DELT, SMALL)
CCC
CCC   FOR LAST TIME STEP, ADJUST DELT SO FINAL TIME IS EQUAL TO TIMAX.
CCC
 4425 IF(TIMAX .GT. 0. .AND. TIMAX - SUMTIM .LT. DELT)
     $ DELT = TIMAX - SUMTIM + 1.D-12
CCC
CCC   FIND RATIO OF ESTIMATED TIME DERIVATIVE TO PRESENT VALUE.
CCC
      RAST = 1.0
      IF(KGOOD .LE. 1) GO TO 4440
CCC
CCC   USE QUADRATIC EXTRAPOLATION FOR INCREASING MAXIMUM SLOPE,
CCC      EXPONENTIAL FOR DECREASING MAXIMUM SLOPE.
CCC
      SLOPS = RAT1*DELTS/(RAT2*DELTSS)
      RDELT = (DELT + DELTS)/(DELTS + DELTSS)
      IF(SLOPS - 1.) 4430,4440,4435
 4430 RAST = 1. + RDELT *(1. - SLOPS)
      GO TO 4440
4435  RAST = SLOPS**(-RDELT) + 1.0D-24
CCC
CCC
4440  FOR = DMAX1(0.57D+0, DMAX1(1.0D+0, RAST)/(1.0D+0 + RAST))
      IF(KSPEC - 2) 4500,4442,4445
 4442 FOR = 1.
      GO TO 4500
4445  FOR = 0.5
CCC
CCC   ON GOOD CYCLES, FIND NEW TEMPERATURES, HEAT CONTENTS, FLUXES.
CCC   ALSO FIND MAXIMUM AND MINIMUM TEMPERATURES IN SYSTEM.
CCC
 4500 PSIMIN1 = 1.0E8
      PSIMAX1 = -PSIMIN1
      GS = 0.
      FORD = FOR*DELT
      DO 4515  N = 1,NODES
      PSI(N) = PSI(N) + DPSI(N)
      PHI(N) = PSI(N) + Z(N)
      PSIMAX1 = DMAX1(PSIMAX1,PSI(N))
      PSIMIN1 = MIN(PSIMIN1,PSI(N))
      H(N) = H(N) + DPSI(N)*CAP(N)
```

```
      W(N) = W(N) + DPSI(N)*CAP(N)
      DEX = RASI*DPSI(N)/DELTS
      F(N)    = F(N) + DF(N)
      IF(NTYPE(N).EQ.2.OR.NODE(N).LT.0) GO TO 4515
      IF(NTYPE(N) . EQ. 0 .OR. KCYC .GT. 1) GO TO 4505
      DEX = DEX/(DELTS/SLIM(N) + 1.)
 4505 IF(DEX*DDPSI(N).LT.0.)DEX = 1.0D-24*DEX
      DDPSI(N) = DEX
4515  CONTINUE
CCC
CCC   COMPUTE TOTAL FLUID GENERATION
CCC
      GS = 0.0
      IF(NUGEN .EQ. 0) GO TO 4525
      DO 4520  N = 1,NUGEN
 4520 GS = GS + G(N) * RHO(N)
      GENS = GENS + GS*DELTS
CCC
CCC   TEST PSI-LIMIT CRITERIA FOR ENDING PROBLEM
 4525 CONTINUE
CCC
 4600 IF(PSIMIN1.GE.PSIMIN) GO TO 4605
      KWIT = 3
 4605 IF(PSIMAX1.LE.PSIMAX) GO TO 4606
      KWIT = 2
      GO TO 4710
CCC
CCC   TEST UPPER PROBLEM TIME LIMIT CRITERION FOR ENDING PROBLEM.
CCC
 4606 IF(TIMAX .EQ. 0. .OR. TIMAX .GT. SUMTIM .AND. SUMTIM .GE. 0.)
     $ GO TO 4610
      KWIT = 1
      GO TO 4710
CCC
CCC   TEST STEADY STATE CRITERIA FOR ENDING PROBLEM.
CCC
 4610 IF(KSPEC .LT. 0 .OR. (DELTMX .LT. MIN(BIG, DELTO)
     1 .AND. DELTMX .GT. DELT) .OR. RATIOS .LT. 1.E3
     2 .OR. KCYC .LT. 10 .OR. KGOOD .LT. 3) GO TO 4620
      KWIT = 4
      GO TO 4710
CCC
CCC   TEST LIMIT ON NUMBER OF TIME STEPS CRITERION FOR ENDING PROBLEM.
CCC
 4620 IF(MCYC .EQ. 0 .OR. MCYC .GT. KCYC .AND. KCYC .GE. 0) GO TO 4640
      KWIT = 7
      GO TO 4710
CCC
CCC   TEST MACHINE TIME LIMIT CRITERION FOR ENDING PROBLEM.
CCC
 4640 IF(MSEC) 4645,4700,4642
 4642 IF(MOD(KCYC, 2000/NODES) .NE. 0) GO TO 4700
C       CALL SECOND(ELT)
C       ELT = ELT - TZERO
C       KSECS = INT(ELT)
         KSECS=0
      IF(KSECS .LT. MSEC) GO TO 4700
 4645 KWIT = 8
      GO TO 4710
 4700 IF(KWIT) 4810,4702,4710
 4702 IF(KCYC .LE. 1) GO TO 4710
```

```
        IF(TIMEP .LE. 0.)GO TO 4705
CCC
CCC   FIND OUT IF A PRINTOUT IS REQUIRED BY TIMEP, SUMTIM VALUES.
CCC
      IF(.6666666666666667*DELT .LT. MIN(TIMEP - TIMS, TIMS)) GO TO 4705
      NOW = 2
      GO TO 4712
CCC
CCC   FIND OUT IF A PRINTOUT IS REQUIRED BY IPRINT, KCYC VALUES.
CCC
 4705 IF(IPRINT .EQ. 0) GO TO 4810
      IF(MOD(KCYC, IPRINT) .GT. 0) GO TO 4810
CCC
CCC   CALCULATE OVERALL HEAT BALANCE QUANTITIES, WRITE OUT SUMMARY.
CCC
4710  NOW = 1
4712  NPRINT = NPRINT + 1
C      FLUID = FLUX = FLX = 0.
        FLUID=0.
        FLUX = 0.
        FLX =0.
      DO 4715  N = 1,NODES
      FLUX = FLUX + F(N)
      FLX = FLX + CAP(N)*PSI(N)
 4715 FLUID = FLUID + W(N)
      PSIAD = FLX/CAPS
      PSILE = GENS/CAPS
      PSIER = FLUX/CAPS
C      FX = FLUX/DMAX1(SUMTIM-TAU,1.D-12)
        TX1 = DMAX1(SUMTIM-TAU, 1.D-12)
        IF(KCYC .LE. 0) TX1=1.D-12
        FX = FLUX/TX1
      FLX = FX/CAPS
      PRINT 5820, NPROB, NAME
      CALL LINE
      PRINT 5825, NPRINT, KCYC, MF, MSS, KWIT, DELTMX, SMALL,
     $ PSIVARY,DPRES,DPMAXS,NUTS
      PRINT 5830,SUMTIM,DELTS,FLUX,PSIER,FX,FLX,PSIAD,CAPS,FLUID,GS,
     $GENS,PSILE
      CALL LINE
      IF(XF.LE.0.)GO TO 4718
      TDF = TLUMP*SUMTIM/XF**2
      PRINT 5831,TDF
 5831 FORMAT(10X,5HTDF =,5X,E12.4/)
 4718 CONTINUE
      IF(KWIT .LE. 0) GO TO 4720
      KDATA = 1
      PRINT 5885, FLUID,FLUX
      GO TO 4725
CCC
CCC   WRITE OUT POTENTIAL DATA FOR NODES
CCC
 4720 IF(KCYC .GE. 1 .OR. KDATA .GE. 0) GO TO 4725
      PRINT 5895,(NODE(N),PHI(N),N=1,NODES)
      CALL LINE
      IF(NODTM.LE.0)GO TO 4724
      PRINT 5896
      DO 4723 N = 1,NODTM
      J = NODTD(N)
      TD =  TLUMP*SUMTIM/(R(J)**2)
      PD = PLUMP + PSI(J)
```

```
 4723 PRINT 5897,NODE(J),TD,PD
 5896 FORMAT(10X,28H NODE        TD              PD/)
 5897 FORMAT(10X,I5,2E14.3)
 4724 CONTINUE
      CALL LINE
      GO TO 4800
 4725 PRINT 5910
      DO 4735  N = 1,NODES
      IF(MOD(N+13,58) .EQ. 0) PRINT 5910
      PRINT 5915,NODE(N),Z(N),PSI(N),PHI(N),DPSI(N),DDPSI(N),G(N),W(N),
     $H(N),F(N)
      DPSIS(N) = DPSI(N)
4735  CONTINUE
      CALL LINE
      IF (NODIM.LE.0) GO TO 4750
      PRINT 5896
      DO 4740 N = 1,NODIM
      J = NDDTD(N)
      TD = TLUMP * SUMTIM/(R(J)**2)
      PD = PLUMP * PSI(J)
      PRINT 5897,NODE(J),TD,PD
 4740 CONTINUE
      CALL LINE
 4750 CONTINUE
C
C********ENTRY POINT FOR PRODUCING A PUNCHED CARD DECK OF THE FINAL
C********CONDITIONS OF THE PROBLEM, FOR LATER USE IN A DATA DECK.
C
      ENTRY TALLY1
C
 4800 IF(KWIT.LE.0) GO TO 4810
      IF(NPUNCH.EQ.0) GO TO 4810
C
C PUNCH FINAL CONDITIONS IN BLOCK 9 FORMAT.
C
        OPEN(UNIT=2,NAME='RESTART.FIL',TYPE='NEW')
        WRITE(2,5860) (NAME(I),I=1,6)
        WRITE(2,5835) SUMTIM,NODES
        DO 4805 N=1,NODES
        WRITE(2,5855) NODE(N),PHI(N),G(N)
4805    CONTINUE
C
C
CCC
CCC   WRITE OUT DATA FOR SPECIAL OUTPUT NODE NUM ON NON-PRINTOUT CYCLES.T
CCC
 4810 IF(NOW .GT. 0 .OR. NUM .LE. 0) GO TO 4815
      PRINT 5995,NUMX,Z(NUM),PSI(NUM),PHI(NUM),DDPSI(NUM),SUMTIM
CCC
CCC SET TIME DERIVATIVES TO ZERO BEFORE CYCLE ZERO, AND EVERY CYCLE,
CCC       IF REQUIRED BY INPUT DATA.
CCC
 4815 IF(NDOT .EQ. 0) RETURN
4820  DO 4825  N = 1,NODES
      DDPSI(N) = 0.
4825  CONTINUE
      RETURN
CCC
CCC   COMPLETED TALLY, RETURN TO HEART.
CCC
 5800 FORMAT(/10X5HCYCLEI5,10H MADE NODEI5,15H A SPECIAL NODE)
```

```
5805 FORMAT(//10X,25HINPUT ERROR, MATERIALS = ,I5,10H, NODES = ,I5,1H,)T
5810 FORMAT (8E10.3)
5815 FORMAT(//,12X,41H PHIONE          GONE          HONE          PCONE,/,10X,4E
    $E12.4)
5820 FORMAT(1H1,9X,17HTRUST OUTPUT DATA,69X,9HDATA DECK,115//
    $  10X,1A1,17A4,A2,1A1,4A2)
5825 FORMAT(/10X,39HPRINTOUT CYCLE  MF   MSS  KWIT   DELTMX,7X,
    15HSMALL,6X,7HPSIVARY,8X,5HDPRES,8X,6HDPMAXS,5X,4HNUTS,/,
    2  10X,5I6,5E13.5,I5)
5830 FORMAT(/,10X,87H   TOTAL TIME       TIME STEP      FLUID FLOW      PSIT
    1 FROM FLUX   FLUX RATE       PSI RATE,/,8X,6E15.5,//
    210X,89H    AVG PSI    FLUID CAPACITY  FLUID CONTENT    GEN RATE
    3   FLUID GEN      PSI FROM GEN ,/,8X,6E15.5)
5835 FORMAT(23HBLOCK 9  PHI,GG AT TIME,10X,1E12.5,17HNUMBER OF NODES =,L
    $I5)
5841 FORMAT(1X)
5845 FORMAT(//,12X,10HNOTE INDEX,10X,4HPPHI,10X,2HGG,10X,2HPC)
5850 FORMAT(10X,2I5,4X,3E15.6)
5855 FORMAT(I5,15X,1P3E12.5)
5860 FORMAT(3H **,10X,1A1,5A4)
5865 FORMAT(9I5,5X,2E10.3)
5870 FORMAT(I5,5X,7E10.3)
5875 FORMAT(//,11X,92H  KD    DELTO          SMALL       PSIVARY         TT
    $AU           TIMAX        PSIMIN          PSIMAX,/,10X,I5,7E13.5)
5880 FORMAT(//,10X,18H   KD KSYM     GEOM,/,10X,2I5,E13.5)
5885 FORMAT(10X,13HFINAL FLUID =,1E15.5,12HFINAL FLOW =,1E15.5)
5890 FORMAT(//10X,48HIPRINT   NUM KDATA KSPEC  MCYC  MSEC NPUNCH NOUT,
    $  3X,5HTIMEP,8X,5HSCALE/10X,8I6,2E13.5)
5895 FORMAT(//,10X,93H  NODE     PHI             NODE    PHI            NODE
    $ PHI             NODE    PHI             NODE    PHI,/,(10X,I6,1PE14.5,
    $I6,1PE14.5,I6,1PE14.5,I6,1PE14.5,I6,1PE14.5))
5900 FORMAT(/12X,93HNODE              TEMP             W/F A           DA              DT
    $DA               W/F B          DB              DDB)
5905 FORMAT(10X,1I6,3X,7E13.4)
5910 FORMAT(/,12X,4HNODE,5X,1HZ,13X,3HPSI,10X,3HPHI,9X,4HDPSI,8X,
    $5HDDPSI,11X,1HG,12X,1HW,12X,1HH,12X,1HF)
5915 FORMAT (5X,I6,3X,9E13.4)
5930 FORMAT(/,26X,31HMAXIMUM ALLOWED TABLE LENGTH IS,I4,1H.)
5945 FORMAT(//,10X,6HTABLES,10X,36H  CAPM  CONT  HSORT PHIB    GT TOTALT
    $,/,26X,6I6)
5950 FORMAT(//10X,21HSUMMARY OF INPUT DATA,/,
    $10X,12HBLOCK NUMBER,4X,8I6)
5955 FORMAT(10X,12HMAXIMUM SIZE,4X,8I6)
5960 FORMAT(10X,12HINITIAL SIZE,4X,8I6)
5965 FORMAT(10X,15HUNMODIFIED SIZE,1X,8I6)
5970 FORMAT(10X,10HFINAL SIZE,6X,8I6)
5975 FORMAT(10X,12HITEM NAME    ,4X,
    $48H   MAT FLUID  NODE  NOD1  NODS NODSB  NODG  NOTE)
5980 FORMAT(/10X,12HOTHER TOTALS,4X,12HNOSPEC NOGEN,/,
    $26X,2I6)
5985 FORMAT (10X,13HTIMES READ IN,3X,8(3X,I3))
5990 FORMAT(10X,17HWILL REPEAT CYCLE,I6,13H        DPRES =,
    $1E10.3,12H   DPSIMAX =,1E10.3,9H   DELT =,1E10.3,10H  SUMTIM =,1E1
    $0.3)
5995 FORMAT(1X,2(5H*****),4HNODE,I6,20HZ, PSI, PHI, DDPSI =,4E12.4,
    $1X,7HAT TIME,E12.4)
     END
```

```
CDECK PATCH
      SUBROUTINE PATCH(NXX,CONE,POUT,LBX)
        IMPLICIT REAL*8 (A-H,O-Z)
C
C********VERSION 5/20/69.
C********REVISED 2/73.
C
C     PATCH STORES CONE IN POUT IF NXX CONTAINS NO DECIMAL POINT,
C        OTHERWISE CONVERTS NXX TO FLOATING POINT AND STORES IN POUT.
C       CALLED BY: SORE
C
      DIMENSION NXX(10),RC(3)
C
      DO 2100  NC = 1,10
      IF(NXX(NC) .EQ. 1H.) GO TO 2105
2100  CONTINUE
      POUT = CONE
      LBX = 0
      RETURN
2105  ENCODE(10,5805,RC) NXX
      DECODE(10,5810,RC) POUT
      LBX = 1
      RETURN
5805  FORMAT(10A1)
5810  FORMAT(E10.3)
      END


CDECK REFER
      SUBROUTINE REFER(LIST, LISTX, MAXE, LISTR, MAR)
        IMPLICIT REAL*8 (A-H,O-Z)
C
C********VERSION 5/20/69.
C********REVISED 2/73.
C
C********REFER IS A REQUIRED SUBROUTINE.
C
C     REFER IS USED FOR CROSS-REFERENCING NODE, MATERIAL, REACTANT NOS.
C     FINDS J FOR WHICH LISTX(N) = LISTR(J), MAKES LIST(N) = J.
C
      DIMENSION LIST(1), LISTR(1), LISTX(1)
C
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
      IF((MAR * MAXE) .LE. 0 .OR. NEWBL(IBLOCK) .LE. 0 .OR. IBLOCK .LE.
     $ 0 ) RETURN
      N1 = 1
      IF(IBLOCK .NE. 1 .AND. NEWBL(IBLOCK) .LT. 1000)
     $ N1 = MIN0(1 + ITEMS(IBLOCK), MAXE)
      DO 3120  N = N1,MAXE
      J = MAR
      DO 3105 L = 1,MAR
      IF(LISTX(N) .EQ. LISTR(J)) GO TO 3115
 3105 J = J - 1
      IF(IBLOCK .EQ. 2 .AND. LISTX(N) .EQ. 0) GO TO 3120
      PRINT 5800, N, IBLOCK, LISTX(N)
      KWIT = 5
      GO TO 3120
3115  LIST(N) = J
3120  CONTINUE
      RETURN
C
C     END OF REFER, RETURN TO CALLER.
C
 5800 FORMAT(/1X,3(5H*****),8HERROR IN,I15,17H"TH ITEM IN BLOCK,I13,
     $40H   RAFERS TO UNSPECIFIED MATL OR NODE NO,I6,1H.)
      END
```

```
CDECK SEEK1
      SUBROUTINE SEEK1(N, ITEM, NB1, MAXE, K)
C
C********VERSION 5/20/69.
C********REVISED 2/73.
C
C********SEEK1 IS A REQUIRED SUBROUTINE.
C
C      SEEK1 IS USED FOR FINDING DATA BLOCK ITEMS TO BE ALTERED.
C      SEEK1 LOOKS FOR N1 IN ARRAY NB1, SETS N TO SUBSCRIPT OF NB1 IF
C      N1 IS FOUND, OTHERWISE SETS N TO ARRAY SIZE PLUS 1.
C
      DIMENSION NB1(1)
C
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
      IF(MAXE .LE. 0) GO TO 2105
      J = MAXE
      DO 2100  L = 1,MAXE
      IF(NB1(J) .EQ. ITEM) GO TO 2110
 2100 J = J - 1
C2105 N = MAXE = MAXE + 1
2105    MAXE=MAXE+1
        N=MAXE
      K = 0
      PRINT 5800, ITEM, IBLOCK
      RETURN
2110  N = J
      K = 1
      RETURN
 5800 FORMAT(1X,3(5H*****),5HITEM ,I15,33H NOT FOUND, ADDED TO END OF BLS
     BOCK, I14,1H.)
      END
```

```
CDECK SEEK2
      SUBROUTINE SEEK2(N, ITEM1, ITEM2, NB1, NB2, MAXE, K)
C
C********VERSION 5/20/69.
C********REVISED 3/73.
C
C********SEEK2 IS A REQUIRED SUBROUTINE.
C
C     SEEK2 IS USED FOR FINDING DATA BLOCK ITEMS TO BE ALTERED.
C     SEEK2 LOOKS FOR PAIR OF NUMBERS N1, N2 IN PAIR OF ARRAYS NB1, NB2,S
C     SETS K TO SUBSCRIPT OF NB1, NB2 IF FOUND, OTHERWISE SETS N TO
C     ARRAY SIZE PLUS 1.
C
      DIMENSION NB1(1), NB2(1)
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
      IF(MAXE .LE. 0) GO TO 2105
      J = MAXE
      DO 2100  L = 1,MAXE
      IF(NB1(J) .EQ. ITEM1 .AND. NB2(J) .EQ. ITEM2) GO TO 2110
 2100 J = J - 1
C2105 N = MAXE = MAXE + 1
2105    MAXE=MAXE+1
        N=MAXE
      K = 0
      PRINT 5800, ITEM1, ITEM2, IBLOCK
      RETURN
2110  N = J
      K = 1
      RETURN
 5800 FORMAT(1X,3(5H*****),5HITEMS,2I6,33H NOT FOUND, ADDED TO END OF BLS
     $OCK, 1I4,1H.)
      END
```

```
CDECK ENTER
      SUBROUTINE ENTER(VECT)
        IMPLICIT REAL*8 (A-H,O-Z)
C
C
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
C     SUBROUTINE TO FIND INDEX OF AN ELEMENT IN AN ORDERED VECTOR.
C
      DIMENSION VECT(1)
C
      MIN = 1
    1 MID = (MIN + MAX)/2
      IF(SET - VECT(MID)) 2,4,3
    2 MAX = MID
      IF(MAX - 2) 4,1,1
    3 MIN = MID
      IF(MAX - MIN .GE. 2) GO TO 1
    4 RETURN
      END
```

```
CDECK SLOPE
      SUBROUTINE SLOPE(V1,V2,V3)
        IMPLICIT REAL*8 (A-H,O-Z)

CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
      DIMENSION V1(1), V2(1), V3(1)
C
      DO 1  J = 2,LTAB
      DTX = (V1(J) - V1(J - 1)) + 1.D-12
      V3(J) = (V2(J) - V2(J - 1))/DTX
      IF(DTX .LE. 0.) KWIT = 12
    1 CONTINUE
      V3(1) = V3(2)
      RETURN
      END
```

```
CDECK LINE
      SUBROUTINE LINE
      PRINT 1
      RETURN
    1 FORMAT(10X,10(10H==========))
      END
```

```
CDECK MORTHAN
      SUBROUTINE MORTHAN(N, MAT, MSUB1)
      
CCALL BLINK
      INCLUDE 'BLINK.INC'
CCALL BLISC
      INCLUDE 'BLISC.INC'
CCALL BLARE
      INCLUDE 'BLARE.INC'
CCALL BLARY
      INCLUDE 'BLARY.INC'
C
      KWIT = 11
        N=MSUB1
        MAT=MSUB1
      PRINT 1, N, IBLOCK
      RETURN
    1 FORMAT(32H ***************MORE THAN ALLOWED,I15,15HITEMS IN BLOCK,
     $ I14)
      END
```

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The computer code, TRUST, provides a versatile tool to solve a wide spectrum of fluid flow problems arising in variably saturated deformable porous media. The governing equations express the conservation of fluid mass in an elemental volume that has a constant volume of solid. Deformation of the skeleton may be nonelastic.

Permeability and compressibility coefficients may be nonlinearly related to effective stress. Relationships between permeability and saturation with pore water pressure in the unsaturated zone may include hysteresis. The code developed by T.N. Narasimhan grew out of the original TRUMP code written by A.L. Edwards. The code uses an integrated finite difference algorithm for numerically solving the governing equation. Marching in time is performed by a mixed explicit-implicit numerical procedure in which the time step is internally controlled. The time step control and related feature in the TRUST code provide an effective control of the potential numerical instabilities that can arise in the course of solving this difficult class of nonlinear boundary value problem. This document brings together the equations, theory, and users manual for the code as well as a sample case with input and output.

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