77-75
LA-5704-MS

UC-32

Reporting Date: July 1974

Issued: January 1975

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A Two-Dimensional Hydrodynamics
and Radiation Transport Program

by

Richard C. Anderson
M. T. Sandford II

los alamos
scientific laboratory

of the University of California

LOS ALAMOS, NEW MEXICO 87544

UNITED STATES
ATOMIC ENERGY COMMISSION
CONTRACT W-7405-ENG. 36

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Printed in the United States of America. Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22151
Price: Printed Copy \$7.60 Microfiche \$2.25

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YØKIFER: A TWO-DIMENSIONAL HYDRODYNAMICS AND RADIATION TRANSPORT PROGRAM

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Richard C. Anderson and M. T. Sandford II

ABSTRACT

The YØKIFER program has been written to calculate the coupled hydrodynamics and radiation transport problem in two-dimensional (R-Z) cylindrical geometry. The hydrodynamics are computed by the ICED-ALE method, the radiation transport by either the Monte Carlo or S_n method.

This report is a description of the program and a guide to its use.

INTRODUCTION

YØKIFER solves the coupled hydrodynamics and radiation transport problem in two-dimensional cylindrical (R-Z) geometry. It is written in Fortran IV and is run under the CRØS system on the CDC-7600 computer. A few subroutines are written in CØMPASS.

This report has been written for those using the program and is limited to a description of the program and its operation. Persons interested in details of either the physics or the numerical methods involved are directed to the following references.

The hydrodynamics problem is solved by the ICED-ALE method of the YAQUI program. Reference 1 is the basic reference for the hydrodynamics. The radiation transport problem is solved by either the Monte Carlo or S_n method for which references 2 and 3, respectively, are the basic references.

I. OVERVIEW OF THE YØKIFER PROGRAM AND DESCRIPTION OF THE MAIN PROGRAM

This section describes the YØKIFER Program as a whole and the main overlay. Also

described are subroutines and calculations applicable to the entire program.

A. Program Organization

The program consists of the main program, YØKIFER (Overlay 0,0) and four primary overlays.

1,0 ØFFWEGØ	Input and Problem Setup
2,0 YØKKY	Hydrodynamics
3,0 MCRT	Radiation Transport (Nongrey, Monte Carlo)
4,0 GREYSN	Radiation Transport (Grey, S_n)

Appendix A contains a list of overlays and subroutines, a list of the common blocks and the overlays in which they are used, and a list of the file sets that YØKIFER uses.

B. Input

There are two different forms of input to YØKIFER. The input reading is controlled by Sense Switch 1.

Bubble input	Sense Switch 1	ON
Purd input	Sense Switch 1	OFF (default)

Bubble input is produced by rotating the results of a one-dimensional starter calculation

(e.g. RADFLØ) through 90° to produce bubble input cards. Appendix A lists the required input cards. Purd input will be described in a separate report.

C. General Order of Calculations

Calculations proceed in the order shown schematically in Fig. 1:

The selection of Monte Carlo or S_n radiation transport calculations is governed by Sense Switch 2.

Monte Carlo	Sense Switch 2	ON
S_n	Sense Switch 2	OFF(default)

The calculation is terminated just before the time limit on the JØB card is reached.

D. OVERLAY 0,0 - YØKIFER

YØKIFER is the main program, which calls the primary overlays, writes data on Fileset 7, and produces dump tapes at regular intervals.

1. Variables Computed by YØKIFER

TTL	Time limit on the job card (s).
T1	CP time at the beginning of the cycle (s).
T2	CP time at the end of the cycle (s).
TCYCLE	Length of a calculation cycle (s). TCYCLE = T2-T1
TDUMP	Length of computing time until the next release (stage) of Fileset 7 to tape (s).
NDUMP	Number of 60-bit words written on Fileset 7.

2. Dump Procedure

Data are copied to Fileset 7 before YØKKY is entered whenever the problem time is greater than the problem output time TØUT. (The determination of TØUT is de-

scribed in Sec. E.7.) Periodically, Fileset 7 is released from disk to magnetic tape. A new, blank tape is used each time.

Initially, TDUMP is set to 900 CP seconds, or TTL, whichever is smaller. After each cycle is calculated, TDUMP is reduced by TCYCLE. Fileset 7 is released to tape whenever $TDUMP < 2 \times TCYCLE$. After each tape stage, TDUMP is reset to 900 s or TTL-T2, whichever is smaller.

Initially NDUMP is set to 0. When data are copied to Fileset 7, NDUMP is incremented by the approximate number of words dumped. When $NDUMP \geq 10^6$, Fileset 7 is dumped to tape and NDUMP is reset to 0.

Each dump tape contains all data copied to Fileset 7 since the previous dump tape was written.

E. General Topics

1. YØKIFER Mesh

The YØKIFER mesh is a two-dimensional grid, in R-Z cylindrical geometry. (The hydrodynamics program is written to handle X-Y cartesian geometry also, but the radiation transport programs cannot do this.) Each cell is a volume of revolution about the z-axis with a quadrilateral cross section. (Initially, the cross sections are rectangular, but not necessarily of uniform size.) Because no physical variables depend on a third coordinate, the mesh can always be represented two-dimensionally by a grid in the R-Z plane.

The mesh consists of IBAR cells in the radial direction and JBAR cells in the axial direction, and the left boundary is the cylindrical axis. These cells are called the "real mesh." For computational purposes, a single row of dummy cells is added at the bottom, on the right, and at the top, for a total of $IP1 = IBAR + 1$ cells radially and $JP2 = JBAR + 2$ cells axially. The maximum allowable value of IBAR and JBAR is 100. The maximum number of cells (including dummy cells) is 7200.

I is the radial cell index, $1 \leq I \leq IP1$; and J is the axial cell index, $1 \leq J \leq JP2$.

The single computationally equivalent index, IJ , is frequently used:

$$IJ = (J-1) (IP1) + 1.$$

The cell index I , J , or IJ refers to the lower left-hand vertex of the cell.

Figure 2 shows the basic mesh conventions. Because cell and vertex properties depend on the properties of neighboring cells and vertices, a standard notation has been developed to describe the neighbor cells (Fig. 3). The coordinate positions of the vertices are given by

- X_{ij} Radial coordinate of vertex ij
- Y_{ij} Axial coordinate of vertex ij
- R_{ij} Geometry indicator. $R_{ij} = 1$ for slab geometry, $R_{ij} = X_{ij}$ for cylindrical geometry.

The mechanics of setting up a mesh are described in Sec. II.

Fig. 2. The basic mesh conventions.

Fig. 3. Neighbor cell notation.

2. YOKIFER Mesh Variables

The principal mesh variables used throughout the program are described below. Other mesh variables are used locally within the program and are described by comments at the places where they are used.

- SIE_{ij} Specific internal energy at the center of cell ij (J/mg).
- $TEMP_{ij}$ Temperature at the center of cell ij (eV).
- $R\rho_{ij}$ Density at the center of cell ij (mg/cm³).
- P_{ij} Pressure at the center of cell ij (MPa).
- U_{ij} Radial fluid speed at vertex ij (km/s).
- V_{ij} Axial fluid speed at vertex ij (km/s).
- $RVOL_{ij}$ 2π /volume of cell ij , in cylindrical geometry (1/km³).

3. Storage of Mesh Variables

Because SCM is not large enough to contain all of the mesh data, most mesh variables are stored in LCM and periodically read into SCM (usually) three rows at a time. NQ words are provided for each cell, and the mesh data needed for any given cell are therefore stored in NQ adjacent locations. At present, $NQ = 18$. Appendix A contains a tabulation of the cell variables stored in the NQ locations for different parts of the program. Mesh data are written into

and out of LCM by subroutine LØØP (Sec. F. 1.) for one entire row of cells at each call.

4. YØKIFER Units

Unless otherwise indicated, the units of all YØKIFER variables are as follows.

Time	s	
Length	km	(10^5 cm)
Volume	km ³	(10^{15} cm ³)
Velocity	km/s	(10^5 cm/s)
Acceleration	km/s ²	(10^5 cm/s ²)
Density	mg/cm ³	(10^{-3} g/cm ³)
Energy	J	(10^7 ergs)
Specific energy	J/mg	(10^{10} ergs/g)
Energy density	J/km ³	(10^{-8} ergs/cm ³)
Pressure	mg-km ² /cm ³ -s ²	(10^7 dynes/cm ² = MPa)
Temperature	eV	(11 605.4 K)
Absorption coefficient	km ⁻¹	(10^{-5} cm)
Frequency	s ⁻¹	

The physical constants used are:

c = speed of light = 3.0×10^5 km/s,

a = radiation density constant = 137.214×10^8 J/km³-eV⁴.

5. Equation of State and Opacity Data

The equation of state and opacity data are read from Fileset 6:

NØPT	Number of temperatures for which data are tabulated (30).
NØPD	Number of densities for which data are tabulated (9).
NFRQ	Number of wavelengths for which absorption coefficients are tabulated (100).
FREQ(K)	Wavelengths (Å). $K = 1$, NFRQ, in order of decreasing wavelengths.
ØPTMP(I)	Log ₁₀ temperatures (eV) for which data are tabulated. $I = 1$, NØPT, in order of ascending temperatures.
ØPDEN(J)	Log ₁₀ densities (g/cm ³) for which data are tabulated. $J = 1$, NØPD, in order of increasing densities.
ØPSIG(K,I,J)	Log ₁₀ absorption coefficients (1/cm). $K = 1$, NFRQ; $I = 1$, NØPT; $J = 1$, NØPD.

SPTBL(I,J) Log₁₀ Planck mean absorption coefficients (1/cm). $I = 1$, NØPT; $J = 1$, NØPD.

SPTBL(I,J) Log₁₀ Rosseland mean absorption coefficients (1/cm). $I = 1$, NØPT; $J = 1$, NØPD.

The mean absorption coefficients

YØKIFER uses are controlled by Sense Switch 3.

Planck mean Sense Switch 3 ON

Rosseland mean Sense Switch 3 OFF (default)

PTAB(I,J) Log₁₀ pressures (dynes/cm³). $I = 1$, NØPT; $J = 1$, NØPD.

ETAB(I,J) Log₁₀ specific internal energies (ergs/g). $I = 1$, NØPT; $J = 1$, NØPD.

BTBL(I,J) Radiation derivatives, = $\partial \rho I / \partial a T^4$. $I = 1$, NØPT; $J = 1$, NØPD.

The data are arranged on the tape in a single file. (NWL is the number of words in the record, and it is not needed by the program.)

Record 1	NØPD, NØPT, NFRQ
Record 2	FREQ
Record 3	NWL, ØPTMP(1), ØPDEN(1), ØPSIG(K,1,1)
Record 4	NWL, ØPTMP(2), ØPDEN(1), ØPSIG(K,2,1)
Record 5	NWL, ØPTMP(3), ØPDEN(1), ØPSIG(K,3,1)
...	...
Record 272	NWL, ØPTMP(NØPT), ØPDEN(NØPD), ØPSIG(K,NØPT,NØPD)
Record 273	SPTBL (Planck)
Record 274	SPTBL (Rosseland)
Record 275	PTAB
Record 276	ETAB
Record 277	BTBL

6. Time and Time Interval Calculations

The program is permeated by the messy calculation of problem times and time intervals. Four main variables are involved:

TIME	Radiation transport (R) time,
DTR	Radiation transport (R) time interval,

T Hydrodynamic (H) time,
 DT Hydrodynamic (H) time interval.

In the following discussion, this notation is used:

TIME_m Time at the start of R cycle m,
 DTR_m Time interval of R cycle m,
 T_n Time at the start of H cycle n,
 DT_n Time interval of H cycle n.

Hydrodynamic Time Calculations. The hydrodynamic overlay (YØKKY) is called if and only if T = TIME. The status of the time variables when YØKKY is called is:

TIME_m Starting time of the next R cycle,
 DTR_m Time interval of the next R cycle,
 T_n Starting time of the next H cycle,
 DT_{n-1} Time interval of the last H cycle (of no interest, now).

At the start of PHASE1 within YØKKY, the new H cycle begins and the hydrodynamic calculations occur. The calculated quantities are

DT_n Time interval for the next H cycle = $\min(DT'_n, 5 \times DTR_m)$.
 T_{n+1} Time at the end of the next H cycle = $T_n + DT_n$. When $T_n = \text{TIME}_m$, T_{n+1} may exceed TIME_{m+1}.

DT'_n is a time interval based on the hydrodynamic constraints described in Sec. III. The $5 \times DTR_m$ limitation restricts the number of R cycles between H cycles to about five. At the end of YØKKY, T_{n+1} is compared with TIME_{m+1} = TIME_m + DTR_m:

$T_{n+1} < \text{TIME}_{m+1}$ Another H cycle is calculated. If another H cycle is calculated, its DT_n is subject to the additional restriction that $DT_n \leq \text{TIME}_m + DTR_m - T_n$.
 $T_{n+1} \geq \text{TIME}_{m+1}$ YØKKY is exited and a radiation transport overlay is called.

Radiation Transport Time Calculations.

The radiation transport overlays (MCRT or GREYSN) are called only if $T \geq \text{TIME} + \text{DTR}$.

The status of the four variables at the beginning of an R cycle is:

TIME_m Starting time of the next R cycle
 DTR_m Time interval of the next R cycle
 T_{n+1} Time at the end of the last H cycle
 DT_n Time interval of the last H cycle

The time interval calculations for R cycle m + 1 occur throughout the overlays during the calculation of R cycle m:

$$DTR_{m+1} = \min(DTR'_{m+1}, 10 \times DT_n).$$

DTR'_{m+1} is a time interval based on radiation transport constraints and described in Secs. IV and V. The $10 \times DT_n$ limitation restricts the number of H cycles between R cycles to about 10. The problem time is advanced at the end of each radiation cycle.

$$\text{TIME}_{m+1} = \text{TIME}_m + DTR_m.$$

A number of checks and adjustment are made.

TIME_{m+1} < T_n. When this condition applies, another R cycle is calculated.

TIME_{m+2} = TIME_{m+1} + DTR_{m+1} is compared with T_n. If TIME_{m+2} > T_n, the time interval is reduced to DTR_{m+1} = T_n - TIME_{m+1}.

TIME_{m+1} = T_n. When this condition applies, the radiation transport overlay is exited and YØKKY is called.

Getting Started. The time calculations are initialized as follows. TIME₁ and DTR₁ are the input numbers TIME and DTR. T₁ = TIME and DT₀ = 0 are set by ØFFWEGØ. When PHASE1 is first called (at the beginning of H cycle 1), DT₁ = DTR and T₂ = T₁ + DT₁.

7. Output

During every cycle there are several short prints (also written on film), and at less frequent intervals more detailed output is written on film. These less frequent times are called TØUT. TØUT is set to provide detailed output n times per decade of elapsed problem time. If t is the elapsed problem time at the start of the decade, output occurs at elapsed times ft, f²t, ..., fⁿt = 10t; hence, $f = \sqrt[n]{10}$. The output overlays (2,2;3,3; and 4,3) are called only

when $T \geq T_{OUT}$. Initially (in OFFWEGØ) $T_{OUT} = T_{START}$, the problem starting time. This causes YØKØUT , the hydrodynamic output program, to be called on cycle 0. It is in YØKØUT that all subsequent changes in T_{OUT} are made.

In cycle 0 $T_{OUT} = DTR$.

In later cycles $T_{OUT} = f(T_{OUT} - T_{START}) + T_{START}$.

The factor f is presently set at 1.15, which corresponds to $n \sim 16$ outputs/decade.

8. Dumps and Restarts

At the output times, T_{OUT} , data are written on Fileset 7, and at less frequent intervals, Fileset 7 is staged to tape. The data written on Fileset 7 include all data needed to restart the problem and other data that are useful to analyze in detail after the problem is run. Data are not written on Fileset 7 after every cycle because of the enormous volume involved. Fileset 7 is staged to tape when:

One reel of tape has accumulated ($NDUMP > 10^6$).

Fifteen CP minutes have elapsed since the last tape was written.

The time limit from the job card is approaching.

Dump tape data are read and analyzed by the program NEXTWAY , described in Appendix B. The dump tapes contain as many problem cycles as may happen to be written on them. The mechanics of the dump procedure were described in Sec. D; the structure of the dump file is in Table A-VII in Appendix A.

F. Subroutines

1. Subroutine $LØØP$

$LØØP$, a highly efficient subroutine originally written for YAQUI , is used to transfer data between SCM and LCM. $LØØP$ maintains the NQ values for each cell in three rows of mesh cells in SCM -- the row for which calculations are being made and the rows immediately above and below. To aid in interpreting the source code listing, the general form of a calculation using $LØØP$

is shown below.

CALL START

The bottom three rows of cell data are read into small core. The indices of the first cell in each row (IJM, IJ, IJP) are set.

$DØ\ 9\ J = 2, J2$

Each time through this loop, mesh data are computed for row J . $J2 = JP1$ for cell-centered quantities, $J2 = JP2$ for vertex quantities.

$DØ\ 8\ I = 1, I2$

Each time through this loop, mesh data are computed for cell I in row J . $I2 = IBAR$ for cell-centered quantities, $I2 = IP1$ for vertex quantities.

Set cell indices

Set indices for cells to the right and left of I , as needed, $IPJ = IJ + NQ$, $IPJP = IJP + NQ$, etc.

Calculate desired data

Increment cell indices

Set indices for the next cell in row I , as needed, $IJ = IPJ$, $IPJ = IPJP$, etc.

8 CONTINUE

CALL $LØØP$

Write data for row IJM into LCM, reset indices IJ and IJP to IJM and IJ , and read data for IJP into SCM.

9 CONTINUE

CALL $DØNE$

Compute data for two top rows and write into LCM.

2. SEARCH (XBAR, X, N, NDX, and MFLAG)

SEARCH is an extremely fast binary search routine. Given a table of N values of X , and a value $XBAR$, SEARCH finds NDX such that $X(NDX) \leq XBAR < X(NDX + 1)$. $MFLAG$ is a returned error flag.

3. DBLINT (K, X, Y, XT, YT, TAB, N1, M, MCØLS, and NDM)

DBLINT performs double linear interpolation of tabulated data. $TAB(I,J)$ is a tabulated function of $XT(I)$ and $YT(J)$, $I = 1, MCØLS$; $J = 1, M$. $TAB(I,J)$ is dimensioned for $(MCØLS, M)$. $NDIM$ is the actual number of I values tabulated. DBLINT returns as

a function value the interpolated value of TAB which corresponds to X and Y. Normally $K = N1 = 0$, but $K, N \neq 0$ allows use of triply subscripted tables.

4. GETEMP (XP, ZP, X, Y, Z, NX, and NY)

Z(I,J) is tabulated as a function of X(I), $I = 1, NX$ and Y(J), $J = 1, NY$. Given the values of X, Z, XP, and ZP, GETEMP computes the corresponding value of Y by inverse interpolation. The subroutine is used with equation of state data to compute temperatures when densities and specific internal energies are known.

5. PAKFNO and UNPKFN

PAKFNO packs three floating point words into a single word. The packed words have a seven bit exponent. UNPKFN unpacks the single word back into three words. These subroutines save significant amounts of space in return for decreasing the significant figures to six.

II. ØFFWEGØ, THE INPUT AND SETUP OVERLAY

Overlay 1,0 (ØFFWEGØ) is used to read input data and to set up the initial mesh, values of mesh variables, and marker particle distributions.

A. Overview of the Overlay

The setup overlay is ØFFWEGØ (Overlay 1,0), which reads card and tape input data and sets up the problem. There are no secondary overlays; the work is done by subroutines MESHMKR, PARTGEN, PARDEN, NSTART, and FILMCØ.

B. ØFFWEGØ

1. Equation of State and Opacity Data

Equation of state and opacity data are read from Fileset 6. The input wavelengths are converted to frequencies (1/s), and, where necessary, units are changed from those of the tabulated data to YØKIFER units. The frequency-dependent opacities, ØPSIG, are stored as a linear array, SIGA, in LCM.

SIGA(IJK) corresponds to ØPSIG(I,J,K) where the equivalent subscript is $IJK = K + (I-1)*NFRQ + (J-1)*NØPT*NFRQ$. I, J, and K are the temperature, density, and frequency indices, respectively.

2. Dump Tape Input

ØFFWEGØ reads the dump file, Fileset 7. If the end-of-information is encountered on the first reading, one assumes that there is no dump input and that initial data are to be read from cards. If data are found on Fileset 7, the file is read until the end-of-information is encountered. When this occurs, the last dump on the file has been stored in the computer and is thus used to restart the problem.

3. ØFFWEGØ Input Cards

ØFFWEGØ reads the following data from cards:

NAME	Problem identification.
TIME	Starting time of the problem (s).
DTR	Initial radiation time interval (s).
CYL	Geometry parameter. CYL = 0.0 for slab geometry, CYL = 1.0 for cylindrical geometry. It is <u>not</u> possible at present to run radiation transport calculations in slab geometry.
GRDVEL	Rezone parameter (Sec. III).
ALPHA	Radiation transport implicitness parameter (Secs. IV and V).
IBAR, JBAR, IUNF, JUNF, JMID, DR, DZ, and FREZ	Quantities that define the mesh (Sec. C-1 and C-2).
AØ, AØM, BØ, XI, MU, LAM, ØM, EPS, ASQ, GM1, GR, and GZ	Parameters used in the hydrodynamic calculations (Sec. III).
REZYØ	Axial coordinate (true altitude) of the "center" of the mesh (km). This value defines the mesh altitude and, in practice, usually corresponds to the coordinate at the center of the bubble.
YBASE	Axial coordinate of the bottom of the real mesh (true altitude). YBASE is <u>not</u> independent of other input quantities (Sec. C-2).

The program operates on the assumption that the altitude at REZYØ = 0. The input value of REZYØ is saved for reference,

but all other altitudes (Y_{ij} , YBASE) are converted to true altitude-REZY0.

REZRØN Ambient density at REZY0 (mg/cm^3).

REZSIE Ambient specific internal energy (excluding radiation) at REZY0 (J/mg).

4. Parameters Set and Computed by

ØFFWEGØ

ØFFWEGØ sets initial values of some parameters and precomputes others. These parameters are defined and described in the following sections, which describe the parts of the program in which they are used.

5. Subroutine Calls

MESHMKR is called to read and compute initial values for the mesh variables X , R , Y , U , V , SIE , $TEMP$, $RØ$, and $RVØL$. PARTGEN or PARDEN is called by MESHMKR to compute marker particle positions for Bubble or Purd input problems, respectively. FILMCØ is called to compute film-plotting parameters.

6. Marker Particle Cells

ITAB(k) is the equivalent index of the cell containing the k^{th} marker particle:

$$ITAB = (J-1) \cdot IP1 + I.$$

7. Mesh Variables

ØFFWEGØ computes the mesh variables:

- M_{ij} Mass of cell ij ($\text{mg}/\text{km}^3/2\pi\text{-cm}^3$).
- E_{ij} Total specific material energy in cell ij (internal + kinetic) (J/mg).
- RM_{ij} Reciprocal mass associated with vertex ij ($2\pi\text{-cm}^3/\text{mg}\text{-km}^3$). The mass associated with a vertex is 1/4 the mass of the four adjacent cells.

8. ØFFWEGØ Output

ØFFWEGØ prints the job number, the date, all input data, and parameters whose values are as set by ØFFWEGØ.

C. Subroutine MESHMKR

MESHMKR establishes the initial values of the mesh variables X , Y , P , U , V , $RØ$, SIE , $TEMP$, and $RVØL$.

1. Uniform Mesh

MESHMKR computes the coordinates X , Y , and R for a uniform mesh of $IBAR \times JBAR$ cells with specified cell dimensions DR

and DZ . The coordinate at the vertex, $J = JMID$, is $Y = REZY0$; that at the bottom of the mesh is $Y = YBASE$. The input value of $YBASE$, for a uniform mesh, must be $REZY0 - DZ \cdot JMID$.

2. Nonuniform Mesh

The nonuniform mesh is computed when $FREZ \neq 1.0$. The nonuniform mesh contains a total of $IBAR \times JBAR$ cells. There is an inner, uniform region $IUNF \times JUNF$ cells, for which the inner part of the previously computed uniform mesh is used. In the outer parts of the mesh, the cells grow (or shrink) by amounts that depend on the value specified for $FREZ$. At the bottom of the mesh $Y = YBASE$. The $FREZ$ input value for a nonuniform mesh must be computed accurately using the formula

$$REZY0 = YBASE + \frac{JUNF}{2} \times DZ + \frac{f}{1-f} \times DZ \times (1-f|JUNF/2-JMID|),$$

where $f = FREZ$ and MESHMKR sets $Y_2 = YBASE$. A nonuniform mesh is illustrated in Fig. 4. The algorithms used to determine the coordinates are

$$x_i = x_{i-1} + f(x_{i-1} - x_{i-2}), \quad i = IUNF + 2, IP1,$$

where $f = FREZ$ and $x_i = X_{ij}$.

$$y_j = -t + \frac{f\Delta z}{1-f} (1-f\Delta_j), \quad j = 2, JBØT-1,$$

where $f = FREZ$, $y_j = Y_{ij}$, $\Delta z = DZ$,

$$t = TJ = \frac{JUNF}{2} (DZ),$$

$$\Delta_j = JDB = |J - JBØT|, \text{ and}$$

$$JBØT = JMID + 2 - JUNF/2.$$

$$y_j = t + \frac{f\Delta z}{1-f} (1-f\Delta_j), \quad j = JTØP + 1, JP2,$$

where $f = FREZ$, $y_j = Y_{ij}$, $\Delta z = DZ$,

$$t = TJ = \frac{JUNF}{2} (DZ),$$

$$\Delta_j = JDT = |J - JTØP|, \text{ and}$$

$$JTØP = JMID + JUNF/2.$$

3. Background Mesh Variables

Ambient values of U , V , $RØ$, and SIE are placed in every mesh cell by one of two methods

Fig. 4. A nonuniform mesh.

Uniform Regions. The data read for each uniform background region are

- NB Number of real cells below the region
- NR Number of real cells to the left of the right boundary of the region
- NT Number of real cells below the top of the region
- NL Number of real cells to the left of the region
- UI Input radial velocity in region (km/s)
- VI Input axial velocity in region (km/s)
- RØI Input density in region (mg/cm^3)
- SIEI Input specific internal energy in region (J/mg) (radiation not included)

Figure 5 shows a uniform background region. U_{ij} , V_{ij} , $RØ_{ij}$, SIE_{ij} are set equal to

Fig. 5. Background mesh input.

U_i , V_i , $RØ_i$, and SIE_i , respectively, for each cell in the region. $TEMP_{ij} = TEMP_i$ is interpolated from the equation of state. The total cell internal energies are found from $SIE + a(TEMP^4)/RØ$. The input data and the interpolated temperatures are printed.

Exponential Atmosphere. Densities that decrease exponentially with increasing altitude are computed for each row. The input value is $\rho = REZRØN$, assumed appropriate at $y = REZY0$. Temperatures corresponding to the local density and the input ambient energy, $REZSIE$, are interpolated from the equation of state tables. The specific internal energies are found from $REZSIE + a(TEMP^4)/RØ$, where $RØ$ varies exponentially. The density, specific internal energy, and temperature are printed for each row of cells.

4. Bubble Input

Bubble input, read only for Bubble input problems, consists of the specification of

mesh variables in the upper right-hand quadrant of an R-Z plane. These values are reflected to the lower right quadrant, and if required, the right semicircle is reflected to form the left semicircle.

The variables used in the code are:

IBUB, JBUB	Indices of vertex corresponding to the center of the bubble
II, JJ	Temporary indices of cell into which data are to be placed. Typically, II and JJ begin at 1.
RØ1	Density in cell II, JJ
SIEI	Specific internal energy in cell II, JJ
VI	Axial velocity at vertex II, JJ
UI	Radial velocity at vertex II, JJ

The actual cell indices corresponding to the bubble location in the mesh are computed from:

Quadrant	Indices
Upper Right	$I=II+IBUB-1, J=JJ+JBUB-1$
Lower Right	$I=II+IBUB-1, J=JBUB-JJ$
Upper Left	$I=IBUB-II, J=JJ+JBUB-1$
Lower Left	$I=IBUB-II, J=JBUB-JJ$

These mesh variables are assigned to the appropriate cells and vertices, destroying that part of the background mesh. Temperatures are computed from the equation of state as previously described, and all Bubble input is printed. Bubble input is illustrated in Fig. 6, but we note that one is not restricted to spherical bubble data.

D. Subroutine NSTART

NSTART is called by MESHMKR and is used only in Purd input problems.

E. Subroutine PARTGEN

PARTGEN generates marker particles for Bubble input problems and is called by MESHMKR. In addition to marking fluid positions, the marker particles are used to define the "region of interest" in film plots. For Bubble input problems, the particle regions generally coincide with the bubbles.

Fig. 6. Bubble input.

Particles may be generated in one or more regions of the mesh. The regions may be either circular or rectangular. The data that define the regions and the numbers of particles in them are read from cards.

DRPAR	Radial spacing of particles in the region (km).
DZPAR	Axial spacing of particles in the region (km).
XC	Radial coordinate. Center of circular region or left boundary of rectangular region (km).
YC	Axial coordinate. Center of circular region or bottom boundary of a rectangular region (km).
XD	Radius of a circular region or right boundary of a rectangular region (km).
YD	Top boundary of a rectangular region (km). $YD \equiv 0$ for a circular region.

A maximum of 1000 particles can be generated, and for both information and plotting purposes they should cover the area of the bubbles. If DRPAR and DZPAR equal DR and DZ, respectively, there will be one particle per

cell. The number of particles can be increased by making DRPAR and DZPAR smaller. Generally, the bubble is a semicircle along the axis, and $XC = 0$, $YC = REZY0$, $XD = \text{Bubble radius}$, and $YD = 0$.

Variables computed by PARTGEN are

$XP\text{AR}_k$ Radial coordinate of the k^{th} particle (km).
 $Y\text{PAR}_k$ Axial coordinate of the k^{th} particle (km). $XP\text{AR}$ and $Y\text{PAR}$ are stored in LCM block YLC2.
 NPT Total particles generated (1000 maximum).
 PYB Minimum value of $Y\text{PAR}$ (in all particle regions) (km).
 PYT Maximum value of $Y\text{PAR}$ (in all particle regions) (km).
 PXR Maximum value of $XP\text{AR}$ (in all particle regions) (km).

All input data are printed.

F. Subroutine PARDEN

PARDEN is called by MESHMKR, and it generates marker particles for PURD input problems.

G. Subroutine FILMCØ

FILMCØ computes certain parameters associated with film plots. It is called initially by ØFFWEGØ, and during each hydrodynamic cycle by REZØNE. It resides with the main overlay, YØKIFER, so the subroutine and its results are available throughout the program.

Variables computed by FILMCØ are:

XL Left boundary of the mesh, $XL = 0$.
 XR Right boundary of the mesh,
 $XR = \max(X_{ij})$.
 YB Bottom boundary of the mesh,
 $YB = \min(Y_{ij})$.
 YT Top boundary of the mesh,
 $YT = \max(Y_{ij})$. The maxima and minima are over the boundaries of real cells.
 IXL 4020 coordinate of XL
 IXR 4020 coordinate of XR
 IYB 4020 coordinate of YB
 IYT 4020 coordinate of YT
 Also computed and stored are the corresponding floating point values, FIXL, FIXR, FIYB, and FIYT.

$XCØNV$ Factor for converting radial coordinates to film coordinates,
 $XCØNV = (FIYT-FIXL)/(XR-XL)$.

$YCØNV$ Factor for converting axial coordinates to film coordinates,
 $YCØNV = (FIYT-FIYB)/(YT-YB)$.

The region of interest is defined by the particle generator subroutine PARTGEN or PARDEN. Region of interest plots eliminate plotting those parts of the mesh in which nothing in particular is happening. The corresponding quantities for the region of interest are:

PXL, PXR, PYB, PYT
 IPXL, IPXR, IPYB, IPYT
 FIPXL, FIPXR, FIPYB, FIPYT
 PXCØNV, PYCØNV

The present region of interest definitions are:

$PYB = PYB - 3 \times PXR$
 $PYT = PYT + 2 \times PXR$
 $PXR = 3 \times PXR$

PYB, PYT, and PXR on the right are values computed by PARTGEN or PARDEN.

III. HYDRODYNAMICS CALCULATIONS

The hydrodynamics calculations are done by Overlay 2,0 (YØKKY), a modification of YAQUI. The basic YAQUI hydrodynamic calculations are unchanged. The differences between YØKKY and YAQUI (other than spelling) are mostly associated with the input and output, and with the fact that YØKKY has been divided into several overlays that communicate with the radiation programs. Properties of the original YAQUI program are described in detail in Ref. 1.

A. Overview of the Overlay

The main overlay, YØKKY, calls the five secondary overlays and decides whether the problem time is right for changing from hydrodynamic to radiation transport calculations.

1. Overlay 2,1 - PHASEØ

PHASEØ performs the final calculations for each cycle. It interpolates total pressures and produces a short print of quantities of interest for each hydrodynamic cycle.

2. Overlay 2,2 - YØKØUT

YØKØUT, the hydrodynamic output program, is called only at output times, TØUT. The output is for the previously computed hydrodynamic cycle.

3. Overlay 2,3 - PHASE1

The hydrodynamic cycle begins in PHASE1, which performs the explicit Lagrangian calculations of YAQUI.

4. Overlay 2,4 - PHASE2

The implicit Lagrangian calculation (pressure iteration) is done in PHASE2.

5. Overlay 2,5 - PHASE3

In PHASE3, the mesh is rezoned and the Eulerian (transport) phase of YAQUI is solved to give final values of all mesh variables.

B. PHASE0

1. Variables Computed by PHASE0

P_{ij} Pressure in cell ij computed by interpolation in the equation of state table PTAB, $(\text{mg}\cdot\text{km}^2/\text{cm}^3\cdot\text{s} = \text{MPa})$.

TIAMB Total ambient internal energy in the mesh (J).

TI Total internal energy (in excess of ambient), including radiation (J).

TK Total kinetic energy (J).

EPØT Total potential energy (J).

TE Total kinetic and internal (in excess of ambient) energy (J).

UMØM Proportional to radial momentum of the material in the mesh $(\text{mg}/\text{km}^4/2\pi\text{-cm}\cdot\text{s})$.

VMØM Proportional to axial momentum of the material in the mesh $(\text{mg}\cdot\text{km}^4/2\pi\text{-cm}\cdot\text{s})$.

CIRC Line integral of the velocities around the edge of the mesh.

TMAX Maximum specific internal energy in the mesh (J/mg). ITM and JTM are the indices of the cell containing TMAX.

TGMX Maximum specific internal energy gradient in the mesh (J/mg-km). ITG and JTG are the indices of the cell containing TGMX.

TMDT Time at the beginning of the hydro cycle (s). $\text{TMDT} = T - \text{DT}$.

Output

The following data are printed and written on film:

NCYC, TMDT, T, DT, NUMIT

TE, TI, TK, EPØT, TIAMB

UMØM, VMØM, CIRC

TMAX, ITM, JTM

TGMX, ITG, JTG

DTV, IDTV, JDTV } Computed by YØKØUT,
DTC, IDTC, JDTC } PHASE2, and PHASE3.

C. YØKØUT

YØKØUT is called only at output times, TØUT, and it computes the value for the next output time. YØKØUT plots two zone plots, two velocity vector plots, and one velocity direction plot. Plotting is controlled by the index NTHRU.

NTHRU = -1 Zones in the entire mesh.

NTHRU = 0 Velocity vectors in the entire mesh; zones in the region of interest.

NTHRU = 1,2 Velocity vectors and directions in the region of interest.

The region of interest is defined in Sec. II. Contour plots of density, specific internal energy, vorticity, and magnitude of velocity are plotted in the region of interest.

The coding for a long print on film is included, but this section of the program is by-passed on all cycles except cycle 0 to save film. The long print gives, for each cell, I, J, X, Y, U, V, SIE, RØ, $1/\text{RVØL}$, D, and P. D is $\vec{v}\cdot\vec{v}$ in $1/\text{s}$.

1. Subroutine PARPLØT

PARPLØT, called by YØKØUT, plots the marker particles in the region of interest.

D. PHASE1

1. Time Interval Calculation

PHASE1 calculates the hydrodynamic time interval.

NCYC Hydrodynamic cycle number, for the cycle to be started in PHASE1, incremented to $\text{NCYC} = \text{NCYC} + 1$.

DT Hydrodynamic time interval for the cycle to be calculated. For the first cycle ($\text{NCYC}=1$), $\text{DT}=\text{DTR}$,

the input radiation transport time interval.

In all subsequent cycles, the hydrodynamic cycle time interval is $DT = \min \{DTV, DTC\}$, where DTV is the viscous stress time interval computed in PHASE2 and DTC is the convective flux time interval computed in PHASE3.

New maximum values of DTV and DTC are set in PHASE1. $DTV = DTC = DT \times DTFAC$, where DTFAC is a factor that causes the time interval to change so as to hold the number of pressure iterations in PHASE2 down to a small number (~ 5). $DTFAC = \frac{20}{15 + NUMIT}$ where NUMIT is the number of iterations required on the previous cycle. DTFAC has a maximum value of 1.25.

The values of DTV and DTC are recomputed by PHASE2 and PHASE3.

T Initially in PHASE1 this is the time at the end of the hydrodynamic cycle just finishing, and it is incremented ($T = T + DT$) to the time at the end of the hydrodynamic cycle to be started.

2. Mesh Variables

PHASE1 makes one pass through the mesh loop and computes the following variables:

UTIL_{ij} Explicit Lagrangian radial velocity component
 VTIL_{ij} Explicit Lagrangian axial velocity component
 GRIR_{ij} Radial velocity increment
 GRIZ_{ij} Axial velocity increment
 E_{ij} A geometric quantity
 DELSM_{ij} A geometric quantity
 RØL_{ij} = RØ_{ij}
 RCSQ_{ij} Reciprocal sound velocity squared

$$RCSQ_{ij} = \frac{1}{ASQ + GGM1 * SIE_{ij}},$$

where $GGM1 = GMI * (1 + GMI)$ (ambient cells) and

$$GGM1 = \frac{P_{ij}}{RØ_{ij} SIE_{ij}} \left(1 + \frac{P_{ij}}{RØ_{ij} SIE_{ij}} \right)$$

(other cells).

PHASE1 utilizes the improved node coupler that smooths vertex velocities by the velocities of all eight surrounding vertices.

3. Subroutine NADD

NADD is called by PHASE1 for Purd problems only.

E. PHASE2

The variables computed by PHASE2 are:

PL_{ij} Gas pressures obtained by iteration.
 NUMIT Number of pressure iterations required (500 maximum).
 ETIL_{ij} Explicit Lagrangian internal energy.
 DTV Tentative value of DT based on viscous stresses. It is the minimum of such values for all cells and the value originally computed in PHASE1. The cell is IDTV, JDTV.

F. PHASE3

PHASE3 computes the final values of the mesh variables X, Y, R, MP, RMP, EP = SIE, U, V, RVØL, and RØ. The temperature is computed from SIE by the iterative scheme described in Sec. IV. DTC, the convective flux time interval is also computed in PHASE3. DTC is computed for each cell, and the final value is the minimum of the value over all cells and the value previously computed in PHASE1. The cell is IDTC, JDTC. PHASE3 calls subroutines REZØNE (to rezone the mesh), PARTMØV (to move the marker particles), and FILMCØ (to modify the film plotting parameters).

1. REZØNE

REZØNE is called by PHASE3 when the rezone parameter (an input number) GRDVEL = 2.0 or when the S_n radiation transport calculation is being used. (GRDVEL = 0.0 and GRDVEL = 1.0, respectively, represent Eulerian or pure Lagrangian rezones that are handled by PHASE3.) The outside of the mesh is moved with velocities FC3 (down), FCP2 (up), and FCX (to the

right). These quantities depend on the arrival of velocities at the outer part of the mesh and on the appearance of nonambient internal energies (such as by radiation) at the edge of the mesh. The latter calculation is not presently activated. For S_n radiation transport problems, the mesh lines are moved, but they remain either vertical or horizontal, thus retaining the rectangular cells and representing continuously rezoned Eulerian geometry. A mesh that is not rectangular can be relaxed to rectangularity by setting the variable mesh "stiffener" parameter $FSTF = 1.0 * RDT$. The rezone constants are printed.

2. PARTMOV

PARTMOV moves marker particles to new positions based on the velocity at the particle location. New values of PYB, PYT, and PXR are computed to redefine the region of interest in film plots.

IV. MONTE CARLO SOLUTION OF THE RADIATION TRANSPORT PROBLEM

The Monte Carlo radiation transport calculations are done by Overlay 3, 0 (MCRT).

A. Overview of the Overlay

The main Monte Carlo radiation transport program is MCRT (Overlay 3,0). MCRT computes variables used throughout the radiation calculation and calls the three secondary overlays.

1. Overlay 3, 1 - REEFER*

REEFER performs the Monte Carlo solution to the radiation transport problem. Its principal function is to generate and follow statistical particles. In Subroutine WALK (called by REEFER), the particles pursue the random walk and meet their statistical fates. REEFER generates NSP (internally set to 10) source particles in each cell in which the temperature exceeds a specified threshold value, TEMIT (internally set to 0.05 eV). REEFER sets values of the following parameters for each particle.

- A random position in the cell,
- A random direction of travel,
- A random frequency (photon energy),
- An energy "weight" equal to the cell emission energy divided NSP.

In WALK, the particles move from their initial positions, with the above initial properties, until one of the following randomly selected events occurs:

- The particle collides and is absorbed, and the walk is terminated.
- The particle collides and is scattered. The particle energy is reduced to a negligible value (set by EDEATH).
- The particle leaves the mesh, and the walk terminates.

The radiation time interval ends.

When a particle is scattered, its random variables are reset as follows.

Its position is the point where the scattering collision occurred.

A new random direction of travel is sampled (isotropic).

A new random frequency (photon energy) is sampled.

The energy is equal to the energy of the particle before the scattering.

If a particle has not died when the time interval ends, it becomes a "census" particle and its parameters are stored on Fileset 1, so that its random walk can be continued on the following radiation transport cycle. The overlay REEFER reads Fileset 1 for census particles from the previous cycle, before new (source) particles are initialized.

When any particle (source or census) undergoes NPCMAX scatterings, its parameters are sent to the "bank." The value of NPCMAX is set by OFFWEGD and is presently 50. Characteristics of particles sent to the bank are also stored on Fileset 1 and are read by REEFER after all census and source particles have been completed. REEFER splits each bank particle into NSP particles. The value of NSP is set by OFFWEGD and is presently three. Each sibling particle is characterized as follows.

*One who reefs (naut): a short coat or jacket of thick cloth.

Its position is the point where the parent particle was deposited in the bank.
 The direction of travel is the same as that of the parent.
 The frequency (photon energy) is the same as that of the parent.
 The energy is the energy of the original particle, divided by NBP.

These sibling particles, in turn, may be deposited in the bank eventually during their random walk, and it is not uncommon to produce many particle progeny during each cycle. As the particles move around the mesh (in WALK), an exponential energy loss is associated with each move, and the energy is deposited (the weight scored) along the path of the move. When a particle is absorbed, dies from lack of energy, leaves the mesh, or goes to census, its energy is scored at the place where the event occurs, by saving the coordinates of each sample. The original particle energies, the energy scores, and the energies of the terminated particles (except census particles) are stored on Fileset 3, for use by overlay ESTEP. Also stored on Fileset 3 are the particle frequencies. Fileset 3 is included in the problem dump tapes so that these data can be analyzed.

2. Overlay 3.2 - ESTEP

ESTEP reads the particle production and deposition energies, and coordinates, from Fileset 3 and uses them to advance the internal energies, and hence temperatures, in each mesh cell.

3. Overlay 3.3 - LISTING

LISTING is called at output times (TOUT) and writes (on film) detailed mesh data associated with the Monte Carlo calculation.

B. MCRT

1. Mesh Variables

MCRT does one mesh loop calculation and computes mesh variables and their spatial integrals. These variables are stored in LCM unless otherwise noted.

CENTX_{ij} Radial coordinate of the centroid of cell ij (km).

CENTY_{ij} Axial coordinate of the centroid of cell ij (km).

The centroids represent the positions of cell-centered mesh variables, and they are the arithmetic means of the radial and axial coordinates of the vertices. CENTX and CENTY are set to 0 when I = IP1, to simplify subroutine CENTROY.

BETALC_{ij} Radiation derivative in cell ij.

SIGPLC_{ij} Mean absorption coefficient in cell ij (1/km).

BETALC and SIGPLC are computed by double logarithmic interpolation in the equation of state tables BTBL and SPTBL, respectively.

FSCAT_{ij} Absorption probability in cell ij (stored in SCM).

FSN_{ij} Identical to FSCAT_{ij}.
 FSCAT is computed from
 FSCAT =

$$\frac{1}{1 + c(\text{ALPHA}) (\text{BETALC}_{ij}) (\text{SIGPLC}_{ij}) (\text{DTOLD})}$$

where ALPHA is an input quantity and DTOLD is the radiation time interval. When ALPHA = 0, FSCAT = 1; there is no scattering, and the calculation that walks each particle to absorption is explicit. When ALPHA = 1, scattering is maximized and the calculation is fully implicit, allowing both absorption and scattering.

RZEDEN_{ij} Total energy to be radiated from cell ij during the radiation transport cycle (J).

RZEDEN_{ij} = $\alpha \cdot c \cdot (\text{FSCAT}_{ij}) (\text{BETALC}_{ij}) (\text{SIGPLC}_{ij}) \cdot (\text{TEMP}_{ij}^4) (\text{DTOLD}) \text{Volume}_{ij}$,
 where Volume = $2\pi / \text{RVOL}_{ij}$.

SIEMIN Smallest amount of internal energy (J) in any cell in which the temperature exceeds TENIT.

SIEMIN is used to determine the death energy of statistical particles. The cell containing SIEMIN is IJMIN, and the temperature and density in the cell are TMIN (eV) and DMIN (mg/cm³), respectively.

EINT Total internal energy (including radiation) in the mesh (J).

EKIN Total kinetic energy in the mesh (J).

EALL Total internal and kinetic energy in the mesh (J).
 URTOT Total radiation energy in the mesh (J).

2. Time Interval

The time interval for the next radiation transport cycle is calculated in MCRT.

TIME Initially, the problem time at the beginning of the radiation transport cycle (s).

At the end of MCRT, TIME is advanced to the value at the end of the cycle (and the beginning of the next cycle). Initially, DTR is the time interval for the radiation cycle, but throughout MCRT it is the time interval of the next cycle. The original value is retained in DTOLD.

T2 Time at the end of the cycle $T2 = TIME + DTR$, where TIME and DTR have their initial values.

DTR, the time interval for the next radiation transport cycle is calculated by MCRT. The inconsistencies introduced by using the time interval for cycle $m+1$ on values at the beginning of cycle m are negligible. This method is used to avoid recomputing quantities available during the MCRT calculation. The energy radiated from a cell during a cycle is $RZEDEN_{ij}$. We require that this not exceed 15% of the total energy (E_{ij}) in any cell where the temperature exceeds TEMIT.

$$\left(\frac{RZEDEN_{ij}}{DTR} \right) \times DTR \leq 0.15 \times E_{ij}$$

Let DTR in the denominator be the value for the current cycle, (DTOLD). Also let the value in the numerator be that for next cycle, and solve for the latter;

$$DTR = \min \left(\frac{0.15 \times E_{ij} \times DTOLD}{RZEDEN_{ij}} \right)$$

At the end of MCRT, DTR may be reduced, if necessary, to complete an even number of radiation cycles per hydrodynamic cycle. Before the possible reduction, $DTOLDER = DTR$. Later values of DTR are based on DTOLDER rather than the reduced value of DTR, which is usually very small.

3. Output

MCRT prints

NCYC, TIME(at start of cycle), T2, DTOLD
 URTOT, EINT, EKIN, EALL
 IJMIN, SIEMIN, TMIN, DMIN

C. REEFER

1. Variables Computed by REEFER

JCEN Initially, the number of census particles carried over from the previous cycle.

At the end of REEFER, JCEN is the number of census particles carried over to the following cycle.

IBANK The number of particles to be withdrawn from the bank on each pass through the bank particle calculation.

On the first pass, it is the number (after splitting) of original source and census particles sent to the bank. On each subsequent pass, it is the number (after splitting) of particles from the previous pass deposited in the bank.

ID Number of words of energy deposition data currently stored in the buffer array EBLØCK.

When $ID = NBUF = 6000$, EBLØCK is dumped to Fileset 3 and ID is reset to 0. NBUF is a fixed parameter set by ØFFWEGØ.

NFLUSH Total number of particles for which deposition data are written on Fileset 3.

The following indices are totaled separately for census particles, source particles, and for each pass through the bank calculation.

NGEN Number of particles started.

NCEN Number of particles sent to census (for processing on the next radiation cycle).

NBANK Number of particles sent to the bank.

NDIE Number of particles that die from either absorption, or loss of energy (in WALK).

IESCAP Number of particles that leave the mesh (in WALK).

NMØVE The number of particle moves (in

WALK several moves may be required to effect a collision).

NCØL The number of particle collisions (in WALK).

The random variables that define particles are listed below:

Statistical particle positions are defined by three coordinates rather than the two coordinates required by all other space-dependent variables in the program. A(1), A(2), and A(3), are the x, y, and z components of the particle position (km). Before WALK changes them, these are called XA1, XA2, XA3, respectively. The corresponding R-Z coordinates are:

Radial coordinate $RHØP = [A(1)^2 + A(2)^2]^{1/2}$

Axial coordinate $ZP = A(3)$.

The initial positions of census and bank particles are the positions recorded at census or deposited in the bank. The initial positions of source particles are randomly sampled in the cells in which they are started. The random positions are chosen by assigning a random weighting factor to each cell vertex.

ØMEGA(1), ØMEGA(2), and ØMEGA(3), the x, y, and z components of the particle direction vector:

Before WALK changes them, these are called XØMEGA1, XØMEGA2, and XØMEGA3, respectively. The initial directions of census and bank particles are the same as those of the particles that arrived at census or the bank. The initial directions of source particles are randomly chosen polar and azimuthal angles.

FREQP Particle frequency (1/s).

Before WALK changes it, FREQP is called XFREQP. For census and bank particles, the initial frequencies are the same as those of the parent particles. For starting source particles, FREQP is a random variable chosen by subroutine PFREQ.

EPART Particle energy (J).

Before WALK changes it, EPART is called XEPART. This is the weight that is used to score the results of random particle walks.

The weight is given according to particle type as follows.

Census Particles. Usually, EPART is the energy with which the particle was sent to census during the previous cycle. If however, EPART for a census particle is subsequently found greater than RZEDEN_{ij} (the energy to be radiated in cell ij, where the census particle is located), EPART is reduced to RZELEN. Furthermore, no single particle is allowed to carry more energy than RZFEDEN/10. Thus, if the particle energy is larger than this, the census particle is split into NCP particles so that the energy of each, EPART, is less than RZEDEN/10. Whenever census particles are generated in a cell ij, RZEDEN_{ij} is reduced by the energy carried by the particles.

Source Particles. NSP = 10 source particles are started in each cell where the temperature exceeds TEMIT = 0.05 eV. The energy of each particle is EPART = RZEDEN/NSP.

Bank Particles. Each particle sent to the bank (with energy EPART') is split into NBP = 3 daughter particles, each with energy EPART = EPART'/NBP.

I, J Indices of the cell in which the particle is generated.

For source particles, I and J are known because particles are generated in particular cells. I and J are known for bank particles because WALK always knows in which cell a particle lies and deposits this information with the parent particle parameters. For census particles, the cell in which the particle lay when it was sent to census is known, but, because the mesh will generally have been rezoned in the meantime, the particle may be in a different cell. Subroutine WHERE is called to find I and J for census particles.

T1 The time when WALK is called (s). For census and source particles, T1 = TIME. For bank particles, T1 is the time the particle was sent to the bank.

EDEATH Particle death energy (J). Particles whose energy is less than EDEATH are terminated by WALK. For census and

source particles, EDEATH is 1% of EPART, or 1% of SIEMIN, whichever is smaller. For the first bank calculation, EDEATH = EDIE. On subsequent bank calculations, EDEATH is 1% of SIEMIN.

EDIE Minimum value of EDEATH for all source particles (J).

IDIE As input to WALK, this identifies the particle type as:

IDIE = 0 Census or source particle,

IDIE = 1 Bank particle.

As output from WALK, IDIE identifies the particle type as:

IDIE = 0 Escaped or dead particle,

IDIE = 1 Bank or census particle.

ERAD Total energy of all source particles (J).

ECEN1 Total energy of all input census particles (J).

ECEN Total energy of all output census particles (J).

EMC Total energy radiated (ERAD+ECEN1) in the particle population.

2. REEFER Data Storage

Particle production and energy deposition data are stored on Fileset 3, two words per particle, in floating point and integer packed format.

Word 1	Bits	59-40	Radial coordinate
		39-20	Axial coordinate
		19-0	Energy
Word 2	Bits	59-18	Frequency
		17-9	I
		8-0	J

The coordinates represent the position where the particle was produced or the energy was deposited. The energy is either the negative of the original source particle energy (the emission energy), or the energy deposited at a score. Word 1 is floating point data packed by PAKFNØ. The frequency in Word 2 is truncated, and the integers I and J are stored in the low-order bits. Census and bank particle data are read from Fileset 1 and written on Fileset 2, eight words per particle.

Word	Census	Bank
1	A(1)	A(1)
2	A(2)	A(2)
3	A(3)	A(3)
4	ØMEGA(1)	ØMEGA(1)
5	ØMEGA(2)	ØMEGA(2)
6	ØMEGA(3)	ØMEGA(3)
7	EPART	-EPART
8	FREQP(bits 59-18)	FREQP(bits 59-40)
	I(bits 17-9)	T1(bits 39-20)
	J(bits 8-0)	I(bits 17-9)
		J(bits 8-0)

For census particles, FREQP is truncated as described above, but not packed. For bank particles, FREQP and T1 are packed by Subroutine PAKFNØ.

3. REEFER Output

The indices NGEN, NCEN, NBANK, NDIE, IESCAP, NMØVE, and NCØL are printed for census particles, for source particles, and for each pass through the bank particles. Also printed are NFLUSH, EMC, ERAD, and ECEN1.

4. Subroutine WALK

Length of Particle Movements.

DMØVE Distance the particle moves.

Generally WALK will move a particle several times between its initial position and its final position (collision, absorption, escape, or census). DMØVE is the minimum of the following:

DCEN Collision Distance.

Initially, $DCEN = c(T2 - T1)$, where $T2 - T1$ is the time remaining in the radiation transport cycle, and c is the speed of light. After each particle move, DCEN is reduced by DMØVE.

DCØL Collision Distance.

Initially, DCØL is the length of a random number of mean free paths. The initial value of DCØL is given by $RMFP \times DMFP$. RMFP is a randomly sampled number of mean free paths. RMFP can vary from 0 to ∞ , it is usually less than 1 and it is sampled from $RMFP = |\ln(\gamma)|$, where γ is a random number.

After each particle move, RMFP is reduced by an appropriate amount and DCØL is re-computed.

DMFP = length of a mean free path at the particle location; where DMFP = 1.0/SIGNU and SIGNU is the absorption coefficient dependent on the temperature and density at the particle location, and on the particle frequency. The weighting factors for computing density and temperature at the particle position are found by subroutine CENTRØY; the subscript of the absorption coefficient, by subroutine SUBSCR.

DCELL Nominal move distance.

Because mesh properties vary continuously, DMFP is a continuous function of particle position. To approximate this continuous change, mesh properties are re-evaluated whenever a particle moves. The nominal move distance is the minimum dimension of the cell in which the particle lies.

5. Energy Scores

When a particle moves, its energy is reduced by

$$ESCØRE = (EPART) \left[1 - e^{(-FSP)(DMØVE)(SIGNU)} \right],$$

where FSP is the absorption probability at the original position of the particle (the weight factors for computing FSP are found by CENTRØY). The energy, ESCØRE, is deposited at a position RHØD, ZD, midway between the initial and final particle positions. The new particle position and energy are then computed. Subroutine WØERE is called to determine the indices I and J of the cell in which the particle lies after the move. Tests are next made to determine whether the particle went to census, went to collision, went out of the mesh, ran out of energy, or merely moved while randomly seeking one of the aforementioned fates. If the particle went to census, its remaining energy is deposited (scored) at its final position and IDIE is set to 1 to tell REEFER to store the particle parameters on Fileset 1. If the particle left the mesh, its remaining energy and final position (outside the mesh) are saved on Fileset 3, and IESCAP

is incremented. If the particle ran out of energy, its remaining energy is deposited (scored) at its final position and NDIE is incremented. If the particle underwent a collision, NPCØL is incremented. The particle will have been absorbed (with a probability FSP), or scattered (with a probability 1-FSP) at the collision. If the particle was absorbed, the remaining energy is deposited (scored) at the point of collision and NDIE is incremented. If the particle was scattered (and NPCØL ≤ NPCMAX) the particle is continued (reemitted). Its random frequency and direction after scattering are computed by subroutines PFRFQ and PØMEGA, respectively. The local mesh properties are recomputed using subroutine CENTRØY. If the number of collisions exceeds NPCMAX, the particle is deposited in the bank. If it is deposited, the particle energy is made negative and IDIE is set to 1 to tell REEFER to store the particle parameters on Fileset 1.

6. Subroutine FLUSH

FLUSH is a utility routine called by WALK and REEFER. This routine writes particle production and energy deposition data (stored in the buffer EBLØCK) on Fileset 3. FLUSH is called by WALK when the counter ID = NBUF, and by REEFER after the last deposition has been made. ID is reset to 0, and NFLUSH is incremented by the number of particles (ID/2) for which data were written.

7. Subroutine CENTRØY

CENTRØY is called by WALK, and it computes interpolation factors for determining the values of the cell-centered mesh variables at the position of a particle in a cell whose indices are I and J.

ISC	I+1 if the particle is in the right side of I, J.
	I-1 if the particle is in the left side of I, J.
JSC	J+1 if the particle is in the top part of I, J.
	J-1 if the particle is in the bottom part of I, J.

CWGT₁ Weight factor for cell ISC, J.

CWGT₂ Weight factor for cell I, JSC.

CWGT₃ Weight factor for cell I, J.

The value of mesh variable z at a position x, y in cell i, j can be approximated by a linear combination of three known values of z :

$$z_3 = z(x_3, y_3) \quad z_1 = z(x_1, y_1) \quad z_2 = z(x_2, y_2).$$

x_3, y_3 is the centroid of cell I, J.

x_1, y_1 is the centroid of cell ISC, J.

x_2, y_2 is the centroid of cell I, JSC.

The three known values of z form a plane, where

$$z = w_1 z_1 + w_2 z_2 + w_3 z_3.$$

let

$$\delta x_1 = x_1 - x_3 \quad \delta y_1 = y_1 - y_3$$

$$\delta x_2 = x_2 - x_3 \quad \delta y_2 = y_2 - y_3$$

$$\delta x = x - x_3 \quad \delta y = y - y_3$$

then

$$w_1 = \frac{\delta x \delta y_2 - \delta x_2 \delta y}{\delta x_1 \delta y_2 - \delta x_2 \delta y_1},$$

$$w_2 = \frac{\delta x_1 \delta y - \delta x \delta y_1}{\delta x_1 \delta y_2 - \delta x_2 \delta y_1},$$

$$w_3 = 1 - w_1 - w_2.$$

The weight factors w_1, w_2 , and w_3 are represented by CWGT₁, CWGT₂, and CWGT₃, respectively, in the program. In a rectangular mesh, $\delta y_1 = \delta x_2 = 0$ and the weights are

$$w_1 = \frac{\delta x}{\delta x_1}, \quad w_2 = \frac{\delta y}{\delta y_2}, \quad w_3 = 1 - w_1 - w_2.$$

Special provisions are made for the mesh boundaries.

At the left boundary ($i-1=0$), or the right boundary ($i+1=IP1$), set $\delta x = \delta x_2 = 0$.

$$w_1 = 0, \quad w_2 = \frac{\delta y}{\delta y_2}, \quad w_3 = 1 - w_2.$$

At the bottom ($j-1=1$), or the top ($j+1=JP2$), set $\delta y = \delta y_1 = 0$.

$$w_1 = \frac{\delta x}{\delta x_1}, \quad w_2 = 0, \quad w_3 = 1 - w_1.$$

At the corners, both conditions apply, and

$$w_1 = w_2 = 0, \quad w_3 = 1.$$

8. Subroutine WHERE

WHERE is called by REEFER and its purpose is to solve the general problem:

Given a position r, z , find the cell i, j in which it is located.

Start with an initial guess i, j . In row j , move to the left (west) until a cell is found whose west boundary is west of r, z . Let this cell be $i-k, j$ ($k=0,1,2,\dots,i-1$).

If the r -values of both northwest and southwest vertices are west of r , then r is in the cell.

If the r -values of both northwest and southwest vertices are east of r , then r is in the next cell.

If one vertex is east of r and the other is west of r , a test is made to determine whether r is east or west of the line connecting the vertices.

If $k > 0$, the particle is in $i-k, j$, and i is set to $i-k$.

If $k = 0$ (the original cell), a similar procedure is followed moving east.

When the value of i is determined, the testing is done both south and north in column i , to find j . If j is different from the original j , the entire process is repeated, because the i -value that is correct for one value of j may be wrong for another.

An improved version of WHERE is in preparation.

9. Subroutine SUBSCR

SUBSCR, called by WALK, is used to find the frequency-dependent absorption coefficient at a particle position. The equation of state variables $\emptyset PTMP(J)$, $\emptyset PDEN(K)$, and $FREQ(I)$ are tabulated. Analytic expressions have been found for

J as a function of $\emptyset PTMP$,

K as a function of $\emptyset PDEN$,

I as a function of $FREQ$.

Given the particle frequency and the temperature and density at a position, I, J and K can

be computed. The combined subscript of the frequency-dependent absorption coefficient is

$$IJK = I + (J-1)*NFRQ + (K-1)+NØPT*NFRQ.$$

Note that frequency-dependent absorption coefficients are taken directly from the tabulated data and are not interpolated, and that this routine is data dependent.

10. Subroutine PFREQ

PFREQ, called by WALK, is used to sample random frequencies of statistical particles. The frequency (eV) is given by the Planckian distribution when

$$\nu = - \frac{1}{\zeta(k)} \ln (\gamma_1, \gamma_2, \gamma_3, \gamma_4) T ,$$

where the γ 's are uniform random numbers on (0,1) and T is the temperature (eV).

$$\zeta(k) = \min [m, \gamma \zeta(\infty)] ,$$

$$\text{where } \zeta(\infty) = \sum_{n=1}^{\infty} \frac{1}{n^4} = 1.0823 \text{ and } \gamma \text{ is}$$

a random number uniform on (0,1).

m is defined as the smallest integer for which

$$\zeta(m) = \sum_{n=1}^m \frac{1}{n^4} \geq \gamma \zeta(\infty) .$$

The factor 2.41814×10^{14} is the conversion between $h\nu$ (energy) and ν (frequency) units, expressed in eV/s^{-1} .

11. Subroutine PØMEGA

PØMEGA samples random direction vectors for statistical particles from the isotropic density function.

D. ESTEP

The variables computed by ESTEP are:

EPART _{ij}	Total energy deposited by particles in cell ij (J).
EMSN _{ij}	Total energy emitted by particles in cell ij (J).
ELØST	Total energy of particles that escape from the mesh (J).
EABS	Total energy of particles absorbed in the mesh (J).
EEMIT	Total energy of emitted particles (J).
RA	Normalizing factor for absorptions.

RE

Normalizing factor for emissions.

RE and RA are the ratios of EMC (the total energy of all particles, computed by REEFER when the particles are generated) to the total emission and absorption energies of the particles actually retrieved by ESTEP.

The ratios differ very slightly from 1 because of the loss of significance caused by packing the data. All energies are normalized by RE or RA to conserve energy. The packing errors are random, so the solution accuracy is limited by statistical error.

SIE_{ij}

Specific internal energy in cell ij (J/mg). SIE_{ij} is based on the original internal energy, increased by the energy absorbed in the cell and decreased by the energy emitted in the cell:

$$SIE_{ij} = SIE_{ij} + \frac{EPART_{ij} - EMSN_{ij}}{RØ_{ij}} \times \text{volume} .$$

TEMP_{ij} Temperature in cell ij (eV).

The calculated total specific internal energy of the cell contains the radiation term, aT^4 . It is necessary to find a $SIE = I(\rho, T) + aT^4$,

where I is the equation of state internal energy for the material in the cell and does not include the radiation term. An iterative procedure is used. On the same graph, (Fig. 7)

$$\text{I. } I = SIE - aT^4 \text{ vs } T ,$$

$$\text{II. } I(\rho, T) \text{ vs } T .$$

Curve I decreases from SIE when $T = 0$, to 0 at some high value of T. Curve II has a positive slope. The intersection of the two curves corresponds to the T being sought. The minimum value of the solution is the ambient temperature $TLØW = TAMB$, and the maximum value is that at which the first curve goes to 0, THIGH.

Guess a value of T midway between THIGH

Fig. 7. Calculation of temperature from internal energy.

and $TL\emptyset W$ and determine the value of both curves. If curve I is above curve II, the intersection is at a higher temperature value, so set $TL\emptyset W = T$. If curve II is above curve I, the intersection is at a lower value, so set $THIGH = T$. Repeat the process until $THIGH$ and $TL\emptyset W$ are the same.

TMAX Maximum temperature in the mesh (eV).
 DMAX Maximum density in the mesh (mg/cm^3).
 DMIN Minimum density in the mesh (mg/cm^3).
 ET $\emptyset$ T Total energy deposited by particles (J).
 TAVG Midpoint of the time interval (s).
 THY Total energy lost from the mesh, summed over all cycles (J).

The following quantities are printed and written on tape:

ET $\emptyset$ T, EABS, EL $\emptyset$ ST, EEMIT, ECEN, RE, RA
 RAVG, TMAX, DMAX, DMIN, and THY.

E. LISTING

LISTING writes REEFER mesh data on film, and it is called only at output times, T $\emptyset$ UT. The data written, for each cell, are

I, J Cell indices.
 X, Y Radial and axial coordinates of the (lower left-hand vertex) of the cell.

EPART, EMSN, TEMP, FSN, SIGPLC, BETALC, and RZEDEN.

V. S_n SOLUTION OF THE RADIATION TRANSPORT PROBLEM

Overlay 4, 0 (GREYSN) computes a grey (one frequency group) solution to the radiation transport problem, using the S_n method.

A. Overview of the Overlay

The primary overlay for the S_n radiation transport is GREYSN, Overlay 4.0, which computes variables used in the calculation and calls the secondary overlays.

1. Overlay 4.1 CYLSN

CYLSN performs the S_n solution to the radiation transport problem in RZ geometry.

2. Overlay 4.2 SNESTEP

SNESTEP uses the energy fluxes computed by CYLSN to advance the internal energies and temperatures in the mesh cells.

3. Overlay 4, 3 SN $\emptyset$ UT

SN $\emptyset$ UT is the output program for the S_n overlay, and it is called only at output times, T $\emptyset$ UT.

B. Calculations of Overlay 4

1. GREYSN

GREYSN initializes parameters

ALPHA Implicitness parameter, originally read as input by $\emptyset$ FFWEG $\emptyset$ ($0 \leq \text{ALPHA} \leq 1$). ALPHA = 0 leads to an explicit calculation (no scattering); ALPHA = 1, to an implicit calculation.
 ISN Order of the S_n calculation, originally set to ISN = 4 by $\emptyset$ FFWEG $\emptyset$.

Both parameters are stored in common block CRIMSN by $\emptyset$ FFWEG $\emptyset$. GREYSN does one mesh loop calculation and computes mesh variables and some totals of mesh variables.

CENTX $_{ij}$ Radial coordinate of the centroid of cell ij (km).

CENTY $_{ij}$ Axial coordinate of the centroid of cell ij (km).

CENTX and CENTY are the arithmetic means of the radial and axial coordinates, respectively, of the cell vertices. They are not used by GREYSN, but are required for the analysis of dump tapes.

SIGPLC_{ij} Planck or Rosseland mean absorption coefficient (1/km) associated with the temperature and density in cell ij, interpolated from the equation of state table, SPTBL.

RZEDEN_{ij} Explicit radiation source in cell ij (J/km³-sr).

$$RZEDEN_{ij} = 3.2757 \times 10^{14} (\text{SIGPLC}_{ij}) (\text{TEMP}_{ij})^4$$

where the constant is $\frac{ac}{4\pi}$.

FSN_{ij} Absorption probability for radiation in cell ij.

$$FSN_{ij} = \frac{1.0}{1+c(\text{ALPHA} (\text{BP}_{ij}) (\text{SIGPLC}_{ij}) (\text{DTR}))}$$

where BP_{ij} is the radiation derivative associated with the temperature and density in the cell and is interpolated from the equation of state table, BTBL. When ALPHA = 0, FSN = 1 and there is no scattering.

AVINT_{ij} The average intensity is set to 0 in all cells before the start of the iteration.

RSN_i Radial coordinate of vertex i = X(I,2) (km).

ZSN_j Axial coordinate of vertex j = Y(1,J) (km).

ESN Total energy radiated (J).

$$ESN = 8\pi^2 \sum_{ij} (RZEDEN_{ij}) / (RVOL_{ij})$$

The principal time interval calculation is in SNESTEP, but the time interval is shortened, if necessary, at the end of GREYSN.

2. CYLSN

CYLSN computes the S_n constants, SNCØN(I) I = 1, 181.

These constants are computed by subroutine SNGEN on the first cycle and on any subsequent cycle when ISN is changed.

B_i Area of the top of cell i (for all j) (km²), = $\pi(\text{RSN}_{i+1}^2 - \text{RSN}_i^2)$.

The rest of CYLSN is devoted to the S_n iteration.

AVØLD_{ij} Average intensities from the previous iteration.

AVINT_{ij} Newly computed average intensities.

In GREYSN, AVINT_{ij} has been set to 0 for all ij. On each iteration in CYLSN, AVØLD_{ij} = AVINT_{ij}, and AVINT_{ij} is recomputed by subroutine SWEEP.

The process is continued until AVINT_{ij} ≈ AVØLD_{ij} for all ij.

ISTEP is the iteration counter. For explicit calculations (ALPHA = SNCØN(182) = 0.0), only one pass is made through SWEEP.

The calling arguments of the subroutines in the CYLSN overlay are summarized in Table I.

SWEEP. Subroutine SWEEP is called by CYLSN. SWEEP and its dependent subroutines IN and ØUT perform the S_n calculation.

The mesh variables computed by SWEEP are:

AVINT_{ij} Average intensity of radiation in cell ij. (J/cm²-s-sr),
EMØMLC_{ij} Vertical component of radiation flux in cell ij (J/cm²-s),
UMØMLC_{ij} Horizontal component of radiation flux in cell ij (J/cm²-s),
FØUTLC_{ij} Net rate of flow of energy out of cell ij (J/s),

TABLE I
SUBROUTINE PARAMETERS

CYLSN	SWEEP	IN,ØUT	REMARKS
ZSN	ZSN		Defined in text
RSN	RSN	R	Defined in text
B	B	B	Defined in text
SNCØN(LBET1)	BET1	BETA	S _n constant
SNCØN(LBET2)	BET2		S _n constant
SNCØN(LU)	U	U	S _n constant
SNCØN(LE)	E	E	S _n constant
SNCØN(LW)	W	W	S _n constant
AL	AL	AL	Defined in text
BR	BR	BH	Defined in text
BB	BB	BV	Defined in text
IBAR	IT	IT	Defined in text
JBAR	JT	JT	Defined in text
NN	NN	NN	NN = ISN/2
MM	MM		MM = ISN(ISN+2)/8
AVINT	AVINT		Defined in text
AVØLD	AVØLD		Defined in text
	S	S	Defined in text
	CT	CT	Defined in text
	UMØM	UMØM	Defined in text
	EMØM	EMØM	Defined in text
	FØUT	FØUT	Defined in text
	1.0, IS	IS	-1.0 in downward calc, 1.0 in upward calc.
	DZP	DZP	DZP = 2*DZ
	DZ	DZ	DZ = ZSN _{i+1} - ZSN _i
	JM1	J	JM1 = index of row being calculated - 1
	AVNEW	AVNEW	Defined in text
	M1		M1 = MM + 1
	M2		M2 = 2*MM

$$\text{SUM} = \sum_{ij} F\text{OUTLC}_{ij}.$$

SWEEP computes the constant $M2 = 2 \cdot MM$, the total number of angles for which fluxes are to be calculated. The maximum permissible value of $M2$ is 72.

SWEEP calculations are done one row at a time, and they utilize row variables, (which are the mesh variables for the row), and intensities.

$$F\text{OUT}_i = F\text{OUTLC}_{ij}.$$

$$EM\text{OM}_i = EM\text{OMLC}_{ij}.$$

$$UM\text{OM}_i = UM\text{OMLC}_{ij}.$$

$$AVNEW_i = AVINT_{ij}.$$

$$CT_i = SIGPLC_{ij}.$$

$$S_i = (RZEDEN_{ij})(FSN_{ij}) + (AV\text{OLD}_{ij})(1 - FSN_{ij})(SIGPLC_{ij})$$

(radiation source).

$BB_{i,m}$ Vertical intensity for direction m , $m = 1, M2$.

$BR_{j-1,m}$ Horizontal intensity for direction m , $m = 1, M2$.

$AL_{k,i}$ Angular flux $k = 1, NN$

The maximum dimensions of the variables are:

Row variables $I = 100$

BB $I = 100, M = 72$

$I \times M = 7200$

BR $J = 101, M = 72$

$(J-1) \times M = 7200$

AL $K = 8, I = 100, K \times I = 800$

SWEEP first computes the downward flux row by row, starting with row JPl . The downward intensities at the top of the mesh (BB) and the inward intensities from the right (BR) are set to 0. The row variables, $F\text{OUT}_i$, $EM\text{OM}_i$, and $UM\text{OM}_i$ are set to 0, and $AVNEW_i$, CT_i , and S_i are computed.

Subroutine IN is called to compute row variables and new intensities, from right to left, and OUT is called to work from left to right.

When the row has been calculated, the row variables are stored as mesh variables.

When the bottom row is reached, the process is reversed and the calculation is made from bottom to top. The upward intensities at the bottom of the mesh are set to 0. The row

variables $F\text{OUT}_i$, $EM\text{OM}_i$, and $UM\text{OM}_i$ are initialized to the corresponding values of the mesh variables.

3. SNESTEP

SNESTEP advances the energies and temperatures in the mesh cells.

$$SIE_{ij} = \frac{(-F\text{OUTLC}_{ij})(DT\text{OLD})(RV\text{OL}_{ij})}{2\pi \times 10^{-15}(R\text{O}_{ij})} + SIE_{ij},$$

where $DT\text{OLD}$ is the time interval of the radiation transport cycle. $TEMP_{ij}$ is found from SIE_{ij} by the iterative procedure described in Sec. IV.

Other variables computed are:

$SIET\text{OT}$ Internal energy, in excess of ambient, (including radiation) in the mesh (J).

$URT\text{OT}$ Radiation energy in the mesh (J).

PWR Total radiation along the mesh boundaries (J/s).

$EL\text{OST}$ Total energy lost from mesh during time step (J).

$EABS$ Energy absorption rate during time step (J/s).

$PWR2$ Time rate of change of internal energy (J/s).

The radiation transport time interval is calculated by SWEEP.

DTR Initially, the radiation time interval for the cycle being calculated, then the interval for the following cycle.

$DT\text{OLD}$ Interval for the cycle being calculated.

During the cycle being calculated, let $ECELL_{ij}$ be the total internal energy in cell ij and $PMARK = |F\text{OUTLC}_{ij}|$, the rate of energy change in cell ij . The energy change in cell ij during the cycle is $(PMARK)(DTR)$. DTR must be such that the energy change does not exceed 15% of $ECELL_{ij}$, in any cell where $TEMP_{ij} > 0.1$ eV. Then,

$$XDTR_{ij} = 0.15 (ECELL_{ij})/PMARK_{ij},$$

$$DTR = \min(XDTR_{ij}).$$

DTR may be modified further by GREYSN.

4. SNØUT

SNØUT plots the magnitude and direction of radiation in each cell. These are two plots, one of the entire mesh and another of the region of interest around the bubble.

ACKNOWLEDGMENTS

The authors gratefully acknowledge their indebtedness to the many people whose assistance and support have made the YØKIFER program possible.

E. M. Jones for assistance in adapting the hydrodynamics program YAQUI to YØKIFER.

W. H. Reed, and H. G. Horak for writing the S_n program and adapting it to YØKIFER.

J. W. Kodis for subroutine PARTMØV and for improved versions of other subroutines to be incorporated into YØKIFER in the future.

LASL groups T-4 and J-15 for providing the equation of state and opacity data.

L. W. Fullerton for the subroutines SEARCH, PAKFNØ, and UNPKFN.

H. M. Peek and J. Zinn for their encouragement and support.

REFERENCES

1. A. A. Amsden and C. W. Hirt, "YAQUI: An Arbitrary Lagrangian-Eulerian Computer Program for Fluid Flow at all Speeds," Los Alamos Scientific Laboratory report LA-5100 (March 1973).
2. M. T. Sandford II and R. C. Anderson "Two Dimensional Implicit Radiation Hydrodynamics," J. Comput. Phys. 13, 130-157 (1973).
3. K. D. Lathrop and P. W. Bunkley "TWØTRAN-II: An Interfaced, Exportable Version of the TWØTRAN Code for Two-Dimensional Transport," Los Alamos Scientific Laboratory report LA-4848-MS (July 1973).

APPENDIX A

INSTANT YØKIFER

TABLE A-I

YØKIFER PROGRAM ORGANIZATION

Overlay 0, 0	YØKIFER	Overlay 3, 0	MCRT
	LØØP		PAKFNØ
	FILMCØ		UNPKFN
	GETEMP	Overlay 3, 1	RFEFER
	DBLINT		FLUSH
	SEARCH		PØMEGA
Overlay 1, 0	ØFFWEGØ		PFREQ
	MESHMKR		SUBSCR
	PARDEN		CRØSS
	PARTGEN		CENTRØY
	NSTART		WALK
Overlay 2, 0	YØKKY		WHERE
Overlay 2, 1	PHASEØ	Overlay 3, 2	FSTEP
Overlay 2, 2	YØKØUT	Overlay 3, 3	LISTING
	PARFLØT		
Overlay 2, 3	PHASE1		
	NADD	Overlay 4, 0	GREYSN
Overlay 2, 4	PHASE2	Overlay 4, 1	CYLSN
Overlay 2, 5	PHASE3		SWEEP
	REZØNE		IN
	PARTMØV		ØUT
			NGEN
		Overlay 4, 2	SNESTEP
		Overlay 4, 3	SNØUT

TABLE A-II

YØKIFER COMMON BLOCKS

Common	ØFFWEGØ	YØKKY	MCRT	GREYSN	DUMP
STATE	x	x	x	x	
RED	x	x	x	x	x
PINK	x	x	x	x	
ØRANGE	x	x			x
WHITE	x	x			x
YELLOW		x			x
GREEN	x		x		x
BLUE	x				
LAVNDER			x		
SILVER	x	x		x	x
CRIMSN	x			x	x
SNØWITE				x	
MAUVE			x		
SENSE	x	x	x	x	

TABLE A-III

YØKIFER FILES

YØKKY	Class 2 Permfile
File 1	YØKIFER program
File 2	Equation of state and opacity data
File 3	NEXTWAY program
PURD	Purd input data
	PURD is identical to Fileset 4.
YØKIFER	Overlay file
Fileset 1	Census particle storage file
Fileset 2	Temporary census and bank particle storage file
Fileset 3	Energy deposition data file
Fileset 4	Purd input file
	Fileset 4 is identical to File 1 of PURD
Fileset 6	Equation of state and opacity data file
	Fileset 6 is identical to File 2 of YØKKY
Fileset 7	Dump file
Fileset 12	Film file

TABLE A-IV

STØRAGE OF MESH VARIABLES

	ØFFWEGØ	YØKKY	MCRT	GREYSN	DUMP
	X, XPAR	X, XPAR	X	X	X, XPAR
1					
2	R, YPAR	R, YPAR	R	R	R, YPAR
3	Y	Y	Y	Y	Y
4	U	U	U	U	U
5	V	V	V	V	V
6	RØ	RØ	RØ	RØ	RØ
7		MP, RMP, RCSQ	CENTX	CENTX	CENTX
8	E	E, ETIL	CENTY	CENTY	CENTY
9	RVØL	RVØL	RVØL	RVØL	RVØL
10	M, RM	M, RM, VP			RM
11		P, PL, EP, UP			
12		UTIL, UL, CQ		EMØMLC	
13		VTIL, VL		UMØMLC	
14		RØL	BETALC	FØUTLC	
15	SIE	SIE	SIE	SIE	SIE
16		DELSM	SIGPLC	SIGPLC	SIGPLC
17		UG, GRIR	RZEDFN	RZEDFN	RZEDFN
18		VG, GRIZ	FSN	FSN	FSN

TABLE A-V

YØKIFER INPUT CARDS

A. GENERAL INPUT CARDS
7 CARDS
READ BY OFFWEGØ

CARD 1	HEADER CARD
NAME	PROBLEM IDENTIFICATION
CARD 2	UNIVERSAL AND RADIATION TRANSPORT DATA
TIME	PROBLEM STARTING TIME
CTR	INITIAL HYDRO AND RADIATION TRANSPORT TIME INTERVAL
CYL	1,0 FOR CYLINDRICAL GEOMETRY 0,2 FOR PLANE GEOMETRY
GRØVEL	0,2 FOR PURE EULERIAN CALCULATION 1,2 FOR PURE LAGRANGIAN CALCULATION 2,0 FOR MIXED
ALPHA	GRØVEL IS NOT USED IN 5% CALCULATIONS 2,0 FOR FULLY EXPLICIT RADIATION TRANSPORT CALCULATION 1,2 FOR FULLY IMPLICIT RADIATION TRANSPORT CALCULATION (0,0 GIVES SMALLEST TIME INTERVAL, 1,0 GIVES LARGEST)
CARD 3	BASIC MESH DATA
IOBH	NUMBER OF CELLS (RADIAL)
JOAR	NUMBER OF CELLS (AXIAL)
YØASL	Y-COORDINATE OF VERTEX 1,2
REZYØ	Y-COORDINATE OF VERTEX 1,2 J+2
CARD 4	VARIABLE MESH DATA
IØNF	NUMBER OF UNIFORM CELLS (RADIAL) FOR A UNIFORM MESH IØNF=IØAR
JØNF	NUMBER OF UNIFORM CELLS (AXIAL) FOR A UNIFORM MESH JØNF=JØAR
J+10	NUMBER OF REAL CELLS BELOW REZYØ THE AXIAL INDEX OF THE VERTEX AT THE VISCOSITY OF THE UNIFORM REGION IS J+2
ØI	INITIAL INTERVAL IN UNIFORM REGION (RADIAL)
ØZ	INITIAL INTERVAL IN UNIFORM REGION (AXIAL)
PREZ	EXPANSION RATE OF ZONES OUTSIDE OF UNIFORM REGION FOR A UNIFORM MESH PREZ=1,0
CARD 5	HYDRO DYNAMIC CONSTANTS
AR	(Ø ₀) COEFFICIENT IN PHASES MOTION EQUATIONS USE 2,1
ARM	(Ø ₀) COEFFICIENT IN PHASES ENERGY AND MOMENTUM EQUATIONS USE 1,0
BA	(Ø ₀) COEFFICIENT IN PHASES MASS, ENERGY, AND MOMENTUM EQUATIONS USE 2,0
VI	(Ø ₀) DETERMINES FORM OF VISCOSITY (KAI IN PROGRAM) =1,0, 0,0, OR 1,0

TABLE A-V (Cont.)

MU	USE -1.0 (μ) INPUT VISCOSITY COEFFICIENT	LOCATION CARD	FIRST BUBBLE
LAM	USE 0.1 (λ) INPUT VISCOSITY COEFFICIENT	FORMAT	216
	USE 0.6	IBUB	INDEX OF VERTEX AT BUBBLE CENTER (RADIAL)
		JUB	INDEX OF VERTEX AT BUBBLE CENTER (AXIAL)
CARD 6	HYDRODYNAMIC CONSTANTS	BUBBLE DATA DECK	FIRST BUBBLE
	FORMAT 5E12.4	1 CARD FOR EACH CELL IN BUBBLE	
OM	(ω) PHASE 2 RELAXATION PARAMETER	FORMAT	215, 4E15, 5
EPS	USE 1.0 (ϵ) PHASE 3 ITERATION CONVERGENCE CRITERION	II	RADIAL INDEX
ASD	USE 0.20001 (α^2) ZERO TEMPERATURE SOUND SPEED	JJ	AXIAL INDEX
	USE 1.0E+15	ROI	DENSITY OF CELL
		SIEI	SPECIFIC INTERNAL ENERGY OF CELL
		VI	AXIAL VELOCITY AT VERTEX
		UI	RADIAL VELOCITY AT VERTEX
CARD 7	HYDRODYNAMIC CONSTANTS	BLANK CARD	FIRST BUBBLE
	FORMAT 5E12.4	BLANK CARD INDICATES END OF BUBBLE DATA DECK	
GM1	($\gamma - 1$) GAMMA-1 (AMBIENT)	LOCATION CARD	SECOND BUBBLE
	USE 0.4	BUBBLE DATA DECK	SECOND BUBBLE
GR	RADIAL GRAVITY	BLANK CARD	SECOND BUBBLE
	USE 0.2		
GZ	AXIAL GRAVITY		
	USE -0.21		
REZROX	INITIAL AMBIENT DENSITY AT REZROX	***	***
REZSIE	AMBIENT SPECIFIC INTERNAL ENERGY	LOCATION CARD	LAST BUBBLE
		BUBBLE DATA DECK	LAST BUBBLE
		BLANK CARD	LAST BUBBLE
B.	UNIFORM BACKGROUND MESH INPUT	***	***
	READ BY MESHYKR	LOCATION CARD	LAST BUBBLE
		BUBBLE DATA DECK	LAST BUBBLE
		BLANK CARD	LAST BUBBLE
UNIFORM REGION CARD	FIRST REGION	FINAL BLANK CARD	
	FORMAT 416, 4E12.4	FINAL BLANK CARD INDICATES THERE ARE NO MORE BUBBLES TO BE READ	
NB	NUMBER OF REAL CELLS BEFORE REGION	D.	PARTICLE INPUT
NR	NUMBER OF CELLS BETWEEN AXIS AND RIGHT BOUNDARY OF REGION		READ BY PARTICLE
NT	NUMBER OF REAL CELLS BEFORE TOP OF REGION		OMIT IN PORD INPUT PROBLEMS
NL	NUMBER OF CELLS BETWEEN AXIS AND LEFT BOUNDARY OF REGION	PARTICLE REGION CARD	FIRST PARTICLE REGION
UI	RADIAL VELOCITY IN REGION		FORMAT 6E12.4
VI	AXIAL VELOCITY IN REGION	DRPAR	PARTICLE SPACING (RADIAL)
ROI	DENSITY IN REGION	DZPAR	PARTICLE SPACING (AXIAL)
SIEI	SPECIFIC INTERNAL ENERGY IN REGION	XC	RADIAL COORDINATE OF LEFT BOUNDARY OF PARTICLE REGION OR CENTER OF CIRCLE
UNIFORM REGION CARD	SECOND REGION	YC	AXIAL COORDINATE OF BOTTOM OF REGION OR CENTER OF CIRCLE
***	***	XU	RADIAL COORDINATE OF RIGHT BOUNDARY OF REGION OR RADIUS OF CIRCLE
UNIFORM REGION CARD	LAST REGION	YD	AXIAL COORDINATE OF TOP OF REGION
			YD = 0.2 FOR CIRCLE
FINAL CARD		PARTICLE REGION CARD	SECOND PARTICLE REGION
	FINAL CARD INDICATES THAT NO MORE BACKGROUND MESH INPUT CARDS ARE TO BE READ		***
0	IN COLUMN 12 CAUSES PROGRAM TO COMPUTE EXPONENTIAL ATMOSPHERE BACKGROUND.	PARTICLE REGION CARD	LAST PARTICLE REGION
1000	IN COLUMNS 9-12 CAUSES BYPASS OF EXP. ATM. CALC.		
C.	BUBBLE INPUT	BLANK CARD	
	READ BY MESHYKR	BLANK CARD INDICATES NO MORE PARTICLE REGIONS TO BE READ	
	OMIT IN PORD INPUT PROBLEMS		

TABLE A-VI

YOKIPER CONTROL CARDS

0. 3JBB (NAME= , CLAU, PL= , TLA , UA= , AC= , LC=400000,

Cards 1-14 are always required

1. 5JDF (SCT=20)

2. 5OPERM(FS=YOKKI, DAC=JDB,FSI=JDES)

3. 5REIND (YOKKY)

4. 5OPEN (S=GLDPL, S=1=10000)

5. 5CPYF (I=YOKKY, S=GLDPL, N=1)

6. 5REIND (GLDPL)

7. 5OPEN (FS=FSET6, SCT=10000)

8. 5CPYF (I=YOKKY, S=FSET6, N=2)

9. 5REIND (FSET6)

10. 5AFSREL (FS=YOKKY)

11. 5UPDATE (ASF=F)

12. 5AFSREL (FS=GLDPL)

13. 5RUN (C=S, I=COMPILE)

14. 5AFSREL (FS=COMPILE)

Cards 15-22 are required only for PURD input problems and may be omitted for Standard input problems.

Cards 23-26 are always required.

23. 5OPEN (FS=FLM, SCT=10000, RUF=512)

24. 5OPEN (FS=FSET1, SCT=10000, RUF=512, DIV=DISVA)

25. 5OPEN (FS=FSET2, SCT=10000, RUF=512, DIV=DISVA)

26. 5OPEN (FS=FSET3, SCT=10000, RUF=512, DIV=DISVA)

Card 27 is required only for PURD input problems and may be omitted for Standard input problems.

Card 28 is required for restart problems and must be omitted in new problems.

28. 5CREATE (FS=FSET7, SCT=10000, INDY=XX)

Card 29 is used when a tape dump is required. Card 29 is used when a dump is not required.

29a. 5OPEN (FS=FSET7, SCT=10000, RUF=512, ANIS=TARY)

29b. 5OPEN (FS=FSET7, SCT=10000, RUF=512)

Card 30 is required for Standard input problems and must be omitted for PURD input problems.

30. 5MSKCH (1)

Card 31 is required for Monte Carlo, omitted for En

31. 5MSKCH (2)

Card 32 is required to read planck mean opacities. Omitted for Roseland means.

32. 5MSKCH (3)

Cards 33, 34 are always required.

33. 5LOGS (LC=10000, SETH=1)

34. 5STOP.

Unused control cards may be placed behind card 34.

TABLE A-VII

STRUCTURE OF FILESET 7 - DUMP FILE

Fileset 7 contains dumps for 1 or more cycles.

For each cycle:

File 1 Record 1

Common blocks RED, SILVER, SHANCE,

WHITE, YELLOW, GREEN, CRIMSON

LCM block VICT (mesh variables)

LCM block VICT (mesh particle data)

Current particle data from Fileset 1

(Monte Carlo)

Average radiation intensities from

Fileset 1, 2, 3, 4

Energy deposition data from Fileset 1

(Monte Carlo)

Empty file (En)

File 2 Record 1

Average radiation intensities from

Fileset 1, 2, 3, 4

Energy deposition data from Fileset 1

(Monte Carlo)

Empty file (En)

APPENDIX B THE NEXTWAY PROGRAM

NEXTWAY reads dump tapes from VEXIPEN and plots the information on them. The program generates a uniform mesh and interpolates the values of the mesh variables to find their values at the centers of the uniform cells. These values are plotted. The plots produced are:

- a. Velocity vectors
- b. Three-dimensional plot, rear view
- c. Three-dimensional plot, rear view
- d. Variable vs radius, through the bubble center
- e. Variable vs axial coordinate, along the axis

Plots b, c, d, and e are plotted for each of the following variables:

1. TEMP Temperature (eV)
2. SIK Specific internal energy (J/mg)
3. R0 Density (mg/cm³)
4. SKK Specific kinetic energy (J/mg)
5. RZDEN Radiation source density (J/cm³)
6. SIGPLC Mean absorption coefficient (1/km)
7. P Pressure (M-Pa)
8. I-FSN Radiation scattering probability
9. AVINT Average radiation intensity (S_n only)

For Monte Carlo calculations, the following additional plots are made:

- f. Spectrum of production particles (W/eV vs eV)
- g. Spectrum of energy depositions (W/eV vs eV)

- h. Spectrum of escaped particles (W/eV vs eV)
- i. Spectrum of census particles (W/eV vs eV)
- j. Map of production particles
- k. Map of energy depositions
- l. Map of census particles

Input Cards

Card 1	Format 216
MXR	Number of cells, radially, in the uniform mesh. Default: 128M
MYR	Number of cells, axially, in the uniform mesh. Default: 128M
Card 2	Format 3E12.4
XR	Right boundary of the uniform mesh (km). Default: X _{1j} , at 1P1.2
YT	Top boundary of the uniform mesh (km). Default: Y _{1j} , at 1. JP2
YB	Bottom boundary of the uniform mesh (km). Default: Y _{1j} , at 1.2
Cards 3-5	Format 6E12.4
SCALER ₁	SCALER ₁ is the minimum ordinate on graphs of mesh variable i.
SCALER ₂	SCALER ₂ is the maximum ordinate on graphs of mesh variable i.
	i refers to the variable numbers (1-9), above. The default values are 0 and 1.5 = maximum value of the variable, and default values are used when SCALER ₁ = 0.

Output Cards

NEXTWAY punches a complete set of input cards that contain either the previous input values or the default values. The cards may be used in subsequent calculations to maintain uniform graph scales from one tape to the next.

SAMPLE YOKIFER PROBLEM

SAMPLE PROBLEM		SAMPLE YOKIFER PROBLEM					1. (Header)
0.09		0.0001	1.0	2.0	1.0		2.
34	68	0.0	0.21266				3.
20	40	20	0.010633	0.010633	1.1		4.
0.1		1.0	0.0	-1.0	0.1	0.6	5.
1.0		1.000E-05	1.000E-15				6.
0.4		0.0	-0.01	1.2	0.210		7.
0							Background Mesh
1	22						Bubble Coordinates
1	1	.16715E-01	.14215E+03	0.		0.	Bubble Input
2	1	.16482E-01	.14340E+03	0.		-.97405E-01	
3	1	.15765E-01	.14049E+03	0.		.20660E-01	
4	1	.15678E-01	.13862E+03	0.		.47920E-01	
5	1	.15920E-01	.13527E+03	0.		.44087E-01	
6	1	.16599E-01	.13026E+03	0.		.40373E-01	
7	1	.17523E-01	.12375E+03	0.		-.19926E-01	
8	1	.18810E-01	.11097E+03	0.		-.42262E-01	
9	1	.22200E-01	.90066E+02	0.		-.25553E-01	
10	1	.30170E-01	.64466E+02	0.		-.52142E-02	
11	1	.42959E-01	.46143E+02	0.		.19662E-01	
12	1	.10529E+00	.18199E+02	0.		.91198E-01	
13	1	.26498E+00	.50252E+01	0.		.21146E+00	
14	1	.48079E+00	.22653E+01	0.		.34704E-01	
15	1	.94772E+00	.10976E+01	0.		-.4E-01	
16	1	.16702E+01	.71019E+00	0.		.38295E-01	
17	1	.27825E+01	.54368E+00	0.		.31167E-01	
18	1	.25877E+01	.37877E-01	.22299E-01		.19165E-01	
19	1	.13055E+01	.21000E+00	.59321E-02		.14526E-01	
20	1	.12041E+01	.21000E+00	.31855E-02		.68596E-02	
21	1	.21000E+00	.21000E+00	.91680E-03		.16533E-02	
1	2	.21000E+00	.21000E+00	0.		.88885E-03	
2	20	.12041E+01	.21030E+00	.54952E-01		0.	
3	20	.12039E+01	.21029E+00	.26936E-01		.30953E-02	
4	20	.12035E+01	.21026E+00	.21007E-01		.56656E-02	
5	20	.12030E+01	.21022E+00	.12144E-01		.72077E-02	
6	20	.12000E+01	.21000E+00	.52932E-02		.72622E-02	
7	20	.12000E+01	.21000E+00	.31001E-02		.49583E-02	
8	20	.12000E+01	.21000E+00	.19648E-02		.13865E-02	
9	20	.12000E+01	.21000E+00	.70265E-03		.11422E-02	
1	21	.12000E+01	.21000E+00	0.		.71110E-03	
2	21	.12000E+01	.21000E+00	.47239E-02		0.	
3	21	.12000E+01	.21000E+00	.21657E-02		.21510E-03	
4	21	.12000E+01	.21000E+00	.17778E-02		.39861E-03	
5	21	.12000E+01	.21000E+00	.12064E-02		.52015E-03	
0		.21000E+00	.21000E+00	0.		.55175E-03	
0							
0.010633		0.010633	0.0	0.21266	0.2	0.0	Marker Particle Input
0							
0							

Sample Problem - Input

RCAYOK JCF 08/02/74

SAMPLE PROBLEM

PROBLEM STARTING TIME 9.0000E-12 SEC

GENERAL DATA

TIME 9.0000E-12 DTR 1.0000E-05 CYL 1.0000E+00 GRDVEL 2.0000E+00

RADN TRANSPORT DATA

ALPHA 1.0000E+00

MESH CONSTANTS

IBAP 34 JRAP 68 YBASE 0. REZYU 2.1266E-01
IUNF 20 JINF 40 JMD 20
DR 1.0633E-02 DZ 1.0633E-02 FRFZ 1.1000E+00

HYDRODYNAMICS CONSTANTS

A0 1.0000E-01 A0M 1.0000E+00 B0 0. KXI -1 MU 1.0000E-01
LAM 6.0000E-01 OM 1.0000E+00 EPS 1.0000E-05 ASQ 1.0000E-15 GM1 4.0000E-01
GR 0. GZ -1.0000E-02 REZRON 1.2000E+00 REZSIE 2.1000E-01

CONSTANTS SET BY OFFWEG0

NQ 18 NOT 630
NBUF 600 NSP 1 NRP 3 NPCMAX 50
TAMB 2.5267E-02 TFMIT 5.0000E-02 ANC 5.0000E-02

BACKGROUND MESH VARIABLES

EXPONENTIAL ATMOSPHERE CALCULATION

J	PO	SIE	TEMP
2	1.2300E+01	2.1000E-01	2.5267E-02
3	1.2284E+01	2.1000E-01	2.5267E-02
4	1.2269E+01	2.1000E-01	2.5267E-02
5	1.2253E+01	2.1000E-01	2.5267E-02
6	1.2238E+01	2.1000E-01	2.5267E-02
7	1.2222E+01	2.1000E-01	2.5267E-02
8	1.2207E+01	2.1000E-01	2.5267E-02
9	1.2191E+01	2.1000E-01	2.5267E-02
10	1.2176E+01	2.1000E-01	2.5267E-02
11	1.2161E+01	2.1000E-01	2.5267E-02
12	1.2145E+01	2.1000E-01	2.5267E-02
13	1.2130E+01	2.1000E-01	2.5267E-02
14	1.2114E+01	2.1000E-01	2.5267E-02
15	1.2099E+01	2.1000E-01	2.5267E-02
16	1.2083E+01	2.1000E-01	2.5267E-02
17	1.2068E+01	2.1000E-01	2.5267E-02
18	1.2052E+01	2.1000E-01	2.5267E-02
19	1.2037E+01	2.1000E-01	2.5267E-02
20	1.2021E+01	2.1000E-01	2.5267E-02

Sample Problem - OFFWEG0 Output

PARTICLE REGIONS

DRPAR	1.0633E-02	DZPAR	1.0633E-02				
XC	0.	YC	2.1266E-01	XD	2.0000E-01	YD	0.

556 PARTICLES GENERATED

PROBLEM CYCLE 0 HYDRO

T 9.0000E-02 TO 9.0000E-02 DT 0. 1 ITER

TE	3.9804E+13	TI	3.5094E+13	IK	4.7105E+12	EPOT	1.9178E+13	TIAMB	4.2044E+14
UMOM	2.3669E-03	VMOM	8.3481E-09	CIRC	-3.0656E-04				
TMAX	1.4341E+02	JTM	1	JTM	23				
TGMX	2.7772E+03	ITG	3	JTG	32				
DTV	IIIII	IDTV	R	JDTV	R				
DTC	IIIII	IDTC	R	JUTC	R				
REZONE CONSTANTS									
VTB	3.7921E-01	VTT	9.3106E-08	UT	2.4512E-08				
FC3	6.7380E-01	FCP2	7.6406E-10	FCX	6.7689E-01				

Sample Problem - YOKKY Output

PROBLEM CYCLE 1 RADN TRANSPORT

TIME 9.0000E-02 TO 9.0010E-02 DTR 1.0000E-05

INITIAL ENERGIES

RADN	7.3413E+08	INT	4.5563E+14	KIN	4.6687E+12	TOTAL	4.6030E+14
IJMIN	1226	SJEMIN	3.9273E+09	UMIN	9.4762E-01	TMIN	1.1769E-01

PARTICLES

	NGFN	NCEN	NBANK	NDIE	IESCAP	NMOVE	NCOL
SOURCE	476	0	67	253	156	11402	5752
BANK	201	0	90	111	0	6888	6888
BANK	274	0	118	152	0	9546	9526
BANK	354	0	56	298	0	7684	7496
BANK	168	0	0	168	0	168	0

37302 DEPOSITION SAMPLES DUMPED TO FSET3

PARTICLE ENERGIES

EMC	6.3629E+12	EPAD	6.3629E+12	ECEN1	0.		
FINAL RADIATION ENERGIES							
EMC	6.3629E+12	EARS	6.3624E+12	ELOST	4.4198E+08	EEM17	6.3629E+12
ECEN	0.	RF	9.9963E-01	RA	1.0003E+00		
PARS	6.3624E+17	PLOST	4.4198E+13	PEMIT	6.3629E+17		
TAVG	9.0005E-02	TMAX	1.9693E+00	UMAX	3.9035E+00	DMIN	1.5678E-02
						THY	4.4198E+08
CP	5.2919E+01	CYCLE	1.8923E+01	TDUMF	2.5108E+02	NDUMP	0

Sample Problem - MCRT Output

PROBLEM CYCLE 33 SN RADN TRANS

TIME 9.5058E-02 TO 9.5181E-02 DTR 1.2289E-04 ISN 4

ESN 2.0137E+19

CYLSN POWER

SUM 3.9146E+13

1 SN ITERATIONS

ENERGIES

SIE 3.5796E+13 URTOT 5.5038E+08 EL0ST -1.1820E+04 EARS 3.3831E+10

POWER

PWR 9.6262E+07 PWR2 -3.9146E+13

TIME INTERVAL DATA

DTR 1.1414E-03 IJDT 913 POWER 3.9199E+12 ECELL 2.9827E+10

TAVG 9.5120E-02 TMAX 1.9304E+00 DMAX 3.7153E+00 UMIN 1.4366E-02

CP 2.7141E+02 CYCLE 1.8005E+01 TDUMP 2.9776E+01 NDUMP 576270

Sample Problem - GREYSN Output

DATA WRITTEN ON FSET 7

TAPE DUMP AT 9.5181E-02

Dump Indicators

YOKIFER
OVERLAY 0,0

NTHRU	Plot
-1	All zones
0	1st zone only
1	2nd zone
2	3rd zone
3	4th zone

PHASE 2

OVERLAY 2, 4

OVERVIEW

REEFER

SOURCE PARTICLE CALCULATION

REEFER

BANK PARTICLE CALCULATION

WALK
continued

ESTEP

OVERLAY 3,2

SNOUT

OVERLAY 4,3

GREYSN

Overlay 4,0

APPENDIX E

INDEX LISTING OF THE YOKIFER PROGRAM

SEARCH, DBLTNT, GETEMP, PAKFNØ, and UNPKFN are written in CØMPASS and are not included in this listing.

```

1      OVERLAY (YOKIFER, 0, 0)
1      PROGRAM YOKIFER (JNP, DUT, FILM, FSET1, FSET2, FSET3, FSET4,
1      1 FSET6, FSET7, FSET12=FILM)
2      COMMON /STATE/  NOPT, NCPD, NFRQ, OPTMP(30), OPDEN(10),
1      1 FREQ(100), SPBL(300), PTAB(300), ETAB(300),
2      2 BTBL(300)
3      COMMON /YSC1/  AASC(5454)
4      COMMON /PINK/  I, IJ, IJM, IJP, J
5      LCM /YLC1/  AA1(131000)
6      LCM /YLC2/  AA2(131000)
7      LCM /HLC1/  SIGA(30000)
8      COMMON /RED/  NAME(12), DT, DTH, EM10, GROVEL, IHAR, IJP5,
1      1 IP1, ISCF1, ISCF2, ISCF3, ISCF4, ITV, JBAH,
2      2 JP1, JP2, NCYC, NUUMP, NU, NQI, REZSIE, TAMB,
3      3 TEMP(7500), T, TIME, TUUT, TSTART, THY
9      COMMON /SILVER/  FIAL, FIPX, FIPY, FIAL, FIPX, FIPY,
1      1 FIAL, FIPX, FIPY, IPY, IAL, IAR, IYH,
2      2 IYT, EXCONV, PXL, PXM, PYB, PYCONV, PYT,
3      3 RIBAR, VV, XCONV, AL, AX, YH, YCONV, YT
10     COMMON /ORANGE/  ANG, ASG, AO, AUFAC, AOM, BO, COLANG, CYL,
1      1 DTGUS, EPS, GMI, GZ, IMI,
2      2 IELP, IP2, ITAB(1000), JNM, JP4, KXJ, LAM,
3      3 LUPP, ML, APT, NGI1, NGI2, NUMIT, OM,
4      4 OMANG, CMCYL, REZHON, REZY0, THIRU, VTEM
11     COMMON /WHITE/  NRVALS, HVALS(73), RANGLS, ANGLES(35), TNEUT
12     COMMON /YELLOW/  DTL, DTCSAV, DTG2, DIV, DIVSAV,
1      1 DUDY, ILTC, ICTV, JUTC, JUTV, MCT
13     COMMON /GREEN/  ALPHA, ANP, NBUF, GSH, NPCMAX, JCEN, TEMIT
14     COMMON /CHIMSN/  SLCU(143), ZI
15     COMMON /SENSE/  JSWICH1, JSWICH2, JSWICH3
16     2001 FCHMAT  (IM, BMC, IPE12, 4, 6X, 6H CYCLE, IPE12, 4, 6X,
1      1 6H TDUMP, IPE12, 4, 6X, 6H NUUMP, I12/IH1)
17     2002 FCHMAT  (IHH, OIAPE DUMP AT, IPE12, 4)
18     2003 FCHMAT  (IM, ODATA WRITTEN ON FSET 7)
C
19     CALL OVERLAY (7LYOKIFER, 1, 0, 0, 0)
20     CALL MEMARK (10MOFFWEGO )
21     RETURN 7
22     CALL OPEN (SLFSET7, 2LST, 512)
23     CALL GETQ (4LKTLM, KTTL)
24     TTL=27, SE=09*PLUAT(KTTL)-30.0
25     CALL SECOND (T1)
26     TLUMP=AMIN(1960.0, TTL)
27     NUUMP=0
28     21 CALL OVERLAY (7LYOKIFER, 2, 0, 0)

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YOKIFER 2
YOKIFER 3
YOKIFER 4
ALLKOM 2
ALLKOM 3
ALLKOM 4
ALLKOM 5
ALLKOM 6
ALLKOM 7
ALLKOM 8
ALLKOM 9
ALLKOM 10
ALLKOM 11
ALLKOM 12
ALLKOM 13
SILVER 2
SILVER 3
SILVER 4
SILVER 5
ORANGE 2
ORANGE 3
ORANGE 4
ORANGE 5
ORANGE 6
ORANGE 7
YELLOW 2
YELLOW 3
GREEN 2
CHIMSN 2
SENSE 2
YOKIFER 12
YOKIFER 13
YOKIFER 14
YOKIFER 15
YOKIFER 16
YOKIFER 17
YOKIFER 18
YOKIFER 19
YOKIFER 20
YOKIFER 21
YOKIFER 22
YOKIFER 23
YOKIFER 24
YOKIFER 25
YOKIFER 26

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29 CALL HEMARK (10HYAQUI )
30 IF (JSWICH2.EQ.2) GO TO 22
31 CALL OVERLAY (7LYCKIFER, 3, 0, 0)
32 CALL HEMARK (10HMCRT )
33 GO TO 23
34 22 CALL OVERLAY (7LYCKIFER, 4, 0, 0)
35 CALL HEMARK (10HGREYSN )
36 23 CALL SECOND (T2)
37 TCYCLE=T2-T1
38 TDUMP=TDUMP+TCYCLE
39 PRINT 2001, T2, TCYCLE, TDUMP, NDUMP
40 T1=T2
41 TDUMP=T
42 IF (TIME.GE.TOUT) TDUMP=1
43 IF (TDUMP.LE.2.0*TCYCLE) TDUMP=2
44 IF (NDUMP.GE.100000) TDUMP=2
45 IF (TDUMP.EQ.0) GO TO 21
46 CALL OPEN (5LFS1,2LST,4608)
47 CALL OPEN (5LFS13,2LST,4608)
48 CALL OPEN (5LFS17,2LST,4608)
49 NDUMP=NDUMP+1
50 IZ2=LOC(IZ2)-LOC(NAME)+1
51 WRITE (7) (NAME(I), I=1,IZ2)
52 ENUFIL 7
53 NECS=AQ1*JD2
54 NDUMP=NDUMP+NECS
55 WRITE (7) (A41(I), I=1,NECS)
56 NECS=2*APT
57 NDUMP=NDUMP+NECS
58 WRITE (7) (A42(I), I=1,NECS)
59 32 ENUFIL 7
60 33 CALL HIBUF (5LFS1,AAS,4608,LENGTH,LSTATUS)
61 CALL HIBUF (5LFS17,AAS,LENGTH)
62 NDUMP=NDUMP+LENGTH
63 IF (LSTATUS.LT.208) GO TO 33
64 WRITE (7)
65 ENUFIL 7
66 34 CALL HIBUF (5LFS13,AAS,4608,LENGTH,LSTATUS)
67 CALL HIBUF (5LFS17,AAS,LENGTH)
68 NDUMP=NDUMP+LENGTH
69 WRITE (7)
70 ENUFIL 7
71 PRINT 2003
72 REWIND 1
73 REWIND 3
74 CALL OPEN (5LFS1,2LST,512)
75 CALL OPEN (5LFS13,2LST,512)
76 CALL OPEN (5LFS17,2LST,512)
77 IF (TDUMP.EQ.1) GO TO 21
78 CALL ADV(1)
79 TDUMP=TDUMP+(40.0+T2-T1)*T2
80 NDUMP=
81 PRINT 2002, TIME
82 WRITE (12,4002) TIME
83 REWIND 7
84 CALL DATANEL (5LFS17)
85 CALL AFSHEL(4FILM)
86 CALL AFSHEL(3LOUT)
87 CALL OPEN (5LFS12,2LST,512)
88 REWIND 7
89 IF (TDUMP.GE.2.0*TCYCLE) GO TO 21
90 STOP
91 END
YOKIFER 27
YOKIFER 28
YOKIFER 29
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YOKIFER 85
YOKIFER 86
YOKIFER 87
YOKIFER 88
YOKIFER 89

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SINGLY REFERENCED VARIABLES

32 =	59*	DTVSAN	=R	1200	GRLEVEL	=R	ACQ	ITAM	(1)	1000	ACYC	=1	BCQ	PYB	=R	900	THY	=R	800	
34 =	66*	DDVT	=R	1200	GREEN	=	130N	ITV	=1	ACQ	AFRW	=1	200	PYCUNV	=R	900	TNEUT	=R	1100	
ADV	=R	7H5U	EMU	=R	ACQ	62	=R	1000	IAL	=1	900	AOPU	=1	200	PYT	=R	900	TSTART	=R	800
ALPHA	=R	130U	EPS	=R	1000	10AR	=1	ACQ	IXM	=1	900	AOPT	=1	200	HDT	=R	1200	VTEM	=R	1000

[illegible]

1	SCURROUTINE LOOP	LOOP	2
2	COMMON /STATE/ NCP1, NCP2, NFRG, OPTMP(30), OPDEN(10),	ALLKCM	2
3	FREQ(100), SPTEL(300), PTAH(300), FTAB(300),	ALLKCM	3
4	BTOL(200)	ALLKCM	4
5	COMMON /YSC1/ AASC(5454)	ALLKCM	5
6	COMMON /PINK/ I, IJ, IJM, IJP, J	ALLKCM	6
7	LCM /YLC1/ AA1(131000)	ALLKCM	7
8	LCM /YLC2/ AA2(131000)	ALLKCM	8
9	LCM /YLC3/ SIGA(30000)	ALLKCM	9
10	COMMON /MED/ NAME(14), DT, UTR, FM10, GROVEL, IPAR, IJMS,	ALLKCM	10
11	IP1, ISC1, ISC2, ISC3, ITV, JRAH,	ALLKCM	11
12	JPI, JPK, PCYC, NDUMP, NU, NUI, KE/SIE, IAHM,	ALLKCM	12
13	TENP(7000), I, TIME, TOUT, ISTART, THY	ALLKCM	13
14	CALL ECHW (AASC(IJMS),IECH,NGI,NE)	LOOP	4
15	IECH = IECH + NUI	LOOP	5
16	GO TO (10,20,30) IBUF	LOOP	6
17	IJP = IJPS = 1	LOOP	7
18	IJ = ISC3	LOOP	8
19	IJM = IJMS = ISC2	LOOP	9
20	IBUF = 2	LOOP	10
21	GO TO 40	LOOP	11
22	IJP = IJPS = ISC2	LOOP	12
23	IJ = 1	LOOP	13
24	IJM = IJMS = ISC3	LOOP	14
25	IBUF = 3	LOOP	15
26	GO TO 40	LOOP	16
27	ENTRY START	LOOP	17
28	IJMS = 1	LOOP	18
29	IECH = IECH + 0	LOOP	19
30	CALL ECHW (AASC(IJPS),IECH,NUI,NE)	LOOP	20
31	IECH = IECH + NUI	LOOP	21
32	IJPS = ISC2	LOOP	22
33	CALL ECHW (AASC(IJPS),IECH,NGI,NE)	LOOP	23
34	IECH = IECH + NUI	LOOP	24
35	IJP = IJPS = ISC3	LOOP	25
36	IJ = ISC2	LOOP	26
37	IJM = IJMS = IBUF = 1	LOOP	27
38	CALL ECHW (AASC(IJPS),IECH,NGI,NE)	LOOP	28
39	IECH = IECH + NUI	LOOP	29
40	RETURN	LOOP	30
41	ENTRY DONE	LOOP	31
42	CALL ECHW (AASC(IJMS),IECH,NGI,NE)	LOOP	32
43	IECH = IECH + NUI	LOOP	33
44	GO TO (50,60,70) IBUF	LOOP	34
45	IJMS = ISC2	LOOP	35
46	GO TO 40	LOOP	36
47	IJMS = ISC3	LOOP	37
48	GO TO 40	LOOP	38
49	IJMS = 1	LOOP	39
50	CALL ECHW (AASC(IJMS),IECH,NUI,NE)	LOOP	40
51	RETURN	LOOP	41
52	ENTRY LOORD	LOOP	42
53	CALL ECHW (AASC(IJPS),IECH,NGI,NE)	LOOP	43
54	IECH = IECH + NUI	LOOP	44
55	GO TO (110,120,130) IBUF	LOOP	45
56	IBUF = 2	LOOP	46
57	IJ = ISC1	LOOP	47
58	IJS = 1	LOOP	48
59	IJM = ISC2	LOOP	49
60	IJMS = ISC2	LOOP	50
61	GO TO 130	LOOP	51
62	ENTRY STARTD	LOOP	52
63	IJMS = ISC2	LOOP	53
64	IECH = IECH + ITV	LOOP	54
65	CALL ECHW (AASC(IJMS),IECH,NUI,NE)	LOOP	55
66	IECH = IECH + NUI	LOOP	56
67	IJM = ISC1	LOOP	57
68	IJMS = IBUF = 1	LOOP	58
69	IJ = ISC2	LOOP	59
70	IJS = ISC2	LOOP	60
71	IF (IECH.LT.0) GO TO 130	LOOP	61

LOOP	62
LOOP	63
LOOP	64
LOOP	65
LOOP	66
LOOP	67
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LOOP	75
LOOP	76
LOOP	77
LOOP	78

AA1	(1)H	SLL	E1AE	(1)H	ZCO	JP2	-1	RCU	NOPT	-1	PCC	REZSLE	-H	BCU	STARTD	-	STEN	TOUT	-H	RCU
AA2	(1)H	SLC	FLCL	(1)H	ZCO	LOCP	-	LSU	NOPT	-1	ZCO	R1C1	-	7CN	STATE	-	ZCN	TSTART	-H	RCU
BTOL	(1)H	ZCO	CHLEVEL	-H	RCU	LOCPD	-	47EN	OPLEN	(1)H	PCC	ARFO	-	7EN	I	-H	RCU	WROW	-	7EN
DONE	-	3CN	IOAH	-1	HCC	NAME	(1)	HCU	CHIMP	(1)H	PCC	SET1U	-	16EN	TAMH	-H	RCU	YLC1	-	5CN
DT	-H	RCU	1P1	-1	HCC	NLYC	-1	RCU	W1K	-	6CN	SIGA	(1)H	7CN	TEMP	(1)H	RCU	YLC2	-	6CN
UTR	-H	RCU	JOAH	-1	HCC	NLCMP	-1	RCU	PTAH	(1)H	PCC	STREL	(1)H	ZCO	7Y1	-H	RCU	YSL1	-	3CN
EM10	-H	RCU	JP1	-1	HCC	NRFO	-1	ZCO	HLU	-	RCN	STMT	-	6EN	TTH	-H	RCU			

[illegible]

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1      SUBROUTINE FILMCO
2      COMMON /STAIR/ NOUT, NCPD, NFHD, OPTMP(30), OPDEN(10),
3      1      FHEU(100), SPTEL(300), PTAB(300), ETAB(300),
4      2      HTEL(300)
5      COMMON /YSC1/ AASC(5454)
6      COMMON /PINK/ I, IJ, IJP, IJP, J
7      COMMON /YLL1/ AA1(13100)
8      COMMON /YLL2/ AA2(13100)
9      COMMON /HLL1/ SIGA(30100)
10     COMMON /RED/ NAME(10), DT, DTH, FM10, GROVEL, IBAR, IJPS,
11     1      IP1, ISCH1, ISCF2, ISC2, ISC3, ITV, JPAH,
12     2      JPI, JPC, NCTC, NOUMP, NG, NQ1, HEZSIE, TAMB,
13     3      TEMP(1000), T, TIME, TUUT, TSTAR1, THY
14     COMMON /SILVER/ FIPAL, FIFX, FIPYH, FIXL, FIXH, FIYB,
15     1      IPAL, IPAH, IPYH, IYU, IAL, IAH, IYB,
16     2      IYI, PYCONV, PAL, PAH, PYB, PYCONV, PYT,
17     3      RIBAH, VV, XCONV, AL, AP, TH, YCONV, YT
18     COMMON /ORANGE/ ANC, ASL, AG, AGFAL, AGH, BG, COLAMC, CYL,
19     1      DTNDS, EPS, OM, OM, OL, IM,
20     2      IEC1, IEC2, IFAH(100), JNP, JPA, KXI, LAM,
21     3      LUP2, MU, NFI, NFIN, NUI2, NUPIT, OM,
22     4      OMANG, OMCYL, HEZHUK, HEZYU, THIMU, VTEM
23     COMMON /WHITE/ HVALS, HVALS(73), NMNGLS, ANGLES(35), INEUT
24     COMMON /SENSE/ JSATCH1, JSATCH2, JSATCH3
25     COMMON /EQUVALENCE/ (AASC(1),X,XPAH), (AASC(2),R,YPAH), (AASC(3),Y),
26     1      (AASC(4),L), (AASC(5),V), (AASC(6),MO),
27     2      (AASC(7),MP,MNP,MCS,CENTX),
28     3      (AASC(8),E,ETIL,CENTY), (AASC(9),HVCL),
29     4      (AASC(10),M,MV,VP), (AASC(11),P,PL,EP,UP),
30     5      (AASC(12),UTIL,UL,CU,EMOMLC),
31     6      (AASC(13),VTIL,VL,VMOMLC),
32     7      (AASC(14),RCL,BETALC,FOUTLC), (AASC(15),SIE),
33     8      (AASC(16),DELSM,SIGFLC),
34     9      (AASC(17),GHIR,IG,IG,IG),
35     10     (AASC(18),GHIZ,VG,VG,SH)
36     COMMON /DIMEN/ LAM, LAM0, M, MP, MU, MU0,
37     1      X(1), XAH(1), A(1), YPAH(1), Y(1), U(1),
38     2      V(1), MC(1), MP(1), MNP(1), MCS(1), CENTX(1),
39     3      E(1), ETIL(1), CENTY(1), HVCL(1), M(1), MV(1),
40     4      VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),
41     5      UL(1), CU(1), EMOMLC(1), VTIL(1), VL(1),
42     6      VMOMLC(1), MVL(1), METALC(1), FOUTLC(1),
43     7      SIE(1), DELSM(1), SIGFLC(1), GHIR(1), UG(1),
44     8      RZLEH(1), GHIZ(1), VG(1), FSA(1)
45     DIMEN
46     FILMCO
47     FILMCO
48     FILMCO
49     FILMCO
50     FILMCO
51     FILMCO
52     FILMCO
53     FILMCO
54     FILMCO
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99     FILMCO
100    FILMCO

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41  IYB = F1YF
42  IYI = F1YT
43  FALS = 0
44  FYD = MAX(1, (PYB, YB))
45  FYI = MAX(1, (FYI, YI))
46  FAX = MAX(1, (PXF, XF))
47  FYF = MAX(1, (PYF, 0.0 * PXF, YB))
48  FYI = MAX(1, (PYI, 0.0 * PXF, YI))
49  FAX = MAX(1, (PXF, 0.0 * PXF, XF))
50  F1YD = 0.0
51  F1YT = 0.0
52  F1YB = 0.0
53  F1YI = 0.0
54  AL = PXH / (PYI - FYB)
55  IF (AL, LT, 1.0) F1FAX = F1YAL * AL * (F1PYH - F1PYT)
56  IF (AL, GT, 1.0) F1FYI = F1YB - (F1PXF - F1YXL) / AL
57  FACUNV = (F1PXF - F1YXL) / (PXF - YAL)
58  FYCUNV = (F1PYT - F1PYB) / (PYT - PYB)
59  LAL = F1YXL
60  IFAX = F1PXF
61  IFYB = F1PYB
62  IFYT = F1PYT
63  F1YH = 0
64  END

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FILMCU 34
FILMCU 35
FILMCU 36
FILMCU 37
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FILMCU 53
FILMCU 54
FILMCU 55
FILMCU 56
FILMCU 57

SINGLY REFERENCED VARIABLES

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AA1 (H) 500 DTH -H 800 IJFS -I 800 JSATCH3 -I 1200 AQIB -I 1000 MEZHUN -R 1000 THY -R 800
AA2 (H) 600 EMIL -H 800 IM1 -I 1000 KX1 -I 1000 NGI2 -I 1000 MEZSIE -R 800 TIME -R 800
ANL -H 1000 EPS -H 1000 IP2 -I 1000 LAMP -H 1400 NVALS -I 1000 MEZYU -R 1000 TNEUT -H 1000
ANGLES (H) 1000 EVALVAL -I 13F ISCF1 -I 400 LUP2 -I 1000 NUM17 -I 1000 HLC1 -R 700 TUUT -H 800
ASU -H 1000 EIAE (H) 200 ISCF2 -I 800 LUPP -R 2750 CM -H 1000 NVALS (H) 1000 TSTART -R 800
AV -H 1000 FILMCL -H 150 ISC2 -I 800 MUG2 -H 1400 CMANC -H 1000 SENSE -R 1200 VTEM -H 1000
AGPAC -H 1000 FLUNT -H 1950 ISC3 -I 800 NAME (H) 800 CMCYL -H 1000 SIGA (H) 700 WHILE -R 1000
APM -H 1000 FREL (H) 700 ITAB (H) 1000 NANGLS -I 1000 CPDEN (H) 200 SILVER -R 900 YLC1 -R 500
BTBL (H) 200 G1 -H 1000 ITV -I 800 NCYC -I 800 CPTMP (H) 200 SPTML (H) 200 YLC2 -R 600
BU -H 1000 OR -H 1000 JBAR -I 800 ADUMP -I 800 CHANGE -R 1000 START -R 2050 YSC1 -R 300
COLAPU -H 1000 ORLEVEL -H 800 JKN -I 1000 NFMU -I 200 FIAN -R 400 STATE -R 200
CYL -H 1000 G2 -H 1000 JPI -I 800 NGPD -I 200 FTAB (H) 200 T -H 800
DIMEND1 -H 15F IECP -I 400 JPI -I 800 NGPD -I 200 REAL -R 14F TAM3 -H 800
UT -H 600 IUP -I 400 JSATCH1 -I 1200 NFI -I 1000 RED -R 800 TEMP (H) 800
UTPOS -H 1000 IUP -I 400 JSATCH2 -I 1200 NFI -I 800 RETURN -R 60F TFRU -R 1000

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MULTIPLY-REFERENCED VARIABLES

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119 = 2200 200
129 = 2100 200
AA3C (H) 300 1300 1300 1300 1300 1300 1300 1300 1300 1300 1300 1300 1300 1300 1300 1300
AAAX1 = 2450 2550 4450 4750
AMIN1 = 2450 4550 4050 4850 4950
HETALC (H) 1300 1501
CFATA (H) 1300 1501
CENTY (H) 1300 1501
COMMON = 3F 8F 9F 10F 11F 12F
CU (H) 1300 1501
DELSM (H) 1300 1501
E (H) 1300 1501
EMULC (H) 1300 1501
EP (H) 1300 1501
ETIL (H) 1300 1501
F1YXL -H 500 50 56 57 59
F1YH -H 400 50 56 57 60
F1PYB -H 400 50 56 58 61
F1PYT -H 500 50 50 58 62
F1XL -H 400 30 36 37 39
F1YH -H 400 30 36 37 40

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FIYB	-H	400	3 =	35	36	37	41
FIYT	-H	31 =	35	36	38	42	
FOUFLC	(H)	13E4	1501				
FSN	(H)	13E4	1501				
GRIP	(H)	13E4	1501				
GRIZ	(H)	13E4	1501				
I	-1	400	2200				
IBAR	-1	400	19				
IJ	-1	400	23	24	25	26 =	26
IPAL	-1	400	54 =				
IPXR	-1	400	6 =				
IPYB	-1	400	61 =				
IPYT	-1	400	62 =				
IPZ	-1	400	2200				
IXL	-1	400	34 =				
IXR	-1	400	4 =				
IYB	-1	400	41 =				
IYT	-1	400	42 =				
J	-1	400	2100				
JPZ	-1	400	2100				
LAM	-H	1000	1000				
LCH	-	51	61	71			
M	(H)	13E4	1400	1501			
M'	(H)	13E4	1400	1501			
MU	-H	1000	1000				
NQ	-1	400	24				
P	(H)	13E4	1501				
PL	(H)	13E4	1501				
PXCONV	-H	400	57 =				
PXL	-H	400	43 =	57			
PAR	-H	400	46 =	46	47	48	49 =
PI	-H	400	44 =	44	47 =	47	54 =
PYCONV	-H	400	56 =				58
PYI	-H	400	45 =	45	48 =	48	54
R	(H)	13E4	1501				58
RCSQ	(H)	13E4	1501				
RIBAH	-H	400	19 =	29			
RM	(H)	13E4	1501				
RMP	(H)	13E4	1501				
RU	(H)	13E4	1501				
RUL	(H)	13E4	1501				
RYOL	(H)	13E4	1501				
RZEDEN	(H)	13E4	1501				
SE	(H)	13E4	1501				
SIGPLC	(H)	13E4	1501				
U	(H)	13E4	1501				
UG	(H)	13E4	1501				
UL	(H)	13E4	1501				
UMOMLC	(H)	13E4	1501				
UP	(H)	13E4	1501				
UJIL	(H)	13E4	1501				
V	(H)	13E4	1501				
VJ	(H)	13E4	1501				
VL	(H)	13E4	1501				
VP	(H)	13E4	1501				
VTIL	(H)	13E4	1501				
VV	-H	400	29 =				
X	(H)	13E4	1501	23			
XCONV	-H	400	37 =				
XU	-H	34 =	35	35	36	36	54 =
XL	-H	400	16 =	37			55
XPAR	(H)	13E4	1501				55
XN	-H	400	10 =	23 =	23	29	34
Y	(H)	13E4	1501	24	25		37
YH	-H	400	17 =	18	24 =	24	34
YCONV	-H	400	34 =				38
YPAR	(H)	13E4	1501				44
YT	-H	400	10 =	25 =	25	34	45

1	OVERLAY (OVERLAY= 1, 2)	OFFWEGC	2
1	PROGRAM OFFWEGC	OFFWEGC	3
1	--- OFFWEGC HEADS AND MODIFIES INPUT	OFFWEGC	4
1	COMMON /STATE/	ALLKCM	5
1	NGHT, NCPD, NFG, OPTMP(30), OPDEN(10),	ALLKCM	6
1	FREQ(100), SPHLL(3,0), PTAB(300), ETAB(300),	ALLKCM	7
1	BTNL(300)	ALLKCM	8
1	COMMON /YSC1/	ALLKCM	9
1	AASC(5454)	ALLKCM	10
1	COMMON /PINK/	ALLKCM	11
1	I, IJ, IJM, IJP, J	ALLKCM	12
1	LCM /YLL1/	ALLKCM	13
1	AA1(131100)	ALLKCM	14
1	LCM /YLL2/	ALLKCM	15
1	AA2(131100)	ALLKCM	16
1	LCM /YLL3/	ALLKCM	17
1	SIGN(30000)	ALLKCM	18
1	COMMON /RED/	ALLKCM	19
1	NAME(12), DI, UTR, EM10, GROVEL, IRAR, IJPS,	ALLKCM	20
1	IP1, ISCF1, ISCF2, ISCF3, ISCF4, ITV, JHAW,	ALLKCM	21
1	JP1, JP2, NCTC, NCLMP, NG, NQ1, HE/SIE, TAMB,	ALLKCM	22
1	TEMP(100), I, TIME, TOUT, TSTART, THY	ALLKCM	23
1	COMMON /SILVER/	SILVER	24
1	FIXAL, FIXX, FIXY, FIAL, FIXH, FIYH,	SILVER	25
1	IPAL, IPAX, IPY, IPY1, IAL, IAR, IYH,	SILVER	26
1	IY1, PACONV, PAL, PAH, PYH, PYCONV, PY1,	SILVER	27
1	RIOPH, VV, XCONV, ALP AH, TH, YCONV, Y1	SILVER	28
1	COMMON /ORANGE/	ORANGE	29
1	ANG, ASH, A, ADFAC, ADM, BD, COLAML, CYL,	ORANGE	30
1	DTFES, EPS, GHI, GH, GZ, IM1,	ORANGE	31
1	IECP, IP2, ITAH(11,0), JNM, JP4, KX1, LAM,	ORANGE	32
1	LUP2, MU, NP1, NULP, NUL2, NUNIT, NY,	ORANGE	33
1	OMAC, LMCYL, KEZHON, HE/YC, THIND, VTEM	ORANGE	34
11	COMMON /WHITE/	ORANGE	35
11	NHVALS, HVALS(73), KNGULS, ANGLES(35), TNEUT	ORANGE	36
12	COMMON /GREEN/	GREEN	37
12	ALPHA, REF, WBUF, NSP, NPMAX, JCEN, TEMIT	GREEN	38
13	COMMON /CRIMSN/	CRIMSN	39
13	SNCON(123), ZZ	CRIMSN	40
14	COMMON /SENSE/	SENSE	41
14	JSWICH1, JSWICH2, JSWICH3	SENSE	42
15	COMMON /BLUE/	BLUE	43
15	DM, DZ, FREQ, IJNP, JMIU,	BLUE	44
15	JJHOK, KATX(750), HUMPH, YHASE	BLUE	45
16	EQUIVALENCE	EQUIV	46
16	(AASC(1),X,APAH), (AASC(2),P,YPAH), (AASC(3),Y),	EQUIV	47
16	(AASC(4),U), (AASC(5),V), (AASC(6),FO),	EQUIV	48
16	(AASC(7),P,MAP,MCEN,CENTX),	EQUIV	49
16	(AASC(8),E,LTIL,CENTY), (AASC(9),RVCL),	EQUIV	50
16	(AASC(10),M,MP,VP), (AASC(11),P,PL,EP,UP),	EQUIV	51
16	(AASC(12),UL,VL,EMOMLC),	EQUIV	52
16	(AASC(13),VTIL,VL,EMOMLC),	EQUIV	53
16	(AASC(14),PCL,MTALC,FOOTLC), (AASC(15),SIE),	EQUIV	54
16	(AASC(16),DELSM,SIOPLC),	EQUIV	55
16	(AASC(17),GRIZ,UG,VEDEN),	EQUIV	56
16	(AASC(18),GRIZ,UG,FSN)	EQUIV	57
17	REAL	EQUIV	58
17	LAM, LAMU, K, MP, MU, MUZ	EQUIV	59
18	DIMENSION	DIMEN	60
18	X(1), APAH(1), P(1), YPAH(1), Y(1), U(1),	DIMEN	61
18	V(1), AC(1), MP(1), RMP(1), RCGS(1), CENTX(1),	DIMEN	62
18	E(1), ETIL(1), CENTY(1), RVOL(1), P(1), MP(1),	DIMEN	63
18	VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),	DIMEN	64
18	UL(1), CV(1), EMOMLC(1), VTIL(1), VL(1),	DIMEN	65
18	UMOMLC(1), KUL(1), METALC(1), FOOTLC(1),	DIMEN	66
18	SIE(1), DELSM(1), SIOPLC(1), GRIZ(1), UG(1),	DIMEN	67
18	RZLEN(1), GRIZ(1), VG(1), FSN(1)	DIMEN	68
19	DIMENSION	OFFWEGC	69
19	XTAH(10), YTAB(15)	OFFWEGC	70
20	DIMENSION	OFFWEGC	71
20	OPSIG(100)	OFFWEGC	72
21	LOGICAL	OFFWEGC	73
21	EGI	OFFWEGC	74
22	12.4 FCHMAT	OFFWEGC	75
22	(12.4)	OFFWEGC	76
23	10.3 FCHMAT	OFFWEGC	77
23	(10.3)	OFFWEGC	78
24	10.4 FCHMAT	OFFWEGC	79
24	(10.4)	OFFWEGC	80
25	1.5 FCHMAT	OFFWEGC	81
25	(1.5)	OFFWEGC	82
26	0.1 FCHMAT	OFFWEGC	83
26	(0.1)	OFFWEGC	84
27	0.1 FCHMAT	OFFWEGC	85
27	(0.1)	OFFWEGC	86
27	1	OFFWEGC	87
27	0	OFFWEGC	88
27	0	OFFWEGC	89
27	0	OFFWEGC	90
27	0	OFFWEGC	91
27	0	OFFWEGC	92
27	0	OFFWEGC	93
27	0	OFFWEGC	94
27	0	OFFWEGC	95
27	0	OFFWEGC	96
27	0	OFFWEGC	97
27	0	OFFWEGC	98
27	0	OFFWEGC	99
27	0	OFFWEGC	100

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28 2.3 FCHMAT (1M, *OMEGA TRANSPORT DATA*/6H ALPHA, IPE12,4) OFFWEGC 27
29 2.4 FCHMAT (1M, *OMEGA CONSTANTS*/6H IBAP, I12,6X, OFFWEGC 28
3 3H JBAH, I12,6X,6H YBASE, IPE12,4,6X, OFFWEGC 29
4 6H KELY, IPE12,4) OFFWEGC 30
30 2005 FCHMAT (5H IUNF, I12,6X,6H JUNF, I12,6X,6H JMU, I12, OFFWEGC 31
1 6H UK, IPE12,4,6X,6H UZ, IPE12,4,6X, OFFWEGC 32
2 6H KHZ, IPE12,4) OFFWEGC 33
31 2000 FCHMAT (1M, *OMEGA DYNAMICALS CONSTANTS*/6H A3, OFFWEGC 34
1 IPE12,4,6X,6H AGM, IPE12,4,6X,6H RG, IPE12,4, OFFWEGC 35
2 6X,6H KA, I12,6X,6H MU, IPE12,4,6H LA, I OFFWEGC 36
3 IPE12,4,6X,6H OM, IPE12,4,6X,6H FPS, OFFWEGC 37
4 IPE12,4,6X,6H ASG, IPE12,4,6X,6H GW, OFFWEGC 38
5 IPE12,4,6H GK, IPE12,4,6X,6H GZ, IPE12,4, OFFWEGC 39
6 6X,7H KEZNO, IPE12,4,6X,7H KEZSE, IPE12,4, OFFWEGC 40
32 2000 FCHMAT (1M, *ALPHA, A12) OFFWEGC 41
33 2000 FCHMAT (1M, *PROBLEM STARTING TIME*/IPE12,4, SEC) OFFWEGC 42
34 2.11 FCHMAT (1M, *CONSTANTS SET BY OFFWEGC*/ OFFWEGC 43
1 6H KU, I12,6X,6H NUI, I12,6H NNUF, I12, OFFWEGC 44
2 6X,6H MSP, I12,6X,6H NDP, I12,6X, OFFWEGC 45
3 7H CPMAA, I11) OFFWEGC 46
35 2.12 FCHMAT (6H TAMB, IPE12,4,6X,6H TEMIT, IPE12,4,6X, OFFWEGC 47
2 6H ANL, IPE12,4) OFFWEGC 48
C OFFWEGC 49
36 CALL GETU (4LKJON, JNN) OFFWEGC 50
37 CALL DATEI (UE) OFFWEGC 51
38 PRINT F16.4, JNN, UE OFFWEGC 52
39 WRITE (12,7008) JNN, UE OFFWEGC 53
40 CALL SWITCH (1,JSWITCH) OFFWEGC 54
41 CALL SWITCH (2,JSWITCH) OFFWEGC 55
42 CALL SWITCH (3,JSWITCH) OFFWEGC 56
C --- SET LCM OFFWEGC 57
43 IFCSE OFFWEGC 58
44 NECS=131000-12CS OFFWEGC 59
45 NECS=MIN(NECS,5454) OFFWEGC 60
46 CALL ECHN (AASC, IECS, NECS, NE) OFFWEGC 61
47 IFCSE=IECS,5454 OFFWEGC 62
48 IF (IL(S,LT,131000) GO TO 22 OFFWEGC 63
C --- READ EVALUATION OF STATE INPUT OFFWEGC 64
49 READ (6) NPT, NCPD, NFRG OFFWEGC 65
50 READ (6) FREQ OFFWEGC 66
51 LC 33 K=1,NFRG OFFWEGC 67
52 FREQ(K)=3.0E+10/FREQ(K) OFFWEGC 68
53 33 C(1)FREQ OFFWEGC 69
54 LC 40 J=1,NCPD OFFWEGC 70
55 LC 41 J=1,NCPD OFFWEGC 71
56 READ (6) NNL, OPTMP(I), QDEN(J), CPSIG OFFWEGC 72
57 LC 41 K=1,NFRG OFFWEGC 73
58 J_K=K*(J-1)*J*FREQ*(J-1)*OPTMP(I) OFFWEGC 74
59 SIGMA(I,K)=OPSIG(K)+CPSIG OFFWEGC 75
60 41 C(1)FREQ OFFWEGC 76
61 QDEN(J)=QDEN(J)+3.0 OFFWEGC 77
62 42 C(1)FREQ OFFWEGC 78
63 NSTATE=KUPD*FREQ OFFWEGC 79
64 READ (6) SPTBL OFFWEGC 80
65 IF (JSWITCH3,UE,1) READ (6) PTAN OFFWEGC 81
66 IF (JSWITCH3,UE,2) READ (6) SPTBL OFFWEGC 82
67 READ (6) PTAN OFFWEGC 83
68 READ (6) ETAB OFFWEGC 84
69 READ (6) HIBL OFFWEGC 85
70 J= OFFWEGC 86
71 J= OFFWEGC 87
72 LC 44 J=1,NSTATE OFFWEGC 88
73 I=1 OFFWEGC 89
74 SPTBL(IJ)=SPTBL(IJ)+5.0 OFFWEGC 90
75 IF (J,UE,2) SPTBL(IJ-1)=2.0*SPTBL(IJ)-SPTBL(IJ-1) OFFWEGC 91
76 FTA(IJ)=FTA(IJ)-7.0 OFFWEGC 92
77 ETA(IJ)=ETA(IJ)-10.0 OFFWEGC 93
78 IF (J,1,NOPI) GO TO 44 OFFWEGC 94

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74      I=
80      J=J+1
81      ** CONTINUE
82      CALL AF5HEL (SELFSET6)
      C    --- CHECK FOR DLMF ON CARDS
83      READ (7) NAME
84      IF (LCI(7)) GO TO 11
85      PRINT /
86      NALL=LOCF(22)-LOCF(NAME(1))+1
87      CALL OPEN (SELFSET1,CLST+400H)
88      CALL OPEN (SELFSET3,CLST+400H)
89      CALL OPEN (SELFSET7,CLST+400H)
90      READ (7) (NAME(I), I=1,NALL)
      C    --- READ DUMP
91      3 READ (7)
92      IF (LCF(7) 404
93      NECS=NAME(1),P2
94      READ (7) (AA1(I), I=1,NECS)
95      NECS=COMP1
96      READ (7) (AA2(I), I=1,NECS)
97      5 READ (7)
98      IF (LCF(7) 606
99      PRINT / 5
100     CALL COPYF (SELFSET7,SELFSET1)
101     CALL COPYF (SELFSET7,SELFSET3)
102     READ (7) (NAME(I), I=1,NALL)
103     IF (LCI(7)) GO TO 7
104     GO TO 3
105     7 CALL OPEN (SELFSET1,CLST+512)
106     CALL OPEN (SELFSET3,CLST+512)
107     CALL OPEN (SELFSET7,CLST+512)
108     IF (JSTIC(1,LCU)) RETURN
109     CALL OPEN (SELFSET4,CLST+400H)
110     CALL SKIPW (SELFSET7,2,4)
111     61 READ (4) KSLP, T2
112     IF (LCI(4)) GO TO 63
113     IF (T2,GT,T) GO TO 62
114     READ (4)
115     READ (4)
116     GO TO 61
117     62 BACKSPACE 4
118     BACKSPACE 4
119     BACKSPACE 4
120     GO TO 64
121     63 JSTIC(1)=1
122     64 CALL OPEN (SELFSET4,CLST+512)
123     RETURN
      C    --- READ CARD INPUT
124     11 NAME=J
125     READ 1001, NAME
126     READ 1002, TIME, UTR, CYL, GMDVEL, ALPHA
127     READ 1004, IHAW, JHAW, YBASE, WEZYO
128     READ 1005, IUNF, JHNF, JUID, UR, UZ, FREZ
129     READ 1003, AQ, AVM, BR, XL, MU, LAM
130     READ 1006, GM, EPS, ASG
131     READ 1007, GVI, GM, GZ, HEZRON, HEZSIE
132     NAL=INT(X1)
133     ISTAR=IIFE
      C    --- WRITE INPUT
134     PRINT 2001, NAME
135     WRITE (12,2001) NAME
136     PRINT 2004, TSTART
137     WRITE (12,2004) TSTART
138     PRINT 2002, TIME, UTR, CYL, GMDVEL
139     WRITE (12,2002) TIME, UTR, CYL, GMDVEL
140     PRINT 2003, ALPHA
141     WRITE (12,2003) ALPHA
142     PRINT 2004, IHAW, JHAW, YBASE, WEZYO

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OFFWEGC 95
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OFFWEGC 161
OFFWEGC 162

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143 WHITE (12,7014) 1000, JHAW, YBASE, REZYO
144 PRINT 2,05, 1000, JHAW, JHAW, JHAW, DZ, FREZ
145 WHITE (12,8015) 1000, JHAW, JHAW, JHAW, DZ, FREZ
146 PRINT 2,05, 1000, JHAW, JHAW, JHAW, DZ, FREZ
147 WHITE (12,2016) 1000, JHAW, JHAW, JHAW, DZ, FREZ
148 C --- COMPUTE AMBIENT TEMPERATURE
149 XHAW=JHAW*(REZYO)
150 ZHAW=JHAW*(REZYO)
151 YHAW=JHAW*(REZYO)
152 C --- SET CONSTANTS
153 101 = JHAW + 1
154 YHAW=YHAW+REZYO
155 102 = JHAW + 2
156 JHAW=JHAW+1
157 JHAW=JHAW+2
158 JHAW = JHAW + 4
159 T=TIME
160 LTHAW=0
161 LTHAW=0
162 NG1 = NG + 1000
163 NG1 = NG + 1000
164 NG1 = NG + 1000
165 NG1=NG1+NG1
166 ISC1 = NG1 + 1
167 ISC2 = ISC1 * NG1
168 ITV = JHAW * NG1
169 ISC1 = ISC2 - NG1
170 ISC2 = ISC1 * NG1
171 LTHAW = JHAW * JHAW/3 + 3
172 IF (LTHAW<0.0) LTHAW = 3
173 LTHAW = LTHAW+NG1+NG1
174 LTHAW=LTHAW+NG1
175 NG1=0
176 NG1 = JHAW+1
177 NG1=JHAW+1
178 NG1 = JHAW+1
179 C(LAM=1.5/(LAM+ML+MU+EN1))
180 A1=JHAW+1
181 THAW = 1.0/3
182 LTHAW = MAX(1,THAW)
183 LTHAW = MAX(1,THAW)
184 LTHAW = JHAW/2
185 IF (JHAW<0.0) JHAW=JHAW/2
186 IF (JHAW<0.0) JHAW=JHAW/2
187 THAW = 1.0/3
188 VTHAW=0
189 NG1=1
190 NG1=1
191 NG1=1
192 NG1=1
193 NG1=1
194 NG1=1
195 NG1=1
196 NG1=1
197 NG1=1
198 NG1=1
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229 NG1=1
230 NG1=1

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217	C	WHILE (I2.GT.0) THEN, I2=I2+1, ALC	OFFMELUC	231
218	C	--- RESP. INPUT	OFFMELUC	232
219	C	CALL KSHHPP	OFFMELUC	233
219	C	--- SET UP FILM PLOT COORDINATES	OFFMELUC	234
219	C	CALL FILMCO	OFFMELUC	235
219	C	--- COMPUTE ATAB YTAB ITAB	OFFMELUC	236
219	C	CALL START	OFFMELUC	237
219	C	LC 139 J=2, JMD	OFFMELUC	238
219	C	YTAB(J) = Y(IJ)	OFFMELUC	239
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	240
219	C	LC 149 I=1, IPI	OFFMELUC	241
219	C	ATAB(I) = X(IJ)	OFFMELUC	242
219	C	LC 159 J=2, JMD	OFFMELUC	243
219	C	YTAB(J) = Y(IJ)	OFFMELUC	244
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	245
219	C	LC 169 I=1, IPI	OFFMELUC	246
219	C	ATAB(I) = X(IJ)	OFFMELUC	247
219	C	LC 179 J=2, JMD	OFFMELUC	248
219	C	YTAB(J) = Y(IJ)	OFFMELUC	249
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	250
219	C	LC 189 I=1, IPI	OFFMELUC	251
219	C	ATAB(I) = X(IJ)	OFFMELUC	252
219	C	LC 199 J=2, JMD	OFFMELUC	253
219	C	YTAB(J) = Y(IJ)	OFFMELUC	254
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	255
219	C	LC 209 I=1, IPI	OFFMELUC	256
219	C	ATAB(I) = X(IJ)	OFFMELUC	257
219	C	LC 219 J=2, JMD	OFFMELUC	258
219	C	YTAB(J) = Y(IJ)	OFFMELUC	259
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	260
219	C	LC 229 I=1, IPI	OFFMELUC	261
219	C	ATAB(I) = X(IJ)	OFFMELUC	262
219	C	LC 239 J=2, JMD	OFFMELUC	263
219	C	YTAB(J) = Y(IJ)	OFFMELUC	264
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	265
219	C	LC 249 I=1, IPI	OFFMELUC	266
219	C	ATAB(I) = X(IJ)	OFFMELUC	267
219	C	LC 259 J=2, JMD	OFFMELUC	268
219	C	YTAB(J) = Y(IJ)	OFFMELUC	269
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	270
219	C	LC 269 I=1, IPI	OFFMELUC	271
219	C	ATAB(I) = X(IJ)	OFFMELUC	272
219	C	LC 279 J=2, JMD	OFFMELUC	273
219	C	YTAB(J) = Y(IJ)	OFFMELUC	274
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	275
219	C	LC 289 I=1, IPI	OFFMELUC	276
219	C	ATAB(I) = X(IJ)	OFFMELUC	277
219	C	LC 299 J=2, JMD	OFFMELUC	278
219	C	YTAB(J) = Y(IJ)	OFFMELUC	279
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	280
219	C	LC 309 I=1, IPI	OFFMELUC	281
219	C	ATAB(I) = X(IJ)	OFFMELUC	282
219	C	LC 319 J=2, JMD	OFFMELUC	283
219	C	YTAB(J) = Y(IJ)	OFFMELUC	284
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	285
219	C	LC 329 I=1, IPI	OFFMELUC	286
219	C	ATAB(I) = X(IJ)	OFFMELUC	287
219	C	LC 339 J=2, JMD	OFFMELUC	288
219	C	YTAB(J) = Y(IJ)	OFFMELUC	289
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	290
219	C	LC 349 I=1, IPI	OFFMELUC	291
219	C	ATAB(I) = X(IJ)	OFFMELUC	292
219	C	LC 359 J=2, JMD	OFFMELUC	293
219	C	YTAB(J) = Y(IJ)	OFFMELUC	294
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	295
219	C	LC 369 I=1, IPI	OFFMELUC	296
219	C	ATAB(I) = X(IJ)	OFFMELUC	297
219	C	LC 379 J=2, JMD	OFFMELUC	298
219	C	YTAB(J) = Y(IJ)	OFFMELUC	299
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	300
219	C	LC 389 I=1, IPI	OFFMELUC	301
219	C	ATAB(I) = X(IJ)	OFFMELUC	302
219	C	LC 399 J=2, JMD	OFFMELUC	303
219	C	YTAB(J) = Y(IJ)	OFFMELUC	304
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	305
219	C	LC 409 I=1, IPI	OFFMELUC	306
219	C	ATAB(I) = X(IJ)	OFFMELUC	307
219	C	LC 419 J=2, JMD	OFFMELUC	308
219	C	YTAB(J) = Y(IJ)	OFFMELUC	309
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	310
219	C	LC 429 I=1, IPI	OFFMELUC	311
219	C	ATAB(I) = X(IJ)	OFFMELUC	312
219	C	LC 439 J=2, JMD	OFFMELUC	313
219	C	YTAB(J) = Y(IJ)	OFFMELUC	314
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	315
219	C	LC 449 I=1, IPI	OFFMELUC	316
219	C	ATAB(I) = X(IJ)	OFFMELUC	317
219	C	LC 459 J=2, JMD	OFFMELUC	318
219	C	YTAB(J) = Y(IJ)	OFFMELUC	319
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	320
219	C	LC 469 I=1, IPI	OFFMELUC	321
219	C	ATAB(I) = X(IJ)	OFFMELUC	322
219	C	LC 479 J=2, JMD	OFFMELUC	323
219	C	YTAB(J) = Y(IJ)	OFFMELUC	324
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	325
219	C	LC 489 I=1, IPI	OFFMELUC	326
219	C	ATAB(I) = X(IJ)	OFFMELUC	327
219	C	LC 499 J=2, JMD	OFFMELUC	328
219	C	YTAB(J) = Y(IJ)	OFFMELUC	329
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	330
219	C	LC 509 I=1, IPI	OFFMELUC	331
219	C	ATAB(I) = X(IJ)	OFFMELUC	332
219	C	LC 519 J=2, JMD	OFFMELUC	333
219	C	YTAB(J) = Y(IJ)	OFFMELUC	334
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	335
219	C	LC 529 I=1, IPI	OFFMELUC	336
219	C	ATAB(I) = X(IJ)	OFFMELUC	337
219	C	LC 539 J=2, JMD	OFFMELUC	338
219	C	YTAB(J) = Y(IJ)	OFFMELUC	339
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	340
219	C	LC 549 I=1, IPI	OFFMELUC	341
219	C	ATAB(I) = X(IJ)	OFFMELUC	342
219	C	LC 559 J=2, JMD	OFFMELUC	343
219	C	YTAB(J) = Y(IJ)	OFFMELUC	344
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	345
219	C	LC 569 I=1, IPI	OFFMELUC	346
219	C	ATAB(I) = X(IJ)	OFFMELUC	347
219	C	LC 579 J=2, JMD	OFFMELUC	348
219	C	YTAB(J) = Y(IJ)	OFFMELUC	349
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	350
219	C	LC 589 I=1, IPI	OFFMELUC	351
219	C	ATAB(I) = X(IJ)	OFFMELUC	352
219	C	LC 599 J=2, JMD	OFFMELUC	353
219	C	YTAB(J) = Y(IJ)	OFFMELUC	354
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	355
219	C	LC 609 I=1, IPI	OFFMELUC	356
219	C	ATAB(I) = X(IJ)	OFFMELUC	357
219	C	LC 619 J=2, JMD	OFFMELUC	358
219	C	YTAB(J) = Y(IJ)	OFFMELUC	359
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	360
219	C	LC 629 I=1, IPI	OFFMELUC	361
219	C	ATAB(I) = X(IJ)	OFFMELUC	362
219	C	LC 639 J=2, JMD	OFFMELUC	363
219	C	YTAB(J) = Y(IJ)	OFFMELUC	364
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	365
219	C	LC 649 I=1, IPI	OFFMELUC	366
219	C	ATAB(I) = X(IJ)	OFFMELUC	367
219	C	LC 659 J=2, JMD	OFFMELUC	368
219	C	YTAB(J) = Y(IJ)	OFFMELUC	369
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	370
219	C	LC 669 I=1, IPI	OFFMELUC	371
219	C	ATAB(I) = X(IJ)	OFFMELUC	372
219	C	LC 679 J=2, JMD	OFFMELUC	373
219	C	YTAB(J) = Y(IJ)	OFFMELUC	374
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	375
219	C	LC 689 I=1, IPI	OFFMELUC	376
219	C	ATAB(I) = X(IJ)	OFFMELUC	377
219	C	LC 699 J=2, JMD	OFFMELUC	378
219	C	YTAB(J) = Y(IJ)	OFFMELUC	379
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	380
219	C	LC 709 I=1, IPI	OFFMELUC	381
219	C	ATAB(I) = X(IJ)	OFFMELUC	382
219	C	LC 719 J=2, JMD	OFFMELUC	383
219	C	YTAB(J) = Y(IJ)	OFFMELUC	384
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	385
219	C	LC 729 I=1, IPI	OFFMELUC	386
219	C	ATAB(I) = X(IJ)	OFFMELUC	387
219	C	LC 739 J=2, JMD	OFFMELUC	388
219	C	YTAB(J) = Y(IJ)	OFFMELUC	389
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	390
219	C	LC 749 I=1, IPI	OFFMELUC	391
219	C	ATAB(I) = X(IJ)	OFFMELUC	392
219	C	LC 759 J=2, JMD	OFFMELUC	393
219	C	YTAB(J) = Y(IJ)	OFFMELUC	394
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	395
219	C	LC 769 I=1, IPI	OFFMELUC	396
219	C	ATAB(I) = X(IJ)	OFFMELUC	397
219	C	LC 779 J=2, JMD	OFFMELUC	398
219	C	YTAB(J) = Y(IJ)	OFFMELUC	399
219	C	IF (J.GT.2) GO TO 139	OFFMELUC	400

SINGLY REFERENCED VARIABLES

120	47*	ELWH	=	46SU	IJFS	=	1	8CO	LOGICAL	=	21F	PINK	=	4CN	HLC1	=	7CN	XL	=	R	9CU			
120	152*	EGUIVAL	=	16F	INT	=	132SU	LOUPD	=	261SU	PACONV	=	H	9CO	HVALS	(R	11CO	XR	=	H	9CU			
140	221*	FILKAC	=	204SU	IPXL	=	1	9CO	MESHMKH	=	20HSU	PXL	=	H	9CO	SENSE	=	14CN	YB	=	H	9CU		
300	246*	FIPAL	=	H	9CO	IPAR	=	1	9CO	MID	=	45SU	PAR	=	H	9CO	SILVEM	=	9CN	YCUNV	=	H	9CU	
340	258*	FIPAH	=	H	9CO	IPYB	=	1	9CO	MUVE	=	202SU	PYB	=	H	9CO	SKIPK	=	110SU	YLC1	=		5CN	
AFSRL	82SU	FIPYB	=	H	9CO	IPYT	=	1	9CO	MUOZ	=	H	17HL	PYCUNV	=	H	9CO	STAND	=	246SU	YLC2	=		6CN
ANGLES (H	11CO	FIAL	=	H	9CO	IXL	=	1	9CO	NARGLS	=	1	11CO	PYT	=	H	9CO	STATE	=	2CN	YSL1	=		3CN
BLUE	15CN	FIAH	=	H	9CO	IXH	=	1	9CO	NOUMP	=	1	RCO	GEXH10	=	151SU	TEMP	(R	8CO	YT	=	H	9CU	
CRIMSV	13CN	FITY	=	H	9CO	IYE	=	1	9CO	NHVALS	=	1	11CO	RADA	(H	15CO	THEH1	=	H	11CO				
DAIES	37SU	GLTEMP	=	150SU	IYT	=	1	9CO	NWL	=	1	56HD	REAL	=	17F	VV	=	R	9CO					
DUNE	245SU	GLIL	=	36SU	KSTEP	=	1	111CO	OFFWEDU	=	15J	HED	=		8CN	WHITE	=		11CN					
ECHO	221SU	GREEN	=	12CN	LAMD	=	H	17FL	ORHNGE	=	10CN	RIAH	=	H	9CO	XCOIV	=	H	9CO					

MULTIPLY-REFERENCED VARIABLES

3	=	51*	14*														
4	=	4*	42	43*													
6	=	4*	40	44*													
7	=	103	105*														
11	=	84	124*														
22	=	44*	40														
33	=	5100	53*														
41	=	5500	5700	60*													
42	=	5400	62*														
44	=	7200	70	81*													
61	=	111*	110														
62	=	113	117*														
63	=	114	121*														
64	=	12	122*														
125	=	19000	20*														
129	=	21400	210*														
131	=	213	211*														
134	=	21100	210*														
151	=	222*	230														
154	=	22300	225*														
161	=	224	226*														
164	=	22000	220*														
171	=	227	224*														
204	=	231	234*														
214	=	23000	230*														
224	=	23100	234*														
349	=	24400	24*														
354	=	24700	26*														
1601	=	22*	125HL														
1603	=	23*	120HL	129HL	130HL	131HL											
1604	=	24*	121HL														
1605	=	25*	120HL														
2001	=	26*	134HL	135HL													
2002	=	27*	136HL	137HL													
2003	=	28*	137HL	141HL													
2004	=	29*	142HL	143HL													
2005	=	30*	144HL	145HL													
2006	=	31*	146HL	147HL													
2008	=	32*	147HL	148HL													
2009	=	33*	149HL	151HL													
2011	=	34*	152HL	153HL													
2012	=	35*	154HL	155HL													
AASC	(H	3CO	100U	106U	16EL	16EG	16EU	16EQ	16EQ	16EQ	16EQ	16EQ	16EQ	16EQ	16EQ	16EQ	16EQ
AA1	(H	10FU	10LU	106U	221AU												
AA2	(H	5LC	44U														
ALPHA	H	12CC	120HU	141HL	147HL	261											
ANG	H	11CO	177S	178	216HL	207HL											
ASU	H	11CO	131HU	140HL	147HL												
A	H	11CO	127HU	140HL	147HL												
ADPAC	H	10CO	1E														
ADH	H	11CO	127HU	140HL	147HL												
BACKSPA	=	117F	110F	114F													
ELIAC	(H	10FU	10U1														

[illegible]

JBAH	-1	FCU	127RU	142PH	143WH	156	157	158	185								
JCEH	-1	1CCU	141=														
JJ	-1	247LU	148														
JMID	-1	15CU	128RU	144PH	145WH	185	185=										
JNM	-1	1 CU	36AU	38PH	39WH												
JPI	-1	RCU	150=	168	235DU												
JPI2	-1	RCU	93	157=	171	171	211DU	223LU	247DU	255	256						
JPI4	-1	1 CU	150=	248													
JSWTCH1	-1	14CU	41AU	121=													
JSWTCH2	-1	14CU	41AU														
JSWTCH3	-1	14CU	42AU	65	66												
JUNF	-1	128RU	144WH	145WH	183=	183	184										
JUNF02	-1	15CU	184=														
K	-1	51DU	52	52	57DU	58	59										
KP	-1	222=	224	227	232=	232											
KXI	-1	14CU	132=	140PH	147WH												
LAM	-K	1 CU	17HL	167RU	146PH	147WH	179										
LIM	-	5F	6F	7F													
LJP2	-1	1 CU	171=	172	172=	173=	173										
LOCF	-	86SU	86SU	174SU													
LOUP	-	217SU	243SU														
LPH	-1	214=	221AU														
M	(1)K	166U	17HL	18DU	239=	254	255	256	257								
MAX0	-	182SU	183SU														
MP	(1)K	166U	17HL	18DU													
MU	-K	1 CU	17HL	167RU	146PH	147WH	179	179									
NME	(1)K	RCU	83RU	86	90RU	102RU	105RU	134PR	135WH								
NBP	-1	12CU	140=	244PH	245WH												
NHUF	-1	14CU	142=	244PH	245WH												
NCYC	-1	RCU	175=														
NDALL	-1	86=	9 RU	102RU													
NE	-1	48AU	221HL														
NECS	-1	44=	45=	45	46AU	93=	94RU	95=	96RU								
NFRU	-1	2CU	49RU	51DU	57LU	58	58										
NOPU	-1	2CU	49RU	54DU	63	150											
NOPT	-1	2CU	49RU	55DU	58	63	78	150									
NPCMAX	-1	12CU	194=	244PH	245WH												
NPP1	-1	221=	223=	229	230	231											
NPT	-1	1 CU	45	130=	219	219	231										
NQ	-1	RCU	124=	162	164	169	173	204PR	205WH	216	237	238	251	252			
NQ1	-1	RCU	43	164=	165	165	166	167	168	170	173	204PR	205WH				
NQ1B	-1	1 CU	162=														
NQ12	-1	1 CU	165=														
NSP	-1	14CU	145=	244PH	245WH												
NSTATE	-1	63=	72DU														
NUMIT	-1	1 CU	154=														
OM	-K	1 CU	13 RU	140PH	147WH												
DMANG	-K	1 CU	17RU														
UMCYL	-K	1 CU	163=														
OPEN	(1)K	2CU	50RU	61=	61	15J											
OPEN	-	87SU	88SU	105SU	106SU	117SU	109SU	122SU									
OPSIG	(1)K	2 DU	56RU	59													
OPTMP	(1)K	2CU	56RU	150													
P	(1)K	166U	167U														
PL	(1)K	166U	167U														
PPINI	-	30F	134F	136F	138F	140F	142F	144F	146F	204F	206F						
PTAB...	(1)K	2CU	63RU	67RU	76=	76											
QUO10	-	142SU	143SU														
R	(1)K	166U	167U														
RCSW	(1)K	166U	167U														
REAU	-	44F	5 F	56F	64F	65F	66F	67F	68F	69F	83SU	90F	91F	94F	96F	97F	102SU
RETOU...	-	114F	115F	125F	126F	127F	128F	129F	130F	131F							
RETOU...	-	104F	105F	203F													
RETOU...	-	82F	93F														
RETOU...	-K	1 CU	131RU	140PH	147WH	148											
RETOU...	-K	RCU	131RU	140PH	147WH	149											
RETOU...	-K	1 CU	131RU	140PH	147WH	150											
RETOU...	(1)K	166U	167U	255=													


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9      COMMON /SILVER/
1      TEMP(1000), T, TIME, TOUT, TSTART, THY
1      FIPAL, FIPXR, FIPYH, FIAL, FIAH, FIYH,
1      IPAL, IPIXH, IPYH, IPLY, IAL, IXH, IYH,
1      IYI, PALCONV, PAL, PXH, PYE, PYCONV, PYI,
1      RIEPH, VV, XCONV, X, XR, YH, YCONV, YI
10     COMMON /ORANGE/
1      AL, ASL, A, AUFAC, AUM, HO, COLAM, CYL,
1      DTHS, EPS, ONI, OM, OZ, IMI,
1      IECH, IPZ, ITAH(1000), JNH, JH4, KXI, LAM,
1      LGFI, ML, KFI, NUIH, NUIZ, NUMIT, OM,
1      UPANC, OMCYL, HEZHH, HEZTU, THIMU, VTEM
11     COMMON /WHITE/
12     COMMON /BLUE/
1      DM, OZ, FREQ, IONF, OMIO,
1      JONFUC, KAPX(7500), ROMPH, YBASE
13     COMMON /SENSE/
14     EQUIVALENCE
1      (AASC(1),X,XPAR), (AASC(2),P,YPAR), (AASC(3),Y),
1      (AASC(4),I), (AASC(5),V), (AASC(6),RO),
1      (AASC(7),MP,HMP,HLSO,CENTX),
1      (AASC(8),E,ETIL,CENT), (AASC(9),HVCL),
1      (AASC(10),P,HMP,VP), (AASC(11),P,PL,EP,UP),
1      (AASC(12),VTIL,VL,EMUMLC),
1      (AASC(13),VTIL,VL,UMMPLC),
1      (AASC(14),FCL,FTALC,FOUTC), (AASC(15),SIE),
1      (AASC(16),DELSH,SIGPLC),
1      (AASC(17),GRIH,GRIHQUEN),
1      (AASC(18),GRIZ,UGHGT)
15     REAL
16     DIMENSION
1      X(1), XPAR(1), K(1), YPAR(1), Y(1), U(1),
1      V(1), K(1), MP(1), HMP(1), HCSG(1), CENTX(1),
1      E(1), ETIL(1), CENTY(1), HVOL(1), M(1), MP(1),
1      VP(1), P(1), PL(1), EP(1), UP(1), VTIL(1),
1      UL(1), CU(1), EMOMPLC(1), VTIL(1), VL(1),
1      UMOMPLC(1), FUL(1), FTALC(1), FOUTLC(1),
1      SIE(1), DELSH(1), SIGPLC(1), GRIH(1), UG(1),
1      RZIER(1), GRI(1), VG(1), FSK(1)
17     1.00 FCHMAT
18     1.01 FCHMAT
19     1.02 FCHMAT
20     1.10 FCHMAT
21     1.11 FCHMAT
22     1.12 FCHMAT
23     1.13 FCHMAT
24     1.14 FCHMAT
25     1.15 FCHMAT
26     C
27     C
28     C
29     C
30     C
31     C
32     C
33     C
34     C
35     C
36     C
37     C

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AL,KCM 13
SILVER 2
SILVER 3
SILVER 4
SILVER 5
ORANGE 2
ORANGE 3
ORANGE 4
ORANGE 5
ORANGE 6
ORANGE 7
BLUE 2
BLUE 3
SENSE 2
EUVHEAL 2
EUVHEAL 3
EUVHEAL 4
EUVHEAL 5
EUVHEAL 6
EUVHEAL 7
EUVHEAL 8
EUVHEAL 9
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EUVHEAL 12
EUVHEAL 13
DIMEN 2
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DIMEN 9
MESHMKR 10
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MESHMKR 49

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33      Y(IJ)=YY-DZ
34      X(IJ)=XX
35      F(IJ)=F(IJ)
36      C-4 J=JUM*FC2) GO TO 204
37      Y(IJ)=YY+DZ
38      X(IJ)=XX
39      F(IJ)=F(IJ)
40      L=JUM*FC1
41      L=JUM*FC1
42      AA = AA + DR
43      L=JUM*FC1
44      219 CONTINUE
45      AA = JA
46      YY = YY + DZ
47      CALL LUMP
48      229 CONTINUE
49      CALL DONE
50
51      C --- COMPUTE VARIABLE COORDINATES
52      IF (FREQ.EQ.1.0) GO TO 300
53      JUM=JUM*2
54      JUM=JUM*JUM*FC2
55      JUM=JUM*JUM*FC2
56      T0 = FREQ*(JUM*FC2) * DZ
57      CALL START
58      DO 249 J=JUM*FC1
59      DO 249 I=1,IMP
60      IMJ = J - N0
61      IF (1.0/IMP+1) X(IJ) = X(IMJ) + FREQ*(X(IMJ)-X(IMJ-N0))
62      F(IJ) = X(IJ)*CYL + O/CYL
63      ULT = IABS(J-JUM)
64      ULT = IABS(J-JUM)
65      IF (J-ULT-N0) Y(IJ)=-J-DZ*FREQ*(1.0-FREQ**JDM)*ROMFR
66      IF (J-ULT-N0) Y(IJ)= J-DZ*FREQ*(1.0-FREQ**JDM)*ROMFR
67      IF (J-ULT-2) Y(IJ)=YBASE
68      L=JUM*FC1
69      239 CONTINUE
70      CALL LUMP
71      249 CONTINUE
72      CALL DONE
73
74      C --- UNIFORM MESH VARIABLES
75      3.0 READ 1001, (N0, NM, NT, NL, UI, VI, ROI, SIEI
76      IF (NM.EQ.1) GO TO 400
77      IF (NM.EQ.1000) GO TO 500
78      AF=6.0/3*(ROI)
79      AF=AF*(AP*OPEN(1))
80      AF=AF*(AP*OPEN(1000))
81      ZF=6.0/3*(SIEI)
82      YF=6.0/3*(XF*ZP*OPEN*OPTMP*ETAB*NOPI*NOPT)
83      IF (YF*NT*OPTMP(NOPT)) YF=OPTMP(NOPT)
84      IF (ZF*NL*OPTMP(NOPT)) ZF=OPTMP(NOPT)
85      IF (ZF*NL*OPTMP(NOPT)) ZF=OPTMP(NOPT)
86      PRINT 101, (N0, NM, NT, NL, ROI, SIEI, UI, VI, TEMPI
87      WRITE (12,101) (N0, NM, NT, NL, ROI, SIEI, UI, VI, TEMPI
88      HROI=13/2*ZL=0.7*TEMPI**2/ROI
89      NPI = N0 + 2
90      NPI = NM + 1
91      NPI = NT + 2
92      NPI = NL + 1
93      DO 249 J=N2+NT2
94      CALL HPI0
95      L=JUM*JUM*IMP*NL
96      DO 319 I=1,IMP
97      CALL SFIJ
98      L=JUM*JUM*IMP*NL
99      L(IJ)=L
100      V(IJ)=V
101      F(IJ)=F0I
102      S(IJ)=E(IJ)=SIEI*HROI
103      T(IJ)=T(IJ)=T(IJ)

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MESHKKK 50
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MESHKKK 117

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114 J19 CONTINUE
115 CALL ATMOH
116 J29 CONTINUE
117 IF (NOZ*NE*2) GO TO J30
118 J=1
119 CALL ATMOH
120 DO 359 I=1,IP
121 CALL SETIJ
122 HC(IJ)=H0I
123 SIE(IJ)=E(IJ)=SIEI*RH0I
124 359 CONTINUE
125 CALL ATMOH
126 DO 369 I=1,IP
127 C --- EXPONENTIAL ATMOSPHERE
128 4.0 XX=UMI*HE/SIE
129 YY = .5*ABS(XX)
130 FNUM=1.5
131 WHILE (12.1*YY)
132 CALL START
133 YCZ=V.5*(Y(IJP)+Y(IJ))+HFZ*Y
134 HCSAV = REZRON*EXP(-GZ*(REZYH-YCZ)/XX)
135 FNUM = (Y(IJP)-Y(IJ))*YY
136 FLEN = FNUM*HFZ
137 HCUJ = HCSAV*(XX+FNUM)/(XX-FLEN)
138 DO 459 I=1,IP
139 HC(IJ) = HOSAV
140 HC(IJP) = HCUJ
141 SIE(IJ)=SIE(IJP)=REZSIE
142 U(IJ)=U(IJP)=V(IJ)=V(IJP)=0.0
143 IJ = IJ + NG
144 IJP=IJP+NG
145 459 CONTINUE
146 CALL LOOP
147 DO 479 J=3,JP1
148 FLEN = (Y(IJP)-Y(IJ))*YY
149 FNUM = (Y(IJ)-Y(IJP))*YY
150 HCSAV = HCSAV*(XX-FNUM)/(XX+FLEN)
151 DO 469 I=1,IP
152 HC(IJ) = HOSAV
153 SIE(IJ)=HEZSIE
154 U(IJ)=V(IJ)=0.0
155 IJ=IJ+NG
156 469 CONTINUE
157 CALL LOOP
158 479 CONTINUE
159 FNUM = FNUM*HFZ
160 FLEN = FNUM*HFZ
161 HCUJ = HCSAV*(XX-FNUM)/(XX+FLEN)
162 DO 489 I=1,IP
163 HC(IJ) = HOSAV
164 SIE(IJ)=HEZSIE
165 U(IJ)=V(IJ)=0.0
166 IJ=IJ+NG
167 489 CONTINUE
168 CALL DONE
169 CALL START
170 DO 499 J=2,JP2
171 IJSC=(J-1)*IP+1
172 XH=H0G17(RC(IJ))
173 XH=H0G17(XH+UMVEN(1))
174 XH=H0G17(XH+UMVEN(UMPD))
175 ZI=H0G17(SIE(IJ))
176 YH=H0G17(XH, ZI, OMVEN, OPTMP, ETAN, NOPU, NOPT)
177 IF (YH.GT.7P17P(NCPI)) YH=OPTMP(NCPI)
178 TEMP(IJSC)=H0G17(YH)
179 PRINT 105, J, H0(IJ), SIE(IJ), TEMP(IJSC)
180 WHILE (12.1*YY) J, H0(IJ), SIE(IJ), TEMP(IJSC)
181 DO 499 I=1,IP
182 MESHNR 116
183 MESHNR 119
184 MESHNR 120
185 MESHNR 121
186 MESHNR 122
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244 MESHNR 180
245 MESHNR 181
246 MESHNR 182
247 MESHNR 183
248 MESHNR 184
249 MESHNR 185

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171	IJSC=IJSC+1	ME SHMRR	186
172	TEMP(IJSC)=TEMP(IJSC-1)	ME SHMRR	187
173	HR01=13/.214E-07*TEMP(IJSC)**4/RQ(IJ)	ME SHMRR	188
174	SIE(IJ)=E(IJ)=SIE(IJ)+HR01	ME SHMRR	189
175	IJ=IJ+NG	ME SHMRR	190
176	498 CONTINUE	ME SHMRR	191
177	CALL LOOP	ME SHMRR	192
178	499 CONTINUE	ME SHMRR	193
179	CALL DONE	ME SHMRR	194
	C	ME SHMRR	195
	--- PUNCH INPUT	ME SHMRR	196
180	5.1 IF (JSTIC-1E+02) GO TO 520	ME SHMRR	197
181	READ 1000, 1800, JB00	ME SHMRR	198
182	IF (1800.EQ.0) GO TO 500	ME SHMRR	199
183	PRINT 1810, 1800, JB00	ME SHMRR	200
184	WRITE (12,1010) 1800, JB00	ME SHMRR	201
185	5.1 READ 1020, 11, JJ, RCI, SIEI, VI, UI	ME SHMRR	202
186	IF (11.EQ.0) GO TO 500	ME SHMRR	203
187	I=11+1E+01	ME SHMRR	204
188	J=JJ+1E+01	ME SHMRR	205
189	CALL KIR00	ME SHMRR	206
190	CALL SFTIJ	ME SHMRR	207
191	R(IJ)=R01	ME SHMRR	208
192	AF=0.0012(RCI)	ME SHMRR	209
193	AF=HR01*(AF+CPDEN(NOPD))	ME SHMRR	210
194	AF=HR01*(AF+CPDEN(I))	ME SHMRR	211
195	ZP=0.0012(SIEI)	ME SHMRR	212
196	YP=0.0012(XP+ZP+OPDEN*OPTMP+ETAB*NOPD*NOPT)	ME SHMRR	213
197	IF (YP.GT.0.0012(NOPT)) YP=0.0012(NOPT)	ME SHMRR	214
198	TEMP=0.0012(YP)	ME SHMRR	215
199	PRINT 1010, 11, JJ, RCI, SIEI, UI, VI, TEMP	ME SHMRR	216
200	WRITE (12,1010) 11, JJ, RCI, SIEI, UI, VI, TEMP	ME SHMRR	217
201	IJSC=(J-1)*IP1+1	ME SHMRR	218
202	TEMP(IJSC)=TEMP	ME SHMRR	219
203	HR01=13/.214E-07*TEMP**4/RCI	ME SHMRR	220
204	SIE(IJ)=SIEI+HR01	ME SHMRR	221
205	U(IJ)=UI	ME SHMRR	222
206	V(IJ)=VI	ME SHMRR	223
207	CALL KIR00	ME SHMRR	224
208	IF (1800.EQ.0) GO TO 502	ME SHMRR	225
209	I=1800+1	ME SHMRR	226
210	IF (1.EQ.0) GO TO 502	ME SHMRR	227
211	IJSC=(J-1)*IP1+1	ME SHMRR	228
212	CALL KIR00	ME SHMRR	229
213	CALL SFTIJ	ME SHMRR	230
214	R(IJ)=R01	ME SHMRR	231
215	SIE(IJ)=SIEI+HR01	ME SHMRR	232
216	TEMP(IJSC)=TEMP	ME SHMRR	233
217	CALL KIR00	ME SHMRR	234
218	I=1	ME SHMRR	235
219	CALL KIR00	ME SHMRR	236
220	CALL SFTIJ	ME SHMRR	237
221	U(IJ)=UI	ME SHMRR	238
222	V(IJ)=VI	ME SHMRR	239
223	CALL KIR00	ME SHMRR	240
224	I=11+1E+01	ME SHMRR	241
225	5.2 J=J+JJ+1	ME SHMRR	242
226	CALL KIR00	ME SHMRR	243
227	CALL SFTIJ	ME SHMRR	244
228	R(IJ)=R01	ME SHMRR	245
229	SIE(IJ)=SIEI+HR01	ME SHMRR	246
230	IJSC=(J-1)*IP1+1	ME SHMRR	247
231	TEMP(IJSC)=TEMP	ME SHMRR	248
232	CALL KIR00	ME SHMRR	249
233	J=J+1	ME SHMRR	250
234	CALL KIR00	ME SHMRR	251
235	CALL SFTIJ	ME SHMRR	252
236	U(IJ)=UI	ME SHMRR	253
237	V(IJ)=VI	ME SHMRR	

238	CALL N1K0W	MESHPKR	254
239	IF (I00H.EQ.1) GO TO 503	MESHPKR	255
24	J=J-1	MESHPKR	256
241	I=I000-1	MESHPKR	257
242	IF (I.E.E.) GO TO 503	MESHPKR	258
243	IUSC=(J-1)*IP)*I	MESHPKR	259
244	CALL N1K0W	MESHPKR	260
245	CALL SFTIJ	MESHPKR	261
246	N(IJ)=H0I	MESHPKR	262
247	SIC(IJ)=SIEI+HKOI	MESHPKR	263
248	TEMP(IJSC)=TEMPI	MESHPKR	264
249	CALL N1K0W	MESHPKR	265
250	I=I+1	MESHPKR	266
251	J=J+1	MESHPKR	267
252	CALL N1K0W	MESHPKR	268
253	CALL SFTIJ	MESHPKR	269
254	L(IJ)=UJ	MESHPKR	270
255	V(IJ)=VJ	MESHPKR	271
256	CALL N1K0W	MESHPKR	272
257	503 GO TO 501	MESHPKR	273
	C --- GENERATE MARKER PARTICLES	MESHPKR	274
258	505 CALL MARKTEA	MESHPKR	275
	C --- CALCULATE RVOL	MESHPKR	276
259	507 CALL START	MESHPKR	277
260	DO 549 J=2,NPJ	MESHPKR	278
261	IUSC=(J-1)*IP	MESHPKR	279
262	LC 539 I=I,IBAK	MESHPKR	280
263	IPJ = (J+NG	MESHPKR	281
264	IPJP = IPJ+NG	MESHPKR	282
265	IUSC=IUSC+1	MESHPKR	283
266	X1=A(IJPJ)	MESHPKR	284
267	X2=A(IPJP)	MESHPKR	285
268	X3=A(IJP)	MESHPKR	286
269	X4=A(IJ)	MESHPKR	287
270	Y1=Y(IJPJ)	MESHPKR	288
271	Y2=Y(IPJP)	MESHPKR	289
272	Y3=Y(IJP)	MESHPKR	290
273	Y4=Y(IJ)	MESHPKR	291
274	H1=H(IPJP)	MESHPKR	292
275	H2=H(IPJP)	MESHPKR	293
276	H3=H(IJP)	MESHPKR	294
277	H4=H(IJ)	MESHPKR	295
278	RVOL(IJ)=8.0/((H1+H2+H3+H4)*((X1-X3)*(Y2-Y4)-(Y1-Y3)*(X2-X4)))	MESHPKR	296
279	IF (J\$WTCM.EQ.1) GO TO 538	MESHPKR	297
280	XH=A1+X2+X3+X4	MESHPKR	298
281	YH=Y1+Y2+Y3+Y4	MESHPKR	299
282	H00A(IJSC)=0.25*USQRT(XH**2+YH**2)	MESHPKR	300
283	508 IJ=IPJ	MESHPKR	301
284	IJP=IPJP	MESHPKR	302
285	539 LC(1)H0E	MESHPKR	303
286	CALL L00F	MESHPKR	304
287	549 CC(1)H0E	MESHPKR	305
288	CALL U00E	MESHPKR	306
289	IF (J\$WTCM.EQ.1) RETURN	MESHPKR	307
	C	MESHPKR	457
290	RETURN	MESHPKR	458
291	END	MESHPKR	459

SINGLY REFERENCED VARIABLES

AA1	(H	SLL	EPS	=H	1000	IPYB	=1	900	J\$WTCM3	=1	1300	NOVALS	=1	1100	PYT	=R	900	TNEUT	=R	1100
AA2	(H	SLL	EGUIVAL	=	14F	IPYI	=1	900	KAI	=1	1000	NUMIT	=1	1000	QSORT	=	28250	TOUT	=R	800
AB5	=	11000	BAF	=	12350	IPZ	=1	1000	LAMB	=H	15HL	CV	=H	1000	REAL	=	15F	TSTART	=H	800
ALC	=H	1000	FIPAL	=H	900	ISCFL	=1	1000	LJMP	=1	1000	CHANC	=H	1000	RED	=	800	VTEM	=R	1000
ARGLES	(H	1000	FIPAL	=H	900	ISCFL	=1	1000	MAL	(I)	2401	CHANGE	=	1000	KIDAM	=R	900	VV	=R	900
ASU	=H	1000	FIPAL	=H	900	ISCFL	=1	1000	MATL	(I)	2401	PARTICL	=	25850	MLCI	=	700	WHITE	=	1000
AV	=H	1000	FIPAL	=H	900	ISCFL	=1	1000	MESHPRK	=	150	FINA	=	400	HVALS	(H)	1000	XCONV	=R	900

ANFAC	-H	1000	PLAN	-H	500	ITAM	171	1000	MDL2	-H	1500	PTAM	17H	200	SENDE	-	1300	AL	-H	400
ARM	-H	1000	PIRE	-H	500	ITV	-1	800	NAT1	-1	800	RUDE	17H	6001	SIGN	17H	700	YB	-H	400
BLUE	-	1000	PIRE	17H	200	IAL	-1	900	NATLS	-1	1000	RUDEM	17H	6001	SIGLEN	-	900	YCONV	-H	900
BTBL	17H	200	OR	-H	1000	IAN	-1	900	NCYC	-1	800	PURM	17H	6001	SPJBL	17H	200	YLL1	-	500
HC	-H	1000	ORLEVEL	-H	800	ITB	-1	900	KUCUP	-1	800	PURUV	17H	6001	STATE	-	200	YLL2	-	600
COLUMB	-H	1000	ICL	-1	1000	IT7	-1	900	NAT1	-1	200	PACONV	-H	400	IT	-H	800	YSC1	-	300
DT	-H	800	ICBS	-1	800	UBAR	-1	800	NAT1	-1	1000	PAL	-H	400	TAMM	-R	800	YT	-H	400
UTPOS	-H	1000	IM	-1	1000	JUN	-1	1000	NAT1	-1	800	PAM	-H	400	TIND	-R	1000			
UTK	-H	800	IPAL	-1	900	JUN	-1	1000	NAT1	-1	1000	PYP	-H	400	TY	-H	800			
EM40	-H	800	IPAN	-1	500	JSATCH2	-1	1000	NAT1	-1	1000	PYCONV	-H	400	TINE	-H	800			

MULTIPLY-REFERENCE TO VARIABLES

402	-	36	414		
404	-	41	434		
419	-	3700	444		
429	-	3100	534		
434	-	0000	124		
449	-	0100	144		
459	-	55	764	1. /	116
419	-	9000	1144		
424	-	9300	1464		
434	-	11.00	1144		
404	-	77	1174		
454	-	12700	1344		
464	-	14.00	1454		
474	-	13700	1474		
484	-	15100	1564		
494	-	17.00	1704		
494	-	15400	1764		
504	-	78	18.4	100	
501	-	1454	251		
502	-	254	251	2254	
503	-	234	242	2374	
505	-	184	2504		
520	-	18	2594		
538	-	279	2834		
539	-	26000	2854		
549	-	26100	2874		
1000	-	174	14110		
1001	-	144	7614		
1004	-	194	2774		
1011	-	214	0014		
1014	-	214	10344	10444	
1017	-	224	14444	20444	
1024	-	234	10544		
1054	-	254	11744	10744	
1051	-	244	10644	10444	

[illegible]

EXPLO	-	85SU	167SU	198SU																
GL0610	-	79SU	80SU	161SU	164SU	192SU	195SU													
Q	(H)	14SU	1001	35=	46=	40	44=	44	65=	274	275	276	277							
WADA	(H)	14CU	244=																	
WCSU	(H)	14SU	1001																	
READ	-	70F	141F	105F																
RETHUM	-	209F	24 F																	
REZHMN	-H	14CU	123																	
REZSIE	-H	6CU	117		142	153														
REZYU	-H	17CU	120	103																
RM	(H)	14SU	1001																	
RMP	(H)	14SU	1001																	
RO	(H)	14SU	1001	1 1=	112=	128=	149=	141=	152=	161	168PR	169WR	173	191=	214=	228=	246=			
ROI	-H	70SU	74	00PR	87WR	88	101	112	165RD	191	192	199PR	200WR	203	214	228	246			
ROJPF	-H	15=	152																	
ROJ	-H	120=	129																	
ROL	(H)	141L	1001																	
RUMFM	-H	14CU	60	64																
RUSAV	-H	123=	120	148	139=	139	141	150												
RH01	-H	80=	110	113	173=	174	203=	204	215	229	247									
RYOL	(H)	141L	1001	218=																
RZELEN	(H)	14SU	1001																	
R4	-H	274=	270																	
R1H0N	-	94SU	114SU	149SU	212SU	219SU	220SU	234SU	244SU	252SU										
R2	-H	275=	278																	
R3	-H	276=	278																	
R4	-H	277=	278																	
SET1J	-	47SU	111SU	194SU	213SU	220SU	221SU	235SU	245SU	253SU										
SIE	(H)	14SU	1001	142=	113=	130=	136=	142=	153=	164	169PR	169WR	174=	174	204=	215=	229=	247=		
SIE1	-H	74WR	62	00PR	87WR	102	113	145WR	195											
SIGFLC	(H)	14SU	1001																	
STANI	-	35SU	61SU	121SU	158SU	259SU														
TEMP	(H)	2CU	113=	107=	148PR	169WR	172=	172	173	202=	216=	231=	248=							
TEMP1	-H	85=	00PR	87WR	103	178=	199PR	200WR	202	216=	203	216	248	248						
TJ	-H	54=	60	64																

Y1 -K 27 = 270 281
Y2 -K 271 = 270 281
Y3 -K 272 = 270 281
Y4 -K 273 = 270 281
ZP -K 28 = 28 104 = 165 195 = 196

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1      SUMMOLTINE PARTGEN
2      COMMON /STAT/  NOMP, NCPD, NFRQ, UPTMP(30), OPDEN(10),
3      COMMON /YSC/  AASC(5*54)
4      COMMON /PINK/  I, IJ, IJM, IJP, J
5      COMMON /YLC/  AAL(13100)
6      COMMON /YLL2/  AAC(13100)
7      COMMON /YLC/  SIGA(10000)
8      COMMON /MED/  NAME(12), DT, DTR, EHLG, GRDVEL, IPAR, IJPS,
9      COMMON /SILVER/  IP1, ISCF1, ISCF2, ISCF3, ISCF4, ITV, JPAR,
10     COMMON /ORANGE/  JPI, JPP, NCYC, NUIMP, NG, NOI, PEZSIE, TAMB,
11     COMMON /WHITE/  TEMP(100), T, TIME, TOUT, ISTART, THY
12     COMMON /BLUE/  FIPAL, FIPAR, FIPY, FIAL, FIXR, FIYB,
13     EQUIVALENCE  IPAL, IPAR, IPY, IPYI, IAL, IAR, IYB,
14     DIMENSION  IYI, PACONV, PAL, PAX, PYU, PYCONV, PYI,
15     COMMON /ORANGE/  RIBBN, VV, XCONV, AL, AR, YH, YCONV, YI
16     COMMON /ORANGE/  ANL, ASG, AU, AUFAL, AGM, BG, CPLAL, CYL,
17     COMMON /ORANGE/  DTPUS, EPS, GVI, GR, GZ, IMI,
18     COMMON /ORANGE/  IELP, IPZ, ITAH(13 G), JNM, JPA, KX, LAM,
19     COMMON /ORANGE/  LJP, ML, NPT, AGIN, NGIZ, NUMIT, ON,
20     COMMON /ORANGE/  OMWOC, CMCYC, HEZHU, HEZTU, THIMU, VTEM
21     COMMON /ORANGE/  NVALS, NVALS(73), NANGLS, ANGLES(75), TNEUT
22     COMMON /BLUE/  OF, OZ, FREZ, JINT, JMIO,
23     COMMON /BLUE/  JUTFOR, WADA(7500), NOMP, YHASE
24     EQUIVALENCE  (AASC(1),X,XPAR), (AASC(2),R,YPAR), (AASC(3),Y),
25     EQUIVALENCE  (AASC(4),U), (AASC(5),V), (AASC(6),RO),
26     EQUIVALENCE  (AASC(7),MP,MPH,RCSD,CENTX),
27     EQUIVALENCE  (AASC(8),E,ETIL,CL,TT), (AASC(9),H,XCL),
28     EQUIVALENCE  (AASC(10),M,MM,VP), (AASC(11),P,PL,EP,UP),
29     EQUIVALENCE  (AASC(12),UTIL,HL,CG,EMUMLC),
30     EQUIVALENCE  (AASC(13),VTIL,VL,UMUMLC),
31     EQUIVALENCE  (AASC(14),DEL,DELALC,FOULC), (AASC(15),SIE),
32     EQUIVALENCE  (AASC(16),DELSM,SIMPLC),
33     EQUIVALENCE  (AASC(17),GRIR,GRW,EDEN),
34     EQUIVALENCE  (AASC(18),GRIZ,UG,SG),
35     EQUIVALENCE  LAM, LAMP, M, MP, IJ, MUOZ
36     DIMENSION  X(1), XPAR(1), R(1), YPAR(1), Y(1), U(1),
37     EQUIVALENCE  V(1), ML(1), MP(1), RMP(1), WOSC(1), CENTX(1),
38     EQUIVALENCE  E(1), ETIL(1), CENTY(1), RVOL(1), M(1), MM(1),
39     EQUIVALENCE  VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),
40     EQUIVALENCE  UL(1), CG(1), EMUMLC(1), VTIL(1), VL(1),
41     EQUIVALENCE  UMUMLC(1), RUL(1), METALC(1), FOULC(1),
42     EQUIVALENCE  SIE(1), DELSM(1), SIGPLC(1), GRIR(1), UG(1),
43     EQUIVALENCE  RZIEEN(1), GRIZ(1), VG(1), FSN(1)
44     COMMON /ORANGE/  (IM, SMORPAR, IPE12, 4, 6A, 6M DZPAR, IPE12, 4,
45     COMMON /ORANGE/  6M AC, IPE12, 4, 6A, 6M YC, IPE12, 4, 6A,
46     COMMON /ORANGE/  6M AU, IPE12, 4, 6A, 6M YU, IPE12, 4,
47     COMMON /ORANGE/  (I, 15, * PARTICLES GENERATED*)
48     COMMON /ORANGE/  (I, * PARTICLE REGIONS*)
49     COMMON /ORANGE/  C
50     COMMON /ORANGE/  FIDDPIT=PAR=1, C
51     COMMON /ORANGE/  K=1
52     COMMON /ORANGE/  PRINT 930
53     COMMON /ORANGE/  I, U, FERR, 450,
54     DIMENSION  LZPAR, XC, YC, AU, YU
55     PARTGEN
56     PARTGEN
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24 IF (DMPAR,LE,0.0) GO TO 240
25 IF (HPT,GE,1000) GO TO 100
26 PRINT 910, DMPAR, DZPAR, XC, YC, XD, YD
27 WRITE (12,910) DMPAR, DZPAR, XC, YC, XD, YD
28 YC=YC+ZC*YD
29 WRITE=YC+XD
30 PAR=PAR*AI(PAL,WHITE)
31 IF (YD,LT,EM10) GO TO 112
32 YTOP=YD+REZYD
33 YD=YC
34 GO TO 113
35 112 YTOP=YC+XD
36 YD=YC-XL
37 113 YD=ANIN1(PYD,YHOT)
38 YI=ANNA1(PYI,YTOP)
39 ZC=YI-YD(10,50,DZPAR
40 ZC=ATC(XC,50,DZPAR)
41 ZC IF (YD,LE,0.0) AND (YI-YC)**2+(XI-XC)**2.GT,XD**2) GO TO 240
42 ANNA(XD)=XI
43 YFAN(XD)=YI
44 KF=KF+2
45 KFI=KFI+1
46 IF (HPT,GE,1000) GO TO 100
47 240 IF (YD,GT,FM10) GO TO 230
48 XA=C00*XC-XI
49 IF (XA,LE,0.0) GO TO 230
50 ANNA(XI)=XA
51 YFAN(XI)=YI
52 KF=KF+2
53 KFI=KFI+1
54 IF (HPT,GE,1000) GO TO 100
55 23. XI=XI+DZPAR
56 IF (XI,LE,XC+XD) GO TO 220
57 24 YI=YI+DZPAR
58 IF (YI,LE,YTOP) GO TO 210
59 GO TO 100
60 220 LPH=HPT+HPT
61 CALL ECHO (ANSC, IECH, LPH, NZ)
62 PRINT 900, HPT
63 WRITE (12,920) HPT
64 RETURN
65 END

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SINGLY REFERENCED VARIABLES

200 = 390	DIR	=H	400	IJ	=I	400	IYB	=I	900	NOPI	=I	200	HADX	(R	1200	TIME	=R	800		
240 = 470	U2	=H	1200	IJM	=I	400	IYT	=I	900	NOPT	=I	200	HEAD	=	230	TNEUT	=R	1100		
AA1 (R)	SLC	LCNN	=	6150	IJP	=I	400	J	=I	400	NO	=I	800	REAL	=	140	TOUT	=R	800	
AA2 (R)	6LC	LPS	=H	1000	IJPS	=I	800	JBAR	=I	800	NOI	=I	800	RED	=	800	TSTART	=R	800	
AMIN1	=	3750	LUUVAL	=	130	IMI	=I	1000	JMD	=I	1200	NOIE	=I	1000	RETURN	=	640	VTEM	=R	1000
ANG	=H	1000	LIPB	(R)	200	IPAL	=I	900	JNM	=I	1000	NGI2	=I	1000	MEZRUN	=R	1000	VV	=H	900
ANGLES (R)	1100	FIAP	=H	900	IPAR	=I	900	JPI	=I	800	NRVALS	=I	1100	MEZSL	=H	800	WHITE	=	1100	
ASU	=H	1000	FIAP	=H	900	IPY5	=I	900	JP2	=I	800	NUMIT	=I	1000	HIBAM	=R	900	XCUNV	=H	900
AO	=H	1000	FIYB	=H	900	IPYT	=I	900	JPM	=I	1000	UM	=H	1000	KLC1	=	700	XL	=H	900
AFAC	=H	1000	FIAL	=H	900	IP1	=I	800	JUNH02	=I	1200	UMANC	=H	1000	KCMFH	=R	1200	XN	=H	900
AUM	=H	1000	FIAP	=H	900	IP2	=I	1000	KAI	=I	1000	UMCYL	=H	1000	NRVALS	(R	1100	YB	=H	900
BLUE	=	1200	FIYB	=H	900	ISCF1	=I	800	LMD	=H	1400	OPEN	(R)	200	SIGA	(R	700	YBASE	=H	1200
BTBL (R)	200	FHEG	(R)	200	ISCF2	=I	800	LJP2	=I	1000	OPTMP	(R)	200	SILVEN	=	500	YCUNV	=R	900	
BI	=H	1000	FHEG	=H	1200	ISCF2	=I	800	MU02	=H	1400	CHANGE	=	1000	SPHUL	(R	200	YLC1	=	500
COLAMP	=H	1000	U2	=H	1000	ISCF3	=I	800	NAME	(R)	1000	PAHTGEN	=	150	STATE	=	200	YLC2	=	800
CYL	=H	1000	UM	=H	1000	ITAB	(R)	1000	NRVALS	=I	1100	FIAX	=	400	T	=H	800	YSC1	=	300
DIMENS1	=	150	UMVEL	=H	400	ITV	=I	800	RCIC	=I	800	PTAB	(R)	200	TAMH	=H	800	YT	=H	900
DM	=H	1200	U2	=H	1000	IUNF	=I	1200	NUMP	=I	800	PCUNV	=H	900	TEMP	(R	800			
DT	=H	800	I	=I	400	IAX	=I	900	NE	=I	6100	PAL	=H	900	THRU	=H	1000			
DTPOS	=H	1000	IPAM	=I	800	IAR	=I	900	NPHU	=I	200	PCUNV	=H	900	THY	=R	800			

MULTIPLY-REFERENCED VARIABLES

100 = 250 25 40 54 59

112	=	31	35*														
113	=	34	37*														
210	=	4 *	56														
220	=	41*	56														
230	=	47	49	55*													
240	=	41	57*														
290	=	24	6 *														
300	=	16*	23MH														
310	=	17*	26MH	27MH													
320	=	18*	26MH	63MH													
330	=	19*	26MH														
AASC	()H	3CO	13EG	13EG	13EG	13EG	13EG	13EG	13EG	13EG	13EG	13EG	13EG	13EG	13EG	13EG	13EG
AMAX1	=	3.5U	385U														
BETALC	()H	13EG	15U1														
CENTA	()H	13EG	15U1														
CENTY	()H	13EG	15U1														
COMMON	=	2F	3F	4F	8F	9F	10F	11F	12F								
CU	()H	13EG	15U1														
DELSM	()H	13EG	15U1														
DRPAH	=H	23MH	24	26MH	27MH	40	55										
DZPAH	=H	23MH	26MH	27MH	39	57											
E	()H	13EG	15U1														
EMOMLC	()H	13EG	15U1														
EM10	=H	8CU	31	47													
EP	()H	13EG	15U1														
ETIL	()H	13EG	15U1														
FORMAT	=	10F	17F	18F	19F												
FOU1LC	()H	13EG	15U1														
FSN	()H	13EG	15U1														
GRIR	()H	13EG	15U1														
GRIZ	()H	13EG	15U1														
IECP	=I	1.0U	61AB														
KP	=I	21=	42	43	44=	44	50	51	52=	52							
LAM	=H	1.0U	14HL														
LCM	=	5F	6F	7F													
LPB	=I	6 =	61AB														
M	()H	13EG	14HL	15U1													
MP	()H	13EG	14HL	15U1													
MJ	=H	1.0U	14HL														
NP1	=I	1.0U	25	45=	45	46	53=	53	54	60	61	62PH	63MH				
P	()H	13EG	15U1														
PL	()H	13EG	15U1														
PHINT	=	22F	26F	62F													
PXR	=H	4CU	2. =	30=	30												
PYB	=H	4CU	2. =	37=	37												
PYT	=H	4CU	2. =	38=	38												
R	()H	13EG	15U1														
RCSQ	()H	13EG	15U1														
REZYU	=H	1.0U	26	32													
RM	()H	13EG	15U1														
HMP	()H	13EG	15U1														
RO	()H	13EG	15U1														
ROL	()H	13EG	15U1														
RVOL	()H	13EG	15U1														
HZEUTN	()H	13EG	15U1														
SJE	()H	13EG	15U1														
SJGMLC	()H	13EG	15U1														
U	()H	13EG	15U1														
UG	()H	13EG	15U1														
UL	()H	13EG	15U1														
UOMMLC	()H	13EG	15U1														
UP	()H	13EG	15U1														
UTIL	()H	13EG	15U1														
V	()H	13EG	15U1														

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VG      ( )K  13EU  1501
VL      ( )K  13EU  1501
VP      ( )K  13EU  1501
VTIL    ( )K  13EU  1501
WRITE   -      27F  63F
X        ( )K  13EU  1501
XC       -K  23KU  26FH  27MH  29    40    41    48    56
XD       -K  23KU  26FH  27MH  29    35    36    41    56
APAR     ( )K  13EU  1501  42=  50=
XWHITE   -K  29=  3=
XIE      -K  4=  41    42    48    55=  55    56
XA       -K  4=  49    50
Y        ( )K  13EU  1501
YBOT     -K  32=  36=  37    39
YC       -K  23KU  26FH  27MH  28=  28    33    35    36    41
YD       -K  23KU  26FH  27MH  31    32    41    47
YPAR     ( )K  13EU  1501  43=  51=
YTE      -K  34=  41    43    51    57=  57    58
YTUP     -K  34=  35=  38    58

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1 OVERLAY (YOKIFER, 2, J)

YOKKY

2

```

1  PROGRAM YOKKY
2  COMMON /STATE/  NGPT, NGPB, NFGD, OPTMP(30), OPDEN(10),
   1  FREQ(100), SPINL(30), PTAH(300), ETAB(300),
   2  BTUL(300)
3  COMMON /YSCI/  AASC(5454)
4  COMMON /PINK/  I, IJ, IJM, IJP, J
5  COMMON /YLC1/  AA1(13100)
6  COMMON /YLC2/  AA2(13100)
7  COMMON /KLC1/  SLOW(30000)
8  COMMON /RED/   NAME(14), DT, DTR, EM10, GMDVEL, IPAR, IJPS,
   1  IP1, ISCF1, ISCF2, ISCF3, ISCF4, ITV, JBAH,
   2  JPI, JP2, NCYC, NUOMP, NU, NQ1, REZSIE, TAMB,
   3  TEMP(1500), T, TIML, TOUT, TSTART, THY
9  COMMON /YELLOW/  UTC, LTCSAV, DTG2, DTV, DTVSAV,
   1  RVCL, IOTC, IDTV, JUTC, JUTV, RDT
10 COMMON /ORANGE/  ANG, ASG, AG, AUFAC, AUM, B3, COLAML, CYL,
   1  DTHOS, EPS, GM1, GM, GZ, IM1,
   2  IECF, IP2, ITAN(100), JNP, JPA, KXI, LAM,
   3  LUP2, MU, NPI, NUIF, NG12, NUWIT, ON,
   4  OMARC, OMCYL, HIFOR, HLZYC, THIRO, VTEM
11 COMMON /WHITE/  RVVALS, RVVALS(7), NANGLS, ANGLES(35), TNEUT
12 EQUIVALENCE
   1  (AASC(1)+X,XPAR), (AASC(2)+P,YPAR), (AASC(3)+Y),
   2  (AASC(4)+U), (AASC(5)+V), (AASC(6)+RQ),
   3  (AASC(7)+MP,HMP,HCSG,CENTX),
   4  (AASC(8)+E,ETIL,CENTY), (AASC(9)+RVCL),
   5  (AASC(10)+P,HMP,VP), (AASC(11)+P,PL,EP,UP),
   6  (AASC(12)+UTIL,UL,CQ,EMOPLC),
   7  (AASC(13)+VTIL,VL,UMOPLC),
   8  (AASC(14)+ROL,HETALC,FOUTLC), (AASC(15)+SIE),
   9  (AASC(16)+DELSM,SIMPLC),
  10  (AASC(17)+GHIR,UG,HZDEN),
  11  (AASC(18)+GHIZ,VG+FSH)
13 REAL  LAP, LAMU, M, MP, MU, MUO2
14 DIMENSION  X(1), APAR(1), R(1), YPAR(1), Y(1), U(1),
   2  V(1), NG(1), MP(1), HMP(1), HCSG(1), CENTX(1),
   3  E(1), ETIL(1), CENTY(1), RVOL(1), M(1), RM(1),
   4  VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),

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```

YOKKY  3
ALLKOM  2
ALLKOM  3
ALLKOM  4
ALLKOM  5
ALLKOM  6
ALLKOM  7
ALLKOM  8
ALLKOM  9
ALLKOM  10
ALLKOM  11
ALLKOM  12
ALLKOM  13
YELLOW  2
YELLOW  3
ORANGE  2
ORANGE  3
ORANGE  4
ORANGE  5
ORANGE  6
ORANGE  7
EQUIVREAL  2
EQUIVREAL  3
EQUIVREAL  4
EQUIVREAL  5
EQUIVREAL  6
EQUIVREAL  7
EQUIVREAL  8
EQUIVREAL  9
EQUIVREAL  10
EQUIVREAL  11
EQUIVREAL  12
EQUIVREAL  13
DIMEN  2
DIMEN  3
DIMEN  4
DIMEN  5

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5          UL(1), CU(1), EMOPLC(1), VTIL(1), VL(1), DIMEN 6
6          UMOMLC(1), RUL(1), RETALC(1), FCUTLC(1), DIMEN 7
7          SLE(1), DELSM(1), SIGPLC(1), GRIR(1), UG(1), DIMEN 8
8          RZLLEN(1), GRIZ(1), VG(1), FSN(1), DIMEN 9
15      11 CALL OVERLAY (7LYCKIFLH, 2, 1, 0) YOKKY 9
16      CALL REMARK (13HYAQU1 PHASE 0) YOKKY 10
17      IF (TIME+LT+OUT) GO TO 12 YOKKY 11
18      CALL OVERLAY (7LYCKIFLH, 2, 2, 0) YOKKY 12
19      CALL REMARK (13HYAQU1 OUTPUT) YOKKY 13
21      12 CALL OVERLAY (7LYCKIFLH, 2, 3, 0) YOKKY 14
21      CALL REMARK (13HYAQU1 PHASE 1) YOKKY 15
22      CALL OVERLAY (7LYCKIFLH, 2, 4, 0) YOKKY 16
23      CALL REMARK (13HYAQU1 PHASE 2) YOKKY 17
24      CALL OVERLAY (7LYCKIFLH, 2, 5, 0) YOKKY 18
25      CALL REMARK (13HYAQU1 PHASE 3) YOKKY 19
26      IF (TIME+LT+TIME+OUT) GO TO 11 YOKKY 20
27      RETURN YOKKY 21
28      END YOKKY 22

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SINGLY REFERENCED VARIABLES

AA1	(1)	5LC	UTUZ	-R	9CU	1DTV	-1	9CU	JHAP	-1	8CU	NOPU	-1	2CU	PTAB	(1)	R	2CU	THY	-R	8CU
AA2	(1)	6LC	UTPUS	-R	19CU	IECP	-1	19CU	JUIC	-1	9CU	NPT	-1	2CU	RD1	-R	9CU	TNEUT	-R	11CU	
AINC	-R	19CU	UTY	-R	9CU	IJ	-1	4CU	JUTV	-1	9CU	NPT	-1	19CU	HEAL	-	13F	TSTART	-R	8CU	
ANGLES	(1)	11CU	UTYSAV	-R	9CU	1JM	-1	4CU	JNM	-1	10CU	NQ	-1	8CU	RED	-	8CN	VTEN	-R	10CU	
ASU	-R	19CU	UVUT	-R	9CU	1JP	-1	4CU	JPI	-1	8CU	NQ1	-1	8CU	RETJMN	-	27F	WHITE	-	11CN	
AS	-R	19CU	EPS	-R	19CU	1JPS	-1	8CU	JPC	-1	8CU	NQ1U	-1	19CU	HEZJMN	-R	10CU	YELLOW	-	9CN	
ACTAC	-R	19CU	EWLVAL	-	12F	1M1	-1	19CU	JPC	-1	19CU	NQ12	-1	19CU	HEZSIE	-R	8CU	YLC1	-	5CN	
AQM	-R	19CU	ELAB	(1)	2CU	1P1	-1	8CU	KK1	-1	19CU	NVALS	-1	11CU	HEZY0	-R	10CU	YLC2	-	6CN	
BOL	(1)	2CU	FHEU	(1)	2CU	1P2	-1	19CU	LAMU	-R	13HL	NUN11	-1	19CU	MLC1	-	7CN	YOKKY	-	15U	
BO	-R	19CU	GP1	-R	19CU	1SCF1	-1	8CU	LJH2	-1	19CU	CM	-R	19CU	NVALS	(1)	R	11CU	YSC1	-	3CN
CLAPU	-R	19CU	GR	-R	19CU	1SCF2	-1	8CU	MOU2	-R	13HL	CMANC	-R	19CU	SIGA	(1)	R	7LC			
CYL	-R	19CU	UNDEVEL	-R	8CU	1SC2	-1	9CU	NANG1	(1)	8CU	CMCYL	-R	19CU	SP1HL	(1)	R	2CU			
DIMENSI	-	14F	U2	-R	10CU	1SC3	-1	8CU	NANGLS	-1	11CU	CPDEN	(1)	2CU	STATE	-	2CN				
DT	-R	8CU	1	-1	4CU	1TAB	(1)	19CU	NCYC	-1	8CU	CPTMP	(1)	2CU	TAMU	-R	8CU				
DTG	-R	9CU	1999	-1	8CU	1TV	-1	8CU	NOUNP	-1	8CU	GRANGE	-	19CN	TEMP	(1)	R	8CU			
DTCSAV	-R	9CU	107C	-1	4CU	J	-1	4CU	NHMD	-1	2CU	PIAK	-	4CN	TEMPU	-R	10CU				

MULTIPLY-REFERENCED VARIABLES

	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
AA5C	(1)	3CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
BETALC	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
CEN1A	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
CNTY	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
COMMON	-	4F	8F	9F	10F	11F														
CU	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
DELSM	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
ETH	-R	8CU	20																	
E	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
EMOMLC	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
EM10	-R	8CU	20																	
EP	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
ETIL	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
FCUTLC	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
FSN	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
GRIR	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
GRIZ	(1)	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU	12CU
LAM	-R	19CU	13HL																	
LCM	-	5F	7F																	
M	(1)	12CU	13HL	1401																
MP	(1)	12CU	13HL	1401																
MU	-R	19CU	13HL																	
OVERLAY	-	155U	183U	245U																
P	(1)	12CU	1401																	
PL	(1)	12CU	1401																	
R	(1)	12CU	1401																	
RCSU	(1)	12CU	1401																	

HEMANK	-	1050	1400	2150	2350	2550
PM	(H)	1050	1400			
RMP	(H)	1050	1400			
NO	(H)	1050	1400			
NOL	(H)	1050	1400			
NVOL	(H)	1050	1400			
RZEDEN	(H)	1050	1400			
SIE	(H)	1050	1400			
SIGPLC	(H)	1050	1400			
T	-H	000	00			
TIME	-H	000	17	20		
TOUT	-H	000	17			
U	(H)	1050	1400			
UG	(H)	1050	1400			
UL	(H)	1050	1400			
UMOMLC	(H)	1050	1400			
UP	(H)	1050	1400			
UTIL	(H)	1050	1400			
V	(H)	1050	1400			
VG	(H)	1050	1400			
VL	(H)	1050	1400			
VP	(H)	1050	1400			
VIL	(H)	1050	1400			
X	(H)	1050	1400			
XPAR	(H)	1050	1400			
Y	(H)	1050	1400			
YPAR	(H)	1050	1400			

1	OVERLAY (YOKIFER, 2, 1)	PHASE0	2
1	PROGRAM PHASE0	PHASE0	3
2	COMMON /STATE/	ALLKCM	2
	NOPT, NCPD, NFGD, OPTMP(30), CPDEN(10),	ALLKCM	3
	FREQ(100), SPTBL(3,0), PTAB(300), ETAB(300),	ALLKCM	4
3	COMMON /YSCI/	ALLKCM	5
4	COMMON /PINK/	ALLKCM	6
5	LCM /YLC1/	ALLKCM	7
6	LCM /YLC2/	ALLKCM	8
7	LCM /HLL1/	ALLKCM	9
8	COMMON /RED/	ALLKCM	10
	NAMP(10), DT, DTR, EM10, GRIDVEL, IRAR, IJMS,	ALLKCM	11
	IP1, ISCF1, ISCF2, ISC2, ISC3, ITV, JBAK,	ALLKCM	12
	JP1, JPP, ACYC, NUOMP, NU, NUI, REZSIE, TAMB,	ALLKCM	13
9	COMMON /YELLOW/	YELLOW	2
	TEMP(1000), T, TIME, TOUT, TSTART, THY	YELLOW	3
	DTC, DICSAV, DTC2, DTV, DTVSAV,	YELLOW	4
10	COMMON /ORANGE/	ORANGE	2
	DVDT, DUTC, DUTC, DUTC, DUTC, DUTC,	ORANGE	3
	ANC, ASG, AD, BDFAL, ARM, BR, COLAMC, CYL,	ORANGE	4
	DTMUS, EPS, OM, OR, GZ, IMI,	ORANGE	5
	IECH, IP2, ITAB(1000), JNM, JP4, KX1, LAM,	ORANGE	6
	LMP2, ML, NPT, NG10, NG12, NUNIT, OM,	ORANGE	7
11	COMMON /WHITE/	WHITE	2
12	EQUIVALENCE	EQUIVALE	3
	OMAC, CCYL, REZHUR, REZYU, THRU, VTEM	EQUIVALE	4
	NHVALS, HVALS(77), PHNLS, ANGLES(35), TNEUT	EQUIVALE	5
	(AASC(1),X,XPAR), (AASC(2),R,YPAR), (AASC(3),Y),	EQUIVALE	6
	(AASC(4),L), (AASC(5),V), (AASC(6),RO),	EQUIVALE	7
	(AASC(7),PP,HMF,HCH,CENTA),	EQUIVALE	8
	(AASC(8),E,ETIL,CENT), (AASC(9),HVCL),	EQUIVALE	9
	(AASC(10),M,HR,VH), (AASC(11),P,PL,EP,UP),	EQUIVALE	10
	(AASC(12),ETIL,EL,CN,EMOMLC),	EQUIVALE	11
	(AASC(13),VTIL,VCL,UM,MLC),	EQUIVALE	12
	(AASC(14),HCL,HETALC,FUOTLC), (AASC(15),SIE),	EQUIVALE	13
	(AASC(16),...), (AASC(17),SIMP),	EQUIVALE	14

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      5      (AASC(17),GRIR(1),GMZ(1),DEN),
      1      (AASC(18),GRIR(1),VG(1),SI)
13      REAL      LAM, LAMB, M, MH, MU, MUQZ
14      DIMENSION X(1), XPR(1), P(1), YPAR(1), Y(1), U(1),
      2      V(1), NG(1), MP(1), RMP(1), RSCS(1), CEMTX(1),
      4      E(1), ETIL(1), CENY(1), HVOL(1), M(1), HM(1),
      6      VP(1), P(1), PL(1), EP(1), DP(1), UTIL(1),
      8      UL(1), CN(1), ENOMLC(1), VTIL(1), VL(1),
      10     UNOMLC(1), KOL(1), METALC(1), FOUTLC(1),
      12     SIE(1), DELSM(1), SIGFLC(1), GRIR(1), VG(1),
      14     RALDEN(1), GMZ(1), VG(1), FSN(1)
15      LEAT      DEPLINT
16      40.1 FCHMAT (IM,PHOMLEM CYCLE=16,BA,OHYDRG//
      1      * 1 * 1PE12.4, 1(10,1PE12.4,6X,ONT * 1PE12.4,
      3      6X,16,* ITERS=)
17      40.2 FCHMAT (1M,SHTE * 1PE12.4,6X,6M TI * 1PE12.4,6X,
      1      6M TK * 1PE12.4,6X,6M EPGT * 1PE12.4,6X,
      3      6M TIAMP*1PE12.4)
18      40.3 FCHMAT (1M,SHLMCM * 1PE12.4,6X,6M VMOM * 1PE12.4,6X,
      1      6M CHC * 1PE12.4)
19      40.5 FCHMAT (1M,SHMAX * 1PE12.4,6X,6M ITM * 112,6X,
      1      6M JTM * 112)
20      40.6 FCHMAT (6M TGM * 112,4,6X,6M ITG * 112,6X,
      1      6M JTG * 112)
21      40.7 FCHMAT (1M,SHMTV * 1PE12.4,6X,6M IDTV * 112,6X,
      1      6M JDTV * 112,6M UTC * 1PE12.4,6X,6M IDTC * 112,
      3      6X,6M JUTC * 112)
C      --- INITIALIZE
22      LIVSAV = UTCSAV = 0.0
23      CMLCPOTE=TR=1=UMOM=VMOM=TIAMP=0.0
24      TMAA=7,6X=6.0
25      ITM=1,ITG=JTM=JTG=0
C      --- COMPUTE PRESSURES AND ENERGIES
26      CALL START
27      LC 189 J=JUP
28      LSC=J*J*IP
29      UC=(J-1)*IP1+J*J*H
30      TEMH=TEMH(JJ)*0.4
31      LC 189 I=1,IMAX
32      IPJ = IJ + NG
33      IPJ = IJP + MU
34      LSC=LJSC+1
35      XPRNG=H0(1)/HVOL(IJ)
36      SFLNG=1.125*(U(IFJ)**2+U(IPJP)**2+U(IJP)**2+U(IJ)**2
      1      +V(IFJ)**2+V(IPJP)**2+V(IJP)**2+V(IJ)**2)
37      YK=7K+SPENC*XMSENG
38      IPUP=ELCH+0.25*XMSENG*(U(IPJ)+U(IPJP)+U(IJP)+U(IJ))
39      VPUP=VCH+0.25*XMSENG*(V(IPJ)+V(IPJP)+V(IJP)+V(IJ))
40      TI=1+XPRNG*GHSIE(IJ)
41      TIAMP=TIAMP+KLSIE*XPRNG*137.214E-6/TEMH/HVOL(IJ)
42      FCTE=CTE*(Y(IJ)+FCTY)/MH(IJ)
43      IF (1.E-4,IMAX,LC+J*FCTJ) GO TO 170
44      IF (SIE(IJ),LT,THA) GO TO 160
45      ITM=1
46      JTM=J
47      TMAA=SIE(IJ)
48      SAVP=(X(IPJ)-X(IJ))**2*(Y(IPJ)-Y(IJ))**2
49      SAVV=(X(IPJ)-X(IJ))**2*(Y(IPJ)-Y(IJ))**2
50      SAVM=MH*(SIE(IJ)-SIE(IPJ))/GSGRT(SAVM)
51      SAVV=MH*(SIE(IJ)-SIE(IPJ))/GSGRT(SAVV)
52      SAV=MAA1(SAVM,SAVV)
53      IF (SAV,LT,TEMA) GO TO 170
54      ITG=1
55      JTG=J
56      TMAA=SAV
57      LC 170
58      IF (J,LC+J*PI) PUTE=PUTE*(Y(IPJ)+PEZY)/RM(IJP)

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EUVHEAL 11
EUVHEAL 12
EUVHEAL 13
DIMEN 2
DIMEN 3
DIMEN 4
DIMEN 5
DIMEN 6
DIMEN 7
DIMEN 8
DIMEN 9
PHASE0 9
PHASE0 10
PHASE0 11
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PHASE0 61
PHASE0 62
PHASE0 63
PHASE0 64

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54 IF (I.EQ.1) CIRC = CIRC + 0.5*(V(IJ)+V(IJP))*(Y(IJP)-Y(IJ))
55 IF (I.EQ.1) CIRC = CIRC + 0.5*(V(IJ)+V(IJP))*(Y(IJP)-Y(IJ))
56 IF (J.EQ.3) CIRC = CIRC + 0.5*(U(IJ)+U(IJP))*(X(IJP)-X(IJ))
57 IF (J.EQ.3) CIRC = CIRC + 0.5*(U(IJ)+U(IJP))*(X(IJP)-X(IJ))
58 X(I)=X(IJ)
59 X(I)=X(IJ)
60 X(I)=X(IJ)
61 X(I)=X(IJ)
62 X(I)=X(IJ)
63 X(I)=X(IJ)
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97 X(I)=X(IJ)
98 X(I)=X(IJ)
99 X(I)=X(IJ)
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101 X(I)=X(IJ)
102 X(I)=X(IJ)
103 X(I)=X(IJ)
104 X(I)=X(IJ)
105 X(I)=X(IJ)
106 X(I)=X(IJ)

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SINGLY REFERENCED VARIABLES

160 = 69*	CYL	=H	1000	GR	=H	1000	JP4	=I	1000	NGIB	=I	1000	RETURN	=	97F	TOUT	=R	800		
AA1 (H)	SLC	DIFERS1	=	14F	CHUVEL	=H	800	KX1	=I	1000	NGI2	=I	1000	REZKUN	=R	1000	TSTART	=R	800	
AA2 (H)	SLC	DURE	=	775L	IECP	=I	1000	LAMP	=R	13HL	NRVALS	=I	1000	YLC1	=	7CN	VTEM	=R	1000	
AMAX1	=	525U	DUG	=H	600	IOPS	=I	800	LEAT	=	15F	CM	=H	1000	NVALS	(H)	1100	WHITE	=	11CN
ANC	=H	1000	DIFCS	=H	1000	IP2	=I	1000	LJP2	=I	1000	CMANC	=H	1000	SIGA	(H)	7LC	YELLOW	=	9CN
ANGLES (H)	1000	OTH	=H	800	ISCF1	=I	800	LOUP	=	755U	CMCYL	=H	1000	SPIDL	(H)	200	YLC1	=	5CN	
ASU	=H	1000	UDVY	=H	400	ISCF2	=I	800	MOU2	=H	13HL	CHANGE	=	10CN	STANT	=	265U	YLC2	=	6CN
AG	=H	1000	CLIV	=H	800	ISCF2	=I	800	NAME	(H)	800	PHASE0	=	15U	STATE	=	2CN	YSC1	=	3CN
ATTAC	=H	1000	EPS	=H	1000	ISCF3	=I	800	NARGLS	=I	1000	CINK	=	4CN	TAMB	=H	800			
ALM	=H	1000	EQUIVAL	=	12F	ITAB	(H)	1000	NOUPE	=I	800	GEPTD	=	675U	THIN	=R	1000			
BTBL (H)	200	ETAF	(H)	200	ITV	=I	800	NFTN	=I	200	ROT	=H	900	THY	=R	800				
BU	=H	1000	FMBG	(H)	200	JNH	=I	1000	NPT	=I	1000	REAL	=	13F	TIME	=R	800			
COLAMP	=H	1000	GR1	=H	1000	JPE	=I	800	NO1	=I	800	RED	=	8CN	TNEUT	=R	1100			

MULTIPLY-REFERENCED VARIABLES

160 =	69	480
170 =	43	570
180 =	3100	720
190 =	2700	760
4001 =	160	850H
4002 =	170	870H
4004 =	180	890H
4005 =	190	910H
4006 =	200	930H

4007 =		210	95FH	90WH	12EW	12EQ	12EQ	12EQ	12EW	12EQ	12EQ	12EQ	12EQ	12EQ	12EQ	12EQ	12EQ
AASC	(1K	3CU	12EW	12EW													
AHS	=	5,5U	515U														
BEJALI	(1K	12EW	1401														
CENYA	(1K	12EW	1401														
CENYU	(1K	12EW	1401														
CIRC	-H	2J=	59=	59	60=	60	61=	61	62=	62	89PR	90WH					
COMMON	=	2F	3F	4F	8F	9F	10F	11F									
CU	(1K	12EW	1401														
DBLINT	=	15LA	605U														
LELSM	(1K	12EW	1401														
DT	-H	8CU	84	85FH	86FH												
DTIC	-H	4CU	45FH	46FH													
DTICSAV	-H	4CU	42=														
DTIV	-H	4CU	45FH	46FH													
DTIVSAV	-H	4CU	42=														
E	(1K	12EW	1401														
EMUMLC	(1K	12EW	1401														
EP	(1K	12EW	1401														
EPOT	-H	82=	87FH	88FH													
ETIL	(1K	12EW	1401														
FORMAT	=	10F	11F	10F	19F	20F	21F										
FOUTLC	(1K	12EW	1401														
FSN	(1K	12EW	1401														
GMIR	(1K	12EW	1401														
GMIZ	(1K	12EW	1401														
GZ	-H	1'CU	82														
I	-1	4CU	310U	43	45	54	59	60									
IBAH	-1	6CU	24	310U	43												
IDTC	-1	4CU	45FH	46FH													
IDIV	-1	9CU	45FH	46FH													
IJ	-1	4CU	32	35	36	38	39	40	41	42	42	44	47	48	48	49	
		45	51	59	55	60	60	61	61	62	63	67	68	68	71=	73	
		73															
IJM	-1	4CU	70=	70													
IJP	-1	4CU	33	36	38	39	49	49	51	58	58	59	59	60	60=	74	
		74															
IJSC	-1	20=	30=	34	65	68											
IM1	-1	1'CU	6														
IMJ	-1	30=	30	30	38	39	48	48	50	61	61	62	62	71			
IMJP	-1	30=	30	30	38	39	69										
IM1	-1	4CU	28	29													
ITU	-1	25=	54=	43FH	44FH												
ITM	-1	25=	45=	41FH	42FH												
J	-1	4CU	270U	28	29	43	46	55	58	61	62	74					
JNAH	-1	6CU	62														
JUTC	-1	4CU	45FH	46FH													
JUTV	-1	4CU	45FH	46FH													
JJ	-1	29=	3														
JPI	-1	8CU	270U	43	58	74											
JTG	-1	25=	55=	43FH	44FH												
JTM	-1	25=	40=	41FH	42FH												
LAM	-H	1'CU	13HL														
LCH	=	5F	6F														
M	(1K	12EW	13HL	1401													
MP	(1K	12EW	13HL	1401													
MU	-H	1'CU	13HL														
NYTC	-1	8CU	85FH	86FH													
NOPU	-1	2CU	60														
NOPT	-1	2CU	60														
NU	-1	8CU	32	33	70												
NUMIT	-1	1'CU	85FH	86FH													
OPDEN	(1K	2CU	60														
OPTMP	(1K	2CU	60														
P	(1K	12EW	1401	670	68=	68											
PL	(1K	12EW	1401														

PHIT	-H	22=	41=	42	58=	58	73=	73	74=	74	81=	81	82
PHINT	-H	85F	87F	87F	91F	93F	95F						
PIAB	(H)	7CU	66										
QC0G10	-H	6450	6550										
QSQR1	-H	5 50	5150										
R	(H)	12E0	1401										
RC50	(H)	12E0	1401										
REZ51E	-H	6CU	41										
REZ4YU	-H	17CU	42	58	73	74							
RM	(H)	12E0	1401	42	58	73	74						
RMP	(H)	12E0	1401										
RO	(H)	12E0	1401	35	63								
RUL	(H)	12E0	1401										
RUT	-H	63=	64										
RVDL	(H)	12E0	1401	35	41								
RZELLEN	(H)	12E0	1401										
SAV	-H	52=	53	50									
SAVA	-H	48=	51=	50	52								
SAVB	-H	45=	51=	51	52								
SIE	(H)	12E0	1401	41	44	47	50	50	51	51			
SIGPLC	(H)	12E0	1401										
SPEAKOK	-H	36=	37										
T	-H	8CU	84	85PH	86PH								
TE	-H	83=	87PH	88PH									
TEMP	(H)	6CU	31	65	68								
TEMP4	-H	31=	41										
TOMA	-H	74=	53	50=	93PH	94WR							
T1	-H	23=	41=	41	79=	79	83	87PH	88PH				
T1AMP	-H	23=	41=	41	78=	78	79	87PH	88PH				
TK	-H	23=	37=	37	80=	80	83	87PH	88PH				
TMAX	-H	24=	44	47=	91PH	92WR							
TMDT	-H	84=	85PH	86PH									
U	(H)	12E0	1401	36	36	36	38	38	38	38	61	61	62
UG	(H)	12E0	1401										
UL	(H)	12E0	1401										
UMOM	-H	73=	30=	36	89PH	90WR							
UMOMLC	(H)	12E0	1401										
UP	(H)	12E0	1401										
UT1L	(H)	12E0	1401										
V	(H)	12E0	1401	36	36	36	39	39	39	39	59	59	60
V6	(H)	12E0	1401										
VL	(H)	12E0	1401										
VMOM	-H	73=	30=	39	89PH	90WR							
V6	(H)	12E0	1401										
VT1L	(H)	12E0	1401										
WR17E	-H	80F	80F	91F	92F	94F	95F						
X	(H)	12E0	1401	48	49	49	49	61	61	62	62		
XMSLNG	-H	35=	37	38	39	40	41						
XPH	(H)	12E0	1401										
X1	-H	84=	85										
X2	-H	85=	86										
X3	-H	86=	87										
Y	(H)	12E0	1401	42	48	48	49	49	58	59	59	60	60
YPH	(H)	12E0	1401										

1	PROGRAM YCKOUT		YCKOUT	3
2	COMMON /STATE/	NOPT, NCPD, NFRQ, OPTMP(30), OPDEN(10),	ALLKCM	2
	1	FREQ(100), SPTUL(3 0), PIAB(300), ETAE(300),	ALLKCM	3
	2	HTUL(300)	ALLKCM	4
3	COMMON /YSC1/	AASC(5454)	ALLKCM	5
4	COMMON /PINK/	I, IJ, IJM, IJP, J	ALLKCM	6
5	LCN /YLC1/	AA1(13100)	ALLKCM	7
6	LCN /YLC2/	AA2(13100)	ALLKCM	8
7	LCN /YLC3/	SIGA(30000)	ALLKCM	9
8	COMMON /RED/	NAME(12), UT, UTR, EM10, GROVEL, IPAR, IJPS,	ALLKCM	10
	1	IP1, ISCF1, ISCF2, JSC2, ISC3, ITV, JBAH,	ALLKCM	11
	2	JP1, JPP, NCYC, NUIMP, NU, NNT, KEZSIE, IAMB,	ALLKCM	12
	3	TEMP(1000), T, TIME, TOUT, TSTART, THY,	ALLKCM	13
9	COMMON /SILVER/	FIPAL, FIPXR, FIPYH, FIAL, FIAH, FIYH,	SILVER	2
	1	IFAL, IFXR, IFYH, IPLY, IAL, IXH, IYH,	SILVER	3
	2	IYT, PACONV, PXL, PXM, PYH, PYCONV, PYI,	SILVER	4
	3	RIPAR, VV, XCONV, XL, XH, YH, YCONV, YI	SILVER	5
10	COMMON /YELLOW/	OTC, DTCSAV, DTC2, DTV, DVSAY,	YELLOW	2
	1	DVBY, DTC, DTV, DUT, DUTV, DUT	YELLOW	3
11	COMMON /ORANGE/	ANL, ASL, AO, AOPAL, AJM, BO, COLAML, CYL,	ORANGE	2
	1	DTPUS, EPS, GHI, GH, GZ, IMI,	ORANGE	3
	2	IECF, IPZ, ITAH(1000), JNM, JP4, KX1, LAN,	ORANGE	4
	3	LJPZ, PL, NPT, NQIN, LQ12, NUMIT, OM,	ORANGE	5
	4	OMANC, CMCYL, HEZMON, HEZYD, THNU, VTEN	ORANGE	6
12	COMMON /WHITE/	NRVALS, NVALS(73), NVALUS, ANGLES(35), INEUT	ORANGE	7
13	DIMENSION	X(1), XAH(1), R(1), YPAR(1), Y(1), U(1),	DIMEN	2
	1	V(1), WC(1), PP(1), RPP(1), RSCG(1), CENTX(1),	DIMEN	3
	2	E(1), ETIL(1), CENTY(1), RVOL(1), M(1), RM(1),	DIMEN	4
	3	VF(1), P(1), PL(1), EP(1), UP(1), UTIL(1),	DIMEN	5
	4	UL(1), CG(1), ENOMLC(1), VTIL(1), VL(1),	DIMEN	6
	5	UMOMLC(1), RUL(1), METALC(1), FCUTLC(1),	DIMEN	7
	6	SIE(1), DELSM(1), SIGPLC(1), GHIR(1), GG(1),	DIMEN	8
	7	RZELER(1), GRI(1), VG(1), FSN(1)	DIMEN	9
14	EQUIVALENCE	(AASC(1)*X,XPAN), (AASC(2)*Y,YPAR), (AASC(3)*Y),	EQUIVEAL	2
	1	(AASC(4)*C), (AASC(5)*V), (AASC(6)*RO),	EQUIVEAL	3
	2	(AASC(7)*P,PPP,RCSG,CENTA),	EQUIVEAL	4
	3	(AASC(8)*E,ETIL,CENTY), (AASC(9)*RVOL),	EQUIVEAL	5
	4	(AASC(10)*M,MM,VH), (AASC(11)*P,PL,EP,UP),	EQUIVEAL	6
	5	(AASC(12)*UTIL,UL,CG,ENOMLC),	EQUIVEAL	7
	6	(AASC(13)*VTIL,VL,UMOMLC),	EQUIVEAL	8
	7	(AASC(14)*RUL,METALC,FCUTLC), (AASC(15)*SIE),	EQUIVEAL	9
	8	(AASC(16)*DELSM,SIGPLC),	EQUIVEAL	10
	9	(AASC(17)*GRI,PG,VSLEN),	EQUIVEAL	11
	10	(AASC(18)*GRI,VG,FSN)	EQUIVEAL	12
15	REAL	LAN, LAM, N, NM, MUD, MUDE	EQUIVEAL	13
16	DIMENSION	IX1(1), IX2(1), IY1(1), IY2(1), XCO(4),	YCKOUT	10
	1	YCU(4), LCN(100), AT(100)	YCKOUT	11
17	DIMENSION	TIC(2)	YCKOUT	12
18	EQUIVALENCE (AT,IX1), (AT(2),IX2), (AT(3),IY1), (AT(4),IY2), (AT(5),	YCKOUT	13	
	1	ACU), (AT(9),YCU), (I1,CUN)	YCKOUT	14
19	4,0,0 FCHMAT	(10)*YACKI OUTPUT*/6H I,6H J,	YCKOUT	15
	1	12H X,12H Y,12H U,	YCKOUT	16
	2	12H V,12H SIE,12H HU,	YCKOUT	17
	3	12H VOL,12H U,	YCKOUT	18
	4	12H W,	YCKOUT	19
20	4,0,0 FCHMAT	(210,1P4E12,4)	YCKOUT	20
21	4,0,0 FCHMAT	(2A,A10+5X,6H T, 1PE12,4,6X,6H NCYC, 10/	YCKOUT	21
	1	2X,1P40)	YCKOUT	22
22	4,0,0 FCHMAT	(2H,1,13,6H,F6,31)	YCKOUT	23
23	4,0,0 FCHMAT	(F4,3)	YCKOUT	24
24	4,0,0 FCHMAT	(0 ISUPYCNICS)	YCKOUT	25
25	4,1,0 FCHMAT	(0 ISCTHERMS)	YCKOUT	26
26	4,1,1 FCHMAT	(1E)-,3)	YCKOUT	27
27	4,1,2 FCHMAT	(1A,OL= 0,1PL10,3)	YCKOUT	28
28	4,1,3 FCHMAT	(1A,OH= 0,1PL10,3)	YCKOUT	29
29	4,1,4 FCHMAT	(0 VINI/CITY)	YCKOUT	30
30	4,1,5 FCHMAT	(0 MUD/ILDE OF VELOCITY)	YCKOUT	31
31	4,1,6 FCHMAT	(6H MIN 1PE12,4,6X,6H MAX, 1PE12,4,6X,	YCKOUT	32

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1      CM L      ,1PE12,4,0A,0H H      ,1PE12,4,6A,      YOKULT      33
2      CM L U      ,1PE12,4)      YOKULT      34
32     *1C1 FCHMAT      (* FCAIPON VORTICITY AT I =*,13,*      YOKULT      35
33     *14 FCHMAT      (* ZONES/4H DMIN,1PE12,*,6X,6H DMAX,1PE12,4,      YOKULT      36
1      CM L      ,1PE12,4,0A,0H UZMAX,1PE12,4,      YOKULT      37
2      CM L      ,1PE12,4,0A,0H YB      ,1PE12,4,6A,      YOKULT      38
3      CM L      ,1PE12,4)      YOKULT      39
34     *1D1 FCHMAT      (* VELOCITY VECTORS/6H VMAX ,1PE12,4)      YOKULT      40
C      IF (NLCYC,FG,LC) TOUT=11E*01H      YOKULT      41
35     IF (NLCYC,GT,LC) TOUT=1.15*(TOUT-TSTAH1)+TSTAH1      YOKULT      42
36     IF (TOUT-T,GT,1/4,LC) TOUT=T+0.6*01H      YOKULT      43
37     CALL CMEN (6L,SET12,C,LS1,133)C)      YOKULT      44
38     C      PLUT PWT,CLES      YOKULT      45
39     CALL PAMPLOT      YOKULT      46
C      C      PLUT ZONES      YOKULT      47
40     NINHUS=1      YOKULT      48
41     Y(U,V)=Y(C,F,V)      YOKULT      49
42     A(U,V)=A(C,F,V)      YOKULT      50
43     YLBY=V      YOKULT      51
44     51 C(L)INDE      YOKULT      52
45     CALL A(U,V,1)      YOKULT      53
46     DMIN = U/MIN = 1.E+20      YOKULT      54
47     DMAX = U/MA = VMAX = V      YOKULT      55
48     CALL STAH      YOKULT      56
49     LC 509 J=2,0H      YOKULT      57
50     LC 509 I=1,IMAX      YOKULT      58
51     IF J = 1J = N1      YOKULT      59
52     IF J = 1J = N1      YOKULT      60
53     VMAX = AMAX1 (VMAX,ABS(C(I,J)),ABS(V(I,J)))      YOKULT      61
54     A1 = A(I,J)      YOKULT      62
55     A2 = A(I,J,P)      YOKULT      63
56     A3 = A(I,J,P)      YOKULT      64
57     A4 = A(I,J)      YOKULT      65
58     Y1 = Y(I,J)      YOKULT      66
59     Y2 = Y(I,J,P)      YOKULT      67
60     Y3 = Y(I,J,P)      YOKULT      68
61     Y4 = Y(I,J)      YOKULT      69
62     A1=(A1-A4)*0.2+(Y1-Y4)*0.2      YOKULT      70
63     A2=(A2-A3)*0.2+(Y2-Y3)*0.2      YOKULT      71
64     Y2=(A2-A1)*0.2+(Y2-Y1)*0.2      YOKULT      72
65     Y3=(A3-A4)*0.2+(Y3-Y4)*0.2      YOKULT      73
66     DMIN = AMIN1(DMIN,(A1+A2)*A23)      YOKULT      74
67     DMAX = AMAX1(DMAX,(A1+A2)*A23)      YOKULT      75
68     DMIN = AMIN1(DMIN,(Y2+Y3)*A23)      YOKULT      76
69     DMAX = AMAX1(DMAX,(Y2+Y3)*A23)      YOKULT      77
70     IAL=IAL+(X1-AL)*ACONVP      YOKULT      78
71     IAL=IAL+(X2-AL)*ACONVP      YOKULT      79
72     IAL=IAL+(X3-AL)*ACONVP      YOKULT      80
73     IAL=IAL+(X4-AL)*ACONVP      YOKULT      81
74     IY1=IYB+(Y1-1L)*YCONVP      YOKULT      82
75     IY2=IYB+(Y2-1L)*YCONVP      YOKULT      83
76     IY3=IYB+(Y3-1L)*YCONVP      YOKULT      84
77     IY4=IYB+(Y4-1L)*YCONVP      YOKULT      85
78     IF (IY1,GT,IYB,OR,IY1,LT,IY1) GO TO 530      YOKULT      86
79     IF (IY2,GT,IYB,OR,IY2,LT,IY1) GO TO 530      YOKULT      87
80     IF (IAL,GT,IAH) GO TO 530      YOKULT      88
81     IF (IAL,GT,IAH) GO TO 530      YOKULT      89
82     IF (IAL,GT,IAH) GO TO 530      YOKULT      90
83     IF (IAL,GT,IAH) GO TO 530      YOKULT      91
84     CALL LRV (IAL,IY1,IAL,IY2)      YOKULT      92
85     CALL LRV (IAL,IY1,IAL,IY2)      YOKULT      93
86     CALL LRV (IAL,IY2,IAL,IY3)      YOKULT      94
87     53 I = IPJ      YOKULT      95
88     509 I = IPJ      YOKULT      96
89     CALL LOOP      YOKULT      97
90     CALL INDE      YOKULT      98
91     DMIN=DJUMT(DMIN)      YOKULT      99
92     DMAX=DJUMT(DMAX)      YOKULT      100

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154	551	CALL LINC	YORULT	168
161		IF (INTPUB,GE,1) GO TO 550	YORULT	169
162		CALL LINCNT(54)	YORULT	170
163		WHILE (12,41=1) DMIN= LMAX, DZM.N, DZMAA, KR, YB, YF	YORULT	171
164		WHILE (12,40=1) JNH, T, NCYC, NAME	YORULT	172
		IF (VMAX,LT,EMTC) GO TO 6.0	YORULT	173
	C	--- VELLCCITY VECTON PLOT	YORULT	174
165	550	ATTNUTP,THHU=1	YORULT	175
166		IF (THHU,FG,3) GC TO 6.0	YORULT	176
167		LEOU = VV/VMAA	YORULT	177
168		CALL ADV(1)	YORULT	178
169		CALL STANT	YORULT	179
17		LC 554 J=2,JP	YORULT	180
171		LC 554 I=1,IM	YORULT	181
172		IF (THHU,EG,2) HQU= .5*VV/GSURT(U(IJ)**2+V(IJ)**2*EM)0	YORULT	182
173		YI=IYH+Y(IJ)-YLB)*YCUHVP	YORULT	183
174		IF (YI,GT,IYH,UK,YI,LT,IYF) GO TO 549	YORULT	184
175		Y=IYH+Y(IJ)+V(IJ)*YHUL-YLB)*YCUHVP	YORULT	185
176		IF (Y,GT,IYH,UK,Y,LT,IYF) GO TO 549	YORULT	186
177		YI=IYH+Y(IJ)-YLB)*YCUHVP	YORULT	187
178		IF (YI,GT,IYH,UK) GO TO 549	YORULT	188
179		Y=IYH+Y(IJ)+V(IJ)*YHUL-YLB)*YCUHVP	YORULT	189
180		IF (Y,GT,IYH,UK) GO TO 549	YORULT	190
181	551	CALL CHV (IXI,IXI,IXI,IXI)	YORULT	191
182		CALL PLI (IXI,IXI,IXI)	YORULT	192
183	554	LC = IJ + NG	YORULT	193
184		CALL LCP	YORULT	194
185	554	CONTINUE	YORULT	195
186		CALL LINCNT(6)	YORULT	196
187		WHILE (12,41=1) VMAA	YORULT	197
188		WHILE (12,40=1) JNH, T, NCYC, NAME	YORULT	198
189		IF (INTPUB,EG,1) GO TO 552	YORULT	199
190		GC TO 555	YORULT	200
	C	--- CONTROL PLOTS	YORULT	201
191	6.0	LC=	YORULT	202
192	610	L = L+1	YORULT	203
193		IF (LEOU,5,AND,NCYC,GT,1) GO TO 490	YORULT	204
194		GC TO (620,621,640,620,400) L	YORULT	205
195	620	CALL STANT	YORULT	206
196		LC 624 J=2,JP	YORULT	207
197		LC 624 I=1,IM	YORULT	208
198		LC(IJ)=M0(IJ)	YORULT	209
199		IF (L,20,2) C(IJ)=SIL(IJ)	YORULT	210
200		JP=JP+1	YORULT	211
201		IF JP=JP+1	YORULT	212
202		IF (L,FG,4) LC(IJ)=6.25*GSURT((L(IJ)+I(IJP)+U(IJP)+U(IJP))**2	YORULT	213
		+ (V(IJ)+V(IJP)+V(IJP)+V(IJP))**2)	YORULT	214
203		JP=JP+1	YORULT	215
204	624	LC = IJ + NG	YORULT	216
205		CALL LCP	YORULT	217
206	634	CONTINUE	YORULT	218
207		CALL LCP	YORULT	219
208		GC TO 740	YORULT	220
209	640	CALL STANT	YORULT	221
210		WHILE (12,41=1)	YORULT	222
211		LC 654 J=2,JP	YORULT	223
212		LC 654 I=1,IM	YORULT	224
213		JP = IJ + NG	YORULT	225
214		JP = IJP + NG	YORULT	226
215		A) = A(IJP)	YORULT	227
216		Y) = Y(IJP)	YORULT	228
217		U) = U(IJP)	YORULT	229
218		V) = V(IJP)	YORULT	230
219		A2 = A(IJP)	YORULT	231
220		Y2 = Y(IJP)	YORULT	232
221		U2 = U(IJP)	YORULT	233
222		V2 = V(IJP)	YORULT	234
223		A2 = A(IJP)	YORULT	235

224		Y3 = Y(IJ2)	Y0AULI	226
225		L3 = L(IJ2)	Y0AULI	231
226		Y2 = Y(IJ2)	Y0AULI	238
227		X4 = X(IJ)	Y0AULI	234
228		Y4 = Y(IJ)	Y0AULI	244
229		L4 = L(IJ)	Y0AULI	241
23		V4 = V(IJ)	Y0AULI	242
231		F1 = .5256RVUL(IJ)*(W(IJ2)+R(IJ2P)+W(IJ2P)+W(IJ2))	Y0AULI	243
232		G(IJ2) = H1*((U1+L1)*(X1-X4)+(V1+V4)*(Y1-Y4))	Y0AULI	244
	2	*(U2+L1)*(X2-X1)+(V2+V1)*(Y2-Y1)	Y0AULI	245
	3	*(U3+L2)*(X3-X2)+(V3+V2)*(Y3-Y2)	Y0AULI	246
	4	*(U4+L3)*(X4-X3)+(V4+V3)*(Y4-Y3)	Y0AULI	247
233		NS4V=NS4A	Y0AULI	248
234		NS4A=NS4A1(NS4A+AES(G(IJ)))	Y0AULI	249
235		IF(NS4V+NS4A) 15V=1	Y0AULI	250
236		IF(NS4V+NS4A) NS4V=J	Y0AULI	251
237		J1 = J10	Y0AULI	252
238	649	J10 = J10H	Y0AULI	253
239		CALL L00P	Y0AULI	254
240	659	CALL INLE	Y0AULI	255
241		CALL D0AE	Y0AULI	256
242	761	GMA = GMA+H	Y0AULI	257
243		GMA = GMAH	Y0AULI	258
244		CALL STANT	Y0AULI	259
245		LC 719 J=2+J1	Y0AULI	260
246		LC 719 J=1+J10H	Y0AULI	261
247		GMA = GMA1 (G(IJ)+GMA)	Y0AULI	262
248		GMA = GMA1 (G(IJ)+GMA)	Y0AULI	263
249	719	J1 = J1 + J10	Y0AULI	264
25		CALL L00P	Y0AULI	265
251	719	CALL INLE	Y0AULI	266
252	71	CALL INLE	Y0AULI	267
253		IF (L1F4+4) GO TO 745	Y0AULI	268
254		AA = GMA/(GMA+L1)	Y0AULI	269
255		IF (AA+L1+2+0) GO TO 735	Y0AULI	270
256		NS1=NS1+L1G1(AA)	Y0AULI	271
257		AA = A+1	Y0AULI	272
258		LC 1 J=0(J1+AA)	Y0AULI	273
259		NS=NS1+L1(M1)	Y0AULI	274
260		AA = J1+0(M-1)	Y0AULI	275
261		K = 1	Y0AULI	276
262	761	AA = AA+J1	Y0AULI	277
263		IF (AA+L1+GMA) GO TO 720	Y0AULI	278
264	73	LC(1) = AA	Y0AULI	279
265		IF (AA+L1+GMA) GO TO 740	Y0AULI	280
266		K = K+1	Y0AULI	281
267		AA = AA+L1	Y0AULI	282
268		LC 719 J=J1	Y0AULI	283
269	735	AA = GMA+L1	Y0AULI	284
27		IF (ABS(AA)+L1+L=3+AM+K1(ABS(GMA)+ABS(L1))) GO TO 610	Y0AULI	285
271		LC 1 J=1(AA+L1)	Y0AULI	286
272		LC 719 K=1+J1	Y0AULI	287
273	739	LC(1) = L1+K+IF(L1+K=1)*L1	Y0AULI	288
274		K = 1	Y0AULI	289
275	74	CALL AIV(1)	Y0AULI	290
276		J=J1+K	Y0AULI	291
277		M1=K+1	Y0AULI	292
278		LC 701 KK = 1 + KKG	Y0AULI	293
279		IF (KK+L1) GO TO 780	Y0AULI	294
280		NS=NS1+L1+KKG(L1) (L1+KKG)	Y0AULI	295
281		LC 701 J=J1	Y0AULI	296
282	702	IF (AA+L1+KKG) GO TO 740	Y0AULI	297
283		NS=NS1+L1+KKG(L1) (L1+KKG)	Y0AULI	298
284	703	CALL MLC (45+L1+J1+KKG+L1)	Y0AULI	299
285		LC 701 J=J1	Y0AULI	300
286	704	NS=NS1+L1+KKG(L1) (L1+KKG)	Y0AULI	301
287		CALL MLC (45+L1+J1+KKG+L1)	Y0AULI	302
288	705	J=J1+K+J1+KKG	Y0AULI	303

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204 CALL LINCR1(50)
205 GC TO 1750,1600,170,705) L
206 C(L,1)=0.100000
207 C(L,2)=0.000000
208 C(L,3)=0.000000
209 C(L,4)=0.000000
210 C(L,5)=0.000000
211 C(L,6)=0.000000
212 C(L,7)=0.000000
213 C(L,8)=0.000000
214 C(L,9)=0.000000
215 C(L,10)=0.000000
216 C(L,11)=0.000000
217 C(L,12)=0.000000
218 C(L,13)=0.000000
219 K=10
220 741 C(L,14)=0
221 GC TO 740
222 751 WH1E(12,4090)
223 GC TO 700
224 705 WH1E(12,4111)
225 GC TO 700
226 701 WH1E(12,4166)
227 GC TO 700
228 710 WH1E(12,4111)
229 WH1E(12,4121) ISV0, JSV0
230 WH1E(12,4121) GHI0, GHA0, CON(1)=CON(N-1)+DG
231 WH1E(12,4121) JAM0, T0, NCYC0, NAME
232 CALL START
233 DC 200 J=2,JBAM
234 CALL LCR1
235 LC 000 I=1,100
236 IF J = 100 * AG
237 IF J = 100 * AG
238 K = 0
239 LC 000 KK=1,K
240 K1 = K2 = K3 = K4 = 0
241 IF (LC(1,J)) .LE. CON(KK) K1=1
242 IF (LC(1,J)) .LE. CON(KK) K2=1
243 IF (LC(1,J)) .LE. CON(KK) K3=1
244 IF (LC(1,J)) .LE. CON(KK) K4=1
245 IF (K1+K2+K3+K4) .LE. 0 .UN. K1+K2+K3+K4 .EQ. 0) GO TO 879
246 IF (N0,GT,0) GC TO 800
247 J00 = J00
248 J00 = J00
249 LC 100 JJ=1,2
250 LC 100 II=1,2
251 IF J00 = J00+AG
252 IF J00 = J00+AG
253 K = K0
254 X(L,K) = .25*(X(1FJB)+X(1FJA)+X(1JA)+X(1JB))
255 Y(L,K) = .25*(Y(1FJB)+Y(1FJA)+Y(1JA)+Y(1JB))
256 J00 = J00
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357		LC = IPJ	YOROUT	372
358		ASSIGN M2% TO KH1	YOROUT	373
359		CC TO M4C	YOROUT	374
360	b2c	IF (K2+K4,NE,1) GC TO B3D	YOROUT	375
361		LC = 2	YOROUT	376
362		LC = 4	YOROUT	377
363		LC = IPJ	YOROUT	378
364		LC = IPJ	YOROUT	379
365		ASSIGN B3D TO KH1	YOROUT	380
366		CC TO M4C	YOROUT	381
367	b3	IF (K3+K4,NE,1) GC TO B7Y	YOROUT	382
368		LC = 3	YOROUT	383
369		LC = 4	YOROUT	384
370		LC = 10	YOROUT	385
371		LC = IPJ	YOROUT	386
372		ASSIGN M7% TO KH1	YOROUT	387
373	M4	LL = L1*	YOROUT	388
374		AA = (CG(KK)-(C*(IJ1)/(CG(IJ2)-CG(IJ1)))	YOROUT	389
375		IA' (LL)=F*XL+(XCG(IC1)+AA*(XCG(IC2)-XCG(IC1))-XL)*XCONVP	YOROUT	390
376		IY' (LL)=F*YB+(YCG(IC1)+AA*(YCG(IC2)-YCG(IC1))-YLB)*YCONVP	YOROUT	391
377		IF (IY' (LL).GT.IYH.OR.IY' (LL).LT.IYI) GO TO B81	YOROUT	392
378		IF (IA' (LL).LT.IAL.O.(IA' (LL).GT.IAP)) GC TO B81	YOROUT	393
379		IF (LL.LT.2) GO TO C41	YOROUT	394
380		CALL C4V (IA',IY',IXC,IYC)	YOROUT	395
381		IF (KK.EQ.5) CALL PLT (IA',IY',19)	YOROUT	396
382		IF (KK.EQ.7) CALL PLT (IA',IY',35)	YOROUT	397
383		IF (KK.EQ.K-1) CALL PLT (IA',IY',24)	YOROUT	398
384	b81	LL=0	YOROUT	399
385		IF (IJ2.EQ.IPJ) GC TO KH1	YOROUT	400
386	M7Y	CC TO M4C	YOROUT	401
387		LC = IPJ	YOROUT	402
388		LC = IPJ	YOROUT	403
389	b8Y	LC = IPJ+NG	YOROUT	404
390	b9Y	CC TO M4C	YOROUT	405
391		CALL STWMT	YOROUT	406
392		CALL C4V (IXL,IY',IXH,IYI)	YOROUT	407
393		CALL C4V (IXP,IY',IXR,IYC)	YOROUT	408
394		CALL C4V (IXR,IYH,IXL,IYB)	YOROUT	409
395		CALL C4V (IXL,IYH,IXL,IYI)	YOROUT	410
396		KYUP=IYH	YOROUT	411
397		YLB=IYLB	YOROUT	412
398		KYLB=IYLB+1	YOROUT	413
399		YLB=KYLB	YOROUT	414
400		IYC=IYC+8	YOROUT	415
401		IXJ=IXH+8	YOROUT	416
402		IYC=IYH+8	YOROUT	417
403		IYJ=IYI+8	YOROUT	418
404		NEAP=J2*CG(L6)C(C1*(IYI-IYH))	YOROUT	419
405		IF (NEAP.EQ.0) NEAP=NEAP+1	YOROUT	420
406		CALL C4V (IYI,IYH)	YOROUT	421
407		YI' (L6)=IYI	YOROUT	422
408		YI' (L6)=IYH	YOROUT	423
409	b8C	YI' (L6)=DTIC	YOROUT	424
410		IF (YI' (L6).GT.YCE) GO TO B8C	YOROUT	425
411		YI' (L6)=YI' (L6)+1	YOROUT	426
412	b8C	IYI=IYH+(YI' (L6)-YLB)*YCONVP	YOROUT	427
413		IF (IYI.LT.IYI) GO TO B81	YOROUT	428
414		CALL C4V (IXL,IY',IX2,IYI)	YOROUT	429
415		CALL C4V (IX3,IY',IXH,IYI)	YOROUT	430
416		IYI'=IYI+1	YOROUT	431
417		CALL L1HCTG (IYI')	YOROUT	432
418		KYI' (L6)=IYI' (L6) YI' (L6)	YOROUT	433
419		YI' (L6)=YI' (L6)+1	YOROUT	434
420		GO TO B82	YOROUT	435
421	b81	IA'=IXL+(IYI'-YL)*XCONVP	YOROUT	436
422		IF (IA'.GT.IAH) GO TO B8C	YOROUT	437
423		CALL C4V (IA',IYH,IA',IYC)	YOROUT	438
424		CALL C4V (IA',IYH,IA',IYI)	YOROUT	439

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425  JX11E=FLUENT(JAL)*0.15 YOKUUT 440
426  CRCCCE(11,40E/71C) WRITE YOKUUT 441
427  JX11E=FLUENT(JVB)*0.015*0.0 YOKUUT 442
428  (CALL L11CCT(JX11E) YOKUUT 443
429  WRITE (12,71C) AT1C YOKUUT 444
43  AT1C=AT1C*0.1C YOKUUT 445
431  GOTO 50 YOKUUT 446
432  50. C(11)LINE YOKUUT 447
433  GOTO 41 YOKUUT 448
C  -- LONG FRONT AND FILM YOKUUT 449
434  4 L (ALL A1V(1) YOKUUT 450
435  L11E5= YOKUUT 451
436  CALL START YOKUUT 452
437  LC 409 J=1,JPZ YOKUUT 453
438  LC 474 J=1,JPZ YOKUUT 454
439  JPZ = JPZ + NW YOKUUT 455
44  JPZ = JPZ + NW YOKUUT 456
441  C=PRV=KSF=0.0 YOKUUT 457
442  IF (J.FL.1) GO TO 45L YOKUUT 458
443  IF (J.FL.1) J=0.0, J.EC,JPZ GO TO 45 YOKUUT 459
444  KSF=5E(1JM) YOKUUT 460
445  PRV=1./KVC(L(1JM) YOKUUT 461
446  A1 = A(1JM) YOKUUT 462
447  Y1 = Y(1JM) YOKUUT 463
448  K1 = K(1JM) YOKUUT 464
449  U1 = U(1JM) YOKUUT 465
45  V1 = V(1JM) YOKUUT 466
451  A2 = A(1JM) YOKUUT 467
452  Y2 = Y(1JM) YOKUUT 468
453  K2 = K(1JM) YOKUUT 469
454  U2 = U(1JM) YOKUUT 470
455  V2 = V(1JM) YOKUUT 471
456  A3 = A(1JM) YOKUUT 472
457  Y3 = Y(1JM) YOKUUT 473
458  K3 = K(1JM) YOKUUT 474
459  U3 = U(1JM) YOKUUT 475
46  V3 = V(1JM) YOKUUT 476
461  A4 = A(1JM) YOKUUT 477
462  Y4 = Y(1JM) YOKUUT 478
463  K4 = K(1JM) YOKUUT 479
464  U4 = U(1JM) YOKUUT 480
465  V4 = V(1JM) YOKUUT 481
466  L = 425*KVC(L(1JM)*((K1+K2)*((U1+U2)*(Y2-Y1)+(V1+V2)*(X1-X2))
YOKUUT 482
1  *((K2+K3)*((U2+U3)*(Y3-Y2)+(V2+V3)*(X2-X3))
YOKUUT 483
2  *((K3+K4)*((U3+U4)*(Y4-Y3)+(V3+V4)*(X3-X4))
YOKUUT 484
3  *((K4+K1)*((U4+U1)*(Y1-Y4)+(V4+V1)*(X4-X1)))
YOKUUT 485
40L IF (L11E5.EC.1) WRITE (12,40H) YOKUUT 486
467  L11E5=L11E5+1 YOKUUT 487
468  IF (L11E5.GT.50) L11E5= YOKUUT 488
47  WRITE (12,40C) 1. J. A(1JM), Y(1JM), U(1JM), V(1JM), KSF= YOKUUT 489
1  KVC(1JM), PRV=0. F(1JM) YOKUUT 490
471  46 L = JPZ YOKUUT 491
472  474 J = JPZ YOKUUT 492
473  CALL L11C YOKUUT 493
474  C(11)LINE YOKUUT 494
C  -- RESTORE FILM PARAMETERS YOKUUT 495
475  49. CALL EXPT YOKUUT 496
476  F1VB=F1VB YOKUUT 497
477  F1V1=F1V1 YOKUUT 498
478  F1A=F1A YOKUUT 499
479  F1AL=F1AL YOKUUT 500
48  F1V=F1V YOKUUT 501
481  F1V1=F1V1 YOKUUT 502
482  F1A=F1A YOKUUT 503
483  F1AL=F1AL YOKUUT 504
484  CALL L11C (6LSET12+2LS1+512) YOKUUT 505
485  CALL A1V(1) YOKUUT 506

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406	METUMN		YOKOUT		507
407	EAD		YOKOUT		508
SINGLY REFERENCED VARIABLES					
450	=	471*	CTL	=H	1100
500	=	101*	CTL	=H	1100
710	=	252*	UTLSAV	=H	1100
747	=	35*	UTL	=H	1100
AA1	(H)	500	UTL	=H	1100
AA2	(H)	600	UTL	=H	1100
AA3	(H)	1100	UTLSAV	=H	1100
AA4	(H)	1200	UTL	=H	1100
AA5	(H)	1300	UTL	=H	1100
AA6	(H)	1400	UTL	=H	1100
AA7	(H)	1500	UTL	=H	1100
AA8	(H)	1600	UTL	=H	1100
AA9	(H)	1700	UTL	=H	1100
AA10	(H)	1800	UTL	=H	1100
AA11	(H)	1900	UTL	=H	1100
AA12	(H)	2000	UTL	=H	1100
AA13	(H)	2100	UTL	=H	1100
AA14	(H)	2200	UTL	=H	1100
AA15	(H)	2300	UTL	=H	1100
AA16	(H)	2400	UTL	=H	1100
AA17	(H)	2500	UTL	=H	1100
AA18	(H)	2600	UTL	=H	1100
AA19	(H)	2700	UTL	=H	1100
AA20	(H)	2800	UTL	=H	1100
AA21	(H)	2900	UTL	=H	1100
AA22	(H)	3000	UTL	=H	1100
AA23	(H)	3100	UTL	=H	1100
AA24	(H)	3200	UTL	=H	1100
AA25	(H)	3300	UTL	=H	1100
AA26	(H)	3400	UTL	=H	1100
AA27	(H)	3500	UTL	=H	1100
AA28	(H)	3600	UTL	=H	1100
AA29	(H)	3700	UTL	=H	1100
AA30	(H)	3800	UTL	=H	1100
AA31	(H)	3900	UTL	=H	1100
AA32	(H)	4000	UTL	=H	1100
AA33	(H)	4100	UTL	=H	1100
AA34	(H)	4200	UTL	=H	1100
AA35	(H)	4300	UTL	=H	1100
AA36	(H)	4400	UTL	=H	1100
AA37	(H)	4500	UTL	=H	1100
AA38	(H)	4600	UTL	=H	1100
AA39	(H)	4700	UTL	=H	1100
AA40	(H)	4800	UTL	=H	1100
AA41	(H)	4900	UTL	=H	1100
AA42	(H)	5000	UTL	=H	1100
AA43	(H)	5100	UTL	=H	1100
AA44	(H)	5200	UTL	=H	1100
AA45	(H)	5300	UTL	=H	1100
AA46	(H)	5400	UTL	=H	1100
AA47	(H)	5500	UTL	=H	1100
AA48	(H)	5600	UTL	=H	1100
AA49	(H)	5700	UTL	=H	1100
AA50	(H)	5800	UTL	=H	1100
AA51	(H)	5900	UTL	=H	1100
AA52	(H)	6000	UTL	=H	1100
AA53	(H)	6100	UTL	=H	1100
AA54	(H)	6200	UTL	=H	1100
AA55	(H)	6300	UTL	=H	1100
AA56	(H)	6400	UTL	=H	1100
AA57	(H)	6500	UTL	=H	1100
AA58	(H)	6600	UTL	=H	1100
AA59	(H)	6700	UTL	=H	1100
AA60	(H)	6800	UTL	=H	1100
AA61	(H)	6900	UTL	=H	1100
AA62	(H)	7000	UTL	=H	1100
AA63	(H)	7100	UTL	=H	1100
AA64	(H)	7200	UTL	=H	1100
AA65	(H)	7300	UTL	=H	1100
AA66	(H)	7400	UTL	=H	1100
AA67	(H)	7500	UTL	=H	1100
AA68	(H)	7600	UTL	=H	1100
AA69	(H)	7700	UTL	=H	1100
AA70	(H)	7800	UTL	=H	1100
AA71	(H)	7900	UTL	=H	1100
AA72	(H)	8000	UTL	=H	1100
AA73	(H)	8100	UTL	=H	1100
AA74	(H)	8200	UTL	=H	1100
AA75	(H)	8300	UTL	=H	1100
AA76	(H)	8400	UTL	=H	1100
AA77	(H)	8500	UTL	=H	1100
AA78	(H)	8600	UTL	=H	1100
AA79	(H)	8700	UTL	=H	1100
AA80	(H)	8800	UTL	=H	1100
AA81	(H)	8900	UTL	=H	1100
AA82	(H)	9000	UTL	=H	1100
AA83	(H)	9100	UTL	=H	1100
AA84	(H)	9200	UTL	=H	1100
AA85	(H)	9300	UTL	=H	1100
AA86	(H)	9400	UTL	=H	1100
AA87	(H)	9500	UTL	=H	1100
AA88	(H)	9600	UTL	=H	1100
AA89	(H)	9700	UTL	=H	1100
AA90	(H)	9800	UTL	=H	1100
AA91	(H)	9900	UTL	=H	1100
AA92	(H)	10000	UTL	=H	1100

MULTIPLY-REFERENCED VARIABLES					
400	=	100	400		
401	=	101	401		
402	=	102	402		
403	=	103	403		
404	=	104	404		
405	=	105	405		
406	=	106	406		
407	=	107	407		
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409	=	109	409		
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411	=	111	411		
412	=	112	412		
413	=	113	413		
414	=	114	414		
415	=	115	415		
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417	=	117	417		
418	=	118	418		
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420	=	120	420		
421	=	121	421		
422	=	122	422		
423	=	123	423		
424	=	124	424		
425	=	125	425		
426	=	126	426		
427	=	127	427		
428	=	128	428		
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433	=	133	433		
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436	=	136	436		
437	=	137	437		
438	=	138	438		
439	=	139	439		
440	=	140	440		
441	=	141	441		
442	=	142	442		
443	=	143	443		
444	=	144	444		
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446	=	146	446		
447	=	147	447		
448	=	148	448		
449	=	149	449		
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451	=	151	451		
452	=	152	452		
453	=	153	453		
454	=	154	454		
455	=	155	455		
456	=	156	456		
457	=	157	457		
458	=	158	458		
459	=	159	459		
460	=	160	460		
461	=	161	461		
462	=	162	462		
463	=	163	463		
464	=	164	464		
465	=	165	465		
466	=	166	466		
467	=	167	467		
468	=	168	468		
469	=	169	469		
470	=	170	470		
471	=	171	471		
472	=	172	472		
473	=	173	473		
474	=	174	474		
475	=	175	475		
476	=	176	476		
477	=	177	477		
478	=	178	478		
479	=	179	479		
480	=	180	480		
481	=	181	481		
482	=	182	482		
483	=	183	483		
484	=	184	484		
485	=	185	485		
486	=	186	486		
487	=	187	487		
488	=	188	488		
489	=	189	489		
490	=	190	490		
491	=	191	491		
492	=	192	492		
493	=	193	493		
494	=	194	494		
495	=	195	495		
496	=	196	496		
497	=	197	497		
498	=	198	498		
499	=	199	499		
500	=	200	500		

[illegible]

U	(1)R	1301	1400	53	172	175	202	202	202	202	217	221	225	229	449	454	459	464
UG	(1)R	1301	1400															
UL	(1)R	1301	1400															
UMOMLC	(1)R	1301	1400															
UP	(1)R	1301	1400															
U11L	(1)R	1301	1400															
U1	-R	217=	232	232	449=	466	466											
U2	-R	221=	232	232	454=	466	466											
U3	-R	225=	232	232	459=	466	466											
U4	-R	229=	232	232	464=	466	466											
V	(1)P	1301	1400	53	172	175	202	202	202	202	218	222	225	230	450	455	460	465
VG	(1)P	1301	1400															
VL	(1)R	1301	1400															
VMAX	-R	47=	53=	53	164	167	187WR											
VP	(1)R	1301	1400															
V11L	(1)R	1301	1400															
VV	-R	400	107	172														
V1	-R	218=	232	232	450=	466	466											
V2	-R	222=	232	232	455=	466	466											
V3	-R	226=	232	232	460=	466	466											
V4	-R	230=	232	232	465=	466	466											
VLCH	-	22450	20750															
WMAX	-R	211=	233	234=	234	235	236											
WR11L	-	121F	130F	104F	163F	187F	180F	307F	309F	311F	313F	314F	315F	316F	418F	429F	467F	470F
W5AV	-R	233=	235	236														
X	(1)R	1301	1400	54	55	56	57	177	179	215	219	223	227	339	339	339	339	446
XCO	(1)R	1301	1400	339=	375	375	375											
XCONV	-R	400	42															
XCONVP	-R	42=	71	71	72	73	124	140=	177	179	375	421						
XL	-R	500	71	71	72	73	124	177	179	375	421							
XPAR	(1)R	1301	1400															
XK	-R	500	162WR															
X11C	-R	111=	124	132WR	133=	133	411=	421	429WR	430=	430							
XX	-R	254=	255	256	257=	258	200=	202=	262	263	264	265	267=	267	269=	270	271	374=
X1	-R	54=	62	64	70	215=	232	232	446=	466	466							
X14	-R	62=	66	67														
X2	-R	65=	63	64	71	219=	232	232	451=	466	466							
X23	-R	65=	66	67														
X3	-R	61=	63	65	72	223=	232	232	456=	466	466							
X4	-R	57=	62	65	73	227=	232	232	461=	466	466							
Y	(1)R	1301	1400	58	59	60	61	173	175	216	220	224	228	340	340	340	340	447
YH	-R	450	457	460	470WR													
YCO	(1)R	1301	1400	340=	376	376	376											
YCONV	-R	400	41															
YCONVP	-R	41=	74	75	76	77	115	141=	173	175	376	412						
YLB	-R	43=	74	75	76	77	111	113	115	139=	173	412	175	376	398	410	412	
YLB1	-R	112=	111	349=	408													
YPAR	(1)R	1301	1400															
YI	-R	500	162WR															
Y11C	-R	111=	112=	112	113	114=	114	115	121WR	122=	122	408=	409=	409	410	411=	411	412
YUP	-R	418WR	419=	419														
YUP1	-R	49	130=	390														
Y1	-R	100=	347=															
Y2	-R	50=	62	64	74	216=	232	232	447=	466	466							
Y21	-R	54=	63	64	75	224=	232	232	452=	466	466							
Y3	-R	64=	66	69														
Y3	-R	61=	64	65	76	224=	232	232	457=	466	466							
Y34	-R	65=	68	69														
Y4	-R	61=	62	65	77	228=	232	232	462=	466	466							

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1      SUBROUTINE PAKPLOT
2      COMMON /STAT/E/ NOPT, NOPU, NERG, UPTMP(30), OPDEN(10),
1      1      FREQ(100), SPHL(30), HTAB(300), ETAB(300),
2      2      BTBL(300)
3      COMMON /YSC1/ AASC(5454)
4      COMMON /PINK/ I, IJ, IJP, IJP, J
5      LCM /YLC1/ FAL(13100)
6      LCM /YLC2/ AAZ(13100)
7      LCM /YLC3/ SIGA(3200)
8      COMMON /RED/ NAME(12), DT, DTR, EM10, GMDVEL, IHAR, IJPS,
1      1      IPI, ISCF1, ISCF2, ISCF3, ISCF4, ITV, JEAR,
2      2      JPI, JPC, NCYC, NUUMP, NU, NOI, HE/SIE, TAMH,
3      3      TEMP(750), I, TIME, IOUT, TSTART, THY
4      COMMON /SILVEN/ FIPAL, FIPXR, FIPYC, FIAL, FIXR, FIYB,
1      1      IPAL, IPAR, IPYH, IPLY, IAL, IAR, IYH,
2      2      IYI, PACONV, PAL, PAR, PYB, PYCONV, PYT,
3      3      RIDAR, VV, XCONV, AL, AR, YH, YCONV, YI
5      COMMON /YELLOW/ DIC, DICSAV, DIC2, DTV, DIVSAV,
1      1      DUUY, IUTC, IUTV, IUTC, IUTV, ROT
6      COMMON /ORANGE/ ANL, ASG, AD, AUFAC, AUM, H9, COLAMU, CYL,
1      1      DTHOS, EPS, GM1, GM, GZ, IM1,
2      2      IEUP, IZ2, IIAH(100), JNP, JP4, KXI, LAM,
3      3      LUPP, ML, KPI, KWIN, NU12, NU17, OM,
4      4      OFANC, OHCYL, HEZUN, HEZTU, THRU, VTEM
7      COMMON /WHITE/ NVALS, NVALS(73), NANGLS, ANGLES(75), INEUT
1      1      X(1), XPAR(1), R(1), YPAR(1), Y(1), U(1),
2      2      V(1), M(1), PP(1), RHP(1), RSCG(1), CENIA(1),
3      3      L(1), ETIL(1), CENY(1), RVOL(1), M(1), RM(1),
4      4      VP(1), H(1), PL(1), EP(1), UP(1), UTIL(1),
5      5      UL(1), CU(1), EMUMLC(1), VTIL(1), VL(1),
6      6      UMUMLC(1), KUL(1), METALC(1), FOOTLC(1),
7      7      SIE(1), BELSM(1), SIGPLC(1), GHIR(1), UG(1),
8      8      RZEMEN(1), GRIZ(1), VG(1), FSN(1)
9      COMMON /EQUIVALENCE/ (AASC(1)+X,XPAR), (AASC(2)+Y,YPAR), (AASC(3)+Y),
1     1      (AASC(4)+U), (AASC(5)+V), (AASC(6)+M),
2     2      (AASC(7)+P,PP,PP,PP,CENIA),
3     3      (AASC(8)+E,ETIL,CENY), (AASC(9)+RVOL),
4     4      (AASC(10)+H,HP,HP), (AASC(11)+P,PL,EP,UP),
5     5      (AASC(12)+UTIL,UL,CU,EMUMLC),
6     6      (AASC(13)+VTIL,VL,UMUMLC),
7     7      (AASC(14)+RUL,METALC,FOOTLC), (AASC(15)+SIE),
8     8      (AASC(16)+BELSM,SIGPLC),
9     9      (AASC(17)+GHIR,UG+RZEMEN),
1    1      (AASC(18)+GRIZ,VG+FSN)
15     REAL LAM, LAPD, F, MP, MU, MU02
16     DIMENSION TIC(2)
17     3.50 FCHMAT (1H, *PARTICLES*/6H PUR ,IPE12,4,6X,6H MUZ ,
1     1      IPE12,4,6X,6H PXH ,IPE12,4,6X,6H PYB ,
2     2      IPE12,4,6X,6H PYT ,IPE12,4,
3     3      (2F,A10,6X,6H T ,IPE12,4,6X,6H NCYC ,16/
4     4      6X,12H0)
19     4 07 FCHMAT (2H,T,13,6H,F6,3)
20     4 00 FCHMAT (F9,3)
21     CALL ADV(1)
22     YCP=PYT
23     YL0=PYH
24     CALL FRAME (IPAL,IPAR,IPYI,IPYH)
25     CALL FRAME (IPAL,IPAR,IPYI,IPYH)
26     YTIC=4*INT(PJUP) + 1.
27     IXC=IPAL+H
28     IXC=IPAR+H
29     IYC=IPYB+H
30     IYC=IPYI+H
31     NEAP=J, J21=ALUG10(0.1)*(YUP-YLB)
32     IF (NEAP.LE.0) NEAP=NEAP-1
33     UTIC=0.0001*EXP
34     XTIC=0.
35     3.21 YTIC=YTIC-DTIC

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PAKPLOT 2
ALLKUM 2
ALLKUM 3
ALLKUM 4
ALLKUM 5
ALLKUM 6
ALLKUM 7
ALLKUM 8
ALLKUM 9
ALLKUM 10
ALLKUM 11
ALLKUM 12
ALLKUM 13
SILVEN 2
SILVEN 3
SILVEN 4
SILVEN 5
YELLOW 2
YELLOW 3
ORANGE 2
ORANGE 3
ORANGE 4
ORANGE 5
ORANGE 6
ORANGE 7
DIMEN 2
DIMEN 3
DIMEN 4
DIMEN 5
DIMEN 6
DIMEN 7
DIMEN 8
DIMEN 9
EQUIVALENCE 2
EQUIVALENCE 3
EQUIVALENCE 4
EQUIVALENCE 5
EQUIVALENCE 6
EQUIVALENCE 7
EQUIVALENCE 8
EQUIVALENCE 9
EQUIVALENCE 10
EQUIVALENCE 11
EQUIVALENCE 12
EQUIVALENCE 13
PAKPLOT 4
PAKPLOT 10
PAKPLOT 11
PAKPLOT 12
PAKPLOT 13
PAKPLOT 14
PAKPLOT 15
PAKPLOT 16
PAKPLOT 17
PAKPLOT 18
PAKPLOT 19
PAKPLOT 20
PAKPLOT 21
PAKPLOT 22
PAKPLOT 23
PAKPLOT 24
PAKPLOT 25
PAKPLOT 26
PAKPLOT 27
PAKPLOT 28
PAKPLOT 29
PAKPLOT 30
PAKPLOT 31

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36      YIIC=FIPYH*(YIIC-YLB)*PYCCNV
37      IF (IYIC.LT.IPYB) GO TO 3021
38      YIIC=YIIC+DTIC
39      3022 YIIC=FIPYH*(YIIC-YLB)*PYCCNV
40      IF (IYIC.LT.IPYB) GO TO 3023
41      CALL UNV(IPL,IYI,IAC,IYI)
42      CALL UNV(IY3,IYI,IHAM,IYI)
43      IWHIC=FLOAT(IYI)*.0025
44      CALL LINCNT(IWHIC)
45      WHILE (I2,40BB) YIIC
46      YIIC=YIIC+DTIC
47      GO TO 3022
48      3023 IAI=FIPAL*(XIIC-PAL)*PACCHV
49      IF (IAI.GT.IPAH) GO TO 3024
50      CALL UNV(IAI,IYH,IAI,IY2)
51      CALL UNV(IAI,IY3,IAI,IYI)
52      IWHIC=FLOAT(IAI)*.0025
53      ENCODE(IY,40B7*YIIC) IWHIC
54      IWHIC=FLOAT(IYH)*.0025+I.C
55      CALL LINCNT(IWHIC)
56      WHILE (I2,YIIC) XIIC
57      XIIC=XIIC+DTIC
58      GO TO 3023
59      3024 CONTINUE
60      CALL LINCNT(5B)
61      WHILE (I2,304) PDR, PDZ, FXR, PYH, PYT
62      WHILE (I2,3045) JNH, I, NCYC, NAME
63      3000 LPH=NHIT+HPT
64      NHIT = 0
65      3010 CALL ECHD (AASC,IECP,LPH,NE)
66      KP = 1
67      3020 IF (XPAH(KP).LT.0.) GO TO 3050
68      IAI = FIPAL * (XPAR(KP)-PAL)*PACCHV
69      IYI=FIPYH*(YPAH(KP)-YLB)*PYCCNV
70      IF (IYI.GT.IYB).0.(IYI).LT.IYI) GO TO 3050
71      CALL PLT (IXI,IYI,IY2)
72      3050 NHIT = NHIT + 1
73      IF (NHIT.EQ.NPT) GO TO 3060
74      KP=KP+2
75      GO TO 3020
76      3000 RETURN
77      END

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PAMPLUT 32
PAMPLUT 33
PAMPLUT 34
PAMPLUT 35
PAMPLUT 36
PAMPLUT 37
PAMPLUT 38
PAMPLUT 39
PAMPLUT 40
PAMPLUT 41
PAMPLUT 42
PAMPLUT 43
PAMPLUT 44
PAMPLUT 45
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PAMPLUT 61
PAMPLUT 62
PAMPLUT 63
PAMPLUT 64
PAMPLUT 65
PAMPLUT 66
PAMPLUT 67
PAMPLUT 68
PAMPLUT 69
PAMPLUT 70
PAMPLUT 71
PAMPLUT 72
PAMPLUT 73

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SINPLY REFERENCED VARIABLES

3000	=	63*	DTCSAV	=H	1000	GR	=H	1100	ITV	=I	800	ADPT	=I	200	PTOP	=H	26	TIME	=H	800
3010	=	65*	DTCC	=H	1000	GRLEVEL	=H	800	IXL	=I	900	AG	=I	800	HUT	=H	1000	TNEUT	=H	1200
AA1	(H)	5LC	DIPUS	=H	1100	6Z	=H	1100	IAH	=I	900	AGI	=I	800	REAL	=	15F	TOUT	=H	800
AA2	(H)	6LC	DIH	=H	800	I	=I	400	J	=I	400	AGIB	=I	1100	HED	=	8CN	TSTART	=H	800
ADV	=	215U	DIY	=H	1200	IBAR	=I	800	JBAR	=I	FC0	AGI2	=I	1100	RETURN	=	76F	VTGM	=H	1100
AGNT	=	265U	DIYSAV	=H	1000	IDTC	=I	1000	JUTC	=I	1000	ARVALS	=I	1200	HEZHON	=H	1100	VV	=H	900
ALUG10	=	315U	DIYV	=H	1000	IDTV	=I	1000	JUTV	=I	1000	NUMIT	=I	1100	HEZSIE	=H	800	WHITE	=	12CN
ALH	=H	1100	ELCH	=	655U	IJ	=I	400	JPI	=I	800	CH	=H	1100	HEZTO	=H	1100	ACONV	=H	900
ANULES	(H)	1200	ELCH	=H	800	IJP	=I	400	JPE	=I	800	CHANC	=H	1100	MIHAM	=H	900	AL	=H	900
ASU	=H	1100	ELCH	=	53F	IJP	=I	400	JPE	=I	1100	CMCYL	=H	1100	KLCL	=	7CN	XR	=H	900
AV	=H	1100	ELPS	=H	1100	IJPS	=I	800	KX1	=I	1100	OPULN	(H)	200	HVALS	(H)	1200	YB	=H	900
ANFAC	=H	1100	ELCH	=	14F	IMI	=I	1100	LAMU	=H	15HL	OPTMP	(H)	200	SIGA	(H)	7LC	YCONV	=H	900
ANM	=H	1100	ELCH	(H)	200	IP1	=I	800	LJP2	=I	1100	CHANGE	=	11CN	SILVER	=	9CN	YELLOW	=	10CN
HTOL	(H)	200	FIPAH	=H	900	IP2	=I	1100	MUUP	=H	15HL	PAMPLOT	=	15U	SPFBL	(H)	200	YLC1	=	5CN
UC	=H	1100	FAL	=H	900	ISC1	=I	800	STRGLS	=I	1200	PIR	=H	61WH	STATE	=	2CN	YLC2	=	6CN
CULAMU	=H	1100	FALH	=H	900	ISC2	=I	800	NDUMP	=I	800	PDZ	=H	61WH	TAMB	=H	800	YSC1	=	3CN
YTL	=H	1100	FALH	=H	900	ISC2	=I	800	NE	=I	65AG	PIAH	=	4CN	TEMP	(H)	800	YT	=H	900
DT	=H	800	FALH	(H)	200	ISC3	=I	800	NEH	=I	200	PLT	=	115U	THRU	=H	1100			
UTC	=H	1100	GR	=H	1100	ITAH	(H)	1100	NUMD	=I	200	FALH	(H)	200	THY	=H	800			

MULTIPLY-REFERENCED VARIABLES

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3021 = 67* 15
3021 = 35* 37
3022 = 35* 47
3023 = 41* 48* 58

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NAME	UNIT	VALUE	UNIT	VALUE	UNIT	VALUE	UNIT	VALUE	UNIT	VALUE	UNIT	VALUE	UNIT	VALUE	UNIT	VALUE	UNIT	VALUE
3074	-	49	54*															
3050	-	67	70	72*														
3065	-	73	75*															
3090	-	17*	61**															
3095	-	12*	62**															
4087	-	15*	53EL															
4088	-	20*	45**															
AASC	(H)	5CU	14CU	14EU	14EU	14EQ	14EQ	14EQ	14EQ	14EQ	14EQ	14EQ	14EQ	14EQ	14EQ	14EQ	14EQ	14EQ
BETALC	(H)	130I	14CU	65AG														
CENTA	(H)	130I	14CU															
CENTY	(H)	130I	14CU															
COMMUN	-	2F	3F	4F	8F	9F	10F	11F	12F									
CG	(H)	130I	14CU															
DELSM	(H)	130I	14CU															
DIMENSI	-	13F	10F															
DRV	-	415U	425U	505U	515U													
DTIC	-H	33=	35	38	46	57												
E	(H)	130I	14CU															
ENOMLC	(H)	130I	14CU															
EP	(H)	130I	14CU															
ETIL	(H)	130I	14CU															
FIPXL	-H	9CU	48	68														
FIPYB	-H	9CU	36	39	69													
FLOAT	-	435U	525U	545U														
FORMAT	-	17F	10F	19F	20F													
FOOTLC	(H)	130I	14CU															
FRAME	-	2*5U	255U															
FSN	(H)	130I	14CU															
GRIR	(H)	130I	14CU															
GRIZ	(H)	130I	14CU															
IECP	-I	11CU	65AG															
IPXL	-I	9CU	24AG	25AG	27	41AG												
IPXR	-I	9CU	24AG	25AG	28	42AG	49											
IPYB	-I	9CU	24AG	25AG	29	37	50AG											
IPYT	-I	9CU	24AG	25AG	30	40	51AG											
IRITE	-I	43=	44AG	52=	53EC													
ITIC	-I	36=	37															
IX1	-I	48=	49	50AG	50AG	51AG	51AG	52	68=	71AG								
IX2	-I	27=	41AG															
IX3	-I	26=	42AG															

Country	1950 (%)	1955 (%)	1960 (%)	1965 (%)	1970 (%)	1975 (%)	1980 (%)	1985 (%)	1990 (%)	1995 (%)	2000 (%)	2005 (%)	2010 (%)	2015 (%)	2020 (%)	2025 (%)	2030 (%)	2035 (%)	2040 (%)	2045 (%)	2050 (%)
Japan	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0
Germany	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0
France	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0
Italy	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0
Spain	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0
Sweden	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0
United Kingdom	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0
United States	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0
Canada	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0
Poland	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0
China	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0
India	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0
Brazil	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0
South Africa	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0
South Korea	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0
Belgium	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0	34.5	35.0
Portugal	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0	33					

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4      (AASC(11)*P*HP*VP) + (AASC(11)*P*PL*EP*UP)
5      (AASC(12)*UTIL*UL*CU*EMOMLC)
6      (AASC(13)*VTIL*VL*UMOMLC)
7      (AASC(14)*ROL*METALC*FOUTC) + (AASC(15)*SIE)
8      (AASC(16)*NELSM*SIGPLC)
9      (AASC(17)*GRIR*UG*Z*ZEN)
10     (AASC(18)*GRIZ*VG*FSN)
14     HEAL      LAR0, P, HP, HJ, MUO2
15     DIMENSION X(1), APAR(1), P(1), TPAR(1), Y(1), U(1),
16             V(1), KC(1), PP(1), RPF(1), HCSG(1), CENTX(1),
17             E(1), ETIL(1), CENTY(1), RVOL(1), M(1), RM(1),
18             VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),
19             UL(1), CU(1), EMOMLC(1), VTIL(1), VL(1),
20             UMOMLC(1), HUL(1), METALC(1), FOUTC(1),
21             SIE(1), NELSM(1), SIGPLC(1), GRIR(1), UG(1),
22             RZLREN(1), GRIZ(1), VG(1), FSN(1)
C      --- INCREMENT TIME
16     NCYC=ACYC+1
17     IF (NCYC.EQ.1) DT=DTM
18     IF (NCYC.GT.1) DT=DTMOS*AMIN1(UTV,DTC)
19     UTRAC=2.0/(15.0*FLUAT(NUNIT))
20     DTV = DTC = DT*UTRAC
21     DT=AMIN1(DT,5.0*DTM)
22     IF (T.GT.TIME) DT=AMIN1(DT,TIME-DTR-T)
23     T = 1.0 + DT
24     HLT = 1.0/DT
25     DTUC = .5*DT
C      --- ADD NEUTRON ENERGY
26     IF (JSMTC).EQ.2) CALL NAUD
C      --- COUPLE ALTERNATE MODES
27     100, CALL START
28     YI=ANC*NDT
29     UC 1000 J=2,JP2
30     UC 1000 J=1,JP1
31     IF J=1J=ND
32     IF J=1J=ND
33     IF J=1J=ND
34     IF J=1J=ND
35     IF J=1J=ND
36     IF J=1J=ND
37     XX=YY=1.0
38     U=U(1J)
39     V=V(1J)
40     IF (1.EQ.1) GO TO 1002
41     U=U(1MJ)
42     V=V(1MJ)
43     UC 10 1011
44     1J,2 U=U(1PJ)
45     V=V(1PJ)
46     XX=.0
47     1,11 IF (1.EQ.1P1) GO TO 1,12
48     U=U(1PJ)
49     V=V(1PJ)
50     GO TO 1,21
51     1,12 U=U(1MJ)
52     V=V(1MJ)
53     XX=.0
54     1,41 IF (J.EQ.2) GO TO 1022
55     U=U(1J)
56     V=V(1J)
57     UC 10 1,31
58     1,42 U=U(1JP)
59     V=V(1JP)
60     YY=.0
61     1,31 IF (J.EQ.JP2) GO TO 1,32
62     U=U(1JP)
63     V=V(1JP)
64     UC 10 1,41

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EQUVAL 6
EQUVAL 7
EQUVAL 8
EQUVAL 9
EQUVAL 10
EQUVAL 11
EQUVAL 12
EQUVAL 13
DIMEN 2
DIMEN 3
DIMEN 4
DIMEN 5
DIMEN 6
DIMEN 7
DIMEN 8
DIMEN 9
PHASE1 10
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PHASE1 60
PHASE1 61

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05 1 JC LE=U(I,JM)
06 VE=V(I,JM)
07 YZ=.0
08 1 41 IF (I.EQ.1) GO TO 1042
09 IF (J.EQ.2) GO TO 1044
10 U1=U(I,JM)
11 V1=V(I,JM)
12 GC TO 1.51
13 1 40 IF (J.EQ.2) GO TO 1043
14 U1=U(I,JM)
15 V1=V(I,JM)
16 AA=.0
17 GC TO 1.51
18 1 43 U1=U(I,JM)
19 V1=V(I,JM)
20 AA=YZ+.7
21 GC TO 1.51
22 1 44 U1=U(I,JM)
23 V1=V(I,JM)
24 YZ=J+.1
25 1 51 IF (I.EQ.1P1) GO TO 1052
26 IF (J.EQ.2) GO TO 1054
27 U2=U(I,JM)
28 V2=V(I,JM)
29 GC TO 1.61
30 1 52 IF (J.EQ.2) GO TO 1053
31 U2=U(I,JM)
32 V2=V(I,JM)
33 AA=.0
34 GC TO 1.61
35 1 53 U2=U(I,JM)
36 V2=V(I,JM)
37 AA=YZ+.7
38 GC TO 1.61
39 1 54 U2=U(I,JM)
40 V2=V(I,JM)
41 YZ=.0
42 1 61 IF (I.EQ.1P1) GO TO 1062
43 IF (J.EQ.2P2) GO TO 1.64
44 U7=U(I,JM)
45 V7=V(I,JM)
46 GC TO 1.71
47 1 62 IF (J.EQ.2P2) GO TO 1.63
48 U7=U(I,JM)
49 V7=V(I,JM)
50 AA=.0
51 GC TO 1.71
52 1 63 U7=U(I,JM)
53 V7=V(I,JM)
54 AA=YZ+.0
55 GC TO 1.71
56 1 64 U7=U(I,JM)
57 V7=V(I,JM)
58 YZ=.0
59 1 71 IF (I.EQ.1P1) GO TO 1.72
60 IF (J.EQ.2P2) GO TO 1.74
61 U4=U(I,JM)
62 V4=V(I,JM)
63 GC TO 1.81
64 1 72 IF (J.EQ.2P2) GO TO 1.73
65 U4=U(I,JM)
66 V4=V(I,JM)
67 AA=.0
68 GC TO 1.81
69 1 73 U4=U(I,JM)
70 V4=V(I,JM)
71 AA=YZ+.0
72 GC TO 1.81

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PHASE1 62
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PHASE1 128
PHASE1 129

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133 1 74 U5=U(1PJM)
134 V5=V(1PJM)
135 Y5=Y(1PJM)
136 1 81 FLAGU=FLAGV=0.0
137 IF (U5.EQ.AMAA1(U4,U5,U6).OR.U5.EQ.AMIN1(U4,U5,U6)) FLAGU=1.0
138 IF (U5.EQ.AMAA1(U2,U5,U6).OR.U5.EQ.AMIN1(U2,U5,U6)) FLAGU=1.0
139 IF (V5.EQ.AMAA1(V2,V5,V6).OR.V5.EQ.AMIN1(V2,V5,V6)) FLAGV=1.0
140 IF (V5.EQ.AMAA1(V4,V5,V6).OR.V5.EQ.AMIN1(V4,V5,V6)) FLAGV=1.0
141 IF (U5.EQ.AMAA1(U1,U5,U9).OR.U5.EQ.AMIN1(U1,U5,U9)) FLAGU=1.0
142 IF (U5.EQ.AMAA1(U3,U5,U7).OR.U5.EQ.AMIN1(U3,U5,U7)) FLAGU=1.0
143 IF (V5.EQ.AMAA1(V3,V5,V7).OR.V5.EQ.AMIN1(V3,V5,V7)) FLAGV=1.0
144 IF (V5.EQ.AMAA1(V1,V5,V9).OR.V5.EQ.AMIN1(V1,V5,V9)) FLAGV=1.0
145 LAY=0.125*(L1+U2+L3+U4+U6+U7+U8+U9)+U5
146 VAY=0.125*(V1+V2+V3+V4+V6+V7+V8+V9)+V5
147 AA=UM+Y1*FLAGU*UAY
148 AT=UZ+Y1*FLAGV*VAY
149 L1IL(1J) = (U(1J)+U1*AA)*AA
150 V1IL(1J) = (V(1J)+U1*AY)*AY
151 G1IL(1J) = (AT-U1)*AA*U1
152 G1IL(1J) = (AT-U1)*AY*U1
153 L1 = L1J
154 LUP=LUP+L1
155 LUM=LUM+L1
156 1 89 CONTINUE
157 CALL LOOP
158 1 99 CONTINUE
159 CALL UPR
C --- COMPUTE UTIL V1IL E DELSM ROL MCSQ
160 1 100 CALL START
161 DO 1100 J=2,JP1
162 DO 1100 I=1,IBAM
163 I1J = IJ + AU
164 I1JP = I1J + IU
165 I1J=I1J+IU
166 KCL(IJ)=KCL(I1J)
167 XCL(I1J)=I1J/(KCL(I1J)*S1E(I1J))
168 GCL(I1J)=I1J*(1.+XCL(I1J))
169 MCSQ(IJ)=1./((ASU+GCL)*S1E(I1J))
170 X1 = X(I1JP)
171 Y1 = Y(I1JP)
172 K1 = K(I1JP)
173 U1 = U(I1JP)
174 V1 = V(I1JP)
175 A1 = A(I1JP)
176 T1 = T(I1JP)
177 K1 = K(I1JP)
178 L1 = L(I1JP)
179 V1 = V(I1JP)
180 A2 = A(I1J)
181 Y2 = Y(I1J)
182 K2 = K(I1J)
183 L2 = L(I1J)
184 V2 = V(I1J)
185 A4 = A(I1J)
186 Y4 = Y(I1J)
187 K4 = K(I1J)
188 L4 = L(I1J)
189 V4 = V(I1J)
190 A4=A4-A4
191 Y4=Y4-Y4
192 A21=A2-A1
193 Y21=Y2-Y1
194 L21=L2-U4
195 V21=V2-V4
196 L21=U2-U1
197 V21=V2-V1
198 U21=(L1+U2+L3+U4)/(K1+K2+K3+K4)*CVL
199 AT=AC+0.125*(L1+L3+U4)

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PHASE1 130
PHASE1 131
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ANGLES	(1H	11CU	PLCH1	=	155C	ITV	=1	4CU	APPA	=1	2CC	CRANB	=	1	CU	SENSE	=	12CN	WHITE	=	11CN
AL	=H	11CU	PLCH2	(1H	2CC	JMAR	=1	8CU	NGPD	=1	2CC	PHASE1	=	15U	SIOW	(1H	7CC	YELLOW	=	9CN	
APPAC	=H	11CU	PLCH3	=H	100	JUTC	=1	9CU	NGPT	=1	2CU	FINA	=	4CU	SFTBL	(1H	2CC	YLL1	=	5CN	
APPA	=H	11CU	UNDEB	=H	4CC	JUTV	=1	9CU	NG1	=1	11CC	FTAB	(1H	2CU	STATE	=	2CN	YLL2	=	8CN	
BTL	(1H	2CU	ADIC	=1	4CC	JUP	=1	10CU	NG2	=1	4CU	REAL	=	14F	TAMH	=H	8CC	YSL1	=	3CN	
BL	=H	11CU	JUTV	=1	4CC	JUPH	=1	10CU	NG12	=1	11CC	HEI	=	8CN	TEMP	(1H	8CC				
DIHENDS	=	15F	ALCH	=1	1	CC	JSWTCM3	=1	12CU	NGVALS	=1	11CC	RETURN	=	20	F	THRU	=H	10CU		
UTLSAV	=H	9CU	PL1	=1	1	CC	JSWTCM3	=1	12CU	CH	=H	10CC	REPMUN	=H	1	CU	THY	=H	4CU		

MULTIPLY-REFERENCE TO VARIABLES

[illegible]

DT02	-H	400	45=	2 7	20E	209	210	243										
DT02K1	-H	2 7=	230	24														
DT02K2	-H	2 7=	230	249														
DT02K3	-H	2 7=	233	244														
DT02K4	-H	21 =	237	244														
DT02K5	-H	1 00	18=															
DTK	-H	800	17	2)	22													
DTV	-H	500	16	2 2														
DOUW	-H	2 2=	211	220														
DOUYK	-H	2 4=	220															
DOUY	-H	500	213=	214	227													
E	(H)	1300	1501	215=														
EMOFLC	(H)	1300	1501															
EMIF	-H	1 00	223															
EP	(H)	1300	1501															
ETJ1	(H)	1300	1501															
FLADD	-H	130=	137=	138=	141=	142=	147											
FLAGV	-H	130=	139=	14 =	143=	144=	146											
FOUFLC	(H)	1300	1501															
FSD	(H)	1300	1501															
GG41	-H	100=	109															
GP	-H	1 00	147	151														
GR1R	(H)	1300	1501	151=														
GP12	(H)	1300	1501	156=														
GZ	-H	1 00	140	152														
HK13	-H	2 5=	234	242														
HR24	-H	2 0=	231	239														
I	-1	400	3 00	40	47	60	65	102	119	16200								
IHAN	-1	800	16200															
IJ	-1	400	31	32	38	39	149	149	150	150	151	152	153=	163	165	166	166	167
		167	167	169	169	185	186	187	188	189	210	215	217	218	220	230	235	237
		237	240	244	244	245=	248	248	25000	251								
IJM	-1	400	33	34	55	56	65	66	155=	155								
IJP	-1	400	35	36	58	59	62	63	154=	154	164	180	181	182	183	184	209	233
		233	241	241	246=	246	248	25400	255									
IJPS	-1	1 00	25400															
IMJ	-1	31=	41	42	51	52	105=											
IMJM	-1	33=	7	11	41	42	110	117	129	130								
IMJP	-1	35=	80	83	95	96	114	105	125	126								
IPJ	-1	32=	40	45	47	49	153	163=	170	171	172	173	174	207	232	232	240	240
		445																
IPJM	-1	34=	74	75	87	88	112	113	133	134								
IPJP	-1	35=	78	79	99	100	106	109	121	122	164=	175	176	177	178	179	208	236
		234	243	243	246													
IPJ	-1	1 00	3 00	47	25	119												
ISCP2	-1	800	25 00															
ISCP2	-1	800	25 00															
J	-1	400	1700	54	61	65	73	86	90	103	107	120	140	16100	249	253		
JP1	-1	800	16100	253														
JP2	-1	1 00	2500	61	103	107	120	124										
JSMTCM1	-1	1000	20															
KX1	-1	1 00	410	219														
LAM	-H	1 00	144L	224	227	229												
LAMU	-H	144L	224=	226														
LI 1	-	50	60	70														
LOP2	-1	1 00	25400															
LOUP	-	15750	25730															
M	(H)	1300	144L	1501														
MP	(H)	1300	144L	1501														
MO	-H	1 00	144L	225														
MOU2	-H	144L	225=	226	227	228	229											
NOYC	-1	800	10=	10	17	18												
NU	-1	800	31	32	33	34	35	36	154	155	163	164	165	25000	25400			
NOU1H	-1	1 00	240	240														
NOU1T	-1	1 00	19															
P	(H)	1300	1501	167	236	236	236											
P1TH	-H	224=	234	234	236	237												
P1TH	-H	224=	234	234														

[illegible]

APAR	(1)H	13EL	1501															
XX	HH	71=	40=	53=	76=	86=	93=	97=	110=	114=	127=	131=	142	151	214=	215	222	231=
		217	233	139=	236	237	239=	240	241	242=	243	244						
XXA	H	21=	214	217														
XY	HH	149=	21	211	229													
X1	HH	17 =	14															
X2	HH	175=	15															
X24	HH	14 =	159	2 J	214	213	231	239										
X3	HH	18 =	14															
X31	HH	14=	144	2 J	214	213	234	242										
X4	HH	185=	14															
Y	(1)H	12EL	1501	171	176	181	186											
YPAR	(1)H	13EL	1501															
YY	HH	37=	6 =	67=	80=	84=	97=	101=	114=	118=	131=	135=	151	152	216=	222	230=	232
		222	232=	230	237													
YYA	HH	213=	216	217	217													
Y1	HH	21=	147	146	171=	193												
Y2	HH	17=	141															
Y24	HH	151=	144	2 C	214	212	236	241	239									
Y3	HH	141=	143															
Y31	HH	142=	147	2 C	214	212	234	235	242									
Y4	HH	141=	141															

1	COVERLAY (YCKREF: 2, 4)	PHASE2	2
1	PROGRAM PHASE2	PHASE2	3
2	COMMON /STATE/	ALLKCM	2
	1	ALLKCM	3
	2	ALLKCM	4
3	COMMON /YSC/	ALLKCM	5
4	COMMON /WIP/	ALLKCM	6
5	LCM /YLC1/	ALLKCM	7
6	LCM /YLC2/	ALLKCM	8
7	LCM /YLC3/	ALLKCM	9
8	COMMON /PBD/	ALLKCM	10
	1	ALLKCM	11
	2	ALLKCM	12
	3	ALLKCM	13
4	COMMON /YELLOW/	YELLOW	2
	1	YELLOW	3
11	COMMON /ORANGE/	ORANGE	2
	1	ORANGE	3
	2	ORANGE	4
	3	ORANGE	5
	4	ORANGE	6
11	COMMON /WHITE/	ORANGE	7
12	EQUIVALENCE	ORANGE	2
	1	EQUIVEAL	3
	2	EQUIVEAL	4
	3	EQUIVEAL	5
	4	EQUIVEAL	6
	5	EQUIVEAL	7
	6	EQUIVEAL	8
	7	EQUIVEAL	9
	8	EQUIVEAL	10
	9	EQUIVEAL	11
	1	EQUIVEAL	12
13	REAL	EQUIVEAL	13
14	LINENSTON	DIMEN	2
	2	DIMEN	3
	3	DIMEN	4

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      4 VP(1), F(1), FL(1), EP(1), UP(1), UTIL(1), DIMEN 5
      5 UL(1), CUL(1), EMOPLC(1), VTIL(1), VL(1), DIMEN 6
      6 UMOPLC(1), FUL(1), HETPLC(1), FOUTLC(1), DIMEN 7
      7 SIE(1), DELSM(1), SIGPLC(1), GRIN(1), UG(1), DIMEN 8
      8 RZELEN(1), GHIZ(1), VG(1), FSA(1) DIMEN 9
      9 (If #ITERATION LIMIT EXCEEDED RUN MAY ABORT*) PHASE2 9
15 41JL FCHPAT C PHASE2 9
      C --- INITIALIZE ITERATION CONSTANTS PHASE2 10
16 20JL NLMIT = 0 PHASE2 11
17 MLSTIT = 1 PHASE2 12
18 PLMAX = EM10 PHASE2 13
      C --- BEGIN ITERATION PHASE2 14
19 201 CALL STAKT PHASE2 15
      C PHASE2 16
20 LC 2:50 J=2,JF1 PHASE2 17
21 LC 2:50 I=1,IBAW PHASE2 18
22 IFJ = IJ + KU PHASE2 19
23 IFJP = IJP + KU PHASE2 20
24 X1 = X(IJP) PHASE2 21
25 Y1 = Y(IJP) PHASE2 22
26 M1 = M(IJP) PHASE2 23
27 U1 = UL(IJP) PHASE2 24
28 V1 = VL(IJP) PHASE2 25
29 X2 = X(IJJP) PHASE2 26
30 Y2 = Y(IJJP) PHASE2 27
31 M2 = M(IJJP) PHASE2 28
32 U2 = UL(IJJP) PHASE2 29
33 V2 = VL(IJJP) PHASE2 30
34 X3 = X(IJF) PHASE2 31
35 Y3 = Y(IJF) PHASE2 32
36 M3 = M(IJF) PHASE2 33
37 U3 = UL(IJF) PHASE2 34
38 V3 = VL(IJF) PHASE2 35
39 X4 = X(IJ) PHASE2 36
40 Y4 = Y(IJ) PHASE2 37
41 M4 = M(IJ) PHASE2 38
42 U4 = UL(IJ) PHASE2 39
43 V4 = VL(IJ) PHASE2 40
44 XLU=1./((X4-X3)*(Y2-Y4)-(X2-X4)*(Y1-Y3)) PHASE2 41
45 XLU=1./((X1-X3)*(Y2-Y4)-(X2-X4)*(Y1-Y3)) PHASE2 42
46 ULM=(U1-U2+U3+U4)*XLU PHASE2 43
47 HAM=AVG PHASE2 44
48 ULUA=((U1-U3)*(Y2-Y4)-(U2-U4)*(Y1-Y3))*HAM PHASE2 45
49 UVUT=((Y2-Y4)*(X1-X3)-(Y1-Y3)*(X2-X4))*HAM PHASE2 46
50 U=(UULX+UVUY)*(1.+UCH*DT)+UOR PHASE2 47
51 S = MLT*(HCL(IJ)-RO(IJ))+ROL(IJ)*D PHASE2 48
52 LELZ=V.*DELSM(IJ) PHASE2 49
53 HAM=HCL(IJ)*(HUT+D)+VELZ PHASE2 50
54 LF = -(H*5/RA PHASE2 51
55 HCL(IJ) = RCL(IJ) + H(SU(IJ)+UP PHASE2 52
56 PLMAX = ANAX1(PLMAX,ANSU(IJ)) PHASE2 53
57 IF (ABS(UP),LE,EPS+PLMAX) GO TO 200C PHASE2 54
      C --- TEST FOR CONVERGENCE IN CELL PHASE2 55
58 MLSTIT = 1 PHASE2 56
      C --- ADJUST UL VL FL FOR NEXT ITERATION PHASE2 57
59 FL(IJ) = FL(IJ)+DP PHASE2 58
60 YC4 = Y2-Y4 PHASE2 59
61 Y21 = Y3-Y1 PHASE2 60
62 XH13 = .5*(P1+H3)*(X1-X3) PHASE2 61
63 XH24 = .5*(P2+H4)*(X2-X4) PHASE2 62
64 AX = LUT2+D PHASE2 63
65 LUTCM1 = XX*HM(IJP) PHASE2 64
66 LUTCM2 = XX*HM(IJP) PHASE2 65
67 LUTCM3 = XX*HM(IJP) PHASE2 66
68 LUTCM4 = XX*HM(IJ) PHASE2 67
69 LL(IJP) = U1+LUTCM1+H1*Y24 PHASE2 68
70 LL(IJP) = L2+LUTCM2+H2*Y31 PHASE2 69
71 UL(IJP) = L3+LUTCM3+H3*Y24 PHASE2 70
72 UL(IJ) = L4+LUTCM4+H4*Y31 PHASE2 71
73 IF (JUEU,2) GO TO 2:50

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74	VL(I,P) = V1-LT02H3*ANZ4	PHASE2	74
75	VL(I,J) = V4-U102H4*AN13	PHASE2	75
76	240 IF (J.EQ.0F1) GO TO 241	PHASE2	76
77	VL(I,P) = V2+U102H2*AN13	PHASE2	77
78	VL(I,J) = V3+L102H3*ANZ4	PHASE2	78
79	240 IJ = I*J	PHASE2	79
80	240 IJ = I*J	PHASE2	80
81	LL(IJ) = LL(IJ) + UL(IJ-HU(I)) + UL(IJ-HU(J)) = 0.	PHASE2	81
82	CALL LUUP	PHASE2	82
83	249 CONTINUE	PHASE2	83
84	CALL UHNE	PHASE2	84
85	C --- TEST ITERATION CONSTANTS	PHASE2	85
86	NLIMIT = 1000000	PHASE2	86
87	IF (NLIMIT.EQ.0) GO TO 2500	PHASE2	87
88	NLIMIT = 1	PHASE2	88
89	IF (NLIMIT.LT.500) GO TO 2613	PHASE2	89
90	PRINT 413	PHASE2	90
91	C --- ITERATION FINISHED COMPUTE ETIL	PHASE2	91
92	250 CONTINUE	PHASE2	92
93	CALL START	PHASE2	93
94	LU CDMJ J=2,JPJ	PHASE2	94
95	LU CDMJ I=1,IBAR	PHASE2	95
96	IJ=I*J	PHASE2	96
97	IJ=I*J	PHASE2	97
98	IJ=I*J	PHASE2	98
99	IJ=I*J	PHASE2	99
100	IJ=I*J	PHASE2	100
101	IJ=I*J	PHASE2	101
102	IJ=I*J	PHASE2	102
103	IJ=I*J	PHASE2	103
104	IJ=I*J	PHASE2	104
105	IJ=I*J	PHASE2	105
106	IJ=I*J	PHASE2	106
107	IJ=I*J	PHASE2	107
108	IJ=I*J	PHASE2	108
109	IJ=I*J	PHASE2	109
110	IJ=I*J	PHASE2	110
111	IJ=I*J	PHASE2	111
112	IJ=I*J	PHASE2	112
113	IJ=I*J	PHASE2	113
114	IJ=I*J	PHASE2	114
115	IJ=I*J	PHASE2	115
116	IJ=I*J	PHASE2	116
117	IJ=I*J	PHASE2	117
118	IJ=I*J	PHASE2	118
119	IJ=I*J	PHASE2	119
120	IJ=I*J	PHASE2	120
121	IJ=I*J	PHASE2	121
122	IJ=I*J	PHASE2	122
123	IJ=I*J	PHASE2	123
124	IJ=I*J	PHASE2	124
125	IJ=I*J	PHASE2	125
126	IJ=I*J	PHASE2	126
127	IJ=I*J	PHASE2	127
128	IJ=I*J	PHASE2	128
129	IJ=I*J	PHASE2	129
130	IJ=I*J	PHASE2	130
131	IJ=I*J	PHASE2	131
132	IJ=I*J	PHASE2	132
133	IJ=I*J	PHASE2	133
134	IJ=I*J	PHASE2	134
135	IJ=I*J	PHASE2	135
136	IJ=I*J	PHASE2	136
137	IJ=I*J	PHASE2	137
138	IJ=I*J	PHASE2	138
139	IJ=I*J	PHASE2	139

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14      U13P=U1-U3
141     V24P=V2-V4
142     V13P=V1-V3
143     U13A=U1*(U24P*Y3)+U13M*Y24
144     U13P=U1*(U13M*Y24+V24P*Y31)
145     U13P=U1*(U13M*Y24+V24P*Y31+U24P*Y3)+U13M*Y24
146     P=(U13P+U13P)*((U13P+U13P)+U13P)
147     AA=U13P
148     Y1=U13P*(U24P*(U24P*Y31)+U13P*Y24)
149     IF (AA*U13P) GO TO 2572
15      AA = H(13P)*Y1
151     GL TO 2577
152     Z57C  LL = U4*Y2 + V4*Y2
153     VL4 = L(AA1*(ABS(U4*AA)+ABS(V4*Y1)))
154     AA=H(U13P)*CCLAMU*(U13P+U13P+U13P+U13P)
155     Z577  ALAM = AK(13P)
156     AMU = AK(13P)
157     LAMU = AMU*(U13P+U13P)*ALAM
158     FLOC = .5*AMU
159     FLOC = .5*AMU
16      F1AA=FLOC*(U13P+U13P)*LAMU
161     F1AY=FLOC*(U13P+U13P)*LAMU
162     F1AY=FLOC*(U13P+U13P)*LAMU
163     F1AY=FLOC*(U13P+U13P)*LAMU
164     AA1=FLOC*(U13P+U13P)*LAMU
165     AA2=FLOC*(U13P+U13P)*LAMU
166     AA3=FLOC*(U13P+U13P)*LAMU
167     AA4=FLOC*(U13P+U13P)*LAMU
168     AA = AA*AA
169     YY = Y1*Y1
17      U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
171     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
172     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
173     IF (U13P+U13P+U13P+U13P) U13P=1
174     IF (U13P+U13P+U13P+U13P) U13P=1
175     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
176     AA1=FLOC*(U13P+U13P)*LAMU
177     AA2=FLOC*(U13P+U13P)*LAMU
178     AA3=FLOC*(U13P+U13P)*LAMU
179     AA4=FLOC*(U13P+U13P)*LAMU
18      U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
181     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
182     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
183     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
184     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
185     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
186     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
187     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
188     U13P=U1*(U13P+U13P)*Y1/(U13P+U13P+U13P+U13P)
189     C --- SET RCL AND ETIL UN BOUNDARIES
19      CALL START
191     IF AA=1
192     C C71 I = 1, ICAF
193     IF AA=1
194     IF AA=1
195     IF AA=1
196     IF (AA*AA) GO TO 1501
197     H(L13P)=H(L13P)
198     ETIL(L13P)=ETIL(L13P)
199     IF (AA*AA) GO TO 1501
200     H(L13P)=H(L13P)
201     ETIL(L13P)=ETIL(L13P)
202     GL TO 1502

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PHASE2 140
PHASE2 141
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PHASE2 200
PHASE2 201
PHASE2 202

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213 15 1 IF (J,AF,JP1) GO TO 15.2 PHASE2 208
214 HCL(I,JP)=HCL(I,JP) PHASE2 209
215 15 2 IF (I,AF,IPAF) GO TO 15.3 PHASE2 210
216 HCL(I,JP)=HCL(I,JP) PHASE2 211
217 ETIL(I,JP)=ETIL(I,JP) PHASE2 212
218 15 3 IJ=IPJ PHASE2 213
219 IJP=IPJP PHASE2 214
220 211 IJM=IJP*NG PHASE2 215
221 CALL LOGP PHASE2 216
222 212 CCH1INDE PHASE2 217
223 CALL LOGE PHASE2 218
224 C PHASE2 219
225 CALL START PHASE2 220
226 DO 2504 J = 2 * JP2 PHASE2 221
227 DO 2504 I = 1 * IP1 PHASE2 222
228 IJ=IJ+NO PHASE2 223
229 IJ=IJ+NO PHASE2 224
230 IJP=IJP+NG PHASE2 225
231 V(L,JP)=.125/PA(IJ)*(GRIP(IJ)*(UTIL(IJ)+U(IJ))+GRIZ(IJ)*(VTIL(IJ)+
V(IJ))) PHASE2 226
232 AA=1. PHASE2 227
233 YY=1. PHASE2 228
234 IF ((I,EG,1),0,(I,EG,IP1)) XX=0. PHASE2 229
235 IF ((J,EG,2),0,(J,EG,JP2)) YY=0. PHASE2 230
236 IF (AA*YY,EG,0) GO TO 1001 PHASE2 231
237 L(I,JP)= E(I,JP)+VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 232
238 E(I,JP)= E(I,JP)+VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 233
239 E(I,JP)= E(I,JP)+VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 234
240 GO TO 1001 PHASE2 235
241 1001 IF (I,AF,1) GO TO 1002 PHASE2 236
242 IF (J,EG,2),0,(J,EG,JP2)) GO TO 1003 PHASE2 237
243 E(I,JP)= E(I,JP)+2.*VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 238
244 E(I,JP)= E(I,JP)+2.*VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 239
245 GO TO 1001 PHASE2 240
246 1002 IF (I,AF,IP1) GO TO 1005 PHASE2 241
247 IF (J,EG,2),0,(J,EG,JP2)) GO TO 1003 PHASE2 242
248 E(I,JP)= E(I,JP)+2.*VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 243
249 E(I,JP)= E(I,JP)+2.*VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 244
250 GO TO 1001 PHASE2 245
251 1003 IF (J,EG,2) GO TO 1004 PHASE2 246
252 E(I,JP)= E(I,JP)+2.*VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 247
253 E(I,JP)= E(I,JP)+2.*VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 248
254 GO TO 1001 PHASE2 249
255 1004 L(I,JP)= E(I,JP)+2.*VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 250
256 E(I,JP)= E(I,JP)+2.*VTEMP*HVCL(I,JP)/RO(I,JP) PHASE2 251
257 CALL LOGP PHASE2 252
258 IJ=IPJ PHASE2 253
259 IJP=IJP+NG PHASE2 254
260 2504 IJM=IJP*NG PHASE2 255
261 CALL LOGP PHASE2 256
262 CCH1INDE PHASE2 257
263 CALL LOGE PHASE2 258
264 C PHASE2 259
265 RETURN PHASE2 260
266 END PHASE2 261

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SINGLY REFERENCED VARIABLES

2100	=	104	UTCSAV	=	NO	900	IJFS	=	1	BCU	IJP2	=	1	BCU	OPLEN	(I)	200	HEZYO	=	NR	1000	TOUT	=	NR	800
AA	(I)	ALL	UTCLS	=	NR	1000	IP1	=	1	BCU	NAME	(I)	1	BCU	CHTRN	(I)	200	NLCI	=	NR	700	TSIART	=	NR	800
AA	(I)	ALL	UIM	=	NR	1000	IP2	=	1	BCU	ANGLES	=	1	BCU	CHANGE	=	1	CN	IVALS	(I)	1100	VLEM	=	NR	1000
AL	=	NR	1000	ELCIV4L	=	12F	ISCF1	=	1	BCU	RCYC	=	1	BCU	PHASE2	=	1	50	SIGA	(I)	700	WHITE	=	NR	1100
ANGLES	(I)	1100	LINE	(I)	NR	200	ISCF2	=	1	BCU	NDIMP	=	1	BCU	FIAR	=	40N	SP70L	(I)	200	YELLOW	=	NR	900	
ASU	=	NR	1000	FORHAI	=	15F	ISCF2	=	1	BCU	NFNU	=	1	200	FRINI	=	89F	STATE	=	20N	YLCI	=	NR	500	
AC	=	NR	1000	FMEL	(I)	NR	ISCF3	=	1	BCU	NUPD	=	1	200	STAB	(I)	200	T	=	NR	800	YLL2	=	NR	600
APAC	=	NR	1000	UMI	=	NR	ITAB	(I)	1000	NOPT	=	1	200	GSCHT	=	1450	TAMU	=	NR	800	YSLI	=	NR	300	
AFH	=	NR	1000	UM	=	NR	ITV	=	1	BCU	NPT	=	1	BCU	REAL	=	1	TEMP	(I)	NR	800				
MBL	(I)	NR	200	UMVEL	=	NR	UBAR	=	1	BCU	NPI	=	1	BCU	RFU	=	80N	THRU	=	NR	1000				
B	=	NR	1000	UZ	=	NR	UDTC	=	1	BCU	NPI2	=	1	BCU	RETURN	=	2504	TRY	=	NR	800				

01000001	14F	1070	-1	900	JP4	-1	1100	NRVAL5	-1	1100	REZREN	-H	1-00	TIME	-H	800
010	-H	900	-1	1-00	JP4	-1	1-00	NRVAL	-H	1-00	REZ51E	-H	800	TIME	-H	1100
MULTIPLY-REFERENCE VALUES																
1081	-	275	231*													
1082	-	231	230*													
1085	-	236	241*													
1088	-	23	232	235	237*	240	244	247*								
1090	-	241	245*													
1501	-	196	199	2 3*												
1502	-	272	213	215*												
1503	-	2 5	208*													
2010	-	15*	66													
2061	-	73	76*													
2080	-	57	76	79*												
2089	-	2100	6 *													
2099	-	2100	63*													
2500	-	86	9 *													
2572	-	144	152*													
2577	-	151	155*													
2581	-	9300	165*													
2584	-	21600	25 *													
2585	-	21500	25c*													
2589	-	9200	167*													
2700	-	19100	212*													
2710	-	19200	21 *													
413*	-	15*	69PH													
AASC	(H)	300	1200	1206	1204	1204	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
AHS	-	5650	5750	15350	15350	17150										
AK	-H	15 =	154 =	155	156											
ALAM	-H	155 =	157	171												
AMAX1	-	5650	15350													
AMINI	-	15750	17250													
AMU	-H	156 =	158	171												
BEFALC	(H)	1200	1401													
CELAKEA	-H	137 =	148													
CENTA	(H)	1200	1401													
CENIT	(H)	1200	1401													
COLAMU	-H	1 00	154													
COMMON	-	4	5*	4F	8F	9F	10F	11F								
CU	(H)	1200	1401													
CYL	-H	1 00	44	135	163											
D	-H	5 =	51	53	146 =	157										
DELE	-H	181 =	181 =	181	182 =	182	183									
DELSM	(H)	1200	1401	52												
DEL2	-H	52 =	53													
DORE	-	4450	18850	21350	25350											
DP	-H	54 =	55	57	59	64										
DU	-H	171 =	171 =	171	172											
DT	-H	800	5	146	182											
DT02	-H	400	64	154												
DT02M1	-H	65 =	69	74												
DT02M2	-H	66 =	71	77												
DT02M3	-H	67 =	71	78												
DT02M4	-H	68 =	72	79												
DTV	-H	400	172 =	172	173	174	175									
DIVSAV	-H	400	173	174	175 =											
DUUX	-H	40 =	5	143 =	146	166										
DUVYH	-H	145 =	162													
DUVY	-H	400	49 =	51	144 =	146	161									
E	(H)	1200	1401	147	226 =	226	227 =	227	228 =	228	229 =	229	233 =	233	234 =	234
		239 =	239	242 =	242	243 =	243	245 =	245	246 =	246					
EMDMLC	(H)	1200	1401													
EM10	-H	800	18	171												
EP	(H)	1200	1401													
EPS	-H	1 00	57													
ETLL	(H)	1200	1401	163 =	168 =	198	201 =	201	207 =	207						

[illegible]


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2      JP (J5+1)*P2+J6+J7+CH*U*VEL*E*J2*J1) GO TO 315L
3      -- (COMPUTE GO GO A Y M (ELEPHANT OR LAGHANGIAN)
4      CALL STANT
5      UC J=14 J=2+JH2
6      LC J=9 J=1+JH1
7      UC(IJ)=J5+J6+CH*VEL*(UC(IJ)+U(IJ))
8      UC(IJ)=J5+J6+CH*VEL*(UC(IJ)+U(IJ))
9      A(IJ)=A(IJ)+U(IJ)*U(IJ)
10     Y(IJ)=Y(IJ)+U(IJ)*U(IJ)
11     H(IJ)=H(IJ)+U(IJ)*U(IJ)
12     I=1+JH1
13     3. 4 (I-1)H1
14     CALL LUMP
15     3. 14 (I-1)H1
16     CALL LUMP
17     GO TO 315L
18     -- (ELCONE
19     315L CALL HEXPONE
20     -- (COMPUTE M*EP HVDL
21     CALL STANT
22     LC J=9 J=2+JH1
23     LC J=9 J=1+JH1
24     JH1 = JH1+1
25     JH2 = JH2+1
26     JH3 = JH3+1
27     A1 = A(IJ)
28     Y1 = Y(IJ)
29     H1 = H(IJ)
30     A2 = A(IJ)
31     Y2 = Y(IJ)
32     H2 = H(IJ)
33     A3 = A(IJ)
34     Y3 = Y(IJ)
35     H3 = H(IJ)
36     A4 = A(IJ)
37     Y4 = Y(IJ)
38     H4 = H(IJ)
39     LC1 = UC(IJ)
40     VL1 = VL(IJ)
41     LC2 = UC(IJ)
42     VL2 = VL(IJ)
43     LC3 = UC(IJ)
44     VL3 = VL(IJ)
45     LC4 = UC(IJ)
46     VL4 = VL(IJ)
47     LC5 = UC(IJ)
48     VL5 = VL(IJ)
49     LC6 = UC(IJ)
50     VL6 = VL(IJ)
51     LC7 = UC(IJ)
52     VL7 = VL(IJ)
53     LC8 = UC(IJ)
54     VL8 = VL(IJ)
55     LC9 = UC(IJ)
56     VL9 = VL(IJ)
57     LC10 = UC(IJ)
58     VL10 = VL(IJ)
59     LC11 = UC(IJ)
60     VL11 = VL(IJ)
61     LC12 = UC(IJ)
62     VL12 = VL(IJ)
63     LC13 = UC(IJ)
64     VL13 = VL(IJ)
65     LC14 = UC(IJ)
66     VL14 = VL(IJ)
67     LC15 = UC(IJ)
68     VL15 = VL(IJ)
69     LC16 = UC(IJ)
70     VL16 = VL(IJ)
71     LC17 = UC(IJ)
72     VL17 = VL(IJ)
73     LC18 = UC(IJ)
74     VL18 = VL(IJ)
75     LC19 = UC(IJ)
76     VL19 = VL(IJ)
77     LC20 = UC(IJ)
78     VL20 = VL(IJ)
79     LC21 = UC(IJ)
80     VL21 = VL(IJ)
81     LC22 = UC(IJ)
82     VL22 = VL(IJ)
83     LC23 = UC(IJ)
84     VL23 = VL(IJ)

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PHASE3 10
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PHASE3 81
PHASE3 82
PHASE3 83

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85      X41 = X4-X1
86      Y41 = Y4-Y1
87      X21 = X2-X1
88      Y41 = Y4-Y3
89      Y14 = Y1-Y4
90      K12 = K1+K2
91      K23 = K2+K3
92      K34 = K3+K4
93      K41 = K4+K1
94      U12 = U1+U2
95      U23 = U2+U3
96      U34 = U3+U4
97      U41 = U4+U1
98      V12 = V1+V2
99      V23 = V2+V3
100     V34 = V3+V4
101     V41 = V4+V1
102     L = 0.5*(H*VCL(IJ))*(R12*(U12*Y21+V12*X12)+H23*(U23+Y32+V23*X23)
103     +R34*(U34+Y43+V34*X34)+R41*(U41+Y14+V41*X41))
104     VCLM = VCLT = VCLC = 1./H*VCL(IJ)
105     IF (1./H*VCL(IJ)) VCLM = 1./H*VCL(IJ)
106     IF (1./H*VCL(IJ)) VOLT = 1./H*VCL(IJ)
107     IF (1./H*VCL(IJ)) U1 TO 32M
108     PL = 0.5
109     AL = 0.5
110     IF (JAF4.2) U1 TO 32M
111     PR = 0.5
112     AR = 0.5
113     324.  PR = ((AR*(Y1-Y2)+X1*(Y2-Y1)+X2*(Y1-Y1))*(R1+R2+R3)+
114     + (AR*(Y2-Y3)+X2*(Y3-Y2)+X3*(Y2-Y2))*(R2+R3+R4)+
115     + (AR*(Y3-Y4)+X3*(Y4-Y3)+X4*(Y3-Y3))*(R3+R4+R5)+
116     + (AR*(Y4-Y1)+X4*(Y1-Y4)+X1*(Y4-Y1))*(R4+R5+R6)) / (VCLM+VCLC)
117     AT(1) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
118     AT(2) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
119     AT(3) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
120     AT(4) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
121     AT(5) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
122     AT(6) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
123     AT(7) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
124     AT(8) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
125     AT(9) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
126     AT(10) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
127     AT(11) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
128     AT(12) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
129     AT(13) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
130     AT(14) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
131     AT(15) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
132     AT(16) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
133     AT(17) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
134     AT(18) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
135     AT(19) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
136     AT(20) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
137     AT(21) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
138     AT(22) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
139     AT(23) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
140     AT(24) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
141     AT(25) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
142     AT(26) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
143     AT(27) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
144     AT(28) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
145     AT(29) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
146     AT(30) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
147     AT(31) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
148     AT(32) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
149     AT(33) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
150     AT(34) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)
151     AT(35) = A*H*VCL(IJ)*PR*(1./H*VCL(IJ)) / (VCLT+VCLC)

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PHASE3 84
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PHASE3 150
PHASE3 151

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215	VG3 = VG(IJP)	PHASE3	220
216	AX = X(IJ)	PHASE3	221
217	Y4 = Y(IJ)	PHASE3	222
218	W4 = W(IJ)	PHASE3	223
219	UL4 = UL(IJ)	PHASE3	224
220	UG4 = UG(IJ)	PHASE3	225
221	VL4 = VL(IJ)	PHASE3	226
222	VG4 = VG(IJ)	PHASE3	227
223	AX = LTCIG*FUL(IJ)	PHASE3	228
224	UL13 = .5*(UL1+UL3+U(IJP)+U(IJP))	PHASE3	229
225	VL13 = .5*(VL1+VL3+V(IJP)+V(IJP))	PHASE3	230
226	UL44 = .5*(UL2+UL4+U(IJP)+U(IJ))	PHASE3	231
227	VL44 = .5*(VL2+VL4+V(IJP)+V(IJ))	PHASE3	232
228	F13 = XA*(R1+W3)*((UG1+UG3-UL12)*(Y3-Y1)+(VG1+VG3-VL13)*(X1-X3))	PHASE3	233
229	F24 = XA*(P2+W4)*((UG2+UG4-UL24)*(Y2-Y4)+(VG2+VG4-VL24)*(X4-X2))	PHASE3	234
230	F41 = F44*PMH(IJP)	PHASE3	235
231	F42 = F13*PMH(IJP)	PHASE3	236
232	F43 = F44*PMH(IJP)	PHASE3	237
233	F44 = F13*RMH(IJ)	PHASE3	238
234	AX = 0.04*RVUL(IJ)/FUL(IJ)	PHASE3	239
235	AL13 = A*OSIGN(I1+I3)+AX*F13	PHASE3	240
236	AL44 = A*OSIGN(I1+I4)+AX*F24	PHASE3	241
237	ULAL13 = 1.0*AL13	PHASE3	242
238	ULAL44 = 1.0*AL44	PHASE3	243
239	ULAL13 = 1.0*AL13	PHASE3	244
240	ULAL24 = 1.0*AL24	PHASE3	245
241	AX = UL3*CHAL24+UL1*ULAL24	PHASE3	246
242	LF(IJP) = LP(IJP) + FM*AX	PHASE3	247
243	LF(IJ4) = LP(IJP) + FM*AX	PHASE3	248
244	AX = UL3*CHAL13+UL2*ULAL13	PHASE3	249
245	LF(IJP) = LP(IJP) + FM*AX	PHASE3	250
246	LF(IJ) = LP(IJ) + FM*AX	PHASE3	251
247	AX = V13*CHAL24+VL1*ULAL24	PHASE3	252
248	VF(IJP) = VP(IJP) + FM*AX	PHASE3	253
249	VF(IJ4) = VP(IJP) + FM*AX	PHASE3	254
250	AX = VL3*CHAL13+VL2*ULAL13	PHASE3	255
251	VF(IJP) = VP(IJP) + FM*AX	PHASE3	256
252	VF(IJ) = VP(IJ) + FM*AX	PHASE3	257
253	I4 = IJ	PHASE3	258
254	I4 = IJP	PHASE3	259
255	LF(IJ) = LP(IJP) + FM*AX	PHASE3	260
256	IF (I4.EQ.2) GO TO 342	PHASE3	261
257	LC 301: I4=ISCL+ISCF*NU	PHASE3	262
258	VF(IJ) = VP	PHASE3	263
259	352 IF (I4.EQ.3) GO TO 304	PHASE3	264
260	LC 303: I4=I4+IJP*NU	PHASE3	265
261	VF(IJP) = VP	PHASE3	266
262	304 CALL LOPR	PHASE3	267
263	305 CALL INDE	PHASE3	268
264	CALL LONE	PHASE3	269
265	C --- COMPUTE U V RM RMH	PHASE3	270
266	37 CALL START	PHASE3	271
267	LC 3719 J42=J42	PHASE3	272
268	LC 37 4 I41=I41	PHASE3	273
269	U(IJ) = UP(IJ)	PHASE3	274
270	V(IJ) = VP(IJ)	PHASE3	275
271	RM(IJ) = RMP(IJ)	PHASE3	276
272	RMH(IJ)=0	PHASE3	277
273	37 4 I4 = IJ + NQ	PHASE3	278
274	CALL LOPR	PHASE3	279
275	3714 CALL INDE	PHASE3	280
276	CALL UONE	PHASE3	281
277	C --- COMPUTE SIE TEMP	PHASE3	282
278	38 CALL START	PHASE3	283
279	LC 3849 J42=J42	PHASE3	284
280	I45L=I41+I41	PHASE3	285
281	LC 3844 I41=I41	PHASE3	286
282	I4J = I4+I4	PHASE3	287

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271      IPJP = IJH*HJ
272      LUSC=LJSC+1
273      SLE(IJ)=SLE(IJ)
C      SLE=SIG + D10RAY PUTS IN THIN RADIATION
274      SLE(IJ)=AMAX1(SLE(IJ),HE4SIE)
275      IF (SLE(IJ)-HE4SIE.GT.1.E-06) GO TO 3801
276      ZT=IATM
277      GO TO 3812
278      38 1 ZH=HJ(IJ)
279      ZT=SLE(IJ)
280      ZHINV=1./ZH
281      ZHL=ZL*ZT*(ZH)
282      ZHL=AMIN1(ZHL,OPDEN(NOPU))
283      ZHL=AMAX1(ZHL,OPDEN(I))
284      TL=ZHL*ZT
285      THIGH=ZHL*ZT*(ZL+ZR+0.0728789E+07)
286      THIGH=ZHL*ZT*(THIGH)
287      ZT=.5*(TL+THIGH)
288      3811 L=137.214E-10/ZT**4
289      ZT=ZL*ZT+ZHLINV
290      ZTL=ZL*ZT*(ZT)
291      ZTL=AMIN1(ZTL,OPTMP(NOPT))
292      ZCL=ZHL*ZT*(1.0-ZHL-ZTL-OPDEN, OPTMP, ETAB, 0, NOPT, NOPU, NUPI)
293      ZCL=ZCL*(ZCL)
294      ZCL=ZCL-ZCL**2
295      IF (ZCL.GT.0.0) TL=ZT
296      IF (ZCL.LT.0.0) THIGH=ZT
297      ZT=.5*(TL+THIGH)
298      IF (THIGH-TL.GT.1.E-06-ZT) GO TO 3812
299      GO TO 3811
300      3812 THMP(IJSC)=ZT
301      L=IPJP
302      L=IPJ
303      3805 CONTINUE
304      CALL LOUP
305      3805 CONTINUE
306      CALL UCNE
C      --- MOVE PARTICLES
307      CALL PARTMOV
C      --- RECOMPUTE PLOTTING COORDINATES
308      CALL FILMCO
C
309      RETURN
310      END

```

SINGLY REFERENCED VARIABLES

3400 = 1.75E	EQUIVAL = 13F	IPXR = -1	900	LAMP = -R	14RL	CHANGE = 11CN	REZONE = 355U	TOUT = -R	800
3700 = 255U	FILMPLC = 3385U	IPYB = -1	900	LEAT = 16F	PARTMOV = 3.75U	MEZHUN = -R	1100	TSTART = -R	800
3810 = 255U	FILMAL = -R	IPYT = -1	900	LOUPD = 1685U	PHASE3 = 15U	MEZYU = -R	1100	VTEM = -R	1100
AA1 (1)H	SLE	IPYB = -R	900	MOUZ = -R	14RL	PINK = 4CN	MIBAM = -R	900	VV = -R
AA2 (1)H	GLC	ISCF1 = -1	900	PTAB (1)H	ACU	PTAB (1)H	MLC1 = 7CN	WHITE = 12CN	
ANL = -R	1100	ISCF3 = -1	900	ITAB (1)H	1100	NAMALS = -1	1200	PKCONV = -R	900
ANULES (1)H	1200	ITV = -1	900	NGTC = -1	800	PKL = -R	900	SVGA (1)H	7LC
ASU = -R	1100	IXL = -1	900	NOUMP = -1	900	PXR = -R	900	SILVEN = 9CN	AR = -R
BTDL (1)H	200	IXH = -1	900	NFT = -1	200	PTB = -R	900	SPTAL (1)H	200
CULAMU = -R	1100	ITB = -1	700	NPT = -1	1100	PTCONV = -R	900	STARTU = 1535U	YCONV = -R
DT02 = -R	1 LU	ITV = -1	900	NUI = -1	800	PYT = -R	900	STATS = 2CN	YELLOW = 10CN
UTH = -R	800	JHAR = -1	300	NUIP = -1	1100	GEXF10 = 2735U	T = -R	800	YLC1 = 5CN
UTV = -R	1 LU	JDTV = -1	1100	NHVALS = -1	1200	RUT = -R	1 LU	THIRD = 1100	YLC2 = 6CN
UTVSAY = -R	1 LU	JNM = -1	1100	NUM1 = -1	1100	REAL = 14F	THY = -R	800	YSC1 = 3CN
UVUY = -R	1 LU	JSTCH2 = -1	21	CM = -R	1100	RED = 8CN	TIMC = -R	800	YT = -R
EPS = -R	1100	KAI = -1	1100	UMANC = -R	1100	RETURN = 3.9F	THED = -R	1200	

MULTIPLY-REFERENCED VARIABLES

309 = 2300	30
3014 = 2200	32
315 = 2	35
3400 = 3	36
3430 = 1.5E	135

3240	-	1120	130															
3259	-	3000	1270															
3269	-	3700	1290															
3281	-	110	1320															
3292	-	119	1300															
3301	-	131	1340															
3309	-	14100	1440															
3319	-	14 00	1510															
3399	-	15000	1070															
3493	-	15400	1090															
3489	-	17200	1700															
3499	-	17100	1700															
3599	-	18200	2440															
3610	-	24700	2400															
3620	-	240	2440															
3630	-	25 00	2510															
3640	-	244	2520															
3649	-	10100	2530															
3709	-	25700	2020															
3719	-	25000	2040															
3801	-	275	2700															
3811	-	2800	244															
3812	-	277	240	3.00														
3889	-	26400	3.30															
3899	-	26700	3.50															
AASC	(1)	300	1300	13EG	13EU	13EQ	13EU	13EN	13EU	13EQ	13EU	13EQ	13EU	13EQ	13EU	13EQ	13EU	13EQ
AB	-H	1300	1300															
ABS	-	1110	121	123	123	123	127											
AL	-H	11050	11050	11050	11050	11750												
AL13	-H	1100	121	121	123	123	133											
AL24	-H	2200	227	229														
AMAX1	-	2200	220	233														
AMINI	-	11050	27050	20350														
AR	-H	11750	20250	29150														
AT	(1)	117	1130	121	121	123	123											
A0	-H	1101	111	115	121	121	123	123										
APAL	-H	1100	220	220														
A04	-H	1100	113	115	133	137												
BTALC	(1)	1100	113	115	133	137	224											
BT	-H	1100	113	115	133	137	224											
CENTA	(1)	1100	113	115	133	137	224											
CENTY	(1)	1100	113	115	133	137	224											
COMMUN	-	27	31	8F	9F	10F	11F	12F										
CU	(1)	1100	113	115	133	137	224											
CYL	-H	1100	20	70	79	80	81											
U	-H	1100	117															
DPINT	-	10LA	24050															
DELSM	(1)	1100	113	115	133	137	224											
DIMENSI	-	15F	17F															
UONE	-	3350	13 50	15250	17950	25450	20950	30650										
DT	-H	200	10	20	270	70	71	72	73	74	75	76	77					
UL	-H	1 00	117	117	118	119	120											
UTCSAV	-H	1 00	110	119	120													
UT010	-H	100	213															
UTPOS	-H	1100	117	117														
E	(1)	1100	113	115	133	137	224											
ENOMLC	(1)	1100	113	115	133	137	224											
EN10	-H	800	117															
EP	(1)	1100	113	115	133	137	224											
ETAB	(1)	200	242															
ETIL	(1)	1100	113	115	133	137	224											
FB	-H	110	110	121	123	136	137	137										
FL	-H	110	110	121	123	136	137	137										
FM1	-H	220	232	230														
FM2	-H	221	235	241														
FM3	-H	222	233	234														
FM4	-H	223	230	242														

JSUTLC	(M)	13EW	1501																	
FR	(M)	13EW	112=	113	113	116	121	123												
FSN	(M)	13EW	1501																	
FT	(M)	1701	11	114=	115	115	116	121	123											
FJ3	(M)	212=	221	223	225	225														
F24	(M)	219=	22	222	226	226														
GRUVEL	(M)	2CU	2	24	25															
GRIR	(M)	13EW	1501																	
GRIZ	(M)	13EW	1501																	
I	(M)	4CU	2300	3800	144	106	110	111	114	115	115	115	116	118	121	121	121	123		
IBAN	(M)	123	123	14100	146	157=	161	162	163	164	17200	18200	25700	26900						
IUTC	(M)	1CU	110=																	
II	(M)	15000	157																	
IJ	(M)	4CU	24	24	24	25	25	25	26	26	26	27	27	27	28	28	29=	29		
		34	4	51	52	53	60	61	68	68	69	69	102	103	117	121	121	121		
		121	121	121	122	122	123	123	124	125=	133	134	137	142	142	142	143	143		
		146	146	149=	149	158	162	165	166=	173	173	174	174	175	175	176=	176	183		
		210	210	210	210	211	212	213	213	216	217	223	224	224	236	236	242	242		
		243=	243	245	24700	248	258	258	259	259	260	260	261	262=	262	270	273	273		
		274	274	275	278	279	312=													
IJM	(M)	4CU	121	123	123	127=	127	144	144	147=	147	159	161	167=						
IJP	(M)	4CU	41	46	49	50	58	59	66	66	67	67	115	121	123	123	126=	145		
		145	148=	148	144	199	260	261	262	263	264	265	214	215	222	233	233	239		
		239	244=	245	245	25000	251	271	261=											
IJPS	(M)	2CU	2500																	
IJSC	(M)	268=	272=	272	300															
IJU	(M)	34=	121	123	123	134=	158=	163	166											
IJUM	(M)	154=	164	167																
IJPJ	(M)	4=	42	43	44	54	55	62	62	63	63	104	141	123	123	125	183=	185		
		186	187	188	189	190	191	214	215	220	232	232	238	238	243	270=	302			
IPJP	(M)	41=	45	46	47	56	57	64	64	65	65	126	184=	192	193	194	195	196		

119

VL2	-H	57=	65	90	99	197=	217	240											
VL24	-H	217=	219																
VL3	-H	59=	67	99	100	204=	215	237											
VL4	-H	61=	69	100	101	211=	217	240											
VOLC	-H	103=	113	113	121	123													
VOLH	-H	103=	104=	113															
VOLY	-H	103=	105=	113															
VM	(H)	130=	1301	113=	239=	235	239=	239	241=	241	242=	242	248=	251=	259				
VTIL	(H)	130=	1301																
V22	-H	98=	102																
V23	-H	99=	102																
V34	-H	100=	102																
V41	-H	101=	102																
X	(H)	130=	1301	20=	26	28	42	45	48	51	185	192	199	206					
XPAR	(H)	130=	1301																
X41	-H	70=	10	112	136														
X42	-H	71=	79	112	112	114	114												
X43	-H	72=	8	114	132														
X44	-H	73=	81	132	132	136	136												
X45	-H	110=	117	10=	161=	162=	162	163=	163	164=	164	165	173=	174	175	213=	218	219	
		274=	225	220	231=	232	233	234=	235	236	237=	238	239	240=	241	242			
X1	-H	92=	7	86	85	112	112	124	136	136	187=	218							
X12	-H	82=	102																
X2	-H	45=	71	62	83	112	114	124	142=	219									
X23	-H	83=	102																
X3	-H	48=	72	83	84	114	114	124	132	132	199=	218							
X34	-H	84=	102																
X4	-H	51=	73	84	85	124	132	136	206=	219									
X41	-H	85=	102																
Y	(H)	130=	1301	27=	27	43	46	49	52	186	193	200	207						
YPAR	(H)	130=	1301																
Y41	-H	74=	110	112	136	136													
Y42	-H	75=	110	112	112	112	114	114	114	114									
Y43	-H	76=	114	114	132	132													
Y44	-H	77=	132	132	132	132	136	136	136	136									
Y1	-H	43=	74	86	89	112	112	112	112	124	136	136	146	136	166=	218			
Y14	-H	84=	102																
Y2	-H	46=	75	86	87	112	112	114	114	124	193=	219							
Y21	-H	86=	102																
Y3	-H	47=	76	87	88	114	114	114	114	124	137	132	152	132	200=	218			
Y32	-H	87=	102																
Y4	-H	50=	77	88	89	124	132	132	136	136	207=	219							
Y43	-H	88=	102																
Z01	-H	294=	295	298															
Z0	-H	274=	285	289															
Z01	-H	284=	294																
Z02	-H	293=	294																
Z02L	-H	292=	293																
Z0	-H	278=	28	261	285														
Z0INV	-H	280=	289																
Z0L	-H	281=	282	283=	283	292													
Z1	-H	270=	280	287	295	299	297=	298	300										
Z1L	-H	290=	291=	291	292														

1	SUBMULTINE REZONE		REZONE	2
2	COMMON /STATE/	NOPT, NUPD, NFRQ, OPTMP(30), OPDEN(10),	ALLKOM	2
		FREQ(10), SPTBL(30), PTAB(300), ETAB(300),	ALLKOM	3
		BTBL(300)	ALLKOM	4
3	COMMON /YSC1/	AASC(5454)	ALLKOM	5
4	COMMON /PINK/	I, J, L, M, N, P, Q	ALLKOM	6
5	COMMON /YSC1/	AAI(10000)	ALLKOM	7

6	LCM /YLL2/	AA2(7J1-50)	ALLKRM	8
7	LCM /YLL1/	SIGABJ(C09)	ALLKRM	9
8	COMMON /RED/	NAME(1C), DT, UTR, EM10, GROVEL, IHAR, IJPS,	ALLKRM	10
	1	IP1, ISC1, ISC2, ISC3, ITV, JHAW,	ALLKRM	11
	2	JH1, JP2, KGYC, NUUKP, NU, NQI, HEZSIE, TAMH,	ALLKRM	12
	3	TEMP(700), T, TIME, TOUT, TSTART, THY	ALLKRM	13
9	COMMON /SILVEN/	FIPAL, FIPXR, FIPYH, FIAL, FIXH, FIYH,	SILVEN	2
	1	IPAL, IXP, IPYH, IPYT, IAL, IAP, IYH,	SILVEN	3
	2	IY1, PYCONV, PAL, PHH, PYH, PYCONV, PY1,	SILVEN	4
	3	HIBAR, VV, XCONV, AL, AR, YH, YCONV, Y1	SILVEN	5
10	COMMON /YELLOW/	UTL, UICSAV, DTC2, UTV, UIVSAV,	YELLOW	2
	1	DVLY, AUTC, IDTV, JUTC, JUTV, HOT	YELLOW	3
11	COMMON /ORANGE/	ANL, ASH, AO, AUFAL, AGH, HH, CCLAML, CYL,	ORANGE	2
	1	DIFUS, EPS, GH, GH, GZ, IM1,	ORANGE	3
	2	IECP, IP2, ITAH(10,0), JHM, JPA, KRI, LAM,	ORANGE	4
	3	LJF2, ML, AH1, AUIB, NU12, NUM13, OM,	ORANGE	5
	4	OMANC, CMY1, HEZMUN, HEZYL, THIM, VTEM	ORANGE	6
12	COMMON /WHITE/	NHVALS, NVALS(73), ANGLS, ANGLES(75), TNEUT	ORANGE	7
13	COMMON /SENSE/	JSWTCH1, JSWTCH2, JSWTCH3	SENSE	2
14	EQUIVALENCE	(AASC(1),X,XPAH), (AASC(2),R,YPAH), (AASC(3),Y),	EQUIVEAL	2
	1	(AASC(4),U), (AASC(5),V), (AASC(6),RO),	EQUIVEAL	3
	2	(AASC(7),PP,HPP,HCSUCENT),	EQUIVEAL	4
	3	(AASC(8),E,ETIL,CENTY), (AASC(9),HVCL),	EQUIVEAL	5
	4	(AASC(10),P,HM,VP), (AASC(11),P,PL,EP,UP),	EQUIVEAL	6
	5	(AASC(12),UTIL,UL,CUMEMMLC),	EQUIVEAL	7
	6	(AASC(13),VTIL,VL,CUMMLC),	EQUIVEAL	8
	7	(AASC(14),HCL,HETALC,FOUTLC), (AASC(15),SIE),	EQUIVEAL	9
	8	(AASC(16),DELSH,SIMPLC),	EQUIVEAL	10
	9	(AASC(17),RHIR,UB,ZEDEN),	EQUIVEAL	11
	1	(AASC(18),GHIZ,VG,FSN)	EQUIVEAL	12
15	REAL	LAM, LAM1, P, PP, MU, MU02	EQUIVEAL	13
16	DIMENSION	X(1), APAR(1), P(1), YPAH(1), Y(1), U(1),	DIMEN	2
	2	V(1), HC(1), MP(1), HMP(1), HCSC(1), CENTX(1),	DIMEN	3
	3	E(1), ETIL(1), CENTY(1), HVOL(1), M(1), HM(1),	DIMEN	4
	4	VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),	DIMEN	5
	5	UL(1), CU(1), EVOMLC(1), VTIL(1), VL(1),	DIMEN	6
	6	UMUMLC(1), HUL(1), HETALC(1), FOUTLC(1),	DIMEN	7
	7	SIE(1), DELSH(1), SIGPLC(1), GHIN(1), UB(1),	DIMEN	8
	8	RZEDEN(1), GHIZ(1), VG(1), FSN(1)	DIMEN	9
17	2,4,1 FCHMAT	(1M, HEZUNE CONSTANTS/OM VTB, 1PE12.4,6A,	HEZUNE	10
	1	6H VTB, 1PE12.4,6A,6H UT, 1PE12.4,	HEZUNE	11
	2	6H FCB, 1PE12.4,6A,6H FCB2, 1PE12.4,6A,	HEZUNE	12
	3	6H FCA, 1PE12.4)	HEZUNE	13
	C		HEZUNE	14
18	FSIF=1.2*HOT		HEZUNE	15
19	PHENF=2.0		HEZUNE	16
20	SWICH=.5		HEZUNE	17
21	IF (JSWTCH2.EQ.2) SWTCH=0.0		HEZUNE	18
22	VIB=VT=UT=0.0		HEZUNE	19
23	FC3=FLX=FCP2=0.0		HEZUNE	20
24	IMESH=IBAR/2		HEZUNE	21
25	JPMESH=JPF/4		HEZUNE	22
26	JPMESH=JPF=JUMESH		HEZUNE	23
27	UMC=1.0+2.0/UM1		HEZUNE	24
	C		HEZUNE	25
28	CALL START		HEZUNE	26
29	UC 1:5F J=2, JPAH		HEZUNE	27
30	UC 1:4F I=1, IM1		HEZUNE	28
31	IF J=1, JAH		HEZUNE	29
32	IF J=1, JAH		HEZUNE	30
33	IF (J.LE.0, JPMESH) FC3=AMAX1(FC3, ABS(VL(I)))		HEZUNE	31
34	IF (J.GE.0, JPMESH) FCP2=AMAX1(FCP2, ABS(VL(I)))		HEZUNE	32
35	IF (J.GE.0, JPMESH) FCA=AMAX1(FCA, ABS(UL(I)))		HEZUNE	33
36	IF (J.EQ.2) VIB=AMAX1(VIB, (.25*HOT*(Y(IJP)-Y(IJ)))		HEZUNE	34
	1 (1.0-VELSIE/SIL(IJ)))		HEZUNE	35
37	IF (J.EQ.0, JPAH) VTB=AMAX1(VTB, 0.25*HOT*(Y(IJP)-Y(IJ)))		HEZUNE	36
	1 (1.0-VELSIE/SIL(IJ)))		HEZUNE	37

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38      IF (1.FG,IN1) U1=AMAX1(U1,0.25*FUT*(X(IPJ)-X(IJ)))*
      I (1,0=REZSIE/SIE(IJ))
39      JL=IPJ
40      IPJ=IPJP
41      I 40 CCONTINUE
42      CALL LOOP
43      I 50 CCONTINUE
44      PMIN1=0.0, VTB, VTT, U1=FC3, FCP2, FCX
45      W=116 (12,400) VTB, VTT, U1=FC3, FCP2, FCX
      C      FCJ=FC3+VTF
      C      FCP2=FCP2+VTF
      C      F(A=FCX+U1
46      FCJ=FCJ+FC3
47      FCP2=FCP2+FCP2
48      F(A=FCJ+FCX
      C      --- FADWME AWEA WEIGHTING ALGORITHM
49      CALL START
50      UC 1 70 J=2,JP2
51      UC 1,0, I=1,IP1
52      IF J=1,0,0
53      IF J=1,0,0
54      IF (1,0,0,1,0,0,1,0,0,IP1,0,0,2,0,0,JP2) GO TO 1051
55      IF J=1,0,0
56      IF J=1,0,0
57      IF JP=1,JP,0
58      UC(IJ)=SWTCH*(UL(IJ)+U(IJ))
59      VL(IJ)=SWTCH*(VL(IJ)+V(IJ))
60      X1=A(I,0,0)
61      X2=A(I,JP)
62      X3=A(I,JP)
63      X4=A(I,JP)
64      X5=A(I,J)
65      Y1=Y(I,JP)
66      Y2=Y(I,JP)
67      Y3=Y(I,JP)
68      Y4=Y(I,JP)
69      Y5=Y(I,J)
70      RA1=0.5*((X1-X5)*(Y2-Y5)-(Y1-Y5)*(X2-X5))
71      RA2=2.0/((X2-X5)*(Y3-Y5)-(Y2-Y5)*(X3-X5))
72      RA3=2.0/((X3-X5)*(Y4-Y5)-(Y3-Y5)*(X4-X5))
73      RA4=2.0/((X4-X5)*(Y1-Y5)-(Y4-Y5)*(X1-X5))
74      UY5=((X5-0.5*(X1+X2))+RA1*(X5-0.5*(X2+X3))*RA2
      I 1*(X5-0.5*(X3+X4))+RA3*(X5-0.5*(X4+X1))*RA4)/(RA1+RA2+RA3+RA4)
75      LX5=4*UAY5
76      UY5=((Y5-0.5*(Y1+Y2))*RA1*(Y5-0.5*(Y2+Y3))*RA2
      I 1*(Y5-0.5*(Y3+Y4))*RA3*(Y5-0.5*(Y4+Y1))*RA4)/(RA1+RA2+RA3+RA4)
77      UY5=4*UAY5
78      UAY5=0.25*(X1+X2+X3+X4)-X5
79      UY5=0.25*(Y1+Y2+Y3+Y4)-Y5
80      UC(IJ)=UG(IJ)+STF*(XAY5
81      VL(IJ)=VG(IJ)+STF*(VAY5
82      IF (J,0,0,3) UC(I,JP)=UG(IJ)
83      IF (1,0,0,2) VG(I,JP)=VG(IJ)
84      GC 10 1 59
85      I 51 CCONTINUE
86      IF (1,0,0,1) GO TO 1052
87      UC(IJ)=J,0
88      GC 10 1 53
89      I 52 IF (1,0,0,1,1) GO TO 1,53
90      UC(IJ)=FCX
91      VL(IJ)=VG(I,JP)
92      I 53 IF (J,0,0,2) GO TO 1,54
93      UC(IJ)=FC3
94      GC 10 1 55
95      I 54 IF (J,0,0,JP2) GO TO 1,55
96      UC(IJ)=UG(I,JP)
97      J,0(IJ)=F,0
98      I 55 IF (1,0,0,1,0,0,JP2) GO TO 1,55

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[illegible]


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22 10. CALL ECHD (AASC,IECP,LPB,NE)
23 KP = 1
24 11 NP1 = NPPT + 1
25 XTE = XPAH(KP)
26 IF (XTE.LT.0.) GO TO 150
27 YTE = YPAH(KP)
28 ICEL = ITHR(NPPT)
29 J = ICEL/IP1 + 1
30 I = ICEL - (J-1)*IP1
31 KRO = 0
32 ITEMP = 0
33 IF (J.EQ.JOLD) GO TO 116
34 115 IEC=(J-1)*NG1
35 JOLD = J
36 CALL ECHD (AASC(ISC2),IEC,NGI2,NE)
37 116 KRO=KRO+1
38 IF (KRO.GT.100) GO TO 490
39 IL = (I-1)*NG + ISC2
40 IFJ = IJ + NG
41 IJP = IJ + NGI
42 IJP = IJP + NGI
43 A1 = A(IJP)
44 Y1 = Y(IJP)
45 X2 = A(IJP)
46 Y2 = Y(IJP)
47 X3 = A(IJP)
48 Y3 = Y(IJP)
49 X4 = A(IJ)
50 Y4 = Y(IJ)
51 AX=XTE
52 YF=YTE
53 XAX3 = X4-X3
54 YFY3 = Y4-Y3
55 Y13=Y1-Y3
56 X13= X1-X3
57 U13= Y13*XPX3 -X13*YFY3
58 IF (U13.GE.0.) GO TO 119
59 Y23=Y2-Y3
60 X23= X2-X3
61 U23= Y23*XPX3 -X23*YFY3
62 IF (U23.LT.0.) GO TO 117
63 U12=(Y2-Y1)*(X2-X1) -(X2-X1)*(Y2-Y1)
64 IF (U12.LT.0.) GO TO 118
65 ITEMP = 1
66 LTM1 = 1./(Y23*X13-X23*Y13)
67 GO TO 125
68 117 IF (J.EQ.JP1) GO TO 490
69 J=J+1
70 GO TO 115
71 118 IF (I.EQ.IRAH) GO TO 490
72 J=J+1
73 GO TO 116
74 119 X43= X4-X3
75 Y43=Y4-Y3
76 U34= X43*YFY3 -Y43*XPX3
77 IF (U34.LT.0.) GO TO 120
78 U14= (Y4-Y1)*(X1-X4) -(Y1-X4)*(X4-X1)
79 IF (U14.LT.0.) GO TO 121
80 LTM1 = 1./(Y13*X43 -X13*Y43)
81 GO TO 125
82 120 IF (I.EQ.1) GO TO 490
83 J=J+1
84 GO TO 116
85 121 IF (J.EQ.2) GO TO 490
86 J=J+1
87 GO TO 115
88 125 U1 = U(IJP)
89 V1 = V(IJP)

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5      U2 = U(IPJD)
6      V2 = V(IPJD)
7      U3 = U(IJ4)
8      V3 = V(IJ4)
9      U4 = U(IJ)
10     V4 = V(IJ)
11     IF (ITER.EQ.1) GO TO 126
12     UA = (U3+U1)*U14*U3*(U13+U4)*UTRI
13     VA = (V3+V1)*U14*V3*(U13+V4)*UTRI
14     CC TO 126
15     120 UA = (U2+U1)*U13*U2*(U12+U3)*UTRI
16     110 VA = (V2+V1)*U13*V2*(U12+V3)*UTRI
17     120 CONTINUE
18     AFAM(KP) = XTE*U1*U4K
19     YFAM(KP) = YTE*U1*U4K
20     PYD=AMIN1(PYT,YFAM(KP))
21     MYI=AMAX1(PYT,YFAM(KP))
22     UAN=AMPA1(PYD-YFAM(KP))
23     ITAN(NPPT) = (U-1)*PI + 1
24     15 IF (NPPT.EQ.NPT) GO TO 160
25     NP = NP+1
26     IF (KPLT.LP5) GO TO 11
27     CALL ECHH (AASL,IECP,LPH+NE)
28     IECP = IECP + LPH
29     GO TO 11
30     16 CALL ECHH (AASL,IECP,LPH+NE)
31     IECP=IECP+LPH
32     RETURN
33     44 AFAM(KP) = -.5*3
34     PRINT P,UI, NPPT, ITAN(NPPT)
35     GO TO 150
36     C

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PANTHUV 108
PANTHUV 109
PANTHUV 110
PANTHUV 111
PANTHUV 112
PANTHUV 113
PANTHUV 114
PANTHUV 115
PANTHUV 116
PANTHUV 117

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101 ERU

SINGLY REFERENCED VARIABLES

AA1	(1)K	5LC	U1K	-H	8CO	GROVEL	-H	8CO	IYB	-I	9CO	ADPT	-I	2CO	NEAL	-	144	TIME	-H	8CO
AA2	(1)K	6LC	U1V	-H	11CO	BZ	-H	11CO	IYI	-I	9CO	ADIB	-I	11CO	NEU	-	864	TIMEUT	-H	12CO
AMINI	-	1550	U1VSAV	-H	11CO	UDTC	-I	19CO	JBAD	-I	8CO	ANVALS	-I	12CO	NETANN	-	1170	YOUT	-H	8CO
ANG	-H	11CO	U1VY	-R	11CO	UDTV	-I	19CO	UDTC	-I	11CO	ADU17	-I	11CO	NECHUN	-H	1166	YSTANT	-H	8CO
ANGLES	(1)K	12CO	E1J	-H	8CO	IJM	-I	4CO	UDTV	-I	11CO	CU	-H	11CO	NECHIE	-H	866	U1EM	-H	11CO
ASU	-H	11CO	U1S	-H	11CO	IJFS	-I	8CO	JMP	-I	11CO	CHANG	-H	11CO	NECPB	-H	1166	UU	-H	9CO
AB	-H	11CO	E1JVAL	-	13F	IM	-I	11CO	JMP2	-I	8CO	CHCTL	-H	11CO	CHBEM	-H	966	UMITE	-	1264
ADUFAC	-H	11CO	E1AH	(1)K	2CO	IPAL	-I	9CO	JMP	-I	11CO	CPDEN	(1)K	2CO	ALCI	-	264	ACUMV	-H	964
ADH	-H	11CO	F1PAL	-H	9CO	IPAR	-I	9CO	KRI	-I	11CO	CHTH	(1)K	2CO	ANVALS	(1)K	1266	AL	-H	960
BTOL	(1)K	2CO	F1PAH	-H	9CO	IPYB	-I	9CO	LAMU	-H	14HL	CHANGE	-	11CN	CHUM	(1)K	266	AM	-H	960
BU	-H	11CO	F1PTU	-H	9CO	IPYT	-I	9CO	LJF2	-I	11CO	PANTHUV	-	150	CHLVLM	-	964	VM	-H	960
COLAMU	-H	11CO	F1AL	-H	9CO	IP2	-I	11CO	MUP2	-H	14HL	F1A	-	464	SHTHL	(1)K	266	TCUMV	-H	960
CYL	-H	11CO	F1H	-H	9CO	15CF1	-I	9CO	NAME	(1)K	8CO	PHIN1	-	11VF	STATE	-	264	VELLUM	-	1064
DIMENS1	-	15F	F1YB	-H	9CO	15CF2	-I	8CO	NANGLS	-I	12CO	PTAB	(1)K	2CO	I	-H	866	VELL1	-	964
DTL	-H	11CO	F1MAT	-	16F	15CF3	-I	8CO	NCTC	-I	8CO	PRCUMV	-H	960	1444	-H	866	VELL2	-	964
UTCSAV	-H	11CO	U1L	(1)K	2CO	1TV	-I	8CO	NUCMP	-I	8CO	FAL	-H	960	1444	(1)K	866	VELL3	-	964
UTU2	-H	11CO	U1L	-H	11CO	1AL	-I	9CO	NTMH	-I	2CO	F1CUMV	-H	960	1444	(1)K	866	VELL4	-	964
UTPOS	-H	11CO	U1L	-H	11CO	1AR	-I	9CO	NU1J	-I	2CO	RDT	-H	11CO	1444	-H	866	VELL5	-	964

MULTIPLY-REFERENCED VARIABLES

100	-	24*	114	
116	-	24*	111	
115	-	34*	71	87
116	-	33	37*	73 H4
117	-	62	66*	
118	-	64	71*	
119	-	58	74*	
120	-	77	62*	
121	-	74	85*	
125	-	67	81	88*
126	-	96	101*	
124	-	94	102*	
150	-	26	104*	120
163	-	114	115*	

	490	32	68	71	82	85	118*											
2001	-	10*	119PH															
AASC	(H)	13CU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU	13EU
AMAX1	-	108SU	117SU															
BETALC	(H)	13EU	15U1															
CENTX	(H)	13EU	15U1															
CENTY	(H)	13EU	15U1															
COMMON	-	2F	3F	4F	5F	9F	10F	11F	12F									
CO	(H)	13EU	15U1															
DELSM	(H)	13EU	15U1															
DT	-H	PCU	103	1.4														
D1R1	-H	60=	62=	97	98	100	101											
D12	-H	63=	64	100	101													
D13	-H	57=	58	97	98	100	101											
D14	-H	70=	71	97	98													
D23	-H	61=	62	100	101													
D34	-H	70=	77	97	98													
E	(H)	13EU	15U1															
ECHD	-	225U	365U															
ECHW	-	1125U	1155U															
EMOMLC	(H)	13EU	15U1															
EP	(H)	13EU	15U1															
ETIL	(H)	13EU	15U1															
FOUCLC	(H)	13EU	15U1															
FSH	(H)	13EU	15U1															
GRIR	(H)	13EU	15U1															
GRIZ	(H)	13EU	15U1															
I	-1	4CU	32	39	71	72=	72	82	83=	83	100							
IHAR	-1	8CU	71															
ICEL	-1	28=	29	31														
IEC	-1	34=	36AG															
IECP	-1	11CU	10	22AG	112AG	113=	113	115AG	116=									
IECPA	-1	18=	110															
IJ	-1	4CU	39=	41	41	49	50	94	95									
IJP	-1	4CU	41=	47	48	92	93											
IPJ	-1	42=	43	43	44	88	89											
IPJP	-1	42=	45	46	46	91												
IP1	-1	8CU	29	31	108													
ISC2	-1	8CU	36AG	39														
ITAB	(H)	11CU	28	100=	119PH													
ITEM	-1	32=	65=	56														
J	-1	4CU	29=	31	33	34	35	88	89=	89	85	86=	86	100				
JOLD	-1	17=	33	35=														
JP1	-1	8CU	60															
KKO	-1	31=	37=	37	38													
KP	-1	23=	25	27	103	104	105	106	107	110=	110	111	110					
LAM	-H	11CU	14KL															
LCH	-	5F	6F	7F														
LEB	-1	19=	22AG	111	112AG	113	115AG											
M	(H)	13EU	14KL	15U1														
MP	(H)	13EU	14KL	15U1														
MU	-H	11CU	14KL															
NE	-1	22AG	36AG	112AG	115AG													
NBMT	-1	17=	24=	24	108	109	110PR	119PH										
NPT	-1	11CU	1.9															
NU	-1	8CU	39	40														
NU1	-1	8CU	19	39	41	42												
NU12	-1	11CU	36AG															
P	(H)	13EU	15U1															
PL	(H)	13EU	15U1															
PXR	-H	9CU	21=	17=	17													
PYB	-H	9CU	22=	15=	15													
PYI	-H	9CU	21=	16=	16													
R	(H)	13EU	15U1															
RCSU	(H)	13EU	15U1															
RH	(H)	13EU	15U1															
RMP	(H)	13EU	15U1															

RO	(RM	13EW	1501				
ROL	(RM	13EW	1501				
RVOL	(RM	13EW	1501				
RZEDEN	(RM	13EW	1501				
SAL	(RM	13EW	1501				
SIGPLC	(RM	13EW	1501				
U	(RM	13EW	1501	88	90	92	94
UG	(RM	13EW	1501				
UR	-RM	97=	10.2	1.3			
UL	(RM	13EW	1501				
UMOMLC	(RM	13EW	1501				
UP	(RM	13EW	1501				
UTIL	(RM	13EW	1501				
U1	-RM	88=	97	1.3			
U2	-RM	97=	10				
U3	-RM	92=	97	1.0			
U4	-RM	94=	97				
V	(RM	13EW	1501	89	91	93	95
VG	(RM	13EW	1501				
VK	-RM	94=	101=	1.4			
VL	(RM	13EW	1501				
VP	(RM	13EW	1501				
VTIL	(RM	13EW	1501				
V1	-RM	89=	98	1.1			
V2	-RM	91=	101				
V3	-RM	92=	90	1.1			
V4	-RM	95=	90				
X	(RM	13EW	1501	43	45	47	49
XP	-RM	51=	53	63	78		
XPAR	(RM	13EW	1501	25	103=	107	118=
XPA3	-RM	53=	57	61	76		
X1E	-RM	25=	20	51	173		
X1	-RM	43=	50	63	78		
X13	-RM	56=	57	66	80		
X2	-RM	45=	0	63			
X23	-RM	6 =	61	66			
X3	-RM	47=	53	50	60	74	
X4	-RM	44=	14	78			
X43	-RM	14=	70	0			
Y	(RM	13EW	1501	44	46	48	50
YP	-RM	57=	54	63	78		
YPAR	(RM	13EW	1501	27	104=	105	106
YMY3	-RM	54=	57	61	76		
YTE	-RM	27=	52	4			
Y1	-RM	44=	55	63	78		
Y13	-RM	55=	57	66	80		
Y2	-RM	44=	54	63			
Y23	-RM	54=	61	66			
Y3	-RM	42=	54	55	59	75	
Y4	-RM	5 =	15	78			
Y43	-RM	75=	70	0.			

1	OVERLAY (YCKIFER, 3, 0)		
1	PHUGRAM MCRT	MCMT	2
		MCMT	3
		MCMT	4
		MCMT	5
		MCMT	6
2	COMMON /STATE/	ALLKOM	2
	1	FREQ(300), SPTBL(300), MTAB(300), ETAB(300),	3
	2	BTBL(300)	4
		ALLKOM	4

3	COMMON /YSC1/	AASC(5+5*)	ALLKCM	5
4	COMMON /PINK/	I, IJ, IJM, IJP, J	ALLKCM	6
5	LCH /YLC1/	AA1(13150)	ALLKCM	7
6	LCH /YLC2/	AA2(131500)	ALLKCM	8
7	LCH /MLC1/	SIGA(30300)	ALLKCM	9
8	COMMON /RED/	NAME(10), DT, DTR, EM10, GROVEL, IRAR, IJPS,	ALLKCM	10
	1	IP1, ISCF1, ISCF2, ISCF3, ITV, JBAR,	ALLKCM	11
	2	JF1, JPF, NCTC, NDUMP, NU, NQ1, MEZSIE, TAMB,	ALLKCM	12
	3	TEMP(500), T, TIME, TOUT, TSTART, THY	ALLKCM	13
9	COMMON /GREEN/	ALPHA, AMP, NHUF, NSP, NPCMAX, JCEN, TEMIT	GREEN	2
10	COMMON /LAVANDUL/	DENS(1500), EBLOCK(10000), ECEN, ENC,	LAVANDUL	2
	1	FSCAT(1500), ID, IESCAP, NCCL, NOIE,	LAVANDUL	3
	2	NFLUSH, NPCVE, SIEMIN, T1, T2	LAVANDUL	4
11	EQUIVALENCE	(AASC(1),X,XPAR), (AASC(2),R,YPAR), (AASC(3),Y),	EQUIREAL	2
	1	(AASC(4),U), (AASC(5),V), (AASC(6),RO),	EQUIREAL	3
	2	(AASC(7),MP,HMP,HCSU,CENTX),	EQUIREAL	4
	3	(AASC(8),E,ETIL,CENTY), (AASC(9),HVOL),	EQUIREAL	5
	4	(AASC(10),H,HM,VH), (AASC(11),P,PL,EP,UP),	EQUIREAL	6
	5	(AASC(12),UTIL,LL,CH,EMOMLC),	EQUIREAL	7
	6	(AASC(13),VTIL,VL,UMOMLC),	EQUIREAL	8
	7	(AASC(14),HCL,HETALC,FOUTLC), (AASC(15),SIE),	EQUIREAL	9
	8	(AASC(16),DELSM,S(1-PLC),	EQUIREAL	10
	9	(AASC(17),GH12,UG,H/UDEN),	EQUIREAL	11
	10	(AASC(18),GH12,VG,VSH)	EQUIREAL	12
12	REAL	LAM, LAND, M, MP, MU, MU02	EQUIREAL	13
13	DIMENSION	X(1), APAR(1), H(1), YPAR(1), Y(1), U(1),	DIMEN	2
	2	V(1), M(1), NP(1), RMP(1), RCSQ(1), CENTX(1),	DIMEN	3
	3	E(1), ETIL(1), CENTY(1), HVOL(1), M(1), RM(1),	DIMEN	4
	4	VP(1), F(1), PL(1), EP(1), UP(1), UTIL(1),	DIMEN	5
	5	UL(1), CU(1), EMOMLC(1), VTIL(1), VL(1),	DIMEN	6
	6	UMOMLC(1), HUL(1), HETALC(1), FOUTLC(1),	DIMEN	7
	7	SIE(1), DELSM(1), SIGPLL(1), GH12(1), UG(1),	DIMEN	8
	8	RZELIEN(1), GH12(1), VG(1), FSN(1)	DIMEN	9
14	C	DEBLINT	MCNT	12
15	C		MCNT	13
16	2,1,1 FCHMAT	(1M,PROBLEM CYCLE,10,6X,RAON TRANSPORT//	MCNT	14
	1	* TIME,1PE12,4,* 10*,1PE12,4,6X,*DTR,1PE12,4)	MCNT	15
17	2,1,1 FCHMAT	(1M,*INITIAL ENMOJES*6M RAON,1PE12,4,	MCNT	16
	1	6X*6M INT,1PE12,4,6X*6M KIN,1PE12,4,	MCNT	17
	2	6X*6M LUTAL,1PE12,4)	MCNT	18
18	2,1,1 FCHMAT	(1M,*SIJUNIN*112,6X,7M SIEMIN,1PE11,4,	MCNT	19
	1	6X*6M UMIN,1PE12,4,6X*6M TMIN,1PE12,4)	MCNT	20
19	C	--- INITIALIZE VARIABLES	MCNT	21
20	KEEP=L		MCNT	22
21	UTOLD=DTR		MCNT	23
22	1 T2=TIME+DTR		MCNT	24
23	UTOLD=DTR		MCNT	25
24	UTM=100.0		MCNT	26
25	EINT=ENIN*URITUT=0.0		MCNT	27
26	SICMIN=1.0E+20		MCNT	28
27	HVOL=11.642E+13*DTOLD		MCNT	29
28	ACAT=1.0E+05*UTOLD*ALPHA		MCNT	30
29	C		MCNT	31
30	PRINT 2001	NCTC, TIME, T2, UTOLD	MCNT	32
31	WRITE (12,20(1))	NCTC, TIME, T2, UTOLD	MCNT	33
32	C		MCNT	34
33	CALL STANT		MCNT	35
34	LC 50 J=2,JP		MCNT	36
35	1,5L=(J-1)*IP1		MCNT	37
36	LC 50 T=1,IPAR		MCNT	38
37	IPJ=1,0*NU		MCNT	39
38	IPJP=1,JP*NO		MCNT	40
39	1,5L=1,5SC+1		MCNT	41
40	CENTX(1J)=0.25*(X(1J)+X(1PJ)+X(1JPJ)+X(1JPI))		MCNT	42
41	CENTY(1J)=0.25*(Y(1J)+Y(1PJ)+Y(1JPJ)+Y(1JPI))		MCNT	43
42	1,5L=1,5L+1		MCNT	44
43	IF (1,5L,IPAR) CENTX(1PJ)=CENTY(1PJ)=0.0		MCNT	45
44	IF (1,5L,IPSC)		MCNT	46

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4  TLUG=GLUG*2*(TP)
5  IF (TLUG.GT.0*TMP(NOPT)) TLUG=0*TMP(NOPT)
6  DEN5(IJSC)=40(IJ)
7  U=UEN5(IJSC)
8  ULUG=GLUG*0*(UP)
9  IF (ULUG.LT.0*UPEN(1)) ULUG=0*UPEN(1)
10 IF (ULUG.GT.0*UPEN(NOPD)) ULUG=0*UPEN(NOPD)
11 E=UBLINT (0,ULUG,TLUG,UPEN,OPTMP,BTBL, 0,NOPT,NOPD,NOPT)
12 DELTALC(IJ)=BP
13 SP=UBLINT (0,ULUG,TLUG,UPEN,OPTMP,SWTBL,0,NOPT,NOPD,NOPT)
14 SP=ULAP1(SP)
15 SIGPLC(IJ)=SP
16 FSCAT(IJSC)=1.0/(1.0+ACAT*BP*SP)
17 FSC(IJ)=FSCAT(IJSC)
18 TP=TP**4
19 HRVOL=6.283184/HRVCL(IJ)
20 HZEDEN(IJ)=SP*TP**XVOL*HRVOL*FSCAT(IJSC)
21 XX=1.0E+15*DP*HRVOL
22 ASIE=XX*SF(IJ)
23 IF (TP.LT.TER1) GO TO 54
24 XLIN=ASIE/HZEDEN(IJ)
25 IF (AUTK.LT.0*H) DTR=ADTR
26 IF (ASIE.GT.SIEMIN) GO TO 54
27 SICMIN=ASIE
28 IJMIN=IJSC
29 TMIN=TP
30 UMIN=UP
31 EINT=EINT+XSIE
32 EKIN=EKIN+XX*.125*(U(IJ)**2+U(IPJ)**2+U(IPJP)**2+U(IJP)**2+
33   V(IJ)**2+V(IPJ)**2+V(IPJP)**2+V(IJP)**2)
34 UHTOT=UHTOT+137.214E+.8*TP**HRVOL
35 IJ=IPJ
36 IJP=IPJP
37 CCONTINUE
38 CALL LOOP
39 CCONTINUE
40 CALL DONE
41 UTR=UTR*UTOLUER*0.15
42 EALL=EINT+EKIN
43
44 C
45 PRINT 2102, UHTOT, EINT, EKIN, EALL
46 WRITE (12,1002) UHTOT, EINT, EKIN, EALL
47 PRINT 2103, IJMIN, SIEMIN, DMIN, TMIN
48 WRITE (12,2003) IJMIN, SIEMIN, DMIN, TMIN
49
50 C
51 NEWIND 1
52 NEWIND 2
53 NEWIND 3
54 C
55 --- PERFORM SOLUTION OF TRANSPORT EQUATION
56 CALL OVERLAY (7LYCKIFR+3.1,6HHECALL)
57 CALL HEMARK (6HHEFEH)
58 C
59 --- EVALUATE ENERGY DEPOSITION AND ADVANCE TEMPERATURES
60 CALL OVERLAY (7LYCKIFR+3.2,6HHECALL)
61 CALL HEMARK (6HHESTEP)
62 C
63 --- RADIATION TRANSPORT OUTPUT
64 IF (TZ.LT.TOUT) GO TO 61
65 IF (KEEP.EQ.NCYC) GO TO 61
66 CALL OVERLAY (7LYCKIFR+3.3,6HHECALL)
67 NEMP=NCYC
68 CALL HEMARK (7HLISTING)
69
70 C
71 61 TIME=T2
72 UTR=AMINI(DTR,1.0*0.1)
73 IF (TIME+EMIC.GE.T) RETURN
74 UTOLUER=UTR
75 IF (TIME+UTR.GT.T+ENL) UTR=T-TIME
76 GO TO 1
77 END

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MCHT 47
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SINGLY REFERENCED VARIABLES

AA1	(1)H	5LC	ETAB	(1)H	2CO	1SCF2	-1	8CO	LAVANDER	-	10CN	ACOL	-1	10CO	PINK	-	4CN	START	-	29SH
AA2	(1)H	6LC	FHEU	(1)H	2CO	1SC2	-1	9CO	LEAT	-	14F	ADIE	-1	10CO	PTAB	(1)R	2CO	STATE	-	2CN
AMINI	-	95SU	UNLEVEL	-R	8CO	1SC3	-1	9CO	LOUP	-	73SU	NOLMP	-1	8CO	UEXP10	-	50SU	TAMB	-R	8CO
DIMENSI	-	13F	GREEN	-	9CN	ITV	-1	9CO	MCMT	-	1SU	NFLUSH	-1	10CO	MEAL	-	12F	THY	-R	8CO
DOHE	-	75SU	10	-1	10CO	JBAR	-1	9CO	MU	-R	12RL	AFRU	-1	2CO	MED	-	8CN	TSTANT	-R	8CO
EKLOCK	(1)H	10CO	1ESLAP	-1	10CO	JGEN	-1	9CO	MUOP	-R	12HL	NMCVE	-1	10CO	RETUHN	-	96F	TI	-R	10CO
ELEN	-R	10CO	10P	-1	4CO	JP2	-1	4CO	NAPF	(1)I	8CO	NPCMAX	-1	9CO	HEZSIE	-R	8CO	YLC1	-	5CN
ENC	-R	10CO	10PS	-1	8CO	LAP	-R	12HL	NUP	-1	9CO	NQI	-1	8CO	KLC1	-	7CN	YLC2	-	8CN
EQUIVAL	-	11F	1SCF1	-1	8CO	LAPD	-R	12HL	NHUF	-1	9CO	NSP	-1	9CO	SIGA	(1)H	7LC	YSC1	-	3CN

MULTIPLY-REFERENCED VARIABLES

1	-	2	*	99																
54	-	54		62		67*														
58	-	3200		72*																
59	-	3 00		74*																
61	-	84		9		94SU														
2001	-	15*		21PM		20WK														
2002	-	10*		10PM		19WK														
2003	-	17*		6 PM		11WK														
AASC	(1)H	3CO	11EW	11EW	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ
ALPHA	-R	9CO	26																	
BETALC	(1)H	11EW	1301	48*																
BP	-R	41*	40	52																
BTL	(1)H	2CO	41																	
CENTA	(1)H	11EW	1301	30*	38*															
CENY	(1)H	11EW	1301	37*	38*															
COMMON	-	2F	3F	4F				9F	10F											
CU	(1)H	11EW	1301																	
DMLINT	-	14LA	47SU	49SU																
DELSM	(1)H	11EW	1301																	
DENS	(1)H	1 CO	42*	43																
DEUG	-R	44*	45	45*	46	46*	47	49												
DMIN	-R	66*	67*	61WK																
DP	-R	47*	44	51	66															
DT	-R	8CO	45																	
DTOLU	-R	21*	25	26	27PM	28WK														
DTOLUER	-R	14*	76	97*																
DTN	-R	8CO	19	21	22*	61	61*	76*	76	95*	95	97	98	98*						
E	(1)H	11EW	1301																	
EALL	-R	77*	76WK	79WK																
EINT	-R	73*	67*	67	77	78PR	79WK													
EKIN	-R	73*	68*	68	77	78PR	79WK													
EMOMLC	(1)H	11EW	1301																	
EMIC	-R	8CO	96	98																
EP	(1)H	11EW	1301																	
ETIL	(1)H	11EW	1301																	
FORMAT	-	15F	16F	17F																
FOUTC	(1)H	11EW	1301																	
FSCAI	(1)H	1 CO	52*	53	56															
FSN	(1)H	11EW	1301	53*																
GRIN	(1)H	11EW	1301																	
GRIZ	(1)H	11EW	1301																	
I	-1	4CO	3200	38																
IBAR	-1	8CO	3200	38																
IJ	-1	4CO	33	36	36	37	37	42	48	51	53	55	56	58	60	66	68	70*		
IJMIN	-1	64*	8 PM	81WK																
IJP	-1	4CO	34	36	37	68	68	71*												
IJSC	-1	31*	35*	35	39	42	43	52	53	56	64									
IPJ	-1	33*	36	37	38	38	68	70												
IPJP	-1	34*	36	37	68	68	71													
IPJ	-1	8CO	31																	
J	-1	4CO	3 00	31																
JPI	-1	8CO	3 00																	
KEEP	-1	10*	9	92*																
LCM	-	1F	6F	7F																
M	(1)H	11EW	12ML	1301																

MP	(1)	11E6	1E6L	1301					
MCYL	-1	ECU	47E6	2066	96	92			
MCPU	-1	ECU	46	40	47	49			
MCPT	-1	ECU	41	41	47	47	44	49	
MCU	-1	ECU	33	34					
MPDEN	(1)	ECU	43	43	46	46	47	49	
MPIMP	(1)	ECU	41	41	47	49			
OVERLAY	-	MSBU	8750	915L					
P	(1)	11E6	1301						
PL	(1)	11E6	1301						
PHINT	-	27E	70E	80F					
ULOU10	-	4E5U	445U						
R	(1)	11E6	1301						
RLSU	(1)	11E6	1301						
REMARK	-	MSBU	005U	935L					
REJIND	-	80F	83F	84F					
RM	(1)	11E6	1301						
RMP	(1)	11E6	1301						
RU	(1)	11E6	1301	4E					
RUL	(1)	11E6	1301						
RK-OL	-K	5E=	5U	57	69				
RVOL	(1)	11E6	1301	55					
RZEDEN	(1)	11E6	1301	56=	60				
SIS	(1)	11E6	1301	58					
SIGMIN	-K	1 CU	24=	62	63=	80PR	81=		
SIGPLC	(1)	11E6	1301	51=					
SP	-K	49=	5 =	51	52	56			
SPTBL	(1)	ECU	49						
T	-K	ECU	96	98	98				
TEMIT	-K	ECU	59						
TEMP	(1)	ECU	39						
TIME	-K	ECU	2	27PH	28PH	94=	96	98	98
TLOG	-K	4 =	41	41=	47	49			
TMIN	-K	65=	8 PH	81PH					
TOUT	-K	ECU	89						
TP	-K	39=	4	54	59	65			
TP4	-K	54=	56	69					
T2	-K	1E6U	2 =	27PH	28PH	89	94		
U	(1)	11E6	1301	08	68	68	68		
UG	(1)	11E6	1301						
UL	(1)	11E6	1301						
UMOMLC	(1)	11E6	1301						
UP	(1)	11E6	1301						
UMTOT	-K	23=	69=	64	78PH	79PH			
UTIL	(1)	11E6	1301						
V	(1)	11E6	1301	68	68	68	68		
VG	(1)	11E6	1301						
VL	(1)	11E6	1301						
VP	(1)	11E6	1301						
VTIL	(1)	11E6	1301						
WRITE	-	2EF	70F	81F					
X	(1)	11E6	1301	36	36	36	36		
XCAT	-K	2E=	5E						
XUTN	-K	6 =	61	61					
XPAH	(1)	11E6	1301						
XSL	-K	5E=	6	6E	63	67			
XVOL	-K	25=	56						
XX	-K	57=	56	66					
Y	(1)	11E6	1301	37	37	37	37		
YFAR	(1)	11E6	1301						

1	CUMULAY (YOKI)E=3.1)	HEEFEN	2
1	PHUGHAN REEFEN	HEEFEN	3
	C	HEEFEN	4
	C	HEEFEN	5
	C	HEEFEN	6
2	COMMON /STATE/	ALLKCM	7
1	NGMT, NGPD, NFRQ, UPTMP(30), CPDENT(10),	ALLKCM	8
2	FREN(100), SPH(13,0), PTAB(300), ETAB(300),	ALLKCM	9
	BTBL(300)	ALLKCM	10
3	COMMON /YSC1/	ALLKCM	11
4	COMMON /PIJK/	ALLKCM	12
5	LCM /YLL1/	ALLKCM	13
6	LCM /YLL2/	ALLKCM	14
7	LCM /HLL1/	ALLKCM	15
8	COMMON /HED/	ALLKCM	16
1	NAME('C'), DT, UTH, EMID, GHDVEL, IPAR, IJPS,	ALLKCM	17
2	IP1, SCF1, ISCF2, ISCF3, ITV, JHAF,	ALLKCM	18
3	JP1, JPE, NCYC, ADUMP, NU, NOI, HEZSIE, IAMB,	ALLKCM	19
4	TEMP(100), T, TIME, TOUT, TSTART, THY	ALLKCM	20
5	ALPHA, AMP, NPLF, MSP, NPMAX, JCEN, TEM1,	UNLEN	21
6	COMMON /LAVADER/	LAVADER	22
7	DEFS(1500), LHLOCK(100), ECEN, EMP,	LAVADER	23
8	FSCAT(1500), IO, IESCAM, NCOL, ADIE,	LAVADER	24
9	NFLUSH, NMVDE, SIEMIN, I1, T2	LAVADER	25
10	EQUIVALENCE	EUVHEAL	26
1	(AASC(1),X,XPAR), (AASC(2),Y,YPAR), (AASC(3),Y),	EUVHEAL	27
2	(AASC(4),C), (AASC(5),V), (AASC(6),NO),	EUVHEAL	28
3	(AASC(7),MP,MPV,NCSC,CENTX),	EUVHEAL	29
4	(AASC(8),PE,PETIL,CENTY), (AASC(9),HVGL),	EUVHEAL	30
5	(AASC(10),M,MV,VP), (AASC(11),P,PL,EP,UP),	EUVHEAL	31
6	(AASC(12),UTIL,LL,CN,EMOMLC),	EUVHEAL	32
7	(AASC(13),VTIL,VL,DMMPLC),	EUVHEAL	33
8	(AASC(14),RCL,METALC,FOUTLC), (AASC(15),SIE),	EUVHEAL	34
9	(AASC(16),DELSM,SIOPLC),	EUVHEAL	35
10	(AASC(17),GHIR,UG,MPLDEN),	EUVHEAL	36
11	(AASC(18),GHIZ,VG,PSI),	EUVHEAL	37
12	REAL	EUVHEAL	38
13	DIMENSION	DIMEN	39
1	LAP, LAMP, M, MP, MU, MUUD	DIMEN	40
2	X(1), XPAR(1), Y(1), YPAR(1), Y(1), U(1),	DIMEN	41
3	V(1), M(1), MP(1), RMP(1), NCSC(1), CENT(1),	DIMEN	42
4	E(1), ETIL(1), CENT(1), HVGL(1), M(1), MP(1),	DIMEN	43
5	VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),	DIMEN	44
6	UL(1), CN(1), EMOMLC(1), VTIL(1), VL(1),	DIMEN	45
7	UPOMLC(1), RCL(1), METALC(1), FOUTLC(1),	DIMEN	46
8	SIE(1), DELSM(1), SIOPLC(1), GHIR(1), UG(1),	DIMEN	47
9	GHIZ(1), VG(1), PSI(1)	DIMEN	48
10	COMMON /HAUVE/	HEEFEN	49
11	DIMENSION	HEEFEN	50
1	NI, MU, MG, MGI, MP, ZP, UCELL	HEEFEN	51
2	A(3), OMEGA(3), COLNCR(1000), AFMUT(3)	HEEFEN	52
3	C	HEEFEN	53
4	2.00 FCHPAT	HEEFEN	54
5	1	HEEFEN	55
6	2.00 FCHPAT	HEEFEN	56
7	1	HEEFEN	57
8	2.00 FCHPAT	HEEFEN	58
9	1	HEEFEN	59
10	2.00 FCHPAT	HEEFEN	60
11	1	HEEFEN	61
12	2.00 FCHPAT	HEEFEN	62
13	1	HEEFEN	63
14	2.00 FCHPAT	HEEFEN	64
15	1	HEEFEN	65
16	2.00 FCHPAT	HEEFEN	66
17	1	HEEFEN	67
18	2.00 FCHPAT	HEEFEN	68
19	1	HEEFEN	69
20	2.00 FCHPAT	HEEFEN	70
21	1	HEEFEN	71
22	2.00 FCHPAT	HEEFEN	72
23	1	HEEFEN	73
24	2.00 FCHPAT	HEEFEN	74
25	1	HEEFEN	75
26	2.00 FCHPAT	HEEFEN	76
27	1	HEEFEN	77
28	2.00 FCHPAT	HEEFEN	78
29	1	HEEFEN	79
30	2.00 FCHPAT	HEEFEN	80
31	1	HEEFEN	81
32	2.00 FCHPAT	HEEFEN	82
33	1	HEEFEN	83
34	2.00 FCHPAT	HEEFEN	84
35	1	HEEFEN	85
36	2.00 FCHPAT	HEEFEN	86
37	1	HEEFEN	87
38	2.00 FCHPAT	HEEFEN	88
39	1	HEEFEN	89
40	2.00 FCHPAT	HEEFEN	90
41	1	HEEFEN	91
42	2.00 FCHPAT	HEEFEN	92
43	1	HEEFEN	93
44	2.00 FCHPAT	HEEFEN	94
45	1	HEEFEN	95
46	2.00 FCHPAT	HEEFEN	96
47	1	HEEFEN	97
48	2.00 FCHPAT	HEEFEN	98
49	1	HEEFEN	99
50	2.00 FCHPAT	HEEFEN	100

101	CHLCK(3)=A(3)	RECFEN	106
102	CHLCK(4)=OMEGA(1)	RECFEN	107
103	CHLCK(5)=OMEGA(2)	RECFEN	108
104	CHLCK(6)=OMEGA(3)	RECFEN	109
105	CHLCK(7)=EPART	RECFEN	110
106	CHLCK(8)=FREQ	RECFEN	111
107	CALL ATOUT (DIFSETZ, CHLCK, 8)	RECFEN	112
108	IF (NCP-GE-1) GO TO 4	RECFEN	113
109	ICLS=ICLS-NGI+16	RECFEN	114
110	CALL ECOM (XEDEN,IECS,1,NEI)	RECFEN	115
111	6 CONTINUE	RECFEN	116
112	IF (LSTATUS-EG-1) GO TO 3	RECFEN	117
113	C	RECFEN	118
114	RE=IND 1	RECFEN	119
115	CALL HMARK (26HCENSUS PARTICLES COMPLETED)	RECFEN	120
116	NCEN=NCEN	RECFEN	121
117	HMARK=HMARK*NSP	RECFEN	122
118	PRINT 2007, NGEN, NCEN, HBANK, NDIE, IESCAP, NMOVE, NCOL	RECFEN	123
119	12 EHAU=0.0	RECFEN	124
120	WAV=1.0/FLOAT(NSP)	RECFEN	125
121	NCEN=0	RECFEN	126
122	NCEN=HBANK*NDIE+IESCAP+NMOVE+NCOL	RECFEN	127
123	CALL START	RECFEN	128
124	DO 14 J=2,JP1	RECFEN	129
125	ICLS=(J-1)*IP1	RECFEN	130
126	DO 16 I=1,IBAW	RECFEN	131
127	IF J=1,0,NSP	RECFEN	132
128	IF J=1,0,NSP	RECFEN	133
129	ICLS=ICLS+1	RECFEN	134
130	IF (ICLS-IECS) GO TO 17	RECFEN	135
131	REPART=HZEEN(IJ)*RNP	RECFEN	136
132	ALCELL=.25*(X(IPJ)-X(IJ)+X(IPJP)-X(IJP)+Y(IJP)-Y(IJ)+	RECFEN	137
133	Y(IPJP)-Y(IPJ))	RECFEN	138
134	LC 16 F=1,NSP	RECFEN	139
135	NCEN=NCEN+1	RECFEN	140
136	RA1=HARNDUM(DUMMY)	RECFEN	141
137	RN2=HARNDUM(DUMMY)	RECFEN	142
138	RN3=HARNDUM(DUMMY)	RECFEN	143
139	RN4=HARNDUM(DUMMY)	RECFEN	144
140	RA1=1.0/(RA1+RN2+RN3+RN4)	RECFEN	145
141	A(1)=RA1*(RN1)*X(IJ)+RN2*X(IPJ)+RN3*X(IPJP)+RN4*X(IJP)	RECFEN	146
142	A(2)=0.0	RECFEN	147
143	A(3)=RA1*(RA1)*Y(IJ)+RN2*Y(IPJ)+RN3*Y(IPJP)+RN4*Y(IJP)	RECFEN	148
144	TI=TIME	RECFEN	149
145	EPART=EPART	RECFEN	150
146	EHAU=EHAU+EPART	RECFEN	151
147	C	RECFEN	152
148	CALL HNEG (FREQ, TP)	RECFEN	153
149	TP=J+1542*HARNDUM(DUMMY)	RECFEN	154
150	STH=1A(TP)	RECFEN	155
151	CTH=LUS(TP)	RECFEN	156
152	PH=0.251*HARNDUM(DUMMY)	RECFEN	157
153	OPH=51P(PH)	RECFEN	158
154	OMEGA(1)=STH*OPH	RECFEN	159
155	OMEGA(2)=STH*OPH	RECFEN	160
156	OMEGA(3)=CTH	RECFEN	161
157	II=1	RECFEN	162
158	UCELL=UCELL	RECFEN	163
159	EDEN=AMINI(1.0)*EPART,0.015(EMIN)	RECFEN	164
160	IF (EDEN-LE-EDIE) EDIE=EDEN	RECFEN	165
161	CALL WALK (A, OMEGA, IDIE, FREQ, EPART, EUEATH)	RECFEN	166
162	IF (IDIE-EG-0) GO TO 16	RECFEN	167
	C	RECFEN	168

163	IF (EPART.LT.0.0) GO TO 14	HELFEH	174
164	NCEN=NCEN+1	HELFEH	175
165	ECEN=ECEN+EPART	HELFEH	176
166	GO TO 15	HELFEH	177
167	14 NEMARK=NEMARK+1	HELFEH	178
168	15 CBLUCK(1)=A(1)	HELFEH	179
169	CBLUCK(2)=A(2)	HELFEH	180
170	CBLUCK(3)=A(3)	HELFEH	181
171	CBLUCK(4)=CPLUGA(1)	HELFEH	182
172	CBLUCK(5)=CPLUGA(2)	HELFEH	183
173	CBLUCK(6)=CPLUGA(3)	HELFEH	184
174	CBLUCK(7)=EPART	HELFEH	185
175	CBLUCK(8)=FREUP	HELFEH	186
176	CALL XTHUF (5LFSSET2, CBLUCK, 8)	HELFEH	187
177	16 CONTINUE	HELFEH	188
178	17 L=1FJ	HELFEH	189
179	L=FJFJ	HELFEH	190
180	18 CONTINUE	HELFEH	191
181	CALL CGUP	HELFEH	192
182	19 CONTINUE	HELFEH	193
183	CALL DONE	HELFEH	194
	C	HELFEH	195
184	CALL REMARK (20M\$SOURCE PARTICLES COMPLETED)	HELFEH	196
185	JCEN=JCEN+NCEN	HELFEH	197
186	IBANK=IBANK+NBANK+NB	HELFEH	198
187	PHIT 2000, NGEN, NCEA, NBANK, NDIE, IESCAP, NMQVE, NCOL	HELFEH	199
188	WRITE (12,20CB) NGEN, NCEA, NBANK, NDIE, IESCAP, NMQVE, NCOL	HELFEH	200
	C	HELFEH	201
189	31 WRITE (2)	HELFEH	202
190	ENUFLE 2	HELFEH	203
191	REWIND 2	HELFEH	204
192	CALL COPYF (5LFSSET2,5LFSSET1)	HELFEH	205
193	REWIND 1	HELFEH	206
194	REWIND 2	HELFEH	207
195	IF (IBANK.EQ.0.0) GO TO 31	HELFEH	208
196	NCEN=IBANK	HELFEH	209
197	IBANK=0	HELFEH	210
198	NCEN=NBANK+NDIE=IESCAP+NMQVE+NCOL=0	HELFEH	211
199	HNUP=1.0/1.0MT(NBF)	HELFEH	212
200	ECEN=HNUP	HELFEH	213
201	CALL OPEN (5LFSSET1,2LST+4008)	HELFEH	214
202	CALL OPEN (5LFSSET2,2LST+4008)	HELFEH	215
203	32 CALL XTHUF (5LFSSET1, CBLUCK, 4000, LENGTH2, LSTATUS)	HELFEH	216
204	LC 3H IJCEN=1,LENGTH2,8	HELFEH	217
205	REPART=CBLUCK(IJCEN+6)	HELFEH	218
206	IF (REPART.LT.0.0) GO TO 33	HELFEH	219
207	CALL XTHUF (5LFSSET2, CBLUCK(IJCEN), 8)	HELFEH	220
208	GO TO 32	HELFEH	221
209	33 REPART=REPART	HELFEH	222
210	REPART=REPART+HNUP	HELFEH	223
211	AA1=CBLUCK(IJCEN)	HELFEH	224
212	AA2=CBLUCK(IJCEN+1)	HELFEH	225
213	AA3=CBLUCK(IJCEN+2)	HELFEH	226
214	ACMEGA1=CBLUCK(IJCEN+3)	HELFEH	227
215	ACMEGA2=CBLUCK(IJCEN+4)	HELFEH	228
216	ACMEGA3=CBLUCK(IJCEN+5)	HELFEH	229
217	ACMEUP=CBLUCK(IJCEN+7)	HELFEH	230
218	ISMPITIAFREUP=-9,AND,777B	HELFEH	231
219	J=AFREUP,AND,777B	HELFEH	232
220	CALL UNPKFN (AFREUP, XFMUT)	HELFEH	233
221	AFREUP=AFMUT(1)	HELFEH	234
222	TF=AFMUT(2)	HELFEH	235
223	L=1	HELFEH	236
224	IECS=(J-1)*NU1+(I-1)*NU	HELFEH	237
225	CALL ECHU (X(IJ), IECS, 30, NE)	HELFEH	238
226	Y(IJ)=X(IJ+2)	HELFEH	239
227	Y(IJ+NU)=X(IJ+NU+2)	HELFEH	240
228	L=L+1	HELFEH	241

229	IFCS=IECS+NGI	HELFEH	242
230	CALL ECHO (X(IJP), IECS, 33, RE)	HELFEH	243
231	Y(IJP)=X(IJP+2)	HELFEH	244
232	Y(IJP+NG)=X(IJP+NG+2)	HELFEH	245
233	ALCELL=0.25*(X(IJ+IG)-X(IJ)+X(IJP+NG)-X(IJP)+ 1 Y(IJP)-Y(IJ)+Y(IJP+NG)-Y(IJ+NG))	HELFEH	246
234	LSL=IJ-1)*I)+1	HELFEH	247
235	IF=IEP(IJSC)	HELFEH	248
236	DC J/ K=7.48P	HELFEH	249
237	A(1)=XAI	HELFEH	250
238	A(2)=XAZ	HELFEH	251
239	A(3)=XAZ	HELFEH	252
240	OMEGA(1)=XOMEGA1	HELFEH	253
241	OMEGA(2)=XOMEGA2	HELFEH	254
242	OMEGA(3)=XOMEGA3	HELFEH	255
243	EPART=XEPART	HELFEH	256
244	FALUP=XFALUP	HELFEH	257
245	UCCELL=XUCCELL	HELFEH	258
246	ILIE=1	HELFEH	259
247	CALL WALK (A, OMEGA, IDIE, FREQP, EPART, EDEATH)	HELFEH	260
248	IF (ILIE.EQ.0) GO TO 37	HELFEH	261
249	IF (EPART.LE.0.0) GO TO 34	HELFEH	262
250	NCEH=NCEH+1	HELFEH	263
251	ECEH=ECEH+EPART	HELFEH	264
252	GO TO 35	HELFEH	265
253	35 HANK=XHANK*	HELFEH	266
254	35 CELUCK(1)=A(1)	HELFEH	267
255	CELUCK(2)=A(2)	HELFEH	268
256	CELUCK(3)=A(3)	HELFEH	269
257	CELUCK(4)=OMEGA(1)	HELFEH	270
258	CELUCK(5)=OMEGA(2)	HELFEH	271
259	CELUCK(6)=OMEGA(3)	HELFEH	272
260	CELUCK(7)=EPART	HELFEH	273
261	CELUCK(8)=FALUP	HELFEH	274
262	36 CALL TOUT (DLSET2, CELUCK, 8)	HELFEH	275
263	37 CONTINUE	HELFEH	276
264	38 CONTINUE	HELFEH	277
265	IF (LASTUS.EQ.1) GO TO 32	HELFEH	278
266	RETURN	HELFEH	279
267	C CALL HANK (24HANK PARTICLES COMPLETED)	HELFEH	280
268	JCEH=JCEH+NCEH	HELFEH	281
269	IF HANK.EQ.0.0	HELFEH	282
270	ELIE=0.01*SIGMIN	HELFEH	283
271	PRINT 2004, NGEN, NCEH, HANK, IDIE, IESCAP, NMVE, NCOL	HELFEH	284
272	WHILE (12.EQ.0) NGEN, NCEH, HANK, IDIE, IESCAP, NMVE, NCOL	HELFEH	285
273	GO TO 31	HELFEH	286
274	C 31 EMC=EMAD+ECEN	HELFEH	287
275	CALL FLUSH	HELFEH	288
276	PRINT 2005, NFLUSH	HELFEH	289
277	WHILE (12.EQ.0) NFLUSH	HELFEH	290
278	WHILE (13)	HELFEH	291
279	ENDFILE 3	HELFEH	292
280	RETURN 3	HELFEH	293
281	CALL OPEN (5LSET3, 2LST, 512)	HELFEH	294
282	C CALL OPEN (5LSET1, 2LST, 512)	HELFEH	295
283	CALL OPEN (5LSET2, 2LST, 512)	HELFEH	296
284	PRINT 2004, EMC, EMAD, ECEN	HELFEH	297
285	WHILE (12.EQ.0) EMC, EMAD, ECEN	HELFEH	298
286	RETURN	HELFEH	299
287	END	HELFEH	300
288	SINGLY REFERENCED VARIABLES		
289	36 = 202* EDLCK (IF 1000 IJP -1 400 LAVNDER = 10CN NOFU -1 200 WED - 0CN TAMB -R 000		
290	AA1 (IN 000 ECFM = 11SU IJP5 -1 400 LOUP = 10ISU NOF1 -1 200 WEEFEN = 1SU THY -N 000		
291	AA2 (IN 000 ECFM -H 400 ISCF1 -1 400 MAUVE = 10CN APCMAX -1 400 WETURN = 200F TOUT -N 000		
292	ALPHA -N 000 EDLCK = 11F ISCF2 -1 400 MU -H 12HL CPEN (1) 200 WEEFEN -R 000 TSTANT -N 000		

BTOL	(1)M	200	ELAB	(1)M	200	ISC2	-1	ACU	MUUP	-H	12HL	GPTRP	(1)M	200	MLC1	-	7CN	12	-H	10CU
COMFY	-	1925U	FLUSP	-	2755U	ISC3	-1	ACU	NAME	(1)	ACU	FFREL	-	1475U	SIGA	(1)R	7LL	UNPKFN	-	2205U
DENS	(1)M	180U	FLUG	(1)M	200	ITV	-1	ACU	NBUF	-1	9CU	PIAA	-	4CN	SFTAL	(1)M	200	WHENE	-	585U
DONE	-	1833	FLCAT	(1)M	10CC	JBAR	-1	9CU	NLYC	-1	8CU	PTAB	(1)M	200	STANT	-	1235U	YLC1	-	5CN
UI	-H	6CU	UNDEVEL	-H	5CU	LAF	-H	12HL	NUNAP	-1	ACU	GSGNI	-	545U	STATE	-	2LA	YLC2	-	6CN
UIR	-H	6CU	UNEN	-	5CN	LAPD	-H	12HL	NFKQ	-1	200	REAL	-	12F	1	-R	6CU	YSC1	-	3CN

MULTIPLY-REFERENCED VARIABLES

[illegible]

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[illegible]


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1      SUBROUTINE FLUSH
2      C
3      COMMON /STATE/  NORT, NGPD, NFRQ, UPTMP(30), UPUEN(10),
4      1      FREQ(100), SPTBL(30), PTAB(300), ETAB(300),
5      2      DTBL(300)
6      COMMON /YSCI/  AASC(5054)
7      COMMON /PINK/  I, J, IJP, J
8      LCM /YLC1/  AA1(131000)
9      LCM /YLC2/  AA2(131003)
10     LCM /YLC3/  SIGA(3000)
11     COMMON /RED/  NAME(14), DT, DTH, EM10, GRDVEL, IHAR, IJPS,
12     1      IP1, ISCF1, ISCF2, ISC2, ISC3, ITV, JBAR,
13     2      JP1, JP2, NCYC, NDUMP, NU, NUI, HEZSIE, TAMB,
14     3      TEMP(100), I, TIME, TOUT, TSTART, THY
15     COMMON /GREEN/  ALPHA, NHP, NHUF, NSP, NPCMAX, JCEN, TENIT
16     COMMON /LAVNDER/  DEHS(100), EHLOCK(100), ECEN, EMC,
17     1      FSCAT(100), IU, IJSCAP, NCOL, NDIE,
18     2      NFLUSH, NMVGE, SIEMIN, T1, T2
19     EQUIVALENCE
20     1      (AASC(1),X,XPAR), (AASC(2),H,YPAR), (AASC(3),Y),
21     2      (AASC(4),U), (AASC(5),V), (AASC(6),R),
22     3      (AASC(7),PP,NMP,NCS,CENTA),
23     4      (AASC(8),E,ETIL,CENTY), (AASC(9),HVOL),
24     5      (AASC(10),M,NM,VP), (AASC(11),P,PL,EP,UP),
25     6      (AASC(12),UTIL,UL,CU,ENOMLC),
26     7      (AASC(13),VTIL,VL,UM,VMLC),
27     8      (AASC(14),RGL,METALC,FOUJLC), (AASC(15),SIE),
28     9      (AASC(16),OLLSM,SIGPLC),
29     10     (AASC(17),GHIR,UG,KLUEN),
30     11     (AASC(18),GHIZ,VG,FSN)
31     LAM, LAMU, M, MP, MU, MUU2
32     DIMENSION
33     1      X(1), XPAR(1), R(1), YPAR(1), Y(1), U(1),
34     2      V(1), H(1), PP(1), NMP(1), NCS(1), CENTA(1),
35     3      E(1), ETIL(1), CENTY(1), HVOL(1), M(1), NM(1),
36     4      VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),
37     5      UL(1), CU(1), ENOMLC(1), VTIL(1), VL(1),
38     6      UROMLC(1), MUL(1), METALC(1), FOUJLC(1),
39     7      SIE(1), UELSM(1), SIGPLC(1), GHIR(1), UG(1),
40     8      RZEDEN(1), GHIZ(1), VG(1), FSN(1)
41
42     THIS ROUTINE FLUSHES THE ENERGY DEPOSITION BUFFER TO DISK
43
44     CALL WTBUF (BLFSET3,EHLOCK,10)
45
46     NFLUSH=NFLUSH+10/2
47     IL=1
48     RETURN
49     END
50
51     SINGLY REFERENCED VARIABLES
52     AA1 (1H) 5LC ETAB (1H) 2C0 IJPS -1 4C0 LAM -R 12RL NFRQ -1 2C0 HEAL - 12F TEMP (1H) 8C0
53     AA2 (1H) 6LC FLUSH - 15U IP1 -1 4C0 LAMU -R 12RL NMVGE -1 15C0 MED - 8CN THY -R 8C0
54     ALPHA -R 9C0 FREQ (1H) 2C0 ISCF1 -1 4C0 LAVNDER - 10CN NODU -1 2C0 METUHN - 17F TIME -R 8C0
55     DTBL (1H) 2C0 FSCAT (1H) 1C0 ISCF2 -1 4C0 MU -R 12RL NORT -1 2C0 HEZSIE -R 4C0 TOUT -R 8C0
56     UENS (1H) 1C0 GRDVEL -R 4C0 ISC2 -1 4C0 MUU2 -R 12RL NPCMAX -1 9C0 HLC1 - 7CN TSTART -R 8C0
57     DIMENS1 - 13F ECEN - 5CN ISC3 -1 4C0 NAME (1H) 4C0 NQ -1 4C0 SIEMIN -R 10C0 T1 -R 10C0
58     DT -R 4C0 I -1 4C0 ITV -1 4C0 NHP -1 9C0 NQ1 -1 4C0 SIGA (1H) 7LC T2 -R 10C0
59     DTH -R 4C0 JBAR -1 4C0 J -1 4C0 NHUF -1 4C0 NSP -1 9C0 SPTBL (1H) 2C0 WTBUF - 145U
60     ECEN -R 10C0 IJSCAP -1 1C0 JBAR -1 4C0 NCOL -1 10C0 CPDEN (1H) 2C0 STATE - 2CN YLC1 - 5CN
61     EM10 -R 10C0 I -1 4C0 JCEN -1 9C0 NCYC -1 4C0 OPTMP (1H) 2C0 T -R 4C0 YLC2 - 6CN
62     EM10 -R 4C0 IJP -1 4C0 JP1 -1 4C0 NDIE -1 10C0 PIAR - 4CN TAMH -R 4C0 YSCI - 3CN
63     EQUIVAL - 11F IJP -1 4C0 JP2 -1 4C0 NDUMP -1 4C0 PTAB (1H) 2C0 TENIT -R 9C0
64
65     -----
66     MULTIPLY REFERENCED VARIABLES
67     AASC (1H) 5C0 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4 11E4
68     UETALC (1H) 11E4 13U1
69     CENTA (1H) 11E4 13U1
70     CENTY (1H) 11E4 13U1
71     COMMON - 4F 3F 4F 4F 4F 10F

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CU      (H) 11EU 1301
UELSM  (H) 11EU 1301
E       (H) 11EU 1301
EMLOCK (H) 1 CU 1440
EMOMLC (H) 11EU 1301
EV      (H) 11EU 1301
ETIL   (H) 11EU 1301
FOOTLC (H) 11EU 1301
FSN     (H) 11EU 1301
GRIR    (H) 11EU 1301
GHI2    (H) 11EU 1301
IO      -1 10CU 1440 15 16*
LCM     - SF OF 7F
M       (H) 11EU 124C 1301
MP      (H) 11EU 124C 1301
NFLUSH  -1 10CU 152 15
P       (H) 11EU 1301
PL      (H) 11EU 1301
R       (H) 11EU 1301
RCSQ    (H) 11EU 1301
RM      (H) 11EU 1301
RMP     (H) 11EU 1301
RO      (H) 11EU 1301
RVL     (H) 11EU 1301
RVOL    (H) 11EU 1301
RZEDEN (H) 11EU 1301
SIE     (H) 11EU 1301
SIGPLC  (H) 11EU 1301
U       (H) 11EU 1301
UG      (H) 11EU 1301
UL      (H) 11EU 1301
UMOMLC  (H) 11EU 1301
UP      (H) 11EU 1301
UTIL    (H) 11EU 1301
V       (H) 11EU 1301
VG      (H) 11EU 1301
VL      (H) 11EU 1301
VP      (H) 11EU 1301
VTIL    (H) 11EU 1301
X       (H) 11EU 1301
XPAR    (H) 11EU 1301
Y       (H) 11EU 1301
YPAR    (H) 11EU 1301

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1      SCONVTIME PUMEGA (A, OMEGA)
2      C
3      DIMENSION A(3), B(3), OMEGA(3), Z(3), XP(3), YP(3), ZP(3)
4      DATA Z/0.0, 0.0, 1.0/
5      C
6      INITIALIZE
7      CUMIST=1.0/(OMEGA(1)**2+OMEGA(2)**2+OMEGA(3)**2)
8      CUMIST=USGRT(CUMIST)
9      ADIST=1.0/(A(1)**2+A(2)**2+A(3)**2)
10     ADIST=USGRT(ADIST)
11     ZP(1)=OMEGA(1)*CUMIST
12     ZP(2)=OMEGA(2)*CUMIST
13     ZP(3)=OMEGA(3)*CUMIST
14     B(1)=A(1)*ADIST
15     B(2)=A(2)*ADIST

```

```

PUMEGA 2
PUMEGA 3
PUMEGA 4
PUMEGA 5
PUMEGA 6
PUMEGA 7
PUMEGA 8
PUMEGA 9
PUMEGA 10
PUMEGA 11
PUMEGA 12
PUMEGA 13
PUMEGA 14
PUMEGA 15

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SINGLY REFERENCED VARIABLES				POMEGA				SU				SIN				32SU			
CO5	-	31SU	DATA	-	3F	DIMENSJ	-	2F	POMEGA	-	1SU	RETURN	-	41F	SIN	-	32SU		
MULTIPLY-REFERENCED VARIABLES																			
11	-	14	170																
21	-	18	250																
31	-	16	29	270															
A	(1K	1A0	201	5	5	5	10	11	12										
ADIST	-K	5=	6=	6	10	11	12												
B	(1K	201	1=	11=	12=	13	17												
CPMI	-K	31=	33	34	35														
CROSS	-	13SU	15SU	17SU	23SU														
CMT	-K	24=	33	34	35														
DUMMY	-K	27	28																
DMULT	-K	4=	7	8	9	36=	37=	37	38	39	40	35=	40	36	36	38=	38		
OMEGA	(1K	1A0	201	4	4	4	7	8	9	33=	34=	35=	40	36	36	38=	38		
		39	4=	40															
QSORT	-	6SU	3 SU	37SU															
RANDOM	-	27SU	26SU																
RN1	-K	27=	29	30															
RN2	-K	28=	31	32															
SHET	-K	13=	14																
SPH1	-K	32=	33	34	35														
SMT	-K	17=	18	19=	19	20	21	22	30=	33	34	35							
UNITY	-K	15=	23=																
XP	(1K	201	15	23	25=	26=	26=	33	34	35									
YP	(1K	201	13	15	17	20=	20	21=	21	22=	22	23	25=	26=	26=	33	34		
Z	(1K	201	300	17															
ZP	(1K	201	7=	8=	9=	13	15	23	33	34	35								

```

1      SUBROUTINE PFREQ (FREQ, TP)
2      C
3      COMMON /STATE/  NQI, NQPD, NFRQ, OPTMP(30), OPDEN(10),
4      FREQ(100), SPHL(300), PTAB(300), FTAB(300),
5      BTBL(300)
6      COMMON /YSC1/  AASC(5454)
7      COMMON /PINK/  I, IJ, IJM, IJP, J
8      LCM /YLC1/  AAL(13100)
9      LCM /YLC2/  AAZ(13100)
10     LCM /HLC1/  SIGN(30000)
11     COMMON /HEND/  NAME(10), DT, DTH, EM10, GNDVEL, IPAR, IJPS,
12     JF1, ISCF1, ISCF2, ISCF3, ISCF4, ITV, JBAR,
13     JF1, JPC, NCYC, NUUMP, NU, NQI, REZSIE, TAMB,
14     TEMP(1000), T, TIME, TOUT, TSTART, THY
15
16     C
17     ZETAX=1.2823234*RANDOM(DUMMY)
18     ZETAX=ZETAX*1.0/(A**4)
19     IF (ZETAX.GE.ZETAR) GO TO 5
20     A=1.0
21     GO TO 4
22
23     5 ZETAR=AMIN1(A,ZETAX)
24     ZETAR=1.0/ZETAR
25     RN1=RANDOM(DUMMY)
26     RN2=RANDOM(DUMMY)
27     RN3=RANDOM(DUMMY)
28     RN4=RANDOM(DUMMY)
29     FREQ=ZETAX*ULUG(RN1*RN2*RN3*RN4)*TP
30     FREQ=Z.41414*1.0*FREQ
31     IF (FREQ.LT.FREQ(1).OR.FREQ.GT.FREQ(NFRQ)) GO TO 3
32
33     C
34     RETURN
35     END
36
37     SINGLY REFERENCED VARIABLES
38     AASC (1)R 300 114E (1)R 200 IP1 -1 RCO JPC -1 RCO NQI -1 RCO NETURN - 25F TEMP (1)R 800
39     AA (1)R 500 GNDVEL -R 800 ISCF1 -1 RCO JPC -1 RCO CPDEN (1)R 200 REZSIE -R 800 THY -R 800
40     AAZ (1)R 600 1 -1 400 ISCF2 -1 RCO NAME (1)R 200 OPTMP (1)R 200 HLC1 - 7CN TIME -R 800
41     AMIN1 - 1000 1000 -1 400 ISCF3 -1 RCO NCYC -1 RCO PFREQ - 150 SIGN (1)R 700 TOUT -R 800
42     BTBL (1)R 700 1J -1 400 ISCF4 -1 RCO NUUMP -1 RCO FIAK - 4CN SPHL (1)R 200 TSTART -R 800
43     DT -R 800 IJM -1 400 ITV -1 RCO NUUP -1 200 PTAB (1)R 200 STATE - 2CN YLC1 - 5CN
44     DTH -R 800 IJP -1 400 J -1 400 NUPT -1 200 CLCG - 225U T -R 800 YLC2 - 6CN
45     EM10 -R 800 IJPS -1 800 JBAR -1 RCO NU -1 RCO RED - 3CN TAMB -R 800 YSC1 - 3CN
46
47     .....
48     MULTIPLY-REFERENCED VARIABLES
49     3 = 5* 2*
50     4 = 12* 15
51     5 = 13 100
52
53     COMMON - 2* 3* 4* 8F
54     DUMMY -R 5 10 14 20 21
55     FREQ (1)R 200 24 24
56     FREQP -R 100 22* 23* 23 24 24
57     LCM - 5* 6* 1*
58     NFRQ -1 200 24
59     RANDOM - 450 1000 150 2050 2150
60     RN1 -R 100 22
61     RN2 -R 100 22
62     RN3 -R 200 22
63     RN4 -R 210 22
64     TP -R 100 22
65     A -R 110 12 14* 14 16
66     ZETAR -R 100 17* 17 22
67     ZETAX -R 50 10 10
68     ZETAX -R 1 12* 12 13

```

```

1      SUBROUTINE SUBSCR (FREQ, TLOG, DLOG, IJK)
2      COMMON /STATE/ NCPT, NCPD, NFRQ, UPTMP(30), OPDEN(10),
3      1      FREQ(100), SPTH(30), PTAB(300), ETAB(300),
4      2      BTCL(300)
5      COMMON /YSC1/ AASC(5454)
6      COMMON /PINK/ I, IJ, IJM, IJP, J
7      LCM /YLC1/ AA1(131000)
8      LCM /YLC2/ AA2(131000)
9      LCM /HLC1/ SIGA(30000)
10     COMMON /HED/ NAME(12), DT, DTR, EM10, GHDVEL, IRAR, IJPS,
11     1      IP1, ISCF1, ISCF2, ISC2, ISC3, ITV, JBAR,
12     2      JP1, JP2, NCYC, NUUMP, NQ, NQ1, REZSIE, TAMB,
13     3      TEMP(7500), I, TIME, TOUT, TSTART, THY
14
15     C
16     C      THIS ROUTINE FINDS SUBSCRIPTS BY USING FITS TO THE RUN OF
17     C      NUMERICAL VALUE VERSUS INDEX.
18     C
19     DATA BL/-1.58677E-01,AL/1.713959E-05,BS/-84.92293E-01,AS/1.1818066E-01,
20     1      B/-0.16101E-01,C/1.83293E-01,1.0000E-01
21
22     C
23     IF (TLOG.GT.0.136721)GOTO5
24     ALUG=(TLOG-BL)*AL
25     JSUB=GFAB10(ALUG)
26     G(100)
27     JSUB=(TLOG-BL)*AS
28     KSUB=ULOG-OPDEN(1)
29     KSUB=KSUB+1
30     JSUB=INT(JSUB/NOPT)
31     JSUB=K*ALU(JSUB,I)
32     KSUB=INT(KSUB/NOPD)
33     XLUG=ULOG1(FREQ)-14.38348144
34     YLUG=(A*ALUG+B)*XLOG+C
35     ISUB=GFAB10(YLUG)
36     ISUB=INT(ISUB/NFRQ)
37     IJP=ISUB*(JSUB-1)*NFKG*(KSUB-1)*NOPT*NFRQ
38     RE(100)
39     EAU
40
41     SUBSCR 2
42     ALLKCM 2
43     ALLKCM 3
44     ALLKCM 4
45     ALLKCM 5
46     ALLKCM 6
47     ALLKCM 7
48     ALLKCM 8
49     ALLKCM 9
50     ALLKCM 10
51     ALLKCM 11
52     ALLKCM 12
53     ALLKCM 13
54     SUBSCR 4
55     SUBSCR 5
56     SUBSCR 6
57     SUBSCR 7
58     SUBSCR 8
59     SUBSCR 9
60     SUBSCR 10
61     SUBSCR 11
62     SUBSCR 12
63     SUBSCR 13
64     SUBSCR 14
65     SUBSCR 15
66     SUBSCR 16
67     SUBSCR 17
68     SUBSCR 18
69     SUBSCR 19
70     SUBSCR 20
71     SUBSCR 21
72     SUBSCR 22
73     SUBSCR 23
74     SUBSCR 24
75     SUBSCR 25
76     SUBSCR 26
77     SUBSCR 27

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SINGLY REFERENCED VARIABLES

AASC	(1)H	3CU	FREQ	(1)H	2CU	IP1	-1	BCU	JP1	-1	BCU	CPTMP	(1)H	2CU	SIGA	(1)R	7LC	TIME	-R	BCU
AA1	(1)H	5LC	GHDVEL	-H	BCU	ISC1	-1	BCU	JP2	-1	BCU	PINK	-	4CN	SPTH	(1)R	2CU	TOUT	-R	BCU
AA2	(1)H	6LC	I	-1	4CU	ISC2	-1	BCU	MAAC	-	195U	PTAB	(1)H	2CU	STATE	-	2CN	TSTART	-R	BCU
BTCL	(1)H	2CU	JBAR	-1	BCU	ISC3	-1	BCU	NAME	(1)H	BCU	GLC10	-	215U	SUBSCH	-	15U	YLC1	-	5CN
DT	-H	BCU	IJ	-1	4CU	ISC3	-1	BCU	NCYC	-1	BCU	RED	-	4CN	T	-H	BCU	YLC2	-	6CN
DTM	-H	BCU	IJM	-1	4CU	ITV	-1	BCU	NUUMP	-1	BCU	RETURN	-	26F	TAMB	-R	BCU	YSC1	-	3CN
EM10	-H	BCU	IJP	-1	4CU	J	-1	4CU	NQ	-1	BCU	REZSIE	-H	BCU	TEMP	(1)R	8CU			
ETAB	(1)H	2CU	IJPS	-1	4CU	JBAR	-1	BCU	NQ1	-1	BCU	RCL1	-	7CN	THY	-R	8CU			

MULTIPLY-REFERENCED VARIABLES

5	-	11	15*																	
6	-	14	16*																	
A	-H	10DA	22																	
AL	-H	4DA	12																	
AS	-H	4DA	15																	
B	-H	10DA	22																	
BL	-H	4DA	12																	
BS	-H	4DA	15																	
C	-H	10DA	22																	
COMMON	-	4F	3F	4F	8F															
DATA	-	4F	1F																	
DLOG	-H	14U	16																	
FREQ	-H	14U	21																	
IJK	-1	14U	25*																	
ISUB	-1	22*	24*	24	25															
JSUB	-1	15*	15*	18*	19*	19	25													
KSUB	-1	16*	17*	17	20*	20	25													
LCM	-	5F	4F	1F																
NAME	-	105U	200	205U																
TEMP	-1	7CU	24	25	25															

```

NOMD  -1 200 2
NOMT  -1 200 10 25
OPDEN  (1)H 200 10
DEAP10  = 1350 235
TLOG  -H 100 11 12 15
ALOG  -H 12= 13 21= 22 22
YLOG  -H 22= 23

```

```

1 FUNCTION CROSS (A,B,C)
2 DIMENSION A(3), B(3), C(3)
3 C(1)=A(2)*B(3)-A(3)*B(2)
4 C(2)=A(3)*B(1)-A(1)*B(3)
5 C(3)=A(1)*B(2)-A(2)*B(1)
6 CROSS=DSUM(C(1)**2+C(2)**2+C(3)**2)
7 RETURN
8 END

```

```

CROSS 2
CROSS 3
CROSS 4
CROSS 5
CROSS 6
CROSS 7
CROSS 8
CROSS 9

```

SINGLY REFERENCED VARIABLES

DIMENS1 = 2F USUM1 = 25U RETURN = 7F

MULTIPLY-REFERENCED VARIABLES

```

A (1)H 100 201 3 3 4 4 5 5
B (1)H 100 201 3 3 4 4 5 5
C (1)H 100 201 3= 4= 5= 6 6 6
CROSS = 150 6=

```

```

1 SUBROUTINE CENTROY (ISC, JSC, CWGT)
2 C COMMON /MAUVE/ IBAR, JP, NQ, NQ1, RHOP, ZP, DCELL
3 DIMENSION CENTX(5), CENTY(5), XYES(60), CWGT(3)
4 CENTX(1)=CENTX(4)=0.0
5 CENTY(1)=CENTY(4)=0.0
6 IECS=(JSC-2)*NQ1+(ISC-1)*NQ
7 IF (JSC.EQ.2) GO TO 3
8 CALL ECHU (XYES, IECS, 8, NE)
9 CENTX(1)=XYES(7)
10 CENTY(1)=XYES(18)
11 3 IECS=IECS+NQ1=NQ
12 CALL ECHU (XYES, IECS, 48, NE)
13 CENTX(2)=XYES(7)
14 CENTX(5)=XYES(17)*NQ
15 CENTX(3)=XYES(17)*NQ*NQ
16 CENTY(2)=XYES(18)
17 CENTY(5)=XYES(18)*NQ
18 CENTY(3)=XYES(18)*NQ*NQ
19 IF (ISC.EQ.1) CENTX(2)=CENTY(2)=0.0
20 IF (JSC.EQ.JP) GO TO 4
21 IECS=IECS+NQ1=NQ
22 CALL ECHU (XYES, IECS, 8, NE)
23 CENTX(4)=XYES(7)
24 CENTY(4)=XYES(18)
25 C LAMHLP=CENTX(5)
26 LY=ZP-CENTY(5)

```

```

CENTROY 2
CENTROY 3
CENTROY 4
CENTROY 5
CENTROY 6
CENTROY 7
CENTROY 8
CENTROY 9
CENTROY 10
CENTROY 11
CENTROY 12
CENTROY 13
CENTROY 14
CENTROY 15
CENTROY 16
CENTROY 17
CENTROY 18
CENTROY 19
CENTROY 20
CENTROY 21
CENTROY 22
CENTROY 23
CENTROY 24
CENTROY 25
CENTROY 26
CENTROY 27
CENTROY 28
CENTROY 29

```

```

27      W1=W2*1.0
28      IF (U1,GE,0.0) GO TO 12
29      U1=CENIX(2)-CENTX(5)
30      UY=CENY(2)-CENTY(5)
31      ISC=ISC-1
32      IF (ISC,GT,0) GO TO 13
33      W1=UY*0.0
34      ISC=1
35      GO TO 13
36      U1=CENIX(3)-CENTX(5)
37      UY=CENY(3)-CENTY(5)
38      ISC=ISC+1
39      IF (ISC,LE,1000) GO TO 13
40      W1=UY*0.0
41      ISC=1000
42      IF (UY,GE,0.0) GO TO 14
43      U1=CENIX(1)-CENTX(5)
44      UY=CENY(1)-CENTY(5)
45      JSC=JSC-1
46      IF (JSC,GE,2) GO TO 15
47      W2=U1*0.0
48      JSC=2
49      GO TO 15
50      U1=CENIX(4)-CENTX(5)
51      UY=CENY(4)-CENTY(5)
52      JSC=JSC+1
53      IF (JSC,LE,2000) GO TO 15
54      W2=U1*0.0
55      JSC=2000
56      X1=1.0/(U1*UYJ-DXJ*UYI)
57      C6G1(1)=(DXJ*UYJ-UY*U1J)*X1*W1
58      C6G1(2)=(UY*U1J-DX*UYI)*X1*W2
59      C6G1(3)=1.-C6G1(1)-C6G1(2)
60      RETURN
61      END

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CENTHUY 30
CENTHUY 31
CENTHUY 32
CENTHUY 33
CENTHUY 34
CENTHUY 35
CENTHUY 36
CENTHUY 37
CENTHUY 38
CENTHUY 39
CENTHUY 40
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CENTHUY 54
CENTHUY 55
CENTHUY 56
CENTHUY 57
CENTHUY 58
CENTHUY 59
CENTHUY 60
CENTHUY 61
CENTHUY 62
CENTHUY 63
CENTHUY 64
CENTHUY 65

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SINGLY REFERENCED VARIABLES

CENHUY = JSU CUMPLA = 2F UCELL = M ZCU DIMENSI = 3F MAUVE = ZCN RETURN = 60F

MULTIPLY-REFERENCED VARIABLES

3	=	1	11																
4	=	2	25																
12	=	28	36																
13	=	32	35	39	42														
14	=	42	5																
15	=	46	49	53	56														
CENIX	(1)	301	4	4	9	13	14	15	19	23	25	29	42	36	36	43	43	50	
CENY	(1)	301	5	5	10	16	17	18	19	24	26	30	39	37	37	44	44	51	
CMGT	(1)	1A6	301	57	58	59	59	59											
UX	=	25	20	57	58														
UXI	=	24	36	56	58														
UXJ	=	43	47	54	54	56	57												
UY	=	26	42	57	58														
UYI	=	31	33	37	42	56	58												
UYJ	=	44	51	56	57														
ELUD	=	250	1250	2250															
IHAR	=	200	39	41															
IEES	=	6	646	11	11	12A6	21	21	22A6										
ISC	=	1A6	6	14	31	31	32	34	38	38	39	41							
JPI	=	200	2	53	55														
JSC	=	1A6	6	7	20	45	45	46	48	52	52	53	55						
NR	=	2A6	12A6	22A6															
NR	=	200	6	11	14	15	15	17	18	18	21								
NOJ	=	200	6	11	21														
RHOP	=	200	25																
W1	=	27	33	40	57														

26	1,STORE=SHIF1(1,9)+J	WALK	27
27	PSIGNE=HEOP,AND,PMASK	WALK	28
28	IF (IUE.EQ.1) GO TO 3	WALK	29
29	ELER(1)=HEOP	WALK	30
30	ELER(2)=ZP	WALK	31
31	ELER(3)=EPANT	WALK	32
32	IL1=IU+1	WALK	33
33	CALL PARFRO (ELER, EBLOCK(ID), IRNG)	WALK	34
34	IF (IMNU.EQ.0) GO TO 201	WALK	35
35	II=IU+2	WALK	36
36	EBLOCK(IU)=PSIGNE,OR,IJSCNE	WALK	37
37	IF (IU.EQ.KBUT) CALL FLUSH	WALK	38
38	3 ILIE=0	WALK	39
	C --- COMPUTE DENS TEMP FSCAT AT PARTICLE LOCATION	WALK	40
39	10 I,SL=(JULI-1)*IP1+IOLU	WALK	41
40	IF (TEMP(IJSC1)*GT.(TAPB+.UE-06)) GO TO 11	WALK	42
41	FSP=PSCAT(IJSC1)	WALK	43
42	TF=TEMP(IJSC1)	WALK	44
43	UF=DENS(IJSC1)	WALK	45
44	GC TO 21	WALK	46
45	11 ISL=IOLU	WALK	47
46	JSC=JOLU	WALK	48
47	CALL CFNTMOY (ISC, JSC, C=GT)	WALK	49
48	12 I,SL2=(JULI-1)*IP1+ISC	WALK	50
49	I,SL2C=(JSC-1)*IP1+IOLU	WALK	51
50	TF=TEMP(I,SL1)*CNGT(1)+TEMP(IJSC2)*C=GT(2)+	WALK	52
	TEMP(IJSC)*C=GT(3)	WALK	53
51	FSP=PSCAT(IJSC1)*CNGT(1)+PSCAT(IJSC2)*C=GT(2)+	WALK	54
	PSCAT(IJSC)*C=GT(3)	WALK	55
52	13 UF=DENS(IJSC1)*CNGT(1)+DENS(IJSC2)*C=GT(2)+	WALK	56
	DENS(IJSC)*C=GT(3)	WALK	57
	C --- COMPUTE MATERIAL OPACITY AND MEAN FREE PATH	WALK	58
53	21 TLOG=LOG10(TP)	WALK	59
54	ULOU=LOG10(UP)	WALK	60
55	TLOG=MIN(TLOG,OPTMP(INLT))	WALK	61
56	ULOU=MIN(ULOU,OPDEN(INLMD))	WALK	62
57	TLOG=MAX1(TLOG,OPTMP(1))	WALK	63
58	ULOU=MAX1(ULOU,OPDEN(1))	WALK	64
59	CALL SHUSCR (FHEUP, TLOG, ULOG, IJK)	WALK	65
60	CF=SIGN(IJK)	WALK	66
61	SIGNU=UEX10(UP)	WALK	67
62	UPP=1./SIGNU	WALK	68
	C --- COMPUTE COLLISION DISTANCE	WALK	69
63	IF (ISTEP,GT.0) GO TO 22	WALK	70
64	KAL=MANUON(DUMMY)	WALK	71
65	NNP=KALS(GLOG(MNI))	WALK	72
66	22 SCUL=NNP*PODUPP	WALK	73
67	UNOVE=MIN1(ULUL,SCEN,ULLELL)	WALK	74
	C --- MOVE PARTICLES	WALK	75
68	24 BAL=PART*UEX1(-FSP*UNOVE*SIGNU)	WALK	76
69	ESLUNE=PART*LENM	WALK	77
70	ELANI=FNE	WALK	78
71	NOVE=UNOVE+1	WALK	79
72	A(1)=A(1)+NOVE*OMEGA(1)	WALK	80
73	A(2)=A(2)+NOVE*OMEGA(2)	WALK	81
74	A(3)=A(3)+NOVE*OMEGA(3)	WALK	82
75	ZL=ZP	WALK	83
76	HPU=HHP	WALK	84
77	ZP=A(3)	WALK	85
78	HPUP=USURT (A(1)*A(1)+A(2)*A(2))	WALK	86
79	IF (LSCUNE,LE.1.0E-26) GO TO 26	WALK	87
80	ZL=ZP*5*(ZP+ZU)	WALK	88
81	HPUL=U,5*(HPUP+HMCU)	WALK	89
82	ELER(1)=HEOP	WALK	90
83	ELER(2)=ZU	WALK	91
84	ELER(3)=ESCONL	WALK	92
85	IL1=IU+1	WALK	93
86	CALL PARFRO (ELER, EBLOCK(IU), IRNG)	WALK	94

87	IF (IMNU,NE,0) GO TO 201	WALK	95
88	IL=IU+2	WALK	96
89	EBLUCN(IU)=FSTORE,OR,IJSTORE	WALK	97
90	IF (IU,FU,NU) CALL FLUSH	WALK	98
91	C	WALK	99
91	20 CALL WMEHT (JULN, JULI)	WALK	100
92	IJSTORE=IIFT(IJLC,97)JULQ	WALK	101
93	IF (TEMP,I,LE,UEATN) GO TO 151	WALK	102
94	IF (IJCUL,GT,INAM) GO TO 91	WALK	103
95	IF (IJCUL,LT,0,UP,0,LU,0,JP1) GO TO 91	WALK	104
96	UCN=UCN-DMOVE	WALK	105
97	IF (UCN,LE,0,0) GO TO 81	WALK	106
98	UCUL=UCUL-DMOVE	WALK	107
99	IF (UCUL,LE,0,0) GO TO 101	WALK	108
100	ISTEP=ISTEP+1	WALK	109
101	TIME=IMOVE*0.333333E-05	WALK	110
102	*****P-DMOVE*SIGNU	WALK	111
103	GO TO 70	WALK	112
104	C --- CENSUS PARTICLE	WALK	113
105	81 IL=1	WALK	114
106	FREQ=STORE,OR,IJSTORE	WALK	115
107	ELLP(1)=F	WALK	116
108	ELLP(2)=F	WALK	117
109	ELLP(3)=E-ART	WALK	118
110	IL=IU+1	WALK	119
111	CALL KANFAD (DEP, EBLOCK(IID1), IPNG)	WALK	120
112	IF (IMNU,NE,0) GO TO 201	WALK	121
113	IL=IU+2	WALK	122
114	EBLUCN(IU)=FREQ	WALK	123
115	IF (IU,FU,NU) CALL FLUSH	WALK	124
116	RETURN	WALK	125
117	C --- PARTICLE ESCAPE FROM MESH	WALK	126
118	91 IF (TEMP,I,LE,UE-20) GO TO 93	WALK	127
119	ELLP(1)=F	WALK	128
120	ELLP(2)=F	WALK	129
121	ELLP(3)=E-ART	WALK	130
122	IL=IU+1	WALK	131
123	CALL KANFAD (DEP, EBLOCK(IID1), IPNG)	WALK	132
124	IF (IMNU,NE,0) GO TO 201	WALK	133
125	IL=IU+2	WALK	134
126	EBLUCN(IU)=FSTORE,OR,IJSTORE	WALK	135
127	IF (IU,FU,NU) CALL FLUSH	WALK	136
128	93 IESCAP=IESCAP+1	WALK	137
129	RETURN	WALK	138
130	C --- PARTICLE COLLISION	WALK	139
131	101 NCUL=NCUL+1	WALK	140
132	NCUL=NCUL+1	WALK	141
133	TIME=IMOVE*0.333333E-05	WALK	142
134	IF (IJCUL,GT,INCMAX) GO TO 121	WALK	143
135	C --- INITIALIZE REEMITTED PARTICLE PROPERTIES	WALK	144
136	C --- FREQ AND DIRECTION OF REEMITTED PARTICLE	WALK	145
137	IJSC=(JULN-1)*IP1+IOLN	WALK	146
138	IF (TEMP(IJSC),GT,(TANH+1,UE-20)) GO TO 111	WALK	147
139	FSP=FSCAT(IJSC)	WALK	148
140	IF (MANUON(LUMY),GT,(1.0-FSP)) GO TO 151	WALK	149
141	TEMP(IJSC)	WALK	150
142	DMVLS(IJSC)	WALK	151
143	GO TO 115	WALK	152
144	111 IJSC=IJCUL	WALK	153
145	IJSC=IJCUL	WALK	154
146	CALL CFTHDY (ISC, JSC, CWGT)	WALK	155
147	IJSC=(JULN-1)*IP1+ISC	WALK	156
148	IJSC=(JSC-1)*IP1+IOLU	WALK	157
149	FSP=FSCAT(IJSC)*CWGT(1)+FSCAT(IJSC2)*CWGT(2)+	WALK	158
150	FSCAT(IJSC)*CWGT(3)	WALK	159
151	IF (MANUON(LUMY),GT,(1.0-FSP)) GO TO 151	WALK	160
152	TEMP(IJSC)*CWGT(1)+TEMP(IJSC2)*CWGT(2)+	WALK	161
153	TEMP(IJSC)*CWGT(3)	WALK	162

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147      DE=DENS(IJSC1)*CGT(1)+DENS(IJSC2)*CGT(2)+DENS(IJSC)*CGT(3)      WALK      163
148      115 ISLEP=      WALK      164
149      CALL FMERG (FMEUP, TP)      WALK      165
150      FSTORE=FMEUP.AND.MASK      WALK      166
151      CALL FOMEGA (A, DMEGA)      WALK      167
152      LLOC=3,DE,0.5*(12+11)      WALK      168
153      GO TO 21      WALK      169
      C      --- PARTICLE SPLIT      WALK      170
154      121 ILIE=1      WALK      171
155      EPART=EPART      WALK      172
156      ELEM(1)=FMEUP      WALK      173
157      ELEM(2)=ELEM(3)=11      WALK      174
158      CALL MAFAD (EUEP, FSTORE, IRNG)      WALK      175
159      FSTORE=FSTORE.AND.MASK      WALK      176
160      FMEUP=FSTORE.ON.IJSTORE      WALK      177
161      RETURN      WALK      178
      C      --- PARTICLE DEATH      WALK      179
162      151 IF (EPART.LE.1) GO TO 153      WALK      180
163      ELEM(1)=HROP      WALK      181
164      ELEM(2)=2H      WALK      182
165      ELEM(3)=EPART      WALK      183
166      IL=IL+1      WALK      184
167      CALL MAFAD (EUEP, EULOCK(ID1), IRNG)      WALK      185
168      IF (IHNG.NE.C) GO TO 201      WALK      186
169      IL=IL+2      WALK      187
170      EULOCK(ID)=FSTORE.OR.IJSTORE      WALK      188
171      IF (ID.EU.NRUF) CALL FLUSH      WALK      189
172      155 ALIE=ADIE+1      WALK      190
173      RETURN      WALK      191
      C      2.1 PRINT 2.01.      IF J, EDEP      WALK      192
174      RETURN      WALK      193
175      C      WALK      194
      WALK      195
      WALK      196

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176 END

SINGLY REFERENCED VARIABLES

12	=	48	EMC	=R	1000	IJPS	=I	800	MAUVE	=	140N	AFRU	=I	200	MED	=	80N	TSTART	=R	800
13	=	52	EMID	=R	800	ISCF1	=I	800	M1	=I	1400	NQ	=I	800	MEZSIE	=R	800	WALK	=	150
24	=	68	EQUIVAL	=	11F	ISCF2	=I	800	MJ	=I	1400	NQI	=I	800	MCI	=	70N	WHERE	=	9150
AA1	(1)H	5LC	EIAD	(1)H	200	ISC2	=I	800	MU	=I	1400	ASP	=I	900	SIEMIN	=R	1000	XYECS	(1)H	1501
AA2	(1)H	6LC	EAP	=	685U	ISC3	=I	800	MU1	=I	1400	PFREU	=	1495U	SPTHL	(1)H	200	YLC1	=	50N
ABS	=	655U	FURMAT	=	17F	ITV	=I	800	MU	=R	12HL	PINK	=	40N	STATE	=	20N	YLC2	=	60N
ALPHA	=R	900	FUEL	(1)H	200	JBAR	=I	800	MUUP	=R	12HL	POMEGA	=	1515U	SUBSCH	=	595U	YLC1	=	30N
BTDL	(1)H	200	GMUVEL	=R	800	JGEN	=I	900	NAME	(1)I	800	PRINT	=	174F	T	=R	800			
DATA	=	16F	UNGEN	=	90N	JP2	=I	800	NBP	=I	900	PTAB	(1)H	200	TEMIT	=R	900			
UT	=R	800	IJ	=I	400	LAP	=R	12HL	NDYC	=I	800	GEXP10	=	615U	THY	=R	800			
UTM	=R	800	IJM	=I	400	LAMP	=R	12HL	NDUMP	=I	800	ULCG	=	655U	TIML	=R	800			
ELEN	=R	1000	IJP	=I	400	LAVNUER	=	100N	NFLUSH	=I	1000	REAL	=	12F	TOUT	=R	800			

MULTIPLY-REFERENCED VARIABLES

3	=	28	30																	
10	=	34	143																	
11	=	4	45																	
21	=	44	53	154																
22	=	63	66																	
28	=	74	41																	
81	=	97	14																	
91	=	44	95	110																
93	=	116	126																	
101	=	49	126																	
111	=	133	139																	
119	=	138	140																	
121	=	131	154																	
151	=	43	135	145	162															
153	=	18	162	174																
201	=	34	87	111	122	168	174													
2001	=	174	174																	
A	(1)H	1A0	1501	24	24	24	24	25	72	72	73	73	74	74	77	78	78	78		
		78	151A0																	

NAME	UNIT	300	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450
AMAX1	-	11E0	11E0														
AMIN1	-	57SU	50SU														
BETALC	(H)	11E0	13U1	67SU													
CENTHOY	-	47SU	141SU														
CENTA	(H)	11E0	13U1														
CENTY	(H)	11E0	13U1														
COMMON	-	2F	3F	4F	8F	9F	10F	14F									
CG	(H)	11E0	13U1														
CWGT	(H)	15U1	47AG	50	50	50	51	51	51	52	52	52	141AG	144	144	144	146
		140	147	147	147	50	51	51	51	52	52	52	141AG	144	144	144	146
UCCELL	-R	14CU	67														
UCEN	-R	23=	67	90=	96	97	152=										
UCOL	-R	66=	67	98=	98	99											
DELSM	(H)	11E0	13U1														
DENS	(H)	17CU	43	52	52	52	137	147	147	147							
DTMENS1	-	13F	15F														
DLOG	-R	54=	50=	50	58=	58	59AG										
UMFP	-R	60=	60	70	73	74	96	98	101	102	130						
UMOVE	-R	67=	68	70	73	74	96	98	101	102	130						
UP	-R	43=	52=	50	137=	147=											
DIMMY	-R	64	135	145													
E	(H)	11E0	13U1														
EHLOCK	(H)	17CU	33AG	30=	86AG	89=	110AG	113=	121AG	124=	167AG	170=					
EUEATH	-R	1AG	93														
EUEP	(H)	15U1	29=	30=	31=	33AG	82=	83=	84=	86AG	106=	107=	108=	110AG	117=	118=	119=
		150=	157=	157=	158AG	163=	164=	165=	167AG	174PR							121AG
EMOMLC	(H)	11E0	13U1														
ENEW	-R	60=	69	70													
EP	(H)	11E0	13U1														
EPART	-R	1AG	10	31	68	69	70=	93	108	116	119	155=	155	162	165		
ESCOHE	-R	65=	74	84													
ETLL	(H)	11E0	13U1														
FCUSH	-	37SU	90SU	114SU	125SU	171SU											
FOUTLC	(H)	11E0	13U1														
FREUP	-R	1AG	27	59AG	135=	113	149AG	150	156	160=							
FSCAT	(H)	17CU	41	51	51	51	134	144	144	144							
FSN	(H)	11E0	13U1														
FSP	-R	41=	51=	60	134=	135	144=	145									
FSTORE	-R	27=	30	69	145	124	150=	158AG	159=	159	160	170					
GRIK	(H)	11E0	13U1														
GRIZ	(H)	11E0	13U1														
I	-1	400	19	26	174PR												
IHAR	-1	6CU	94														
ID	-1	17CU	32	35=	35	36	37	85	88=	88	89	90	109	112=	112	113	114
		123=	123	124	125	166	167=	169	171	171							120
IDIE	-1	1AG	20	38=	164=	154=											
IDU	-1	32=	33AG	85=	86AG	149=	110AG	120=	121AG	166=	167AG						
IESCAP	-1	17CU	126=	126													
IJK	-1	59AG	60														
IJSC	-1	39=	40	41	42	43	50	51	52	132=	133	134	136	137	144	146	147
IJSC1	-1	48=	50	51	52	142=	144	146	147								
IJSC2	-1	49=	50	51	52	143=	144	146	147								
IJUSTORE	-1	26=	30	69	42=	105	124	160	170								
IOLD	-1	19=	39	45	49	91AG	92	94	132	139	143						
IP1	-1	8CU	39	48	49	132	142	143									
IRNG	-1	33AG	34	80AG	87	110AG	111	121AG	122	158AG	167AG	168					
ISC	-1	45=	47AG	40	139=	141AG	142										
ISTEP	-1	22=	63	100=	100	149=											
J	-1	4CU	20	26	174PR												
JOLD	-1	20=	39	40	48		91AG	92	95	95	132	140	142				
JRI	-1	8CU	95														
JSC	-1	40=	47AG	49	140=	141AG	143										
LEH	-	5F	6F	7F													
M	(H)	11E0	12HL	13U1													
MASK	-1	160A	27	150	159												
MP	(H)	11E0	12HL	13U1													

NBUF	-1	4CU	37	90	114	125	171													
NCOL	-1	10CU	129=	129																
NDIE	-1	10CU	172=	172																
NMOVE	-1	10CU	71=	71																
NOPU	-1	2CU	50																	
NOPT	-1	2CU	55																	
NPCMAX	-1	4CU	131																	
NPCUL	-1	21=	126=	128	131															
OMEGA	()H	146	1501	74	73	74	151AG													
OP	-K	61=	61																	
OPUEN	()H	2CU	50	58																
OPIMP	()H	2CU	55	57																
P	()H	11EU	1301																	
PAKFNO	-	33SU	86SU	110SU	121SU	158SU	167SU													
PL	()H	11EU	1301																	
QLOG10	-	53SU	54SU																	
QSUPT	-	24SU	70SU																	
R	()H	11EU	1301																	
RANDOM	-	64SU	135SU	145SU																
RCSU	()H	11EU	1301																	
RETURN	-	115F	121F	101F	173F	175F														
RHOU	-K	76=	81=	81	82															
RHOP	-K	14CU	24=	29	76	78=	81	106	117	163										
RM	()H	11EU	1301																	
RHFP	-K	65=	60	102=	102															
RH7	()H	11EU	1301																	
RNI	-K	64=	65																	
RU	()H	11EU	1301																	
ROL	()H	11EU	1301																	
RVOL	()H	11EU	1301																	
HZELEN	()H	11EU	1301																	
SHIFT	-	20SU	92SU																	
SIE	()H	11EU	1301																	
SIGA	()H	7LC	61																	
SIGNU	-K	61=	62	68	132															
SIGPLC	()H	11EU	1301																	
TAMB	-K	8CU	4	133																
TEMP	()H	8CU	4	42	50	50	50	133	136	146	146	146								
TLOG	-K	51=	55=	55	57=	57	59AG													
TP	-K	42=	5=	53	136=	146=	149AG													
T1	-K	10CU	23	11=	101	130=	130	152	157											
T2	-K	10CU	23	154																
U	()H	11EU	1301																	
UG	()H	11EU	1301																	
UL	()H	11EU	1301																	
UMDMLC	()H	11EU	1301																	
UP	()H	11EU	1301																	
UTIL	()H	11EU	1301																	
V	()H	11EU	1301																	
VG	()H	11EU	1301																	
VL	()H	11EU	1301																	
VP	()H	11EU	1301																	
VTIL	()H	11EU	1301																	
X	()H	11EU	1301																	
XPAR	()H	11EU	1301																	
Y	()H	11EU	1301																	
YPAR	()H	11EU	1301																	
ZD	-K	75=	81=	80	83															
ZP	-K	10CU	25=	30	75	77=	80	107	118	164										

```

1      SUBROUTINE WHERE (I, J)
2
3      COMMON /MAUVE/  IHAH, JP1, NU, NG1, RHOP, ZP, DCELL
4      DIMENSION      XYECS(3,1)
5
6      C
7      INEW=IOLU=I
8      JNEW=JOLU=J
9      IECS=(J-1)*NU1+(1-1)*NU
10     CALL ECHU (XYECS,IECS,3,NE)
11     ASA=XYECS(1)
12     YSA=XYECS(3)
13     ASC=XYECS(NG+1)
14     YSC=XYECS(NG+3)
15     IECS=IECS+NG1
16     CALL ECHU (XYECS,IECS,3,NE)
17     ARW=XYECS(1)
18     YRW=XYECS(3)
19     ARL=XYECS(NG+1)
20     YRL=XYECS(NG+3)
21
22     C --- ACST
23     11 IF (INEW.LE.1) GO TO 91
24     ITEST=
25     IF (IMPOP.LT.AHW) ITEST=ITEST+1
26     IF (IMPOP.LT.ASW) ITEST=ITEST+1
27     IF (ITEST-1) 41, 21, 31
28     41 IES1=ASA*(XAL-ASW)*(ZP-YSA)/(YRW-YSW)
29     IF (IMPOP.GT.ITEST) GO TO 91
30     41 INEW=INEW-1
31     APL=ARW
32     YPL=YRW
33     ASC=ARL
34     YSC=YSW
35     IECS=(JNEW-1)*NU1+(INEW-1)*NG
36     CALL ECHU (XYECS,IECS,3,NE)
37     ASA=XYECS(1)
38     YSA=XYECS(3)
39     IECS=IECS+NG1
40     CALL ECHU (XYECS,IECS,3,NE)
41     ARW=XYECS(1)
42     YRW=XYECS(3)
43     GO TO 11
44
45     C
46     91 IF (INEW.NE.IOLU) GO TO 211
47     C --- EAD1
48     111 ITEST=
49     IF (IMPOP.GT.ANE) ITEST=ITEST+1
50     IF (IMPOP.GT.ASE) ITEST=ITEST+1
51     IF (ITEST-1) 211,121,131
52     121 IES1=ASE*(XAL-ASE)*(ZP-YSE)/(YNE-YSE)
53     IF (IMPOP.LE.ITEST) GO TO 211
54     131 INEW=INEW+1
55     IF (IMPOP.GT.IBAH) GO TO 401
56     ARW=ARE
57     YRW=RYR
58     ASW=ASF
59     YSW=YSF
60     IECS=(JNEW-1)*NU1+INEW*NU
61     CALL ECHU (XYECS,IECS,3,NE)
62     ASE=XYECS(1)
63     YSE=XYECS(3)
64     IECS=IECS+NG1
65     CALL ECHU (XYECS,IECS,3,NE)
66     ARL=XYECS(1)
67     YRL=XYECS(3)
68     GO TO 111
69     C --- SOUTH
70     211 ITEST=
71     IF (ZP.LT.YSW) ITEST=ITEST+1

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03      IF (ZP.LT.YSE) ITEST=ITEST+1
04      IF (ITEST=1) 291,291,291
05      221 ITEST=YSE*(YSW-YSE)*(HHOP-ASE)/(XSW-XSE)
06      IF (ZP.GE.ITEST) GO TO 291
07      231 JNEW=JNEW+1
08      IF (JNEW=LT2) GO TO 401
09      AN=ASW
10      YN=YSW
11      ANL=ASE
12      YNL=YSE
13      ILC=(JNEW-1)*NOI*(INW-1)*NO
14      CALL ECHD (XVCLS,ILC,3L,ANE)
15      AS=AYFCS(1)
16      YS=AYFCS(3)
17      ASL=AYFCS(NG+1)
18      YSL=AYFCS(NG+3)
19      GO TO 211

C
01      291 IF (JNEW=NE,JULD) GO TO 391
C
01      311 ITEST=
02      IF (ZP.GT.YNW) ITEST=ITEST+1
03      IF (ZP.GT.YNE) ITEST=ITEST+1
04      IF (ITEST=1) 391,391,391
05      321 ITEST=YNE*(YNW-YNE)*(HHOP-XNE)/(XNW-XNE)
06      IF (ZP.LT.ITEST) GO TO 391
07      331 JNL=JNL+1
08      IF (JNL=GT2JP) GO TO 401
09      AN=ANW
10      YN=YNW
11      ASL=ANL
12      YSL=YNL
13      ILC=JNL*NOI*(INW-1)*NO
14      CALL ECHD (XVCLS,ILC,3L,ANE)
15      AN=AYFCS(1)
16      YN=AYFCS(3)
17      ANL=AYFCS(NG+1)
18      YNL=AYFCS(NG+3)
19      GO TO 311

C
100      391 IF (JNL=EQ,JULD) GO TO 401
101      JLU=JNL
102      JCU=JNL
103      GO TO 11

C
104      401 I=INW
105      J=JNL
106      LCLL=7.25*(ANL-XNW*ASE-ASW*YNW-YSW*YNE-YSE)
107      HETURA
108      END

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WMENE 70
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WMENE 119

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SINGLY REFERENCED VARIABLES

COMMON = 2P DIMENS1 = 3P NAME = 2CN RETURN = 107F WHERE = 15U

MULTIPLY-REFERENCED VARIABLES

```

11 = 10 30 1.3
21 = 22 23
31 = 22 25
41 = 18 22 30
111 = 41 0
121 = 43 44
131 = 43 46
211 = 44 45 61 75
221 = 44 46
231 = 44 47
291 = 44 48
311 = 41 49
321 = 44 45
331 = 44 47

```

LINE	STATEMENT	LINE	STATEMENT	LINE	STATEMENT
1	OVERLAY (YORIFEP,3,2)	1	PHUGHAM ESTEP	2	ESTEP
2	COMMON /STATE/	3	COMMON /YSC1/	4	COMMON /PINK/
3	COMMON /YSC1/	5	LCM /YLC1/	6	LCM /YLC2/
4	COMMON /PINK/	7	LCM /RL1/	8	COMMON /RED/
5	LCM /YLC1/	9	COMMON /GREEN/	10	COMMON /LAVNUER/
6	LCM /YLC2/	11	EQUIVALENCE		
7	LCM /RL1/				
8	COMMON /RED/				
9	COMMON /GREEN/				
10	COMMON /LAVNUER/				
11	EQUIVALENCE				


```

12      REAL
13      DIMENSION
14      C
15      DIMENSION
16      EQUIVALENCE
17      LEAT
18      2001 FCHMAT
19      2003 FCHMAT
20      2004 FCHMAT
21      C
22      DPAAR=15.0
23      DPAAR=15.0
24      I=1
25      UC=1
26      EPART(IJSC)=0.0
27      EFSN(IJSC)=0.0
28      C
29      10 CONTINUE
30      C
31      --- ENERGY DEPOSITION RETRIEVAL
32      ELUST=0.0
33      EABS=0.0
34      EEMIT=0.0
35      CALL OPEN (5,1,SET3,2,LIST,168)
36      CALL HBBUF (5,1,SET3,2,ELUCK, NBUF, LENGTH2, LSTATUS)
37      UC=1
38      K=1,LENGTH2,2
39      CALL UNPKFN (ELUCK(K), EDEP)
40      ESTATUS=ELUCK(K+1)
41      I=SHIFT(STATUS,-9),AND,777b
42      J=STATUS AND,777b
43      I=J/10*(J+1)+1
44      IF (ELUCK(3),L1,0) GO TO 27
45      IF (I,GT,IRAK) GO TO 25
46      IF (J,LT,2,CH,J,GT,JH) GO TO 25
47      EPART(IJSC)=EPART(IJSC)+EDEP(3)
48      EABS=EABS+EDEP(3)
49      GO TO 24
50      C
51      --- COMPUTE ENERGY LOST FROM MESH
52      25 EPART(IJSC)=EPART(IJSC)+EDEP(3)
53      ELUST=FLOST+EDEP(3)
54      GO TO 24
55      C
56      --- COMPUTE EMISSION
57      27 EFSN(IJSC)=EFSN(IJSC)+EDEP(3)
58      EEMIT=EEMIT+EDEP(3)
59      C
60      24 CONTINUE
61      IF (LSTATUS,EW,1) GO TO 11
62      MC=EHC/EEMIT
63      MA=EHC/(EABS+ELUST)
64      EEMIT=EEMIT*MC
65      EABS=EABS*MA
66      ELUST=ELUST*MA
67      C
68      --- ADVANCE CELL TEMPERATURES
69      TMAX=0.0
70      CALL STANT

```

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EQUVREAL 11
EQUVREAL 12
EQUVREAL 13
DIMEN 2
DIMEN 3
DIMEN 4
DIMEN 5
DIMEN 6
DIMEN 7
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DIMEN 9
ESTEP 13
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58      LC 4, J=2,JP1
59      LUSC=(J-1)*IP1
60      UC 39 I=1,IBAK
61      IFJ=IJ+NU
62      IFJP=IJ+NG
63      LUSC=LJSC+1
64      EM1=EMSN(IJSC)*RE
65      RESUR=EMANT(IJSC)*RA
66      SIE(IJ)=SIE(IJ)+J.159155E-15*RVOL(IJ)*(ABSOR-EMIT)/RO(IJ)
67      SIL(IJ)=MAX1(SIE(IJ),RELSIE)

C
68      IF (SIE(IJ)-RELSIE.GT.1.0E-05) GO TO 36
69      ZT=IAMB
70      GC TO 38
71      36 ZH=HU(IJ)
72      ZE=SIE(IJ)
73      ZMINV=1.0/ZR
74      ZHL=ULUG1(ZH)
75      ZHL=MPIN1(ZPL,OPDEN(NOPD))
76      ZHL=MAX1(ZRL,OPDEN(1))
77      TLUM=IAMB
78      THIGH=USQRT(ZL*ZH*0.00728789E+07)
79      THIGH=USQRT(THIGH)
80      Z1=.5*(TLOW+THIGH)
81      37 ZL1=137.214E-07*ZT**4
82      ZL1=ZL-UR1*ZMINV
83      ZL1=ULUG1(ZL1)
84      ZTL=MPIN1(ZTL,OPTMP(NOPT))
85      ZLZL=UHLINTL(ZRL,ZTL,CPDEN,OPTMP,ETAB,0,NOPT,NOPD,NCHT)
86      ZLZL=MAX1(ZLZL)
87      ZLZL=ZL-ZLZ
88      IF (ZLZL.GT.0.) TLOW=ZT
89      IF (ZLZL.LT.0.) THIGH=ZT
90      Z1=.5*(TLOW+THIGH)
91      IF (THIGH-TLOW.LT.1.0E-05*ZT) GO TO 38
92      GC TO 37
93      38 TEMP(IJSC)=Z1
94      TMAX=MAX1(TMAX,ZT)
95      UMAX=MAX1(UMAX,RC(IJ))
96      UMIN=MIN1(UMIN,RC(IJ))
97      L=IPJ
98      LUP=IPJP
99      LUM=IPJH
100      39 CONTINUE
101      CALL LOOP
102      40 CONTINUE
103      CALL DONE

C
104      FEMIN=J
105      CALL OPEN (SLFSET3,2LST,512)
106      ETUT=EAHS+ELOST
107      TAVG=.5*(TIME+T2)
108      FRY=FRY+ELOSS
109      HLT=L./(T2-TIME)
110      PLOST=ELOST*HUT
111      PAHS=EAHS*HUT
112      FEMIT=EMLT*HUT
113      PRINT 203, ETUT, EAHS, ELOST, FEMIT, ECEN, RE, RA
114      WHILE (12,2031) ETUT, EAHS, ELOST, FEMIT, ECEN, RE, RA
115      PRINT 2034, PAHS, PLOST, FEMIT
116      WHILE (12,2034) PAHS, PLOST, FEMIT
117      PRINT 2033, TAVG, IMAX, UMAX, UMIN, THY
118      WHILE (12,2033) TAVG, IMAX, UMAX, UMIN, THY
119      RETURN
120      END

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ESTEP 71
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ESTEP 135

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SINGLY REFERENCED VARIABLES

AA1	(1H	5LC	GNVLL	-H	8CO	ITV	-1	8CO	NAME	(11	8CO	AOI	-1	8CO	MCL1	-	7CN	TSTART	-H	8CO	
AA2	(1H	6LC	GNVLL	-H	9CA	JBAR	-1	8CO	NBP	-1	9CO	ASP	-1	9CO	SHIFT	-	35SU	T1	-H	10CO	
ALPHA	(1H	9CO	10	-1	17CO	JCEN	-1	9CO	NCUL	-1	10CO	PINK	-	4CN	SIEVIN	-R	10CO	UNPKFN	-H	33SU	
BDEL	(1H	2CO	1ESCAP	-1	10CO	LAM	-H	12HL	NCYC	-1	8CO	PTAB	(1H	2CO	SIGA	(1R	7LC	YLC1	-	5CN	
DOVE	-	1	35U	1JF5	-1	8CO	LAMP	-H	12HL	NDIE	-1	18CO	GEXPI0	-	66SU	SPTUL	(1R	2CO	YLC2	-	6CN
DT	-H	8CO	1JF5	-1	99	LAVNDEH	-	10CN	NDUMP	-1	8CO	ROBUF	-	31SU	STANT	-	57SU	YSC1	-	3CN	
DTH	-H	8CO	15C1	-1	8CO	LEAT	-	16F	NFLUSH	-1	17CO	REAL	-	12F	STATE	-	2CN				
EM10	-H	8CO	15C2	-1	8CO	LOCP	-	161SU	NFKU	-1	2CO	RED	-	8CN	T	-R	8CO				
ESTEP	-	15U	15C2	-1	8CO	MU	-H	12RL	NMOVE	-1	18CO	RETURN	-	119F	TEMI	-R	9CO				
FHEU	(1H	2CO	15C3	-1	8CO	MUC2	-H	12RL	NFLMAX	-1	9CO	REWIND	-	1:4F	TOUT	-H	8CO				

MULTIPLY-REFERENCED VARIABLES

10	-	2310	26*																	
11	-	31*	5																	
25	-	39	4	44*																
27	-	38	47*																	
29	-	38DU	43	48	49*															
36	-	68	71*																	
37	-	81*	92																	
38	-	7	91	93*																
39	-	61DU	10*																	
40	-	58DU	112*																	
2002	-	17*	113PK	114WR																
2003	-	18*	117PK	118WR																
2004	-	19*	115PK	116WR																
AASC	(1H	3CO	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG	11EG
ABSDN	-H	25*	66																	
AMAA1	-	67SU	70SU	94SU	95SU															
AMINI	-	75SU	84SU	96SU																
BETALC	(1H	11EG	13U1																	
CENTA	(1H	11EG	13U1																	
CENTY	(1H	11EG	13U1																	
COMMON	-	2F	3F	4F	8F	9F	10F													
CU	(1H	11EG	13U1																	
DOLINT	-	16LA	65SU																	
DELAM	(1H	11EG	13U1																	
DEMS	(1H	1:2U	15LU																	
DIMENSI	-	13F	14F																	
DMAX	-H	2*	45*	95	117PK	118WR														
DMIN	-H	21*	46*	96	117PK	118WR														
E	(1H	11EG	13U1																	
EABS	-H	28*	42*	52	54*	54	106	111	113PR	114WR										
EBLOCK	(1H	1:CO	31AG	33AG	34															
ELEN	-H	1:CO	113PK	114WR																
EDEP	(1H	14U1	33AG	38	41	42	44	45	47	48										
EEHIT	-H	24*	48*	48	51	53*	53	112	113PR	114WR										
ELOST	-H	27*	49*	49	52	55*	55	106	108	110	113PR	114WR								
EMC	-H	1:CO	51	52																
EMIT	-H	64*	65																	
EMOMLC	(1H	11EG	13U1																	
EMSN	(1H	14U1	15LU	25*	47*	47	64													
EP	(1H	11EG	13U1																	
EPART	(1H	14U1	15LU	24*	41*	41	44*	44	65											
EQUIVAL	-	11F	15F																	
ETAB	(1H	2CO	85																	
ETIL	(1H	11EG	13U1																	
ETOT	-H	1:0*	113PK	114WR																
FORMAT	-	17F	18F	19F																
FOOTLC	(1H	11EG	13U1																	
FSCAT	(1H	1:CO	15LU																	
FSN	(1H	11EG	13U1																	
FSTONE	-H	34*	35	36																
GRIN	(1H	11EG	13U1																	
GRIZ	(1H	11EG	13U1																	
I	-1	4CO	35*	37	39	60DO														
IHAH	-1	8CO	37	60DU																
IJ	-1	4CO	61	66	66	66	67	67	68	71	72	45	96	97*						

[illegible]

[illegible]

1	CVENLAY (YORIFER+3,3)	LISTING	2
1	PROGRAM LISTING	LISTING	3
C		LISTING	4
C		LISTING	5
C	THIS SUBROUTINE PRINTS KEEFER OUTPUT	LISTING	6
2	COMMON /STATE/	ALLKCM	2
1	NOPT, NCPD, NFRQ, UPTMP(30), OPDEN(10),	ALLKCM	3
C	FRW(100), SMTHL(3,0), PTAB(300), ETAB(300),	ALLKCM	4
3	ATHL(300)	ALLKCM	5
4	COMMON /YSCI/	ALLKCM	6
5	AASC(3454)	ALLKCM	7
6	COMMON /HKK/	ALLKCM	8
7	I, IJ, IJM, IJP, J	ALLKCM	9
8	LCM /YLC1/	ALLKCM	10
9	AA(13130)	ALLKCM	11
10	LCM /YLC2/	ALLKCM	12
11	AA(13130)	ALLKCM	13
12	LCM /HLC/	ALLKCM	14
13	SI(43100)	ALLKCM	15
14	COMMON /HED/	ALLKCM	16
15	NAME(14), DT, DTH, EM10, GROVEL, IMAR, IJPS,	ALLKCM	17
16	IM1, ISC1, ISC2, ISC3, ISC4, ITV, JRAW,	ALLKCM	18
17	JR1, JRC, ACYC, NUUMP, NUN, NQ1, REZSIE, TAMB,	ALLKCM	19
18	TEM(700), I, TIME, TOUT, TSTART, THY	ALLKCM	20
19	COMMON /GREEN/	GREEN	21
20	ALPHA, KHP, KHUP, KSP, KPMAX, JCEN, TEMT	GREEN	22
21	COMMON /LAVNUER/	GREEN	23
22	DENS(100), SHLOC(100), ECEN, EMC,	LAVNUER	24
23	FSCAT(500), ID, ZSCAP, ACUL, NUIE,	LAVNUER	25
24	NFLSN, ANOVE, SIMINO, I1, I2	LAVNUER	26
25	EQUIVALENCE	EUVHEAL	27
26	(AASC(1),X,XPAR), (AASC(2),Y,YPAR), (AASC(3),Y),	EUVHEAL	28
27	(AASC(4),U), (AASC(5),V), (AASC(6),R0),	EUVHEAL	29
28	(AASC(7),YF,KHP,HCSU,CENT),	EUVHEAL	30
29	(AASC(8),E,ETIL,CENT), (AASC(9),HVCL),	EUVHEAL	31
30	(AASC(10),Y,KH,VP), (AASC(11),P,PLEP,UP),	EUVHEAL	32
31	(AASC(12),UTIL,LL,CY,EMHLC),	EUVHEAL	33
32	(AASC(13),UTIL,VL,UMHLC),	EUVHEAL	34
33	(AASC(14),RCL,METALC,FCUTLC), (AASC(15),SIE),	EUVHEAL	35
34	(AASC(16),FFLSM,SIGLCL),	EUVHEAL	36
35	(AASC(17),GRH,GMPLDENT),	EUVHEAL	37
36	(AASC(18),GRH,VOVSU),	EUVHEAL	38
37	HEAL	EUVHEAL	39
38	LAP, LAM1, N, NP, M, MU02	EUVHEAL	40
39	DIMENSION	DIMEN	41
40	X(1), XPAR(1), L(1), YPAR(1), Y(1), U(1),	DIMEN	42
41	V(1), M(1), MP(1), RMP(1), RCSG(1), CENT(1),	DIMEN	43
42	L(1), ETIL(1), CENTY(1), HVCL(1), M(1), MP(1),	DIMEN	44
43	VP(1), V(1), PL(1), EP(1), UP(1), UTIL(1),	DIMEN	45
44	UL(1), CU(1), EMHLC(1), VTIL(1), VL(1),	DIMEN	46
45	UMHLC(1), RUL(1), METALC(1), FCUTLC(1),	DIMEN	47
46	SIE(1), DELSM(1), STOPLC(1), GRH(1), UB(1),	DIMEN	48
47	REZIENT(1), GRIZ(1), VG(1), FSN(1)	DIMEN	49
48		LISTING	50
49	DIMENSION	LISTING	51
50	EPART(100), EMSN(1000)	LISTING	52
51	EQUIVALENCE	LISTING	53
52	(FSCAT(1),PART), (DELS, EMSN)	LISTING	54
53	(I1), KELEF OUTPUT//OH	LISTING	55
54	1,6H J,	LISTING	56
55	12H X,12H Y,12H	LISTING	57
56	12H EMSN,12H TEMP 12H	LISTING	58
57	12H SIGMLC,12H METALC,	LISTING	59
58	12H REZIENT,	LISTING	60
59	(216,IMVE12,4)	LISTING	61
60		LISTING	62
61		LISTING	63
62		LISTING	64
63		LISTING	65
64		LISTING	66
65		LISTING	67
66		LISTING	68
67		LISTING	69
68		LISTING	70
69		LISTING	71
70		LISTING	72
71		LISTING	73
72		LISTING	74
73		LISTING	75
74		LISTING	76
75		LISTING	77
76		LISTING	78
77		LISTING	79
78		LISTING	80
79		LISTING	81
80		LISTING	82
81		LISTING	83
82		LISTING	84</

```

10 CALL OPEN (6LFSET12+ZLST+13312)
11 LINES=
12 CALL START
21 LC 13 J=1+JP2
22 IJSC=(J-1)*1P1
23 IF 12 Y=1-TP1
24 IF J=1JH+AQ
25 IF J=1+AQ
26 IJSC=IJSC+1
27 IF (LINES.EQ.0) WRITE (12+2001)
28 LINES=LINES+1
29 IF (LINES.GT.50) LINES=0
30 WRITE (12+2002) I, J, X(IJH), Y(IJH), EPART(IJSC), EMSN(IJSC),
    TEMP(IJSC), FSN(IJH), SIGPLC(IJH), BETALC(IJH),
    RZELCN(IJH)
31 I=IPJ
32 IJH=IPJH
33 12 CONTINUE
34 CALL LOOP
35 13 CONTINUE
36 CALL DONE
37 CALL OPEN (6LFSET12+ZLST+512)
C
38 RETURN
39 END

```

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LISTING 22
LISTING 23
LISTING 24
LISTING 25
LISTING 26
LISTING 28
LISTING 29
LISTING 30
LISTING 31
LISTING 32
LISTING 33
LISTING 34
LISTING 35
LISTING 36
LISTING 37
LISTING 38
LISTING 39
LISTING 40
LISTING 41
LISTING 42
LISTING 43
LISTING 44
LISTING 45
LISTING 46

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SINGLY REFERENCED VARIABLES

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AA1 (H) 5LC ETAB (H) 2CC ISC2 -I 8CO MU -R 12RL AMOVE -I 1CCO RED - 8CN TEMIT -H 9CO
AA2 (H) 6LC FREG (H) 2CC ISC3 -I 8CO MU02 -H 12RL NOPD -I 2CC RETURN - 38F THY -H 8CO
ALPHA -H 9CO GMOVEL -H 8CO 1TV -I 8CO NAME (I) 8CO NOPT -I 2CC REZSIE -R 8CO TIME -R 8CO
BTBL (H) 2CO UNETH -H 9CN JUAR -I 8CO NHP -I 9CO APCMAX -H 9CO HLC1 - 7CN TOUT -H 8CO
DONE - 365U UNH -I 8CO JCEN -I 9CO NBUF -I 9CO ROI -I 8CO STEALN -R 10CO TSTART -H 8CO
DT -H 8CO IJ -I 10CC JPI -I 8CO NCUL -I 10CO KSP -H 9CO SIGA (H) 7LC T1 -H 10CO
UTH -H 8CO 12SLAP -I 10CC LAM -H 12RL NCYC -I 8CO CPDEN (H) 2CC SPTBL (H) 2CO T2 -H 10CO
ENLOCK (H) 1CO 1JP -I 4CO LAMP -H 12RL NOIE -I 10CO CPTMP (H) 2CO START - 205U YLC1 - 5CN
ELEN -H 10CO 1JPS -I 8CO LAVNOER - 17CN NUUMP -I 8CO PIAK - 4CN STATE - 2CN YLC2 - 6CN
EMC -H 10CO 1SCF1 -I 8CO LISTING - 15U NPLUSH -I 10CO RTAB (H) 2CO T -H 8CO YSC1 - 3CN
EM10 -H 8CO 1SCF2 -I 8CO 10CP - 345U NPLQ -I 2CO REAL - 12F FAHH -R 8CO

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MULTIPLY-REFERENCED VARIABLES

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12 = 2300 334
13 = 2100 350
2001 = 100 274H
2002 = 170 34H
AASC (H) 3CO 11EW 11EW 11EW 11EW 11EW 11EW 11EW 11EW 11EW 11EW 11EW 11EW 11EW 11EW 11EW
BETALC (H) 11EW 1301 30WH
CENTA (H) 11EW 1301
CENTY (H) 11EW 1301
COMMON = 2F 3F 4F 8F 9F 10F
CO (H) 11EW 1301
UELSM (H) 11EW 1301
UEHS (H) 11CO 15EW
UIMENS1 = 13F 14F
E (H) 11EW 1301
EMOHLG (H) 11EW 1301
EMSH (H) 1401 15EW 30WH
EP (H) 11EW 1301
EPART (H) 1401 15EW 30WH
EQUIVAL = 11F 15F
ETIL (H) 11EW 1301
FURMAT = 16F 17F
FOUTLC (H) 11EW 1301
FSCAT (H) 11CO 15EW
FSN (H) 11EW 1301 30WH
GNIR (H) 11EW 1301
GNIZ (H) 11EW 1301
I -1 4CO 2300 30WH
IJ -1 4CO 25 312

```

IUM	-1	400	24	30WH	30WH	30WH	30WH	30WH	32W
IJSL	-1	22=	20=	26	30WH	30WH	30WH		
IPJ	-1	25=	31						
IPJM	-1	24=	32						
IFI	-1	200	22	2300					
J	-1	400	2100	22	30WH				
JP2	-1	400	2100						
LCM	-	5F	0F	7F					
LINES	-1	14=	21	26=	28	29	29=		
M	(1)K	11EG	12ML	1301					
MP	(1)K	11EG	12ML	1301					
NU	-1	400	24	25					
OPEN	-	1850	3150						
P	(1)K	11EG	1301						
PL	(1)K	11EG	1301						
R	(1)K	11EG	1301						
NC50	(1)K	11EG	1301						
KH	(1)K	11EG	1301						
RMP	(1)K	11EG	1301						
RO	(1)K	11EG	1301						
ROL	(1)K	11EG	1301						
RYOL	(1)K	11EG	1301						
RZEDEN	(1)K	11EG	1301	30WH					
STE	(1)K	11EG	1301						
SIGPLC	(1)K	11EG	1301	30WH					
TEMP	(1)K	400	3 4H						
U	(1)K	11EG	1301						
UG	(1)K	11EG	1301						
UL	(1)K	11EG	1301						
UMOMLC	(1)K	11EG	1301						
UP	(1)K	11EG	1301						
UTIL	(1)K	11EG	1301						
V	(1)K	11EG	1301						
V6	(1)K	11EG	1301						
VL	(1)K	11EG	1301						
VP	(1)K	11EG	1301						
VJIL	(1)K	11EG	1301						
WRITE	-	27F	3 F						
X	(1)K	11EG	1301	30WH					
XPAR	(1)K	11EG	1301						
Y	(1)K	11EG	1301	30WH					
YPAR	(1)K	11EG	1301						

1	OVERLAY (YOKIPEH: 4, 6)	GHEYSN	2
1	PROGRAM GHEYSN	GHEYSN	3
	C	GHEYSN	4
	C	GHEYSN	5
	C	GHEYSN	6
2	COMMON /STATE/	ALLKCM	7
	1	ALLKCM	8
	2	ALLKCM	9
3	COMMON /YSC1/	ALLKCM	10
4	COMMON /PINK/	ALLKCM	11
5	LCM /YLC1/	ALLKCM	12
6	LCM /YLC2/	ALLKCM	13
7	LCM /YLC3/	ALLKCM	14
8	COMMON /RED/	ALLKCM	15
	1	ALLKCM	16
	2	ALLKCM	17
	3	ALLKCM	18
9	COMMON /CHIMS/	CHIMS	19
10	COMMON /SILVER/	SILVER	20
	1	SILVER	21
	2	SILVER	22
	3	SILVER	23

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11      EQUIVALENCE      (AASC(1),X,XPAN), (AASC(2),Y,YPAN), (AASC(3),Y), EQUVREAL      2
12      REAL              LAM, LAMD, M, MP, MUP, MUDE      EQUVREAL      3
13      DIMENSION          X(1), XPAR(1), R(1), YPAR(1), Y(1), U(1),      EQUVREAL      4
14      V(1), KU(1), MP(1), RMP(1), RSCQ(1), CENTX(1),      EQUVREAL      5
15      E(1), ETIL(1), CENTY(1), RVOL(1), M(1), MP(1),      EQUVREAL      6
16      VP(1), F(1), PL(1), EP(1), UP(1), UTIL(1),      EQUVREAL      7
17      UL(1), CU(1), EMUMLC(1), VTIL(1), VL(1),      EQUVREAL      8
18      UMUMLC(1), RUC(1), HETALC(1), FOUTLC(1),      EQUVREAL      9
19      SIE(1), DELSP(1), SIUPLC(1), GRIN(1), UG(1),      EQUVREAL      10
20      RZEDEN(1), GHIZ(1), VG(1), FSA(1)      EQUVREAL      11
21      COMMON /SNOB1E/    ISN, AVINT(7500), KSH(101), ZSN(102)      EQUVREAL      12
22      LEAT              DELINT      EQUVREAL      13
23      C
24      2002 FCHMAT      (IN, *PROBLEM CYCLE, *16, 6X, *SN HADN TRANS//      GMEYSN      14
25      * TIME, *1PE12.4, * 10, 1PE12.4, 6X, *NTR, *1PE12.4,      GMEYSN      15
26      *X, *1SN, *16)      GMEYSN      16
27      2003 FCHMAT      (1H, 5MESN, *1PE12.4)      GMEYSN      17
28      C
29      4,1 IZ=TIME+DTP      GMEYSN      18
30      ESN=J, *      GMEYSN      19
31      ALPMA=SNCCN(102)      GMEYSN      20
32      ISN=MCVE(SNCUN(103))      GMEYSN      21
33      PRINT 2,02, NLYC, TIME, IZ, DTH, ISN      GMEYSN      22
34      WRITE (12,4002) NLYC, TIME, IZ, DTH, ISN      GMEYSN      23
35      C      --- COMPUTE SIGPLC RZEDEN FSN      GMEYSN      24
36      RSN(1)=0.0      GMEYSN      25
37      CALL START      GMEYSN      26
38      DO 420 J=2,JP1      GMEYSN      27
39      IJSC=(J-1)*JP1      GMEYSN      28
40      ZSN(J)=Y(IJ)      GMEYSN      29
41      IF (J.EQ.2) ZSN(J+1)=Y(IJP)      GMEYSN      30
42      DO 420 I=1,IBAK      GMEYSN      31
43      IFJ=J+NU      GMEYSN      32
44      IFJP=JF+KQ      GMEYSN      33
45      IJSC=IJSC+1      GMEYSN      34
46      IF (J.EQ.2) RSN(I+1)=X(IFJ)      GMEYSN      35
47      AVINT(IJSC)=0.0      GMEYSN      36
48      CENTX(IJ)=0.25*(X(IJ)+X(IFJ)+X(IFJP)+X(IJP))      GMEYSN      37
49      CENTY(IJ)=0.25*(Y(IJ)+Y(IFJ)+Y(IFJP)+Y(IJP))      GMEYSN      38
50      TLUG=ULUG10(TLMP(IJSC))      GMEYSN      39
51      DLUG=ULUG10(MU(IJ))      GMEYSN      40
52      DLUG=AMIN1(DLUG,CPDEN(MUP))      GMEYSN      41
53      SP=UBINT(0,DLUG,TLUG,UPDEN,OPTMP,SBTL,0,NOPT,NCPD,ROPT)      GMEYSN      42
54      SP=UEXP1P(SP)      GMEYSN      43
55      SIUPLC(IJ)=SP      GMEYSN      44
56      KZLULN(IJ)=3.2757E+14*SP*TEMP(IJSC)**4      GMEYSN      45
57      ESI=ESN*KZEDEN(IJ)/RVOL(IJ)      GMEYSN      46
58      BP=UBINT(0,DLUG,TLUG,UPDEN,OPTMP,SBTL,0,NOPT,NCPD,ROPT)      GMEYSN      47
59      XPSH=1.0+3.0E-05*ALPMA*BP*SP*UFR      GMEYSN      48
60      FSN(IJ)=1./XPSH      GMEYSN      49
61      I=1FJ      GMEYSN      50
62      IJF=IFJP      GMEYSN      51
63      420 CONTINUE      GMEYSN      52
64      *      CALL LOUP      GMEYSN      53
65      420 CONTINUE      GMEYSN      54
66      CALL DONE      GMEYSN      55
67      ESN=76.4568*ESN      GMEYSN      56
68      PRINT 2,03, ESN      GMEYSN      57
69      C      GMEYSN      58
70      GMEYSN      59
71      GMEYSN      60

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57 REMIND 1
58 CALL MMBUF (BLFSET), AVINT, 7500, LENGTH2, LSTATUS:
59 CALL OVERLAY (7LYCKIFER, 4, 1, 6HRECALL)
60 REMIND 1
61 1-MAA=1P10JP1
62 CALL MMBUF (BLFSET), AVINT, 1JMAX)
63 CALL OVERLAY (7LYCKIFER, 4, 2, 6HRECALL)
64 CALL MEMARK (7MSNESTLP)
65 IF (T2.LT.TCUT) GO TO 441
66 CALL OVERLAY (7LYCKIFER, 4, 3, 6HRECALL)
67 CALL MEMARK (7MSNCUT)
68 441 TIME=T2
69 DIME=ANJW1(DTH,1P,0*DT)
70 IF (TIME+EM10*GE=1) GO TO 541
71 IF (TIME+UTR*DT+1*EM10) UTR=T-TIME
72 GO TO 441
73 5-1 WHITE (1)
74 WHITE (3)
75 ENUTILE 1
76 ENUTILE 3
77 REMIND 1
78 REMIND 3
79 RETURN
80 END

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GREYSN 61
GREYSN 62
GREYSN 63
GREYSN 64
GREYSN 65
GREYSN 66
GREYSN 67
GREYSN 68
GREYSN 69
GREYSN 70
GREYSN 71
GREYSN 72
GREYSN 73
GREYSN 74
GREYSN 75
GREYSN 76
GREYSN 77
GREYSN 78
GREYSN 79
GREYSN 80
GREYSN 81
GREYSN 82
GREYSN 83
GREYSN 84
GREYSN 85
GREYSN 86

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SINGLY REFERENCED VARIABLES

AA1	(1)K	5LC	F1TB	-R	14CO	ISC2	-1	8CO	LEXT	-	15F	PXCUNV	-H	10CO	HIBAN	-R	10CU	XCONV	-H	10CU
AA2	(1)K	6LL	F1TB	(1)K	7CO	ISC3	-1	8CO	LOUP	-	52SU	PXL	-H	10CO	HLG1	-	7CN	XL	-H	10CU
GRMSN	-	9CN	GRMVEL	-H	8CO	ITV	-1	8CO	LSTATUS	-1	58AG	PXR	-H	10CO	SIGA	(1)K	7LC	XH	-H	10CU
DIMENS1	-	13F	UMEYSN	-	15U	1XL	-1	10CO	MOVE	-	27SU	PYB	-H	10CO	SILVER	-	10CN	YB	-H	10CU
DUNE	-	54SU	1JA	-1	4CO	1XR	-1	10CO	MU	-H	12RL	PYCONV	-H	10CO	SNOWITE	-	14CN	YCONV	-H	10CU
EQUVAL	-	11F	1JFS	-1	4CO	1YB	-1	10CO	MUO2	-H	12RL	PYT	-H	10CO	START	-	25SU	YLC1	-	5CN
ETMB	(1)K	2LU	1PAL	-1	10CO	1YT	-1	10CO	NAME	(1)K	8CO	GEXP10	-	42SU	STATE	-	2CN	YLC2	-	6CN
F1AL	-H	14CO	1PAK	-1	8CO	1JHAR	-1	8CO	NDUMP	-1	8CO	RDHUF	-	58SU	TAMB	-R	8CU	YSC1	-	3CN
F1MAX	-R	10CO	1PYB	-1	10CO	1JPE	-1	8CO	NHCU	-1	2CO	REAL	-	12F	1HY	-H	8CU	YT	-H	10CU
F1PYD	-H	10CO	1PYT	-1	10CO	1AP	-H	12HL	HU1	-1	8CO	REC	-	8CN	1STAHT	-R	8CU	ZZ	-H	9CU
F1AL	-H	14CO	1SCF1	-1	8CO	LAMP	-H	12HL	P1NK	-	4CN	RETURN	-	19F	VV	-R	10CU			
F1AR	-H	14CO	1SCF2	-1	8CO	LEPGTH2	-1	58AG	P1AH	(1)K	2CO	REZSIE	-H	8CU	MTBUF	-	62SU			

MULTIPLY-REFERENCED VARIABLES

401	=	18*	72																	
42H	=	31DU	51*																	
429	=	20DU	53*																	
441	=	65	68SU																	
501	=	7	73*																	
2002	=	16*	22PH	23PH																
2003	=	17*	50PH																	
AA5C	(1)K	3CO	11EW	11FU	11EG	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ	11EQ
ALPHA	-H	21*	47																	
AMIN1	=	45U	69SU																	
AVINT	(1)K	14CO	39*	58AG	62AG															
BEFALC	(1)K	11EW	13U1																	
BP	-H	40*	41																	
BTBL	(1)K	2CO	46																	
CENTA	(1)K	11EW	13U1	30*																
CENNT	(1)K	11EW	13U1	31*																
COMFUS	=	21	31	4*	8F	9F	10F	14F												
CU	(1)K	11EW	13U1																	
DBLINT	=	15LA	41SU	46SU																
DELSM	(1)K	11EW	13U1																	
DELOH	-H	39*	40	41	46															
DT	-H	8CO	69																	
DTA	-H	8CO	1H	22PH	23PH	47	69*	69	71	71*										
L	(1)K	11EW	13U1																	

[illegible]

VTIL	()H	11E0	1301						
WRITE	-	23F	73F	74F					
X	()H	11E0	1301	34	36	36	36	36	
XFSN	-H	47F	48						
XPAK	()H	11E0	1301						
Y	()H	11E0	1301	28	29	37	37	37	37
YPAK	()H	11E0	1301						
ZSN	()H	14C0	28F	29F					

1	OVERLAY (YOKIPEH 4 1)	CYCLSN	2
1	PROGRAM CYCLSN	CYCLSN	3
C		CYCLSN	4
C	2D CYLINDRICAL SN RADIATION TRANSPORT CODE BY BILL REED (14)	CYCLSN	5
C		CYCLSN	6
2	COMMON /STATE/ NOPT, NCPD, NFRQ, OPTMP(30), OPDEN(10), 1 FREQ(10), SPHL(30), PTAB(300), ETAB(300), 2 BTBL(300)	ALLKOM	2
3	COMMON /YSC1/ AASC(5454)	ALLKOM	3
4	COMMON /PIAK/ I, IJ, IJM, IJP, J	ALLKOM	4
5	LCM /YLC1/ AAL(131000)	ALLKOM	5
6	LCM /YLC2/ AAZ(131000)	ALLKOM	6
7	LCM /HLC1/ SIGA(30000)	ALLKOM	7
8	COMMON /HED/ NAME(12), DT, UTR, EMIG, GHDEL, IHAR, IJPS, 1 IP1, ISCF1, ISCF2, ISC2, ISC3, ITV, JBAR, 2 JP1, JP2, KCYC, NUUMP, NU, NOI, REZSIE, TAMB, 3 TEHP(7000), T, TIME, TOUT, TSTART, THY	ALLKOM	10
9	COMMON /CHMSN/ SNCON(183), ZZ	ALLKOM	11
10	COMMON /SNOWITE/ ISN, AVINT(17000), HSN(101), ZSN(102)	ALLKOM	12
11	DIMENSION AVULU(500), HR(7000), BB(7200), 1 B(100), AL(800)	ALLKOM	13
12	EQUIVALENCE (AASC(4001),B), (AASC(4101),AL)	ALLKOM	14
13	EQUIVALENCE (ISNP, SNCON(1))	ALLKOM	15
14	2001 FCHPAI (TH,15,* SN ITERATIONS*)	ALLKOM	16
C	--- OBTAIN SN CONSTANTS	ALLKOM	17
15	ISTEP=1	ALLKOM	18
16	AA=ISA/2	ALLKOM	19
17	MA=(ISN*(ISA+2))/8	ALLKOM	20
18	LC=0	ALLKOM	21
19	LE=LU+MM	ALLKOM	22
20	LE=LE+MM	ALLKOM	23
21	LEET1=LE+MM	ALLKOM	24
22	LEET2=LEET1+MM	ALLKOM	25
23	IF (ISN.EQ.ISN) GO TO 5	ALLKOM	26
24	CALL SNGEN (SNCON(LU), SNCON(LE), SNCON(LM), SNCON(LRET1), 1 SNGEN(LRET2), ISN, MM)	ALLKOM	27
25	ISNP=ISN	ALLKOM	28
C	--- CALCULATE AREA ELEMENTS	ALLKOM	29
26	5 DO 10 J=1,IBAR	ALLKOM	30
27	E(1)=3.141592*(HSA(I+1)**2-HSN(I)**2)	ALLKOM	31
28	10 CONTINUE	ALLKOM	32
C		ALLKOM	33
29	11 ISTEP=ISTEP+1	ALLKOM	34
30	DO 12 J=2,JP1	ALLKOM	35
31	LSL=(J-1)*IP1	ALLKOM	36
32	DO 12 J=1,IHAK	ALLKOM	37
33	LSL=LSL+1	ALLKOM	38
34	AVULU(IJSC)=AVINT(IJSC)	ALLKOM	39
35	AVINT(IJSC)=0.0	ALLKOM	40
36	12 CONTINUE	ALLKOM	41
C		ALLKOM	42
37	CALL SNEF (ZSN, RSN, B, SNCON(LRET1), SNCON(LRET2), SNCON(LU), 1 SNCON(LE), SNCON(LM), AL, BR, BH, IBAR, JBAR, NI, MM, AVINT, 2 AVULU)	ALLKOM	43
C		ALLKOM	44
		ALLKOM	45

CYLLSN	46
CYLLSN	47
CYLLSN	48
CYLLSN	49
CYLLSN	50
CYLLSN	51
CYLLSN	52
CYLLSN	53
CYLLSN	54
CYLLSN	55
CYLLSN	56
CYLLSN	57
CYLLSN	58
CYLLSN	59
CYLLSN	60
CYLLSN	61

AA1	(1)	SLC	UIN	-H	8C0	1JPS	-1	ACU	NDUMP	-1	8C0	PRINT	-	4BF	SPTUL	(1)	2C0	TSTART	-H	8C0
AA2	(1)	6LC	EMIO	-H	8C0	1SCF1	-1	ACU	NPMU	-1	2C0	PTAH	(1)	2C0	STATE	-	2C0	WHITE	-	49F
ANS	-	455U	E1AB	(1)	2C0	1SCF2	-1	ACU	NPMU	-1	2C0	REL	-	8C0	SNECP	-	375U	YLC1	-	5CN
AMAX1	-	455U	FORMAT	-	14F	1SC2	-1	ACU	NMPT	-1	2C0	RETUHN	-	5F	T	-H	8C0	YLC2	-	6CN
ATBL	(1)	2C0	FHEG	(1)	2C0	1SC3	-1	ACU	NG	-1	2C0	REZS1E	-H	8C0	TAMH	-H	8C0	YSL1	-	3CN
CHMSN	-	9CN	UNDVEL	-H	8C0	ITV	-1	ACU	NMI	-1	2C0	RLC1	-	7CN	TEMP	(1)	8C0	ZZ	-H	9C0
CYLSN	-	15U	1J	-1	4C0	1J2	-1	ACU	OPHEN	(1)	2C0	SIGK	(1)	7LC	THY	-H	8C0			
DIMENS1	-	11F	1JM	-1	4C0	NAME	(1)	ACU	OPHNP	(1)	2C0	SNGEN	-	45U	TIME	-H	8C0			
DT	-H	8C0	1JH	-1	4C0	NCTC	-1	ACU	PINK	-	7C0	SNCWITE	-	1CN	TOUT	-H	1J0			

5	-	23	60*		
10	-	2600	60*		
11	-	24*	47		
12	-	3.00	3200	30*	
22	-	4.00	4200	44	46*
31	-	3*	40*		

[illegible]

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1      SUBROUTINE SWEEP (ZSN, HSN, B, BET1, BET2, U, E, W, AL,
1      EM, EH, IT, J1, NN, MM, AVINT, AVOLD)
2      COMMON /STATE/  IOPT, NCPB, NFNG, UPTMP(30), OPDEN(10),
2      FREL(100), SPHLE(3,0), PIAB(300), ETAB(300),
2      BTLL(3,0)
3      COMMON /YSC1/   AASC(5454)
4      COMMON /PINK/   I, IJ, IJM, IJP, J
5      LCM /YLC1/      AAL(13180)
6      LCM /YLC2/      AA2(13140)
7      LCM /YLC3/      -SIGA(30000)
8      COMMON /PED/    NAME(10), DT, DTR, EM10, GHDVEL, IHAR, IJPS,
1     IP1, ISCF1, ISCF2, ISCF3, ISCF4, ITV, JBAR,
2     JP1, JP2, NCYC, NUUMP, NU, NOI, REZSIE, TAMH,
3     TEMP(1500), I, TIME, TCUT, TSTART, THY
9      COMMON /CHIMSH/ SMLUN(183), ZZ
10     DIMENSION      EMOM(100), UNOM(10), FOUT(100), CT(100),
1     S(100), BH(JT,1), HH(IT,1),
2     AL(100,4), ZSN(1), HSN(1), c(1), BET1(1),
3     BET2(1), U(1), E(1), w(1),
4     AVINT(1), AVOLD(1), AVNEW(100)
11     EQUIVALENCE
1     (AASC(4901),EMOM), (AASC(5001),UNOM),
2     (AASC(5101),FOUT), (AASC(5201),CT),
3     (AASC(5301),S), (AASC(5401),AVNEW)
12     CALL FCHMAT
1     (IM,=CYLSN PUNEH*GM SUM ,IPE12,4)
13     C
14     PI=MM*PI
15     PC=Z*PM
16     IF=PAAX*(IHAR,JBAR)
17     JF=12*PCZ
18     SLM=U*G
19     C
20     --- CALCULATE FLUX IN DOWNWARD DIRECTION
21     C
22     LC 142 I=1,800
23     AL(1)=0.0
24     CCONTINUE
25     LC 143 I=1,I2
26     ME(1)=HH(1)=0.0
27     CCONTINUE
28     C
29     IECS=NOI*JP1
30     LC 201 JJ=1,JBAR
31     J=JP2-JJ
32     JN1=J-1
33     IECS=IECS-NOI
34     CALL ECHD (AASC, IECS, NOI, ME)
35     C,=ZSN(J+1)=ZSN(J)
36     DZP=0.253185306*U2
37     L=12
38     IJBL=(J-1)*IP1
39     LC 198 I=1,IHAR
40     IJSC=IJSC+1
41     EPMF(1)=UNOM(1)=FOUT(1)=0.0
42     AVNEW(1)=0.0
43     C(1)=AASC(IJ+4)
44     S(1)=AASC(IJ+5)*AASC(IJ+6)+AVOLD(IJSC)*(1.0-AASC(IJ+6))*CT(1)
45     L=IJ+NU
46     CCONTINUE
47     I=800
48     --- INWARD SWEEP
49     CALL IN (BR, BH, AL, PSN, H, BET1, U, E, W, S, CT, UNOM, EMOM,
50     FOUT, -1.0, DZP, DZ, IHAR, JBAR, NN, JM1, AVNEW)
51     --- OUTWARD SWEEP
52     CALL OUT (BR, BH(1,MM), AL, PSN, H, BET2, U, E, W, S, CT, UNOM,
53     EMOM, FOUT, -1.0, DZP, DZ, IHAR, JBAR, NN, JM1, AVNEW)
54     C
55     I=12
56     IJSC=(J-1)*IP1
57     LC 199 I=1,IHAR

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SWEEP 2
SWEEP 3
SWEEP 4
ALLKCM 2
ALLKCM 3
ALLKCM 4
ALLKCM 5
ALLKCM 6
ALLKCM 7
ALLKCM 8
ALLKCM 9
ALLKCM 10
ALLKCM 11
ALLKCM 12
ALLKCM 13
CHIMSH 2
SWEEP 1
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SWEEP 59

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+7      IJSC=IJSC+
+8      AVINT(IJSC)=AVNEW(I)
+9      AASC(IJ)=EMCM(I)
50      AASC(IJ+1)=LMCM(I)
51      AASC(IJ+2)=FOOT(I)
52      IJ=IJ+1
53      195 CONTINUE
54      CALL ECHH (AASC, IECS, NUI, NE)
55      200 CONTINUE
C
C      --- CALCULATE FLUX IN UPWARD DIRECTION
C
56      UC 243 I=1, IZ
57      BH(I)=0
58      243 CONTINUE
C
59      IECS=0
60      UC 300 J=2, JPI
61      JH=J-1
62      IFCS=IECS+NUI
63      CALL ECHH (AASC, IECS, NUI, NE)
64      LZ=ZSN(J+1)-ZSN(J)
65      DZP=0.783)053(B*DZ
66      IJ=IZ
67      IJSC=(J-1)*IP1
68      UC 400 I=1, IBAH
69      IJSC=IJSC+1
70      ECHH(I)=AASC(IJ)
71      UNUM(I)=AASC(IJ+1)
72      FOOT(I)=AASC(IJ+2)
73      AVNEW(I)=AVINT(IJSC)
74      CT(I)=AASC(IJ+4)
75      S(I)=AASC(IJ+5)*AASC(IJ+6)+AVOLD(IJSC)*(1.0-AASC(IJ+6))*CT(I)
76      IJ=IJ+1
77      290 CONTINUE
C      --- INWARD SNEEP
78      CALL IN (RR(1,M1), BB, AL, RSN, B, BET1, U, E, W, S, CT, UNUM,
I ECHH, FOOT, L, DZP, DZ, IBAH, JBAH, NN, JM1, AVNEW)
C      --- OUTWARD SNEEP
79      CALL OUT (RR(1,M1), BH(1,M1), AL, RSN, B, BET2, U, E, W, S, CT,
I UNUM, ECHH, FOOT, L, DZP, DZ, IBAH, JBAH, NN, JM1, AVNEW)
C
80      IJ=IZ
81      IJSC=(J-1)*IP1
82      UC 499 I=1, IBAH
83      IJSC=IJSC+1
84      AVINT(IJSC)=AVNEW(I)
85      AASC(IJ)=EMCM(I)
86      AASC(IJ+2)=FOOT(I)
87      AASC(IJ+1)=LMCM(I)
88      SUM=SUM+FOOT(I)
89      IJ=IJ+1
90      244 CONTINUE
91      CALL ECHH (AASC, IECS, NUI, NE)
92      300 CONTINUE
C
93      PRINT 205, SUM
94      WRITE (12,206) SUM
95      RETURN
96      END

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SNEEP 60
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SNEEP 117
SNEEP 118
SNEEP 119

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SINGLY REFERENCED VARIABLES

AA1	(1H	5LC	EQUVAL	=	11F	ISCF1	=	1	BCU	NDUMP	=	1	BCU	PTAB	(1H	2CO	STATE	=	2CN	TSTART	=	R	BCU
AA2	(1H	6LC	ETAB	(1H	2CO	ISCF2	=	1	ACU	NHQA	=	1	2CO	RED	=	BCN	SNEEP	=	1SC	WRITE	=	94F	
BTBL	(1H	2CO	FLMAT	=	12F	ISCF2	=	1	ACU	NOMD	=	1	2CO	RETURN	=	45F	1	=	R	BCG	YLC1	=	5CN
CRIMSH	=	4CO	PMEL	(1H	2CO	ISCF3	=	1	BCU	NOMT	=	1	2CO	REZSIE	=	BCU	TAMB	=	R	BCU	YLC2	=	6CN
DIMENS1	=	11F	OMVEL	=	4CO	11V	=	1	ACU	OPDEN	(1H	2CO	RLC1	=	7CN	TEMP	(1H	BCU	YSC1	=	3CN		
DT	=	R	BCU	1JF	=	4CO	MAX0	=	1SSU	OMIMP	(1H	2CO	SIGA	(1H	7LC	THY	=	R	BCU	ZZ	=	R	9CU

DTM EMIO	-H -H	BCU BCU	1UP 1UPS	-1 -1	4CO PCO	NAPE NAYC	(11 -1	BCU BCU	PINK PHINT	- -	4CN 93F	SNCUN SPTBL	(1H 1H	9CO 2CO	TIME TOUT	-H -H	BCU BCU
MULTIPLY-REFERENCED VARIABLES																	
142	-	1800	2.4														
143	-	2100	23.4														
198	-	3400	41.4														
199	-	4600	53.4														
200	-	2500	55.4														
243	-	9600	56.4														
258	-	6600	77.4														
299	-	8200	9.4														
300	-	6.00	92.4														
2001	-	12.4	93PM	94PM													
AASC	(1H	300	11EG	11EG	11EG	11EG	11EG	11EG	29AG	38	39	39	39	49	50	51	54AG 63AG
AL	(1H	76	71	72	74	75	75	75	85	86	87	91AG					
AVINT	(1H	1AG	1.01	19	42AG	43AG	78AG	79AG									
AVNEH	(1H	1AG	1.01	48	42AG	43AG	46	73	78AG	79AG	84						
AVOLL	(1H	1AG	1.01	39	75												
B	(1H	1AG	1.01	42AG	43AG	7EAG	79AG										
BB	(1H	1AG	1.01	22	42AG	43AG	57	78AG	79AG								
BET1	(1H	1AG	1.01	44AG	78AG												
BET2	(1H	1AG	1.01	43AG	79AG												
BR	(1H	1AG	1.01	22	42AG	43AG	78AG	79AG									
COMMON	-	2F	3F	4F	8F	9F											
CT	(1H	1.01	11EG	38	39	42AG	43AG	74	75	78AG	79AG						
U2	-H	3	37	42AG	43AG	64	65	78AG	79AG								
U2P	-H	37	42AG	43AG	65	78AG	79AG										
E	(1H	1AG	1.01	42AG	43AG	7EAG	79AG										
ECHD	-	79SU	63SU														
ECWR	-	54SU	41SU														
EHOM	(1H	1.01	11EG	36	42AG	43AG	49	70	78AG	79AG	85						
FOUT	(1H	1.01	11EG	36	42AG	43AG	51	72	78AG	79AG	86	88					
I	-1	4CU	1800	19	2100	22	24	3400	36	36	37	38	39	39	39	4000	48 49
		57	51	50100	57	6600	70	71	72	73	74	75	75	8200	84	85	86 87
IBAP	-1	80															
IBCS	-1	24	26	28	29AG	54AG	54	62	62	63AG	8200						
IJ	-1	400	32	38	39	39	39	40	44	49	50	51	52	52	52	60	70 71
IJSC	-1	72	74	75	75	75	76	80	85	86	87	89	89	89	89	89	
IN	-	33	35	35	39	45	47	47	48	67	69	69	73	75	81	83	84
IN	-	42SU	78SU														
IP1	-1	800	33	45	67	81											
IT	-1	1AG	1.01														
IC	-1	15	16	16	2100	5600											
J	-1	400	26	27	30	30	33	45	6000	61	64	64	67	81			
JBAH	-1	600	15	2500	42AG	43AG	78AG	79AG									
JJ	-1	2500	26														
JM1	-1	27	42AG	43AG	61	78AG	79AG										
JPI	-1	800	24	6000													
JP2	-1	800	26														
JT	-1	1AG	1.01														
LCM	-	5F	6F	7F													
MM	-1	1AG	13	14	78AG	79AG											
M1	-1	13	43AG	78AG	79AG												
M2	-1	14	16														
NE	-1	29AG	54AG	63AG	91AG												
NN	-1	1AG	1.01	42AG	43AG	78AG	79AG										
NO	-1	800	41	52	76	89											
NO1	-1	800	24	28	29AG	54AG	62	63AG	91AG								
OUT	-	43SU	79SU														
MSN	(1H	1AG	1.01	42AG	43AG	78AG	79AG										
S	(1H	1001	11EG	39	42AG	43AG	75	78AG	79AG								
SUM	-H	17	88	88	93PM	94PM											
U	(1H	1AG	1.01	42AG	43AG	78AG	79AG										
UMOM	(1H	1001	11EG	36	42AG	43AG	50	71	78AG	79AG	87						
W	(1H	1AG	1.01	42AG	43AG	78AG	79AG										
ZSN	(1H	1AG	1.01	30	30	64	64										

1	SLEROUTLINE IN (BF,BV,AL,R,B,BETA,U,E,W,S,CT,UMOM,EMOM,FOUT,ES)	IN	2
2	1 LAMP=1+IT+J+NN*W+AVNEW	IN	3
3	UMOM(JUN BF(JT+1)+BV(JT+1)+AL(NN+1)+R(I)+B(I)+BETA(I)+U(I)+	IN	4
4	1 E(I)+W(I)+S(I)+CT(I)+UMOM(I)+EMOM(I)+FOUT(I)	IN	5
5	DISPERSIGN AVNEW(I)	IN	6
6	CC 100 I1=1,IT	IN	7
7	I=IT+1-I1	IN	8
8	M=	IN	9
9	CC 100 K=1,AN	IN	10
10	CC 100 L=1,K	IN	11
11	M=0	IN	12
12	AP=U(M)+UZP*M(I+1)	IN	13
13	BE=E(M)+B(I)	IN	14
14	C=UZP*(R(I+1)-R(I))+BETA(M)	IN	15
15	1=1+M+M(L+P)+BB*EV(I,M)+CC*AL(K,I)+B(I)*DZ*S(I) / (AA+BB+CC)	IN	16
16	1 E(I)+M*CT(I)	IN	17
17	FOUT(I)=FOUT(I)+W(M)*(U(M)+UZP*(T=R(I)-BH(J,M)+R(I+1))+BE+	IN	18
18	1 (T=EV(I,M))	IN	19
19	UMOM(I)=UMOM(I)+W(M)*U(M)+T	IN	20
20	EVOM(I)=EVOM(I)+W(M)*E(M)+S+T	IN	21
21	AVNEW(I)=AVNEW(I)+C*(7957749*W(M)+T	IN	22
22	BF(J+P)=T	IN	23
23	EV(I+M)=T	IN	24
24	AL(K,I)=T	IN	25
25	1.1 CC(1)100 I1=1,IT	IN	26
26	HE 100 K=1,AN	IN	27
27	END	IN	28

SINGLY REFERENCED VARIABLES

IN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	
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SINGLY REFERENCED VARIABLES

175

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1      SLOMOUTINE SNGEN (U, E, N, BET1, BET2, N, MP)
2      C
3      DIMENSION      U(1), E(1), N(1), BET1(1), BET2(1)
4      C
5      M=(N*(N+2))/6
6      IF (N.GT.16) GO TO 188
7      GC TO (100,110,120,130,140,150,160,170), 1
8      100 U(1)=1.0
9      U(1)=5.735027
10     E(1)=E(1)
11     GC TO 240
12     110 U(2)=0.40444915
13     U(1)=0.30163878
14     N(1)=0.33333333
15     N(2)=N(1)
16     N(3)=N(1)
17     GC TO 190
18     120 U(1)=0.2309194
19     U(2)=0.0812432
20     U(3)=0.44557010
21     N(1)=0.16444650
22     N(2)=0.16388077
23     N(3)=N(1)
24     N(4)=N(2)
25     N(5)=N(2)
26     N(6)=N(1)
27     GC TO 190
28     130 U(1)=0.14232741
29     U(2)=0.5735127
30     U(3)=0.7352170
31     U(4)=0.96229448
32     N(1)=0.11678047
33     N(2)=0.04325523
34     N(3)=N(2)
35     N(4)=N(1)
36     N(5)=N(2)
37     N(6)=0.04010320
38     N(7)=N(2)
39     N(8)=N(2)
40     N(9)=N(2)
41     N(10)=N(1)
42     GC TO 190
43     140 U(1)=0.16962228
44     U(2)=0.50714142
45     U(3)=0.69466020
46     U(4)=0.84500612
47     U(5)=0.47680202
48     N(1)=0.08584203
49     N(2)=0.067286105
50     N(3)=0.055780171
51     N(4)=N(2)
52     N(5)=N(1)
53     N(6)=N(2)
54     N(7)=N(2)
55     N(8)=N(7)
56     N(9)=N(2)
57     N(10)=N(3)
58     N(11)=N(7)
59     N(12)=N(3)
60     N(13)=N(2)
61     N(14)=N(2)
62     N(15)=N(11)
63     GC TO 190
64     150 U(1)=0.15395746
65     U(2)=0.45769112
66     U(3)=0.62469000
67     U(4)=0.76225328
68     U(5)=0.87568027

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SNGEN      2
SNGEN      3
SNGEN      4
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SNGEN     65
SNGEN     66
SNGEN     67
SNGEN     68
SNGEN     69
SNGEN     70

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68	U(1) = 0.47-06432
69	U(1) = 0.7332178
70	U(2) = 0.5266740
71	U(3) = 0.4161495
72	U(4) = 0.3
73	U(5) = 0.2
74	U(6) = 0.1
75	U(7) = 0.0
76	U(8) = 0.13095007
77	U(9) = 0.3549016
78	U(10) = 0.18
79	U(11) = 0.12
80	U(12) = 0.13
81	U(13) = 0.14
82	U(14) = 0.15
83	U(15) = 0.16
84	U(16) = 0.17
85	U(17) = 0.18
86	U(18) = 0.19
87	U(19) = 0.2
88	U(20) = 0.21
89	U(21) = 0.22
90	U(22) = 0.23
91	U(23) = 0.24
92	U(24) = 0.25
93	U(25) = 0.26
94	U(26) = 0.27
95	U(27) = 0.28
96	U(28) = 0.29
97	U(29) = 0.3
98	U(30) = 0.31
99	U(31) = 0.32
100	U(32) = 0.33
101	U(33) = 0.34
102	U(34) = 0.35
103	U(35) = 0.36
104	U(36) = 0.37
105	U(37) = 0.38
106	U(38) = 0.39
107	U(39) = 0.4
108	U(40) = 0.41
109	U(41) = 0.42
110	U(42) = 0.43
111	U(43) = 0.44
112	U(44) = 0.45
113	U(45) = 0.46
114	U(46) = 0.47
115	U(47) = 0.48
116	U(48) = 0.49
117	U(49) = 0.5
118	U(50) = 0.51
119	U(51) = 0.52
120	U(52) = 0.53
121	U(53) = 0.54
122	U(54) = 0.55
123	U(55) = 0.56
124	U(56) = 0.57
125	U(57) = 0.58
126	U(58) = 0.59
127	U(59) = 0.6
128	U(60) = 0.61
129	U(61) = 0.62
130	U(62) = 0.63
131	U(63) = 0.64
132	U(64) = 0.65
133	U(65) = 0.66
134	U(66) = 0.67
135	U(67) = 0.68
136	U(68) = 0.69

SHUEH	71
SHUEH	72
SHUEH	73
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SHUEH	133
SHUEH	134
SHUEH	135
SHUEH	136
SHUEH	137
SHUEH	138
SHUEH	139

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137      W(13)ZL,012177C13
138      W(14)ZL,012560C04
139      W(15)ZL(1)
140      W(16)ZL(13)
141      W(17)ZL(2)
142      W(18)ZL(1)
143      W(19)ZL(2)
144      W(10)ZL,012049C75
145      W(11)ZL,015622C25
146      W(12)ZL,015874C02
147      W(13)ZL(11)
148      W(14)ZL(1)
149      W(15)ZL(2)
150      W(16)ZL(3)
151      W(17)ZL(11)
152      W(18)ZL,015446C01
153      W(19)ZL(11)
154      W(20)ZL(11)
155      W(21)ZL(3)
156      W(22)ZL(4)
157      W(23)ZL(12)
158      W(24)ZL(13)
159      W(25)ZL(12)
160      W(26)ZL(4)
161      W(27)ZL(4)
162      W(28)ZL(11)
163      W(29)ZL(11)
164      W(30)ZL(4)
165      W(31)ZL(3)
166      W(32)ZL(1)
167      W(33)ZL(3)
168      W(34)ZL(2)
169      W(35)ZL(2)
170      W(36)ZL(1)
171      GC LU 140

C      --- SN SET NOT FOUND IN LIBRARY
172      CALL INHUE
173      CALL TALL
174      RET
175      UC CDB J0201
176      LAB=100J
177      UC CDB L010LA
178      E(N)ZL(1)
179      200  K0000
180      210  CALL INHUE
181      RET
182      UC CDB J0101
183      LAB=100J
184      UC CDB L010LA
185      E(N)ZL(1)
186      220  K0000
187      230  CALL INHUE
188      240  UC CDB J0101P
189      W(1)ZL,101592033509740001J)
190      250  CALL INHUE

C      --- REUNDEH SN LIBRARY
191      RET
192      LABP
193      260  T00(N)
194      E(N)ZL(1)
195      U(L)=1
196      T00(N)
197      E(N)ZL(1)
198      E(L)=1
199      T00(N)
200      W(N)ZL(1)
201      W(L)=1
202      K0000
203      E(L)=1

```

SNUEA	140
SNUEA	141
SNUEA	142
SNUEA	143
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SHUEA	209
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SHUEA	211
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SHUEA	218
SHUEA	219
SHUEA	220
SHUEA	221
SHUEA	222
SHUEA	223

UPLAND - 2F EAST - 173SL RETURN - 215F SMOKE N - 15U

106	c	79					
111	c	110					
121	c	170					
131	c	270					
141	c	320					
151	c	330					
161	c	410					
171	c	1270					
181	c	1720					
191	c	26	41	62	90	12	171 1740
201	c	17710					
211	c	17510					
221	c	18410					
231	c	18610					
241	c	1870					
251	c	1800					
261	c	1800					
271	c	1800					
281	c	1800					
291	c	1800					
301	c	1800					
311	c	1800					
321	c	1800					
331	c	1800					
341	c	1800					
351	c	1800					
361	c	1800					
371	c	1800					
381	c	1800					
391	c	1800					
401	c	1800					
411	c	1800					
421	c	1800					
431	c	1800					
441	c	1800					
451	c	1800					
461	c	1800					
471	c	1800					
481	c	1800					
491	c	1800					
501	c	1800					
511	c	1800					
521	c	1800					
531	c	1800					
541	c	1800					
551	c	1800					
561	c	1800					
571	c	1800					
581	c	1800					
591	c	1800					
601	c	1800					
611	c	1800					
621	c	1800					
631	c	1800					
641	c	1800					
651	c	1800					
661	c	1800					
671	c	1800					
681	c	1800					
691	c	1800					
701	c	1800					
711	c	1800					
721	c	1800					
731	c	1800					
741	c	1800					
751	c	1800					
761	c	1800					
771	c	1800					
781	c	1800					
791	c	1800					
801	c	1800					
811	c	1800</					

179

```

1      OVERLAY (YORKIER 40 2)
1      PROGRAM SNESTEP
C      THIS PROGRAM IS DESIGNED TO READ THE ENERGY DEPOSITION
C      DATA AND SOLVE THE HEAT EQUATION TO GIVE NEW TEMPERATURES
C      MODIFICATIONS HAVE BEEN MADE TO COMMUNICATE WITH THE SON CODE
C      0/24/73=H, T, S.
2      COMMON /STATE/ NCP1, NCP2, NFHE, UPTMP(30), OMDEN(10),
1      FREQ(100), SPHL(130), PTAB(300), FTAB(300),
C      BTOL(300)
3      COMMON /YSC1/ AASC(1000)
4      COMMON /PINK/ I, IJ, IJM, IJP, J
5      LCH /YLL1/ AAL(13100)
6      LCH /YLL2/ AAZ(13100)
7      LCH /YLLC/ SIGA(10000)
8      COMMON /HED/ NAME(10), DT, DTH, FMIQ, GHVEL, IBAR, IJPS,
1      JF1, JSCF1, JSCF2, JSCF3, JSCF4, ITV, JBAH,
4      JF1, JPC, KCTC, KUMP, NG, NOI, RE/SIE, TAMB,
1      TERM(700), I, TIME, TOUT, TSTART, THY
9      COMMON /CHTSA/ SNGON(10), Z
1     EQUIVALENCE
1     (AASC(1),XPAR), (AASC(2),RYPAR), (AASC(3),Y),
C     (AASC(4),U), (AASC(5),V), (AASC(6),RO),
C     (AASC(7),XPPHPP,RLSD,CENTA),
C     (AASC(8),E,ETIL,CENTY), (AASC(9),HVCL),
C     (AASC(10),M,HP,VP), (AASC(11),P,PL,EP,UP),
C     (AASC(12),UTIL,UL,CUMUMLC),
C     (AASC(13),VTIL,VL,CUMVLC),
C     (AASC(14),RCL,METAL,CFOUTLC), (AASC(15),SIE),
C     (AASC(16),DELSM,SIGMLC),
C     (AASC(17),GH1,UG,PPEDEN),
C     (AASC(18),GH12,UG,SH)
11    REAL LAM, LAPD, K, MP, EUT, MUUC
12    DIMENSION
2     X(1), APAX(1), R(1), YPAR(1), Y(1), U(1),
C     V(1), MU(1), MP(1), RHP(1), ACSC(1), CENTA(1),
C     E(1), ETIL(1), CENTY(1), HVOL(1), M(1), MP(1),
C     VP(1), P(1), PL(1), EP(1), UP(1), UTIL(1),
C     UL(1), CU(1), FOMUL(1), VTIL(1), VL(1),
C     UMUMLL(1), AVL(1), METALL(1), FOUTLC(1),
C     SIE(1), DELSM(1), SIGMLC(1), GRH(1), UG(1),
C     KZLEN(1), GH12(1), VG(1), FSN(1)
13    LEAT DBLINT
14    ZLUB FCHMAT (LM,GBHTAVG,1PE12.4,0.0,AM,IMAX,1PE12.4,0.0,
1     OM,IMAX,1PE12.4,0.0,OM,UMIN,1PE12.4)
15    ZLUB FCHMAT (LM,ENERGIES,OM,SIE,1PE12.4,0.0,OM,UMTUT,
1     1PE12.4,0.0,OM,ELUST,1PE12.4,0.0,OM,EAHS,
C     1PE12.4)
16    ZLUB FCHMAT (LM,POWER,OM,PMW,1PE12.4,0.0,OM,PMK,
1     1PE12.4)
17    ZLUB FCHMAT (LM,TIME INTERVAL DATA,OM,DTR,1PE12.4,
1     OM,UM,1PE12.4,0.0,OM,POWER,1PE12.4,OM,
C     OM,ELULL,1PE12.4)
18    C
19    TAAAB=0.0
20    LAAAB=15.0
21    UNH=15.0
22    SHTUT=0.0
23    LHTUT=0.0
24    USIE=0.0
25    BTULUT=0.0
26    LHTUT=0.0
27    ELUST=0.0
28    EADSD=0.0
29    C --- ADVANCE CELL ENERGIES AND TEMPERATURES
30    CALL STANT
31    DO 40 J=1,JP1

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```

2      SNESTEP
3      SNESTEP
4      SNESTEP
5      SNESTEP
6      SNESTEP
7      SNESTEP
8      SNESTEP
9      SNESTEP
10     SNESTEP
11     SNESTEP
12     SNESTEP
13     SNESTEP
14     SNESTEP
15     SNESTEP
16     SNESTEP
17     SNESTEP
18     SNESTEP
19     SNESTEP
20     SNESTEP
21     SNESTEP
22     SNESTEP
23     SNESTEP
24     SNESTEP
25     SNESTEP
26     SNESTEP
27     SNESTEP
28     SNESTEP
29     SNESTEP
30     SNESTEP
31     SNESTEP
32     SNESTEP
33     SNESTEP
34     SNESTEP
35     SNESTEP
36     SNESTEP
37     SNESTEP
38     SNESTEP
39     SNESTEP

```

31	UC JV (=).IPAK	SNESTEP	40
32	IF J=I+KHU	SNESTEP	41
33	ISL=(J-1)*I+1	SNESTEP	42
34	FOULC(IJ)=FOULC(IJ)	SNESTEP	43
35	IF (FOULC(IJ).GT.1.0) EABS=EABS+FOULC(IJ)	SNESTEP	44
36	IF (I.EQ.1) PAK=UM+J.EU.2.UM+J.EU.JP1) PAK=PAK+FOULC(IJ)	SNESTEP	45
37	VOL=0.703184*VUL(IJ)	SNESTEP	46
38	XX=FOULC(IJ)*DTOLD	SNESTEP	47
39	USIE=USIE+XX	SNESTEP	48
40	NESTEP=XX/VOL	SNESTEP	49
41	IF (TEMP(IJSC).GE.0.0) GO TO 35	SNESTEP	50
42	IF (FOULC(IJ).GE.0.0) GO TO 35	SNESTEP	51
43	ECELL=SITE(IJ)*HU(IJ)*VOL*1.0E+15	SNESTEP	52
44	PAK=PAK+USIE*FOULC(IJ)	SNESTEP	53
45	ALINEV.15=ECELL/PAK	SNESTEP	54
46	IF (U14.LI.AUTM) GO TO 35	SNESTEP	55
47	UTM=ALIN	SNESTEP	56
48	IJ=I+JSC	SNESTEP	57
49	K=K+PAK	SNESTEP	58
50	ECELLUT=ECELL	SNESTEP	59
51	USIE=USIE+PAK/HU(IJ)*1.0E+15	SNESTEP	60
52	SIE(IJ)=SIE(IJ)+USIE	SNESTEP	61
53	SIE(IJ)=SIE(IJ)+SIE(IJ)*HU(IJ)*VOL*1.0E+15	SNESTEP	62
	C	SNESTEP	63
54	ZH=HU(IJ)	SNESTEP	64
55	IF (SIE(IJ)-NEZSIE.GT.1.0E+06) GO TO 36	SNESTEP	65
56	ZI=IAPK	SNESTEP	66
57	ZL=ZSIE(IJ)	SNESTEP	67
58	GO TO 30	SNESTEP	68
59	30 ZL=SITE(IJ)	SNESTEP	69
60	ZFINV=1.0/ZP	SNESTEP	70
61	ZML=UUL(IJ)*(ZH)	SNESTEP	71
62	IF UM=IAPK	SNESTEP	72
63	TRUM=USUM*(ZL+ZH*0.0072070VE+07)	SNESTEP	73
64	TRUM=USUM*(TRUM)	SNESTEP	74
65	ZI=-.5*(TRUM+THIGH)	SNESTEP	75
66	37 UH=1.37.ZI4E-47*ZT000	SNESTEP	76
67	ZL=ZL-UP*2HINV	SNESTEP	77
68	ZL=UUL(IJ)*(ZL)	SNESTEP	78
69	ZL=UUL(IJ)*(ZL+ZL*OPDEN*OPTMP*ETAB.0. NOPT, AUPU, AUPU)	SNESTEP	79
70	ZL=UUL(IJ)*(ZL+ZL)	SNESTEP	80
71	ZL=ZL-ZL2	SNESTEP	81
72	IF (ZL.GT.0.0) TLOW=ZT	SNESTEP	82
73	IF (ZL.LT.0.0) THIGH=ZT	SNESTEP	83
74	ZI=-.5*(TRUM+TLOW)	SNESTEP	84
75	IF (TRUM-TLOW.LE.1.0E+06*ZT) GO TO 36	SNESTEP	85
76	GO TO 37	SNESTEP	86
77	38 TEMP(IJSC)=PAK*(ZT+IAPK)	SNESTEP	87
78	TRUM=PAK*(TRUM+TEMP(IJSC))	SNESTEP	88
79	UM=PAK*(UM+PAK/HU(IJ))	SNESTEP	89
80	UM=PAK*(UM+PAK/HU(IJ))	SNESTEP	90
81	U14=U14+U14*ZT*ZL+1.37.ZI4E-47*(TEMP(IJSC)+0.0)*VOL	SNESTEP	91
82	IJ=IJ+1	SNESTEP	92
83	35 CONTINUE	SNESTEP	93
84	CALL LOOP	SNESTEP	94
85	46 CONTINUE	SNESTEP	95
86	CALL DONE	SNESTEP	96
	C	SNESTEP	97
87	PAK=PAK/FLUAT(2*U14+JPAK)	SNESTEP	98
88	PAK=USIE/DTOLD	SNESTEP	99
89	PAVU=TIME*0.5*DTOLD	SNESTEP	100
90	ELOS=PAK*DTOLD	SNESTEP	101
91	EABS=PAK*DTOLD	SNESTEP	102
92	PRINT P155 SITE01, URT01, ELUST, EABS	SNESTEP	103
93	WRITE (12,005) SITE01, URT01, ELUST, EABS	SNESTEP	104
94	PRINT P155 PAK, PAK2	SNESTEP	105
95	WRITE (12,006) PAK, PAK2	SNESTEP	106
96	PRINT P155 UTM, IJUT, PAK, ECELLUT	SNESTEP	107
97	WRITE (12,007) UTM, IJUT, PAK, ECELLUT	SNESTEP	108

```

      20 PRINT 2.003, TAVG, TMAX, DMAX, DMIN
      40 WHITE (12,000) TAVG, TMAX, DMAX, DMIN
      100 C RETURN
      110 C
      111 END

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SNESTEP 109
SNESTEP 110
SNESTEP 111
SNESTEP 112
SNESTEP 113
SNESTEP 114

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SINGLY REFERENCED VARIABLES

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AA1 (1) 5LC 01 -H 8CO 1JPS -1 8CO LAM1 -H 11HL AFRQ -1 2CO HLC1 - 7CN THY -H 8CU
AA2 (1) 6LC 01 -H 8CO 1SCF1 -1 8CO LEAT - 13F AGI -1 8CO SIGA (1) 7LC TOUT -H 8CU
AB3 - 44SU 01 -H 17F 1SCF2 -1 8CO LOUP - 84SU PINA - 4CN SACUN (1) 9CU TSTART -H 8CU
AA-111 - 79SU 1LCAT - 87SL 1SC2 -1 8CO KU -H 11HL PTAB (1) 2CO SNESTEP - 1SU YLC1 - 5CN
B1BL (1) 2CU 1FEL (1) 2CO 1SC3 -1 8CO MUM2 -H 11HL CEXP10 - 75SU SPT3L (1) 2CU YLC2 - 6CN
CHMSH - 9CN 01 -H 8CO 1TV -1 8CO NAME (1) 8CO REAL - 11F STAK1 - 29SU YSC1 - 3CN
D1HERSI - 12F 1JP -1 8CO NCTC -1 8CO REC - 8CN STATE - 2CN ZZ -H 9CU
DUNE - 80SU 1JP -1 8CO LAM -H 11HL NUUMP -1 8CO RETURN - 10UF 1 -H 8CU

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MULTIPLY-REFERENCED VARIABLES

```

35 = 41 42 40 51*
36 = 55 54*
37 = 60 70
38 = 50 75 17*
39 = 3100 63*
40 = 3100 65*
2403 = 140 90PH 99PH
2405 = 150 90PH 93PH
2406 = 160 90PH 95PH
2407 = 170 90PH 97PH
AASC (1) 3CU 1124 10EL 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ 10EQ
AASCH -H 1124 1124 51
AASAI - 7750 7850 8050
BETALC (1) 1124 1201
CENTA (1) 1124 1201
CENTY (1) 1124 1201
COMMON - 2F 3F 4F 8F 9F
CU (1) 1124 1201
DRLJIT - 1124 8950
DRLSIE -H 512 52
DELISH (1) 1124 1201
DMAA -H 142 62 60 98PH 99PH
DMIN -H 202 72 79 98PH 99PH
DSIE -H 242 342 39 89
LTOLU -H 252 30 89 90 91 90PH 97PH
DIN -H 8CU 20 46 472 90PH 97PH
L (1) 1124 1201
LANS -H 222 352 35 912 91 92PH 93PH
LCLL -H 432 45 50
ECLLLO1 -H 512 90PH 97PH
ECLUST -H 272 42 93PH
EMUMLC (1) 1124 1201
EP (1) 1124 1201
ETAB (1) 2CU 69
ETIL (1) 1124 1201
FURNAT - 142 152 162 17F
FOUTLC (1) 1124 1201 342 34 35 35 36 38 42 44
FSN (1) 1124 1201
GRIN (1) 1124 1201
GRIZ (1) 1124 1201
I -1 4CU 3100 33 36
IBAN -1 8CU 3100 36 87
IJ -1 4CU 32 34 35 36 37 38 42 43 43 44 51 52 52 53
JOUT -1 422 90PH 97PH
JSC -1 322 41 48 77 78 81
IPJ -1 322 62
IPJ -1 8CU 33

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1      OVERLAY (YOKIPEX: 4: 3)
1      PROGRAM SNOUT
C
C      THIS CODE GIVES OUTPUT FOR THE SN CALCULATIONS
2      COMMON /STATE/ NCHT, NCPD, NFRQ, OPTMP(J), OPEN(10),
1      FREQ(100), SPHL(J,0), PTAB(300), ETAB(300),
2      BTHL(J,1)
3      COMMON /VSC1/ AASC(5000)
4      COMMON /PIAN/ I=1, J=1, J2, J
5      COMMON /VLC1/ AA(131000)
6      COMMON /VLC2/ AA2(131000)
7      COMMON /VLL1/ SIGA(50000)
8      COMMON /RED/ NAME(12), DT, DTH, EM10, GRDVEL, IPAR, IJPS,
1      ISCF1, ISCF2, ISCF3, ITV, JBAR,
2      JP1, JP2, KCYC, NUUMP, NU, NU1, HEZSIE, TAMB,
3      TEMP(750), T, TIME, TOUT, TSTART, THY
9      COMMON /CRIMSN/ SCON(1000), ZZ
10     COMMON /SILVEN/ FIAL, FIPRH, FIPYH, FIAL, FIXR, FIYB,
1      IPAL, IPAR, IPYH, IPYT, IAL, IXH, IYB,
2      IYI, PACONV, PXL, PAM, PYB, PYCONV, PYT,
3      RIBAR, VV, XCONV, AL, AR, YB, YCONV, YT
11     EQUIVALENCE
1      (AASC(1),X,XPAN), (AASC(2),H,YPAN), (AASC(3),Y),
2      (AASC(4),U), (AASC(5),V), (AASC(6),MO),
3      (AASC(7),MP,HMP,HLSU,CENTX),
4      (AASC(8),E,ETIL,CENTY), (AASC(9),HVCL),
5      (AASC(10),M,MP,VP), (AASC(11),P,PL,EP,UP),
6      (AASC(12),UTL,UL,CQ,EMOMLC),
7      (AASC(13),VTIL,VL,UMOMLC),
8      (AASC(14),ROL,BETALC,FOOTLC), (AASC(15),SIE),
9      (AASC(16),DELSM,SIGPLC),
10     (AASC(17),GRIZ,UG,FDEN),
11     (AASC(18),GRIZ,VG,FSN)
12     REAL LAM, LAMP, M, MP, MU, MUOZ
13     DIMENSION X(1), XPAR(1), R(1), YPAR(1), Y(1), U(1),
2      V(1), MC(1), MP(1), HMP(1), RCSQ(1), CENTX(1),
3      E(1), ETIL(1), CENTY(1), RVOL(1), M(1), RM(1),
4      VP(1), P(1), FL(1), EP(1), UP(1), UTL(1),
5      UL(1), CO(1), EMOMLC(1), VTIL(1), VL(1),
6      UMOMLC(1), ROL(1), BETALC(1), FOOTLC(1),
7      SIL(1), DELSM(1), SIGPLC(1), GRIZ(1), VG(1),
8      RZLUDN(1), GRIZ(1), VG(1), FSN(1)
14     DIMENSION TITLE(5)
15     COMMON /SNOWITE/ ISN, AVINT(7500), HSN(101), ZSN(102)
16     2+30 FCHMAT (6M RFLUX,1PE12.4,MH ZFLUX,1PE12.4,
1      12H J/LU KM=SEC)
C      -- FLUX DIAGRAM SHOWING RADIATION FLOW
17     UPAA=VMAX=0.
18     UN=UZ=1.0E+36
19     CALL START
20     DO 419 J=2,JP1
21     DO 418 I=1,IBAR
22     AL=HHS(UMOMLC(I,J))
23     AV=HHS(EMOMLC(I,J))
24     UPAA=AMAX1(XU,UPAA)
25     VMAA=AMAX1(XV,VMAA)
26     IF (J.EQ.2) UN=AMIN1(UN,HSN(I,1)-RSN(I))
27     IF (I.EQ.1) UZ=AMIN1(UZ,ZSN(J,1)-ZSN(J))
28     IJ=IJ+NU
29     CONTINUE
30     CALL LOOP
31     419 CONTINUE
32     CALL DONE

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SNOUT 2
SNOUT 3
SNOUT 4
SNOUT 5
SNOUT 6
ALLKRM 2
ALLKRM 3
ALLKRM 4
ALLKRM 5
ALLKRM 6
ALLKRM 7
ALLKRM 8
ALLKRM 9
ALLKRM 10
ALLKRM 11
ALLKRM 12
ALLKRM 13
CHIMSN 2
SILVEN 3
SILVEN 4
SILVEN 5
EQUIVALENCE 2
EQUIVALENCE 3
EQUIVALENCE 4
EQUIVALENCE 5
EQUIVALENCE 6
EQUIVALENCE 7
EQUIVALENCE 8
EQUIVALENCE 9
EQUIVALENCE 10
EQUIVALENCE 11
EQUIVALENCE 12
EQUIVALENCE 13
DIMEN 2
DIMEN 3
DIMEN 4
DIMEN 5
DIMEN 6
DIMEN 7
DIMEN 8
DIMEN 9
SNOUT 12
SNOUT 13
SNOUT 14
SNOUT 15
SNOUT 16
SNOUT 17
SNOUT 18
SNOUT 19
SNOUT 20
SNOUT 21
SNOUT 22
SNOUT 23
SNOUT 24
SNOUT 25
SNOUT 26
SNOUT 27
SNOUT 28
SNOUT 29
SNOUT 30
SNOUT 31
SNOUT 32

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33	CK=AMIN(OR,UZ)	SNOUT	33
34	DROU=1.2*OR/AMAX(UMAX,VMAX)	SNOUT	34
	C	SNOUT	35
35	CALL ADV(1)	SNOUT	36
36	CALL FRAME(IXL,IXR,IYI,IYB)	SNOUT	37
37	CALL START	SNOUT	38
38	DC 435 J=2,JP1	SNOUT	39
39	Y1=ZSN(J)	SNOUT	40
40	DC 434 I=1,IHAR	SNOUT	41
41	X1=HSH(I)	SNOUT	42
42	X2=X1*UMOMLC(IJ)*DROU	SNOUT	43
43	Y2=Y1*EMOMLC(IJ)*DROU	SNOUT	44
44	IX1=X1*IXL*X1*XCINV	SNOUT	45
45	IX2=X1*IXL*X2*XCINV	SNOUT	46
46	IY1=X1*YB*(Y1-YB)*YCONV	SNOUT	47
47	IY2=X1*YB*(Y2-YB)*YCONV	SNOUT	48
48	CALL DMV(IX1,IY1,IX2,IY2)	SNOUT	49
49	IJ=IJ+NU	SNOUT	50
50	434 CCNTINUE	SNOUT	51
51	CALL LOOP	SNOUT	52
52	435 CCNTINUE	SNOUT	53
53	CALL DONE	SNOUT	54
54	ERLUDU(50,2408,TITLE) UMAX,VMAX	SNOUT	55
55	JYB=IYB+10	SNOUT	56
56	JXL=10	SNOUT	57
57	CALL DLCH(JXL,JYB,49,TITLE,2)	SNOUT	58
	C	SNOUT	59
58	CALL ADV(1)	SNOUT	60
59	CALL FRAME(IXL,IXR,IYI,IYB)	SNOUT	61
60	CALL START	SNOUT	62
61	DC 445 J=2,JP1	SNOUT	63
62	Y1=ZSN(J)	SNOUT	64
63	IF (Y1,LT,PYB,OF=Y1,GT,MYT) GO TO 445	SNOUT	65
64	DC 444 I=1,IHAR	SNOUT	66
65	X1=HSH(I)	SNOUT	67
66	IF (X1,LT,PXL,OF=X1,GT,PAR) GO TO 443	SNOUT	68
67	X2=X1*UMOMLC(IJ)*DROU	SNOUT	69
68	Y2=Y1*EMOMLC(IJ)*DROU	SNOUT	70
69	IX1=X1*IXL*X1*XCINV	SNOUT	71
70	IX2=X1*IXL*X2*XCINV	SNOUT	72
71	IY1=X1*YB*(Y1-YB)*PYCONV	SNOUT	73
72	IY2=X1*YB*(Y2-YB)*PYCONV	SNOUT	74
73	CALL DMV(IX1,IY1,IX2,IY2)	SNOUT	75
74	443 IJ=IJ+NU	SNOUT	76
75	444 CCNTINUE	SNOUT	77
76	CALL LOOP	SNOUT	78
77	445 CCNTINUE	SNOUT	79
78	CALL DONE	SNOUT	80
79	CALL DLCH(JXL,JYB,49,TITLE,2)	SNOUT	81
80	CALL ADV(1)	SNOUT	82
	C	SNOUT	83
81	RETURN	SNOUT	84
82	END	SNOUT	85

SINGLY REFERENCED VARIABLES

AA1	(1)H	5LC	FIPAR	-H	1-CC	ISC2	-1	ACU	NCYC	-1	BCO	RED	-	BCN	STATE	-	2CN	YLC1	-	SCN
AA2	(1)H	6LL	FIPAR	-H	1-CC	ISC3	-1	BCU	NUUMP	-1	BCO	RETURN	-	6LF	T	-H	8CO	YLC2	-	6CN
AVINT	(1)H	15CO	FURKAT	-	16F	15N	-1	15CO	NFNU	-1	2CO	REZSIE	-H	8CO	TAMU	-H	8CO	YSC1	-	3CN
BTUL	(1)H	7CU	FMCL	(1)H	2CO	1TV	-1	8CO	NUMU	-1	2CO	HIBAR	-H	15CO	TEMP	(1)H	8CU	YT	-H	10CU
CHIMSH	-	9CN	OMUVEL	-H	8CC	JBAR	-1	8CU	NOPT	-1	2CO	RLC1	-	7CN	THY	-H	8CU	ZZ	-H	9CU
DT	-H	8CU	IJP	-1	4CO	JP2	-1	8CU	NOI	-1	8CO	SIGA	(1)H	7LC	TIME	-H	8CC			
DTM	-H	8CO	IJP	-1	4CO	LAP	-H	12RL	OPDEN	(1)H	2CO	STLVER	-	15CN	TOUT	-H	8CU			
EM10	-H	8CU	IJPS	-1	8CO	LAPD	-H	12RL	OPIMP	(1)H	2CO	SNCON	(1)H	9CO	TSTAKT	-H	8CC			
ENLUDU	-	54F	IP	-1	8CO	MU	-H	12RL	PINK	-	4CN	SNOUT	-	15U	VV	-H	10CU			
EQUIVAL	-	11F	ISCF1	-1	8CO	MUG2	-H	12RL	PIDM	(1)H	2CO	SNOWITE	-	15CN	XL	-H	10CU			
ETMH	(1)H	2CO	ISCF2	-1	8CO	NAME	(1)H	ACU	REAL	-	12F	SPTBL	(1)H	2CO	AR	-H	10CU			

MULTIPLY-REFERENCING VARIABLES

[illegible]

MASTER INDEX

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C MEANS VARIABLE WAS DEFINED IN COMMON IN THAT ROUTINE
D MEANS VARIABLE WAS DEFINED IN OTHER DECLARATIONS
NON-ALPHA NUMERIC IS NUMBER OF NON-DECLARATORY REFERENCES
S PRECEDING MEANS SUBROUTINE (PROGRAM/FUNCTION) NAME
L PRECEDING MEANS COMPILE(L) NAME
P PRECEDING MEANS FORTRAN RETURN
* PRECEDING MEANS VARIABLE IS DECLARED, NOT USED ANYWHERE

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AAC	YURIFER	10	LCOM	0	FILMCO	0	OFFWEGO	20	MESHMKR	0	PARTGEN	0	YORKY	0	PHASE0	0	YOKOUT	0
	PARPLOT	0	PHASE1	0	PHASE2	0	PHASE3	0	REZONE	0	PARTMOV	0	MCHT	0	REEFER	0	FLUSH	0
	PHREG	0	SUBSCH	0	WALK	0	ESTEP	0	LISTING	0	GREYSN	0	CYLSN	0	SLEEP	0	SNESTEP	0
	SNOUT	0																
S	PHASE1	6																
	MESHMKR	1	PHASE1	2	YOKOUT	6	PHASE1	2	PHASE2	5	PHASE3	5	REZCNL	4	WALK	1	HOWFAR	2
	CYLSN	1	SNESTEP	1	SNOUT	2												
	SNESTEP	2																
	ABSDUR	2																
	ESTEP	2																
	HOWFAR	110																
	PURREGA	6																
S	ADV	1	YOKOUT	5	PARPLOT	1	SNOUT	3										
S	YURIFER	1	OFFWEGO	1														
S	AFSREL	2																
S	YURIFER	2																
	PARPLOT	1																
	PHASE1	4	PHASE2	4														
	AL	6	SUBSCH	10	CYLSN	10	SLEEP	40	IN	30	OUT	30						
	ALAM	3																
	PHASE1	3																
S	PARPLOT	1																
	YURIFER	0	OFFWEGO	40	MCHT	10	REEFER	0	FLUSH	0	WALK	0	ESTEP	0	LISTING	0	GREYSN	2
	ALPHA	3																
	AL13	3																
	AL24	3																
S	AMAX1	4	MESHMKR	3	PARTGEN	2	PHASE0	1	YOKOUT	6	PHASE1	9	PHASE2	2	PHASE3	3	REZONE	6
	PARTMOV	2	WALK	2	ESTEP	4	CYLSN	1	SNESTEP	3	SNOUT	3						
S	AMIN1	5	FILMCO	5	MESHMKR	3	PARTGEN	1	YOKOUT	12	PHASE1	12	PHASE2	2	PHASE3	3	PARTMOV	1
	YURIFER	2	PHREG	2	MCHT	1	HOWFAR	3	ESTEP	3	GREYSN	2	SNESTEP	1	SNOUT	3		
	MCHT	1																
	PHASE2	3																
	YURIFER	0	FILMCO	0	OFFWEGO	40	MESHMKR	0	PARTGEN	0	YORKY	0	PHASE0	0	YOKOUT	0	PARPLOT	0
	PHASE1	10	PHASE2	0	PHASE3	0	REZONE	0	PARTMOV	0	PARTMOV	0						
	YURIFER	0	FILMCO	0	OFFWEGO	0	MESHMKR	0	PARTGEN	0	YORKY	0	PHASE0	0	YOKOUT	0	PARPLOT	0
	PHASE1	0	PHASE2	0	PHASE3	0	REZONE	0	PARTMOV	0	PARTMOV	0						
	PHASE2	0																
	REZONE	0																
	PHASE3	0																
	PHASE1	0																
	PHASE2	0			</													

BU	YUKIFER	C	FILMCO	C	OFFWEGO	3C	MESHMKR	C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	C	PANPLOT	C
C	PHASE1	C	PHASE2	C	PHASE3	5C	REZONE	C	PARTMOV	C								
CBLOCK	SUNSCR	10	CROSS	10														
CC	KEEFER	460																
CLAKLA	IN	3	ULT	3														
S CENTHUY	PHASE1	3	PHASE2	2														
CENTX	CENTHUY	1	WALK	2														
	FILMCO	U	OFFWEGO	U	MESHMKR	U	PARTGEN	D	YOKKY	D	PHASE0	D	YOKOUT	D	PANPLOT	D	PHASE1	D
	PHASE2	U	PHASE3	D	REZONE	D	PARTMOV	D	MCRT	2D	KEEFER	D	FLUSH	D	CENTHUY	170	WALK	D
	ESTEP	U	LISTING	D	GREYSN	10	SNSTEP	D	SNOUT	D								
CENTY	FILMCO	U	OFFWEGO	D	MESHMKR	U	PARTGEN	D	YOKKY	D	PHASE0	D	YOKOUT	D	PANPLOT	D	PHASE1	D
	PHASE2	U	PHASE3	D	REZONE	D	PARTMOV	D	MCRT	2D	KEEFER	D	FLUSH	D	CENTHUY	170	WALK	D
	ESTEP	U	LISTING	D	GREYSN	10	SNSTEP	D	SNOUT	D								
CINC	PHASE	11																
COLAPU	YUKIFER	C	FILMCO	C	OFFWEGO	1C	MESHMKR	C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	C	PANPLOT	C
F COMMON	PHASE1	1C	PHASE2	1C	PHASE3	C	REZONE	C	PARTMOV	C								
	YUKIFER	11	LOOP	4	FILMCO	8	OFFWEGO	11	MESHMKR	9	PARTGEN	8	YOKKY	7	PHASE0	7	YOKOUT	8
	PANPLOT	8	PHASE1	8	PHASE2	7	PHASE3	8	REZONE	9	PARTMOV	8	MCRT	6	KEEFER	7	FLUSH	8
	PHASE	4	SLBSCR	4	CENTHUY	1	WALK	7	MCWFAR	1	WHERE	1	ESTEP	6	LISTING	6	GREYSN	7
	CYLSN	6	SLEEP	5	SNSTEP	5	SNOUT	7										
CON	YOKOUT	250																
S CUPYF	OFFWEGO	2	KEEFER	1														
S COS	KEEFER	2	POMEGA	1														
CPH	KEEFER	2																
CPH	POMEGA	4																
CU	FILMCO	U	OFFWEGO	D	MESHMKR	U	PARTGEN	D	YOKKY	D	PHASE0	D	YOKOUT	140	PANPLOT	D	PHASE1	D
	PHASE2	U	PHASE3	D	REZONE	D	PARTMOV	D	MCRT	D	KEEFER	D	FLUSH	D	WALK	D	ESTEP	D
	LISTING	U	GREYSN	D	SNSTEP	D	SNOUT	D										
L CRIMSH	YUKIFER	1	OFFWEGO	1	GREYSN	1	CYLSN	1	SWEEP	1	SNSTEP	1	SNOUT	1				
S CROSS	POMEGA	4	CROSS	2														
CT	WALK	60	IN	20	OUT	20												
CTH	KEEFER	2																
CTMT	POMEGA	4																
CTUT	CENTHUY	60	WALK	20														
CYL	YUKIFER	C	FILMCO	C	OFFWEGO	4C	MESHMKR	2C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	C	PANPLOT	C
	PHASE1	2C	PHASE2	3C	PHASE3	5C	REZONE	1C	PARTMOV	C								
S CYLSN	CYLSN	1	PHASE1	2	PHASE2	5	PHASE3	7	MCWFAR	8								
	YOKOUT	3																
S DATAREL	YUKIFER	1																
F DATA	POMEGA	1	SLBSCR	2	WALK													
S DATE1	OFFWEGO	1																
UCLJAT	PHASE	10	PHASE3	10	MCRT	20	ESTEP	10	GREYSN	20	SNSTEP	10						
UCELL	KEEFER	4	CENTHUY	C	WALK	1C	WHERE	1C										
UEN	WALK	5																
UDOL	WALK	5																
UD	MCWFAR	5																
ULLE	PHASE1	5																
ULSIL	SNSTEP	2																
ULSP	FILMCO	U	OFFWEGO	D	MESHMKR	U	PARTGEN	U	YOKKY	D	PHASE0	D	YOKOUT	D	PANPLOT	D	PHASE1	10
	PHASE2	10	PHASE3	D	REZONE	U	PARTMOV	D	MCRT	D	KEEFER	D	FLUSH	D	WALK	D	ESTEP	D
	LISTING	U	GREYSN	D	SNSTEP	D	SNOUT	D										
ULL2	PHASE2	2																
UENS	MCRT	20	KEEFER	C	FLUSH	C	WALK	8C	ESTEP	CU	LISTING	CU						
F DIMENSI	FILMCO	1	OFFWEGO	3	MESHMKR	2	PARTGEN	1	YOKKY	1	YOKOUT	3	PANPLOT	2	PHASE1	1		
	PHASE2	1	PHASE3	2	REZONE	1	PARTMOV	1	MCRT	1	KEEFER	2	FLUSH	1	POMEGA	1	CROSS	1
	CENTHUY	1	WALK	2	MCWFAR	1	WHERE	1	ESTEP	2	LISTING	2	GREYSN	1	CYLSN	1	SLEEP	1
	IN	2	ULT	2	SNSTEP	1	SNSTEP	1	SNOUT	2								
UISC	MCWFAR	1																
S ULCN	SNOUT	2																
ULUG	MCRT	1	SLBSCR	2	WALK	5	GREYSN	5										
UNAX	ESTEP	5	SNSTEP	5														
UMP	WALK	2																
UMIN	MCRT	3	ESTEP	5	SNSTEP	5												
UMOVE	WALK	1																
UNEG	MCWFAR	1																
S UONE	LOOP	1	OFFWEGO	1	MESHMKR	5	PHASE0	1	YOKOUT	2	PHASE1	2	PHASE2	4	PHASE3	7	REZONE	3
	MCRT	1	KEEFER	1	ESTEP	1	LISTING	1	GREYSN	1	SNSTEP	1	SNOUT	3				
UP	PHASE2	5																
UPLS	MCWFAR	7																

[illegible]

PARFLOL: 6 PHASES

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[illegible]

17	SLEEP	10	IN	20	OUT	20	MESHMAN	C	PANTGEN	C	YURRY	C	PHASE0	C	YURCUT	C	PANPLOT	C
17M	YURIPEN	C	FILMCC	C	OFFWEGU	1C	REZONE	C	PANTGEN	JC								
17EN	PANPLOT	3																
17EST	PHASE0	20																
17U	PHASE0	4																
17IC	PANPLOT	2																
17M	PHASE0	4																
17V	YURIPEN	C	LCUP	1C	FILMCC	C	OFFWEGU	1C	MESHMAN	C	PANTGEN	C	YURRY	C	PHASE0	C	YURCUT	C
	PANPLOT	C	PHASE0	C	PHASE2	C	REZONE	C	PANTGEN	C	YURRY	C	PHASE0	C	YURCUT	C	FLUSH	C
	PHASE0	C	SLDSCH	C	WALK	C	ESTEP	C	LISTING	C	ONEYSN	C	MCNT	C	FLUSH	C	SNESSTEP	C
	SNOLT	C																
18NF	OFFWEGU	5C	MESHMAN	1C	PANTGEN	C	MESHMAN	C	PANTGEN	C	YURCUT	10C	PANPLOT	C	PHASE3	C	REZONE	C
18L	YURIPEN	C	FILMCC	1C	OFFWEGU	C												
	PANPLOT	C	ONEYSN	C	SNOLT	1C												
18LO	YURCUT	2																
18M	YURIPEN	C	FILMCC	1C	OFFWEGU	C	MESHMAN	C	PANTGEN	C	YURCUT	20C	PANPLOT	C	PHASE3	C	REZONE	C
	PANPLOT	C	ONEYSN	C	SNOLT	1C												
18MO	YURCUT	4																
18I	YURCUT	20U	PANPLOT	9	SNOLT	4												
18E	YURCUT	10U	PANPLOT	2	SNOLT	4												
18J	YURCUT	7	PANPLOT	2														
18N	YURCUT	3																
18O	YURIPEN	C	FILMCC	1C	OFFWEGU	C	MESHMAN	C	PANTGEN	C	YURCUT	20C	PANPLOT	2C	PHASE3	C	REZONE	C
	PANPLOT	C	ONEYSN	C	SNOLT	2C												
18ON	YURCUT	2																
18I	YURIPEN	C	FILMCC	1C	OFFWEGU	C	MESHMAN	C	PANTGEN	C	YURCUT	20C	PANPLOT	1C	PHASE3	C	REZONE	C
	PANPLOT	C	ONEYSN	C	SNOLT	1C												
18IC	YURCUT	2																
18I	YURCUT	20U	PANPLOT	11	SNOLT	4												
18E	YURCUT	10U	PANPLOT	2	SNOLT	4												
18J	YURCUT	7	PANPLOT	2														
18N	YURCUT	3																
18O	YURIPEN	C																
18E	SLEEP	5																
18J	YURIPEN	C	LCUP	2C	FILMCC	1C	OFFWEGU	20C	MESHMAN	32C	PANTGEN	C	YURRY	C	PHASE0	10C	YURCUT	12C
	PANPLOT	C	PHASE0	10C	PHASE2	10C	PHASE3	20C	REZONE	20C	PANTGEN	10C	MCNT	2C	REPEEN	10C	FLUSH	C
	PHASE0	C	SLDSCH	C	WALK	3C	WHEE	4C	ESTEP	6C	LISTING	3C	ONEYSN	9C	CYLSN	6C	SLEEP	12C
	IN	4																
18AR	YURIPEN	C	LCUP	C	FILMCC	C	OFFWEGU	7C	MESHMAN	C	PANTGEN	C	YURRY	C	PHASE0	1C	YURCUT	1C
	PANPLOT	C	PHASE0	C	PHASE2	C	PHASE1	C	REZONE	2C	PANTGEN	C	MCNT	C	REPEEN	C	FLUSH	C
	PHASE0	C	SLDSCH	C	WALK	C	ESTEP	C	LISTING	C	ONEYSN	C	CYLSN	1C	SLEEP	6C	SNESSTEP	1C
	SNOLT	C																
18ME SH	REZONE	3																
18UJ	MESHMAN	3																
18UU	MESHMAN	4																
18EN	YURIPEN	C	OFFWEGU	1C	MCNT	C	DEEFER	MC	FLUSH	C	WALK	C	ESTEP	C	LISTING	C		
18U	MESHMAN	2																
18IC	YURIPEN	C	YURRY	C	PHASE0	4C	YURCUT	C	PANPLOT	C	PHASE1	C	PHASE2	C	PHASE3	1C	REZONE	C
	PANPLOT	C																
18IV	YURIPEN	C	YURRY	C	PHASE0	2C	YURCUT	C	PANPLOT	C	PHASE1	C	PHASE2	1C	PHASE3	C	REZONE	C
	PANPLOT	C																
18U	OFFWEGU	2	MESHMAN	5	PHASE0	2C	YURCUT	1	PHASE3	2	SLEEP	2						
18AD	OFFWEGU	5C	MESHMAN	5C	PANTGEN	L												
18I	SLEEP	6																
18EN	MCNT	4																
18M	YURIPEN	C	FILMCC	C	OFFWEGU	3C	MESHMAN	C	PANTGEN	C	YURRY	C	PHASE0	C	YURCUT	3C	PANPLOT	1C
	PHASE0	C	PHASE2	C	PHASE3	C	REZONE	C	PANTGEN	C								
	PANPLOT	C	WALK	11	MCNT	3C	WHEE	4										
18L	YURIPEN	C	LCUP	C	FILMCC	C	OFFWEGU	3C	MESHMAN	2C	PANTGEN	C	YURRY	C	PHASE0	4C	YURCUT	4C
	PANPLOT	C	PHASE0	2C	PHASE2	5C	PHASE3	7C	REZONE	2C	PANTGEN	1C	MCNT	1C	REPEEN	2C	FLUSH	C
	PHASE0	C	SLDSCH	C	LISTING	3C	WALK	1C	WHEE	1C	ESTEP	2C	LISTING	C	ONEYSN	3C	CYLSN	2C
	SLEEP	4	SNOLT	1C	SNOLT	3C												
18E	YURIPEN	1C	LCUP	C	FILMCC	1C	OFFWEGU	4C	MESHMAN	4C	PANTGEN	C	YURRY	C	PHASE0	C	YURCUT	3C
	PANPLOT	C	PHASE0	4C	PHASE2	4C	PHASE1	6C	REZONE	6C	PANTGEN	C	MCNT	C	REPEEN	1C	FLUSH	C
	PHASE0	C	SLDSCH	C	WALK	C	ESTEP	1C	LISTING	1C	ONEYSN	C	CYLSN	C	SLEEP	1C	SNESSTEP	C

Job	YURIFEM	C	FILMCL	C	OFFWEGU	3C	MESHMKR	C	PARTGEN	C	YORKY	C	PHASE1	C	YORKUT	C	PANPLOT	C
WHITE	PHASE1	6	PHASE2	C	PHASE3	1C	REZONE	C	PANMOV	C								
JSL	YURCUT	16	PANPLOT	7														
JSL	YURCUT	7																
JSL	YURCUT	2																
JSL	YURIFEM	C	FILMCL	C	OFFWEGU	3C	MESHMKR	C	PHASE1	1C	REZONE	C	PHASE1	C	YORKUT	C	PANPLOT	C
JSL	YURIFEM	1C	FILMCL	C	OFFWEGU	1C	MESHMKR	C	PHASE1	C	PHASE3	1C	REZONE	1C				
JSL	YURIFEM	C	FILMCL	C	OFFWEGU	3C	MESHMKR	C	PHASE1	C	REZONE	C						
JT	SALEP	10	IP	10														
JTU	PHASE	4																
JTM	PHASE	4																
JTMS	REZONE	2																
JTOP	REZONE	3																
JUNF	OFFWEGU	6																
JUNF	OFFWEGU	1C	MESHMKR	3C	PARTGEN	C												
JUL	SNOUT	3																
JYB	SNOUT	3																
K	OFFWEGU	6	YURCUT	17	HEEFER	2	ESTEP	3	IN	4	OUT	6	SNGEN	18				
KA	OUT	2																
KEEP	PHASE	3																
KA	YURCUT	15																
KRU	PANMOV	4																
KR	OFFWEGU	5	PANMOV	4	PANPLOT	6	PANMOV	12										
KR	YURCUT	3																
KR	YURCUT	6																
KSTEP	OFFWEGU	1																
KSUM	SUMSCH	2																
KTIL	YURIFEM	2																
KX1	YURIFEM	C	FILMCL	C	OFFWEGU	3C	MESHMKR	C	PARTGEN	C	YORKY	C	PHASE1	C	YORKUT	C	PANPLOT	C
K1	PHASE1	2C	PHASE2	2C	PHASE3	C	REZONE	C	PANMOV	C								
K2	YURCUT	6																
K3	YURCUT	6																
K4	YURCUT	6																
L	YURCUT	6	IN	1	OUT	2	SNGEN	15										
LA	SNGEN	4																
LAM	YURIFEM	C	FILMCL	C	OFFWEGU	4C	MESHMKR	C	PARTGEN	C	YORKY	C	PHASE1	C	YORKUT	C	PANPLOT	C
	PHASE1	1C	PHASE2	1C	PHASE3	C	REZONE	C	PANMOV	C	YORKY	C	PHASE1	C	YORKUT	C	PANPLOT	C
LAND	ESTEP	U	LISTING	D	GREYSN	U	SNOUT	D	YORKY	D	PHASE1	U	YORKUT	D	PANPLOT	D	PHASE1	4D
	FILMCL	U	OFFWEGU	D	MESHMKR	U	PANMOV	D	YORKY	D	PHASE1	U	YORKUT	D	PANPLOT	D	PHASE1	4D
	PHASE1	4U	PHASE2	D	REZONE	U	PANMOV	D	YORKY	D								

P	FILMCO	U	OFFWEGO	5D	MESHMKH	U	PARTGEN	D	YOKKY	D	PHASE0	U	YOKOUT	D	PANPLOT	D	PHASE1	U
	PHASE1	U	PHASE3	D	HEZCNE	U	PARTMOV	D	MCHT	D	REEFER	U	FLUSH	D	WALK	D	ESTEP	D
	LISTING	U	G-LYSN	D	IN	19	OUT	17	SNGEN	11	SNESTEP	U	SNOUT	D				
MASK	MESHMKH	U																
MAT	MESHMKH	U																
MATIL	MESHMKH	U																
L MAUVE	REEFER	1	CENTROY	1	WALK	1	HOWFAH	1	WHERE	1								
S MAAN	OFFWEGO	2	SLOSCN	1	SNEEP	1												
S MCHT	PLNT	1																
S MESHMKH	OFFWEGO	1	MESHMKH	1														
M1	REEFER	1C	WALK	C														
S MING	OFFWEGO	1	SLOSCN	3														
MJ	REEFER	1C	WALK	C														
MM	CYLSN	7	SNEEP	3	SNGEN	2												
S MOVE	OFFWEGO	1	G-LYSN	1														
MP	FILMCO	U	OFFWEGO	D	MESHMKH	U	PARTGEN	D	YOKKY	D	PHASE0	U	YOKOUT	D	PANPLOT	D	PHASE1	U
	PHASE1	U	PHASE3	D	HEZCNE	U	PARTMOV	D	MCHT	D	REEFER	U	FLUSH	D	WALK	D	ESTEP	D
	LISTING	U	G-LYSN	D	SNESTEP	U	SNOUT	D										
MU	REEFER	1C	WALK	C														
MU1	REEFER	1C	WALK	C														
MU	TUNIFEM	C	FILMCO	CD	OFFWEGO	5CD	MESHMKH	CD	PARTGEN	CD	YOKKY	CD	PHASE0	CD	YOKOUT	CD	PANPLOT	CD
	PHASE1	1CD	PHASE3	1CD	HEZCNE	CD	REZCNE	CD	PARTMOV	CD	MCHT	CD	REEFER	D	FLUSH	D	WALK	D
	ESTEP	U	LISTING	U	G-LYSN	U	SNESTEP	D	SNOUT	D								
MUOZ	FILMCO	U	OFFWEGO	D	MESHMKH	U	PARTGEN	D	YOKKY	D	PHASE0	U	YOKOUT	D	PANPLOT	D	PHASE1	5D
	PHASE1	3D	PHASE3	D	HEZCNE	U	PARTMOV	D	MCHT	D	REEFER	U	FLUSH	D	WALK	D	ESTEP	D
	LISTING	U	G-LYSN	D	SNESTEP	D	SNOUT	U										
MUSTIT	PHASE1	4																
M1	SNEEP	5																
MP	SNEEP	2																
N	YOKOUT	0	SNGEN	5														
S NAUD	PHASE1	1																
NAME	TUNIFEM	2C	LCUP	C	FILMCO	C	OFFWEGO	7C	MESHMKH	C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	3C
	PANPLOT	1C	PHASE1	C	PHASE2	C	PHASE3	C	HEZONE	C	PARTMOV	C	MCHT	C	REEFER	C	FLUSH	C
	PHASE1	C	SLOSCN	C	WALK	C	ESTEP	C	LISTING	C	G-LYSN	C	CYLSN	C	SNEEP	C	SNESTEP	C
	SNOUT	C																
NAME	TUNIFEM	C	FILMCO	C	OFFWEGO	C	MESHMKH	C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	C	PANPLOT	C
	PHASE1	C	PHASE3	C	HEZCNE	C	PARTMOV	C										
NAME	MESHMKH	4																
NAME	REEFER	10																
NAME	TUNIFEM	C	OFFWEGO	3C	MCHT	C	REEFER	5C	FLUSH	C	WALK	C	ESTEP	C	LISTING	C		
NAME	TUNIFEM	C	OFFWEGO	3C	MCHT	C	REEFER	C	FLUSH	C	WALK	5C	ESTEP	1C	LISTING	C		
NAME	MESHMKH	3																
NAME	REEFER	10																
NAME	PLNT	C	REEFER	9C	FLUSH	C	WALK	2C	ESTEP	C	LISTING	C						
NAME	REEFER	7																
NAME	TUNIFEM	C	LCUP	C	FILMCO	C	OFFWEGO	1C	MESHMKH	C	PARTGEN	C	YOKKY	C	PHASE0	2C	YOKOUT	6C
NAME	PANPLOT	1C	PHASE1	4C	PHASE2	C	PHASE3	C	HEZONE	C	PARTMOV	C	MCHT	4C	REEFER	C	FLUSH	C
NAME	PHASE1	C	SLOSCN	C	WALK	C	ESTEP	C	LISTING	C	G-LYSN	2C	CYLSN	C	SNEEP	C	SNESTEP	C
NAME	SNOUT	C																
NAME	OFFWEGO	3																
NAME	PLNT	C	REEFER	9C	FLUSH	C	WALK	2C	ESTEP	C	LISTING	C						
NAME	TUNIFEM	14C	LCUP	C	FILMCO	C	OFFWEGO	C	MESHMKH	C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	C
NAME	PANPLOT	C	PHASE1	C	PHASE2	C	PHASE3	C	HEZONE	C	PARTMOV	C	MCHT	C	REEFER	C	FLUSH	C
NAME	PHASE1	C	SLOSCN	C	WALK	C	ESTEP	C	LISTING	C	G-LYSN	C	CYLSN	C	SNEEP	C	SNESTEP	C
NAME	SNOUT	C																
NAME	LISTING	11	OFFWEGO	2	PARTGEN	1	PANPLOT	1	PARTMOV	4	REEFER	5	CENTROY	3	WHERE	0	SNEEP	4
NAME	TUNIFEM	C	OFFWEGO	2														
NAME	TUNIFEM	11	PANPLOT	5														
NAME	PLNT	C	REEFER	3C	FLUSH	2C	WALK	C	ESTEP	C	LISTING	C						
NAME	TUNIFEM	C	LCUP	C	FILMCO	C	OFFWEGO	5C	MESHMKH	C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	C
NAME	PANPLOT	C	PHASE1	C	PHASE2	C	PHASE3	C	HEZONE	C	PARTMOV	C	MCHT	C	REEFER	C	FLUSH	C
NAME	PHASE1	1C	SLOSCN	3C	WALK	C	ESTEP	C	LISTING	C	G-LYSN	C	CYLSN	C	SNEEP	C	SNESTEP	C
NAME	SNOUT	C																
NAME	REEFER	11																
NAME	MESHMKH	5																
NAME	MESHMKH	2																
NAME	PLNT	C	REEFER	9C	FLUSH	C	WALK	2C	ESTEP	C	LISTING	C						
NAME	CYLSN	2	SNEEP	5D	IN	2D	OUT	2D										

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S	VLUGU	OFFWEGO	2	MESHMKR	6	PHASE0	2	YOKOUT	4	PHASE3	2	MCRT	2	SUBSCH	1	WALK	2	ESTEP	2
	QNN	GHEYSN	2	MESHMKR	2														
	QMA	YOKOUT	11																
S	USWRT	YOKOUT	21																
		MESHMKR	1	PHASE1	2	YOKOUT	6	PHASE1	2	PHASE2	1	PHASE3	2	KEEFER	1	POMEGA	3	CROSS	1
	UX	WALK	3	ESTEP	2	SNSTEP	2												
	UY	PHASE2	3																
	R	PHASE2	2																
		FILMCO	0	OFFWEGO	0	MESHMKR	10	PARTGEN	0	YOKKY	0	PHASE0	0	YOKOUT	0	PANPLOT	0	PHASE1	40
		PHASE2	60	PHASE3	50	KEZONE	10	PARTMOV	0	MCRT	0	KEEFER	0	FLUSH	0	WALK	0	MUMFAR	2
		ESTEP	0	LISTING	0	GHEYSN	0	IN	60	OUT	60	SNSTEP	0	SNOUT	0				
	MA	PHASE2	0																
	MAUX	OFFWEGO	0	MESHMKR	10	PARTGEN	0												
S	HANDGM	KEEFER	6	POMEGA	2	PFREQ	5	WALK	3										
	MAH	PHASE2	3																
	MA1	KEZONE	5																
	MA2	KEZONE	5																
	MA3	KEZONE	5																
	MA4	KEZONE	5																
	HCSU	FILMCO	0	OFFWEGO	0	MESHMKR	0	PARTGEN	0	YOKKY	0	PHASE0	0	YOKOUT	0	PANPLOT	0	PHASE1	10
		PHASE2	20	PHASE3	0	KEZONE	0	PARTMOV	0	MCRT	0	KEEFER	0	FLUSH	0	WALK	0	ESTEP	0
		LISTING	0	GHEYSN	0	SNSTEP	0	SNOUT	0										
S	KLBUF	YOKIFEM	2	KEEFER	2	ESTEP	1	GHEYSN	1										
	MDT	YOKIFEM	0	YOKKY	0	PHASE0	0	YOKOUT	0	PARPLOT	0	PHASE1	20	PHASE2	20	PHASE3	0	KEZONE	50
		PARTMOV	0	ESTEP	4														
	HE	ESTEP	5																
F	READ	OFFWEGO	26	MESHMKR	3	PARTGEN	1												
F	REAL	FILMCO	1	OFFWEGO	1	MESHMKR	1	PARTGEN	1	YOKKY	1	PHASE0	1	YOKOUT	1	PANPLOT	1	PHASE1	1
		PHASE2	1	PHASE3	1	KEZONE	1	PARTMOV	1	MCRT	1	KEEFER	1	FLUSH	1	WALK	1	ESTEP	1
		LISTING	1	GHEYSN	1	SNSTEP	1	SNOUT	1										
L	RED	YOKIFEM	1	LCUP	1	FILMCO	1	OFFWEGO	1	MESHMKR	1	PARTGEN	1	YOKKY	1	PHASE0	1	YOKOUT	1
		PANPLOT	1	PHASE1	1	FILMCO	1	PHASE3	1	KEZONE	1	PARTMOV	1	MCRT	1	KEEFER	1	FLUSH	1
		PFREQ	1	SUBSCH	1	WALK	1	ESTEP	1	LISTING	1	GHEYSN	1	CYLSN	1	SWEEP	1	SNSTEP	1
		SNOUT	1																
S	REEFER	REEFER	1																
S	REMARK	YOKIFEM	4	YOKKY	5	MCRT	3	REEFER	3	GHEYSN	2	PARTGEN	1	YOKKY	1	PHASE0	1	YOKOUT	1
F	RETURN	YOKIFEM	1	LCUP	6	FILMCO	1												

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TLOW	PHASEJ	5	ESTEP	5	SNESTEP	5												
TMAX	PHASEJ	5	ESTEP	5	SNESTEP	5												
TMUT	PHASEJ	3																
TMIN	MCRT	3																
*TNEUT	YOKIFEM	1	FILMCO	C	OFFWEGO	C	MESHMKR	C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	C	PANPLOT	C
	PHASE1	C	PHASE2	C	PHASE3	C	REZONE	C	PARTMOV	C								
TOUT	YOKIFEM	10	LOOP	C	FILMCO	C	OFFWEGO	10	MESHMKR	C	PARTGEN	C	YOKKY	10	PHASE0	C	YOKOUT	50
	PANPLOT	C	PHASE1	C	PHASE2	C	REZONE	C	PANIMOV	C	MCRT	10	PHASE0	C	KEEPER	C	FLUSH	C
	PHASE0	C	SCHSCH	C	WALK	C	ESTEP	C	LISTING	C	GREYSN	10	CYLSN	C	SNESTEP	C		
	SNOUT	C																
TP	MCRT	5	KEEPER	4	PFREQ	2	WALK	6	NGEN	4								
TP4	MCRT	3																
ISTART	YOKIFEM	C	LOOP	C	FILMCO	C	OFFWEGO	30	MESHMKR	C	PARTGEN	C	YOKKY	C	PHASE0	C	YOKOUT	20
	PANPLOT	C	PHASE1	C	PHASE2	C	PHASE3	C	REZONE	C	PANIMOV	C	MCRT	C	KEEPER	C	FLUSH	C
	PHASE0	C	SCHSCH	C	WALK	C	ESTEP	C	LISTING	C	GREYSN	C	CYLSN	C	SNESTEP	C		
	SNOUT	C																
TTL	YOKIFEM	3																
TWELTH	PHASEJ	5																
T1	YOKIFEM	3	MCRT	C	KEEPER	30	FLUSH	C	WALK	70	ESTEP	C	LISTING	C				
T2	YOKIFEM	6	OFFWEGO	2	MCRT	50	KEEPER	C	FLUSH	C	WALK	20	ESTEP	20	LISTING	C	GREYSN	5
U	FILMCO	0	OFFWEGO	40	MESHMKR	90	PARTGEN	0	YOKKY	0	PHASE0	120	YOKOUT	160	PANPLOT	0	PHASE1	300
	PHASE2	50	REZONE	10	MCRT	40	PANIMOV	40	MCRT	40	KEEPER	0	FLUSH	0	WALK	0	ESTEP	0
	LISTING	0	GREYSN	0	SNESTEP	50	IN	40	OUT	40	NGEN	400	SNESTEP	0	SNOUT	0		
UAV	PHASEJ	2																
UD1	PHASEJ	2																
UD2	PHASEJ	2																
UD3	PHASEJ	2																
UD4	PHASEJ	2	PHASE3	2														
UD	FILMCO	0	OFFWEGO	0	MESHMKR	0	PARTGEN	0	YOKKY	0	PHASE0	0	YOKOUT	0	PANPLOT	0	PHASE1	0
	PHASE2	0	PHASE3	10	REZONE	120	PANIMOV	0	MCRT	0	KEEPER	0	FLUSH	0	WALK	0	ESTEP	0
	LISTING	0	GREYSN	0	SNESTEP	0	SNOUT	0										
UG1	PHASEJ	2																
UG2	PHASEJ	2																
UG3	PHASEJ	2																
UG4	PHASEJ	2																
U1	MESHMKR	11																
U2	PANIMOV	3																
UL	FILMCO	0	OFFWEGO	0	MESHMKR	0	PARTGEN	0	YOKKY	0	PHASE0	0	YOKOUT	0	PANPLOT	0	PHASE1	0
	PHASE2	100	PHASE3	10	REZONE	20	PANIMOV	0	MCRT	0	KEEPER	0	FLUSH	0	WALK	0	ESTEP	0
	LISTING	0	GREYSN	0	SNESTEP	0	SNOUT	0										
UL1	PHASEJ	7																
UL13	PHASEJ	2																
UL2	PHASEJ	7																
UL24	PHASEJ	7																
UL3	PHASEJ	7																
UL4	PHASEJ	7																
UMAX	SNOUT	5																
UMOM	PHASEJ	5	SNESTEP	20	IN	30	OUT	30										
UMOML	FILMCO	0	OFFWEGO	0	MESHMKR	0	PARTGEN	0	YOKKY	0	PHASE0	0	YOKOUT	0	PANPLOT	0	PHASE1	0
	PHASE2	0	PHASE3	0	REZONE	0	PANIMOV	0	MCRT	0	KEEPER	0	FLUSH	0	WALK	0	ESTEP	0
	LISTING	0	GREYSN	0	SNESTEP	0	SNOUT	30										
UNITY	PANIMOV	2																
UNPAF	KEEPER	1	ESTEP	1														
UOM	PHASEJ	4	PHASE2	7														
UP	FILMCO	0	OFFWEGO	0	MESHMKR	0	PARTGEN	0	YOKKY	0	PHASE0	0	YOKOUT	0	PANPLOT	0	PHASE1	0
	PHASE2	0	PHASE3	140	REZONE	0	PANIMOV	0	MCRT	0	KEEPER	0	FLUSH	0	WALK	0	ESTEP	0
	LISTING	0	GREYSN	0	SNESTEP	0	SNOUT	0										
UN10T	MCRT	5	SNESTEP	5														
UN1	PHASEJ	2	ESTEP	2	SNESTEP	2												
UT	REZONE	5																
UT1L	FILMCO	0	OFFWEGO	0	MESHMKR	0	PARTGEN	0	YOKKY	0	PHASE0	0	YOKOUT	0	PANPLOT	0	PHASE1	130
	PHASE2	10	PHASE3	0	REZONE	0	PANIMOV	0	MCRT	0	KEEPER	0	FLUSH	0	WALK	0	ESTEP	0
	LISTING	0	GREYSN	0	SNESTEP	0	SNOUT	0										
U1	YOKOUT	0	PHASE1	1	PHASE2	4	PANIMOV	3										
U1L	PHASEJ	3																
U12	PHASEJ	2	PHASE3	2														
U13M	PHASEJ	3																
U2	YOKOUT	0	PHASE1	4	PHASE2	4	PANIMOV	2										
U2L	PHASEJ	3																

[illegible]

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● 2019 年 10 月 1 日起，企业发生的符合条件的职工教育经费支出，不超过工资薪金总额 8% 的部分，准予扣除；超过部分，准予在以后纳税年度结转扣除。

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