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IMTB:CJW

MEMORANDUM FOR: George H. Bidinger
Regulatory and International
Safeguards Branch, NMSS

FROM: Carl J. Withee
Transportation Branch, NMSS

SUBJECT: CRITICALITY CALCULATIONS FOR THE LES APPLICATION

Enclosed is a report on the calculations preformed in support of the review of the Louisiana Enrichment Services application. The report gives a brief descriptions of the calculations performed for the cases you specified along with the calculational results. Most of the results are in tabular form. Also enclosed are parts of the computer generated output. The output sheets contain a copy of the input data file and the page reporting the calculated result. Mixing tables for representative cases are also included as well as the convergence plots for the KENO calculations. If you have any questions or comments please contact me.

Carl Withee

Carl J. Withee
Transportation Branch, NMSS

Enclosures: As stated

cc: R. Chappell
C. MacDonald

G3880 40069 RA

CRITICALITY CALCULATIONS FOR LOUISIANA ENRICHMENT SERVICES APPLICATION

Criticality analyses were performed to support the review of the fixed site application from Louisiana Enrichment Services. The analyses consist of determining optimum parameters and calculating values of k_{eff} for various cases defined by George Bidinger. The report treats the two major areas of UO_2F_2 solutions in process and UF_6 product. Calculations using the SCALE computational system were performed with the 27-group neutron cross section set developed by ORNL. The uranium isotopic composition was modeled as a mix of ^{235}U and ^{238}U with an enrichment of 5.02% by weight.

UO_2F_2 Solutions

In the analysis of UO_2F_2 solutions, a PC version of the XSDRNPM code in the SCALE system was used. XSDRNPM is a 1-D code which can handle spheres, cylinders, and slabs. Use of this code for the investigation of optimum parameters gave smoothly varying deterministic values for k_{eff} without statistical variation.

The uranium concentration in a UO_2F_2 solution which optimizes k_{eff} was determined for a sphere with a fixed volume of 36.1 liters, an infinitely long cylinder of diameter 28.5 cm, and an infinite slab of thickness 14.2 cm. Full density water reflection was included (35 cm thick for the sphere and cylinder, and 40 cm thick for the slab). Values of k_{eff} as calculated for a range of uranium concentrations are given in Table 1 and graphed in Figure 1.

The effect of different neutron cross section sets was also investigated. Duplicate runs with PC SCALE were made at 1600 g U/L using the 123-group and 16-group Hansen-Roach cross section sets. The resulting values of k_{eff} are presented in Table 2.

From the data in Table 1, the concentration of 1600 g U/L was selected as the value which came closest to the maximum of k_{eff} for all three geometries. A search calculation was performed to determine the dimensions which give $k_{eff} = 1$ at a concentration of 1600 g U/L with water reflection as reported above. The calculated dimensions for a just critical configuration are a volume of 32.7 liters (radius=19.83 cm) for a sphere, a diameter of 27.226 cm for an infinitely long cylinder, and a thickness of 13.196 cm for an infinite slab.

Values of k_{eff} were calculated for geometry control limits provided to the analyst. A concentration of 1600 g U/L with full water reflection was also used for these calculations. For a sphere of 26.9 liters, $k_{eff} = 0.966931$; for an infinitely long cylinder of diameter 25.4 cm, $k_{eff} = 0.967981$; and for an infinite slab of thickness 12.0 cm, $k_{eff} = 0.967259$.

ENCLOSURE 1

Next, a series of calculations was made to determine the volume of a water reflected sphere which optimizes k_{eff} when the sphere contains 38.0 kgs of uranium in a UO_2F_2 solution. The calculated values of k_{eff} are given in Table 3 and graphed in Figure 2.

From this data, the optimum sphere size is found to be 43 liters. This size sphere has a concentration of 883.72 g U/L. Using this concentration, k_{eff} was calculated for two mass limits when the solution is in a water reflected sphere. The results are k_{eff} = 0.95450 for a sphere with a total mass of 28.3 kgs uranium and k_{eff} = 0.86708 for a sphere with a total mass of 17.0 kgs uranium.

UF_6 Product Material

Because of the more complex geometrical configurations to be treated in the analysis of the UF_6 product material, a PC version of the KENO V.a computer code in the SCALE system was used to determine values of k_{eff}.

To establish an upper limit on the reactivity of the UF_6 product, calculations were made for an infinite mass with varying degrees of hydrogenous moderator present. Results are presented in Table 4 for full density UF_6 at 4.85 g/cm^3 with hydrogen atoms added.

The infinite mass calculations bound the calculations for arrays of cylinders containing UF_6 product. The UF_6 cylinders are type 30B and were modeled as right circular cylinders with a 30-inch OD and 76-inch outside length. A 0.5-inch thick cylindrical shell of carbon steel was included. The cylinders in the arrays have a 12-inch spacing between their outside surfaces and each cylinder was assumed to be completely full.

The first configuration of cylinders was an infinite cubic array where the UF_6 has three different levels of hydrogen contamination and varying densities of water are interspersed between the cylinders. These results are provided in Table 5.

The final case is an infinite planar array of UF_6 cylinders lying horizontally on a concrete pad 18 inches thick. The cylinders are positioned 6 inches above the concrete and the water mist extends 10 meters above the array. The k_{eff} values for the planar array are given in Table 6.

Benchmarks

The PC version of XSDRNPM was benchmarked against critical values reported in "Critical Dimensions of Systems Containing ^{235}U, ^{239}PU, and ^{233}U," LA-10860-MS, 1986 Revision, Los Alamos National Laboratory, Table 9 (page 33). The parameters came from the first two entries under the data for $U(4.89)O_2F_2$ Solution, Aluminum Container, Water Reflected. The enrichment in the critical experiments was 4.89% which is very close to the 5.02% limit in the application. The calculated values of k_{eff} are given in Table 7. An investigation of the effect of smaller mesh intervals around the fuel-reflector interface in the slab geometry did not show an appreciable difference in the values calculated for k_{eff}.

The Los Alamos report gives composition information on the UO_2F_2 solution in terms of an $H/^{235}U$ atomic ratio and a density of ^{235}U in grams/cm^3. The ^{235}U density was divided by the fractional enrichment (i.e., 0.0489) to convert to a density of total uranium for input to the SCALE processor for UO_2F_2 solutions. The atomic number densities in the Mixing Table output from the SCALE code were checked to determine how well the $H/^{235}U$ ratios were preserved. A comparison showed that Los Alamos reported a $H/^{235}U$ ratio of 524 versus 526.5 for SCALE in the first critical configuration and 643 versus 645.7 for SCALE in the second critical configuration reported.

As a second check of the PC version of XSDRNPM, duplicate calculations of the concentration optimization calculations were performed on the ORNL mainframe computer. These duplicate calculations were performed at a concentration of 1600 g U/L and the results are reported in Table 8. The ORNL values are very close to the PC generated values.

The XSDRNPM code was also benchmarked against the critical experiment reported in "Neutron Physics Division Annual Progress Report for Period Ending May 31, 1966," ORNL-3973 Vol. 1, dated September 1966, page 14. The critical experiment was a 19.99-inch ID sphere of UO_2F_2 solution with 910.18 g of U per liter and 4.98% enrichment. The calculated k_{eff} was 1.00027.

The PC version of KENO was also benchmarked against critical experiments reported in "Critical Mass Studies, Part X Uranium of Intermediate Enrichment," by D.F. Cronin, ORNL-2968, dated September 20, 1960. The experiments as reported in Table B-3 on page 46 of the report are cylinders of UO_2F_2 solution. The calculated values of k_{eff} for selected are cases are given in Table 9.

TABLE 1
Variation of K_{eff} Values

CONCENTRATION (GRAMS U/L)	SPHERE	CYLINDER	SLAB
1000	0.99051	0.99131	0.98834
1200	1.00797	1.00989	1.00961
1400	1.01570	1.01871	1.02098
1500	1.01690	1.02043	1.02394
1600	1.01672	1.02076	1.02548
1700	1.01533	1.01988	1.02581
1800	1.01288	1.01794	1.02506
2000	1.00540	1.01142	1.02093
2200	0.99503	1.00209	1.01397

TABLE 2
Calculated K_{eff} Values for Different Neutron Cross Section Sets

NEUTRON CROSS SECTION SET	SPHERE	CYLINDER	SLAB
123 GROUP	1.02180	1.02376	1.02389
27 GROUP	1.01672	1.02076	1.02548
HANSEN-ROACH	1.00130	1.00746	1.01693

Table 3
Variation of K_{eff} with Sphere Size and Constant Total Mass of U

VOLUME (L)	K_{eff}
36	0.99615
40	1.00039
42	1.00120
43	1.00132
44	1.00130
46	1.00077
48	0.99966
50	0.99812
52	0.99621
54	0.99385
56	0.99124

TABLE 4
Infinite Mass of UF_6

H/U	K_{eff}
0	0.70857 ± 0.00156
0.3	0.84412 ± 0.00240
1.0	1.04523 ± 0.00295

TABLE 5
Infinite Cubic Array of UF_6 Cylinders (K_{eff})

H/U	DENSITY OF INTERSPERSED WATER			
	0	0.05	0.1	1.0
0	0.68912±0.00169	0.76521±0.00302	0.68109±0.00265	0.52353±0.00254
0.3	0.81438±0.00222	0.82539±0.00296	0.74378±0.00265	0.63170±0.00269
1.0	1.00380±0.00313	0.96483±0.00305	0.90778±0.00334	0.82969±0.00338

TABLE 6
Infinite Planar Array of UF_6 Cylinders (K_{eff})

H/U	DENSITY OF INTERSPERSED WATER			
	0	0.05	0.1	1.0
0	0.47939±0.00182	0.56384±0.00258	0.55289±0.00245	0.52182±0.00241
0.3	0.61132±0.00275	0.66415±0.00292	0.65750±0.00288	0.62957±0.00312
1.0	0.83554±0.00384	0.85437±0.00336	0.85389±0.00321	0.83360±0.00392

TABLE 7
XSDRNPM Benchmark Values of K_{eff} for Critical Configurations

$H/^{235}U$	G $^{235}U/CM^3$	SPHERE	CYLINDER	SLAB
524	0.0425	0.99851	1.01075	1.03734
643	0.0356	0.99024	1.00181	1.02586

TABLE 8
K_{eff} Values for XSDRNPM Calculations on the ORNL Computer

CONCENTRATION (GRAMS U/L)	SPHERE	CYLINDER	SLAB
1600	1.01666	1.02071	1.02544

TABLE 9
KENO Benchmark Values of K_{eff} for Critical Experiments

Reported H/^{235}U	SCALE's H/^{235}U	G ^{235}U per CM^3	CYLINDER DESCRIPTION	HEIGHT CM	K_{eff}
524	526.0	0.04254	15"-dia.,Al shell	44.78	0.99820±0.00392
643	645.3	0.03562	30"-dia.,Al shell*	26.49	0.99970±0.00385
735	733.7	0.03179	20"-dia.,SS shell	40.09	1.00324±0.00389
991	988.1	0.02428	30"-dia.,Al shell*	40.49	1.00522±0.00316
994	990.7	0.02422	20"-dia.,SS shell	85.72	0.99845±0.00330

* Top surface of cylinder is not reflected.


SPHERE
36.1 L
CYLINDER
Dia. = 28.5 cm
Length = Infinite
SLAB
Thickness = 14.2 cm
Length/Width = Infinite
K-EFFECTIVE
URANIUM CONCENTRATION
(grams-U/liter)

FIGURE 1

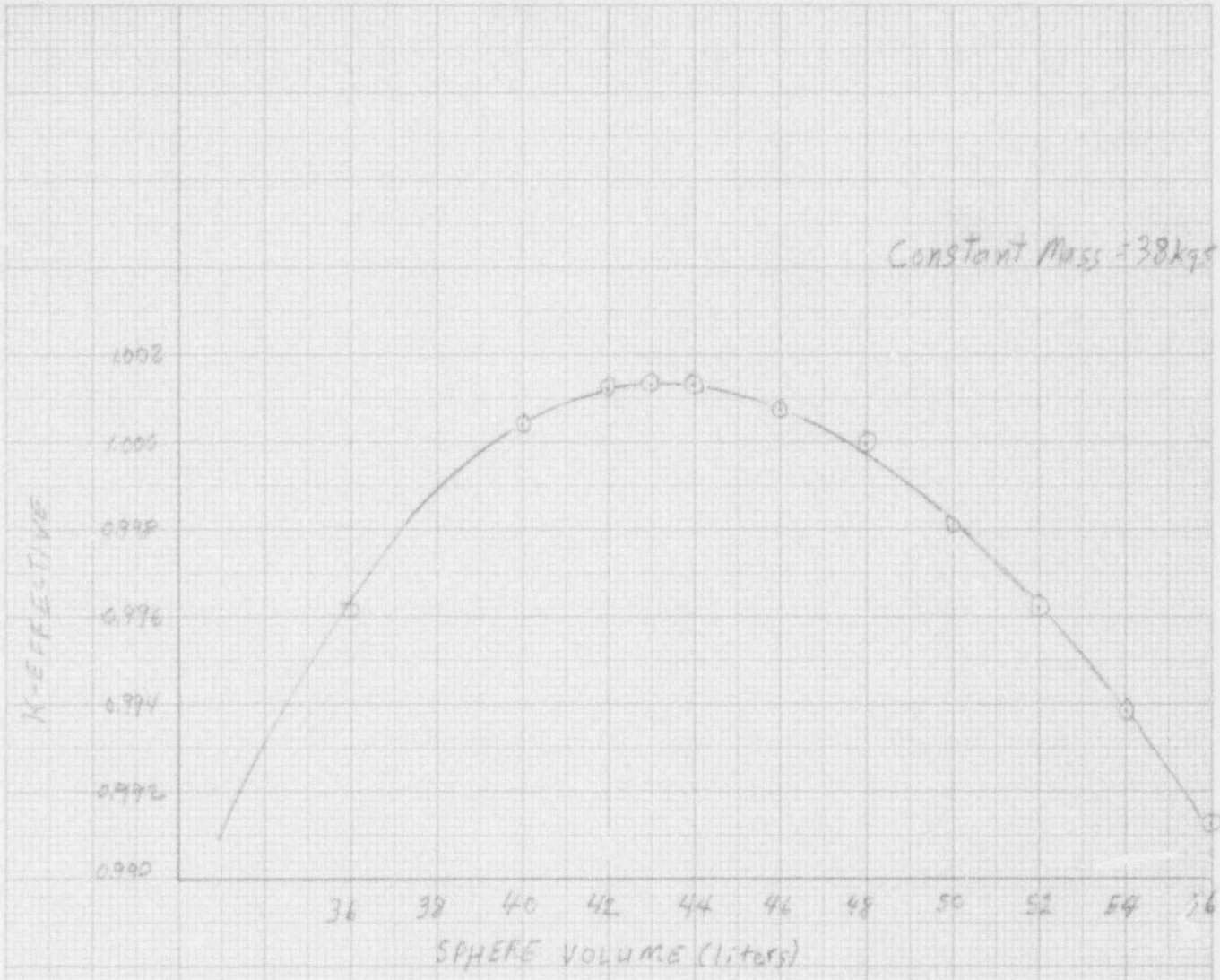

Constant Mass = 38kgs U
K-EFFECTIVE
1.002
1.000
0.998
0.996
0.994
0.992
0.990
36
38
40
42
44
46
48
50
52
54
56
SPHERE VOLUME (Liters)

FIGURE 2

TABLE # 7
XSDRNPM Benchmark Values of K_{eff} for Critical Configurations

$H/^{235}U$	G 235U/CM^3	SPHERE	CYLINDER	SLAB
524	0.0425	0.99851	1.01075	1.03734
643	0.0356	0.99024	1.00181	1.02586

TABLE # 1
Variation of K_{eff} Values

UOX5POP7.CJW UOXCYOP7.CJW UOX5LOP7.CJW

CONCENTRATION (GRAMS U/L)	SPHERE	CYLINDER	SLAB
1000	0.99051 1	0.99131 1	0.98834 1
1200	1.00797 2	1.00989 2	1.00961 2
1400	1.01570 3	1.01871 3	1.02098 3
1500	1.01690 8	1.02043 4	1.02394 4
1600	1.01672 4	1.02076 5	1.02548 5
1700	1.01533 9	1.01988 6	1.02581 6
1800	1.01288 5	1.01794 7	1.02506 7
2000	1.00540 6	1.01142 8	1.02093 8
2200	0.99503 7	1.00209 9	1.01397 9

Mixing Tables

TABLE 3
K_{eff} Values for XSDRNPM Calculations on the ORNL Computer

CONCENTRATION (GRAMS U/L)	SPHERE	CYLINDER	SLAB
1600	1.01666	1.02071	1.02544

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMUM CONCENTRATION SEARCH              UOXSPOP1.CJW
    27GROUPNDF4                  INFHOMMEDIUM
    SOLNUO2F2    1  1000.0 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    1$$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I20.5025 55.5025
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	7.77156E-16	9.90693E-01	7.23973E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0722
2	223	1.22275E-02	9.04930E-01	-3.55518E+00	-7.67694E-01	-5.81534E-02	0.00000E+00	0.4338
3	433	3.07687E-03	1.06331E+00	6.96965E-02	-2.60120E-01	-1.32736E-02	0.00000E+00	0.7788
4	632	1.66297E-03	1.04482E+00	5.58413E-02	-1.10007E-01	-6.77008E-03	0.00000E+00	1.1095
5	826	9.62765E-04	1.02571E+00	3.94626E-02	-6.68807E-02	-3.84029E-03	0.00000E+00	1.4345
6	1005	5.63574E-04	1.01232E+00	2.61690E-02	-4.12977E-02	-2.22992E-03	0.00000E+00	1.7393
7	1180	3.29841E-04	1.00368E+00	1.66198E-02	-2.51409E-02	-1.30350E-03	0.00000E+00	2.0387
8	1348	1.92632E-04	9.98321E-01	1.02546E-02	-1.50974E-02	-7.63586E-04	0.00000E+00	2.3287
9	1514	1.11827E-04	9.95084E-01	6.19288E-03	-8.96947E-03	-4.46021E-04	0.00000E+00	2.6162
10	1680	6.45880E-05	9.93154E-01	3.68538E-03	-5.27776E-03	-2.59769E-04	0.00000E+00	2.9047
11	1842	3.71652E-05	9.92010E-01	2.17381E-03	-3.08489E-03	-1.50994E-04	0.00000E+00	3.1875
12	2000	2.12405E-05	9.91339E-01	1.27225E-03	-1.79368E-03	-8.73533E-05	0.00000E+00	3.4648
13	2158	1.20168E-05	9.90950E-01	7.38164E-04	-1.03551E-03	-5.01539E-05	0.00000E+00	3.7423
14	2309	6.74592E-06	9.90725E-01	4.25897E-04	-5.93121E-04	-2.86468E-05	0.00000E+00	4.0103
15	2453	3.75028E-06	9.90595E-01	2.44485E-04	-3.37646E-04	-1.62613E-05	0.00000E+00	4.2693
16	2597	2.05093E-06	9.90520E-01	1.39250E-04	-1.90641E-04	-9.13043E-06	0.00000E+00	4.5293
17	2741	1.09823E-06	9.90478E-01	7.85954E-05	-1.06328E-04	-5.05883E-06	0.00000E+00	4.7887

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	3.25155E-05	9	1.00001E+00	7
2	1	23	3.60382E-05	6	1.00002E+00	10
3	1	23	3.75900E-05	6	1.00001E+00	11
4	1	23	3.64536E-05	4	1.00001E+00	15
5	1	23	3.20201E-05	3	1.00002E+00	20
6	1	23	2.56733E-05	3	1.00002E+00	20
7	1	1	2.15311E-05	2	1.00003E+00	29
8	1	1	1.99638E-05	2	1.00003E+00	46
9	1	1	2.06212E-05	1	1.00003E+00	5
10	1	1	2.10419E-05	1	1.00003E+00	8
11	1	1	2.11779E-05	1	1.00003E+00	58
12	1	1	2.59491E-05	1	1.00002E+00	58
13	1	1	2.72963E-05	1	1.00002E+00	58
14	1	1	2.70276E-05	1	1.00002E+00	58
15	2	58	4.31628E-07	45	1.00000E+00	58
16	2	58	1.16983E-06	58	1.00000E+00	58
17	2	58	1.34409E-06	58	1.00000E+00	58
18	2	58	1.30823E-06	58	1.00000E+00	58
19	2	58	1.55924E-06	58	1.00000E+00	58
20	2	58	1.24469E-06	44	9.99999E-01	58
21	2	58	1.74430E-06	58	1.00000E+00	58
22	2	58	1.58503E-06	58	9.99999E-01	58
23	1	49	1.82279E-05	49	1.00003E+00	58
24	1	49	5.12151E-05	49	1.00010E+00	58
25	1	49	7.42360E-05	49	1.00010E+00	58
26	1	50	8.13774E-05	49	1.00018E+00	58
27	2	58	1.57003E-06	58	9.99998E-01	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
18	2777	1.23590E-10	9.90513E-01	6.61183E-06	-4.61635E-05	-5.98618E-07	0.00000E+00	4.8625

final monitor lambda 9.90513E-01 production/absorption 9.93206E-01 angular flux on 16

elapsed time 4.86 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
       3q array has      7 entries.
       4q array has      7 entries.
       5q array has      7 entries.
       6q array has      2 entries.
       7q array has      2 entries.
       8q array has      2 entries.
       9q array has      2 entries.
      10q array has      7 entries.
      11q array has      2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     1.28619E-04          92235
   2        1     92238     2.40277E-03          92238
   3        1      8016     3.30051E-02           8016
   4        2      8016     3.33757E-02         208016
   5        1      9019     5.06278E-03           9019
   6        1      1001     5.58847E-02           1001
   7        2      1001     6.67514E-02         201001
geometry and material description
zone   mixture   outer dimension   temperature      extra xs   type (0/1--fuel/mod)
   1       1        1.00000E+00    2.93000E+02   0.00000E+00            0
   2       2        6.00000E+00    2.93000E+02   0.00000E+00            0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMUM CONCENTRATION SEARCH            UOXSPOP2.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  1200.0 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    1$$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I20.5025 55.5025
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.03794E+00	6.75780E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0717
2	224	1.14991E-02	9.60462E-01	-2.97702E+00	-7.12224E-01	-5.72462E-02	0.00000E+00	0.4350
3	435	3.57958E-03	1.07355E+00	7.41853E-02	-2.46875E-01	-1.56395E-02	0.00000E+00	0.7820
4	634	1.93236E-03	1.05562E+00	5.89497E-02	-1.22658E-01	-7.90128E-03	0.00000E+00	1.1123
5	829	1.08791E-03	1.03836E+00	4.09692E-02	-7.45847E-02	-4.33048E-03	0.00000E+00	1.4383
6	1008	6.17675E-04	1.02639E+00	2.65169E-02	-4.48945E-02	-2.43159E-03	0.00000E+00	1.7432
7	1181	3.50812E-04	1.01880E+00	1.63843E-02	-2.65401E-02	-1.37804E-03	0.00000E+00	2.0397
8	1349	1.98328E-04	1.01423E+00	9.80577E-03	-1.54593E-02	-7.81840E-04	0.00000E+00	2.3300
9	1515	1.11466E-04	1.01154E+00	5.74130E-03	-8.89511E-03	-4.42690E-04	0.00000E+00	2.6183
10	1681	6.22822E-05	1.00998E+00	3.31249E-03	-5.06979E-03	-2.49930E-04	0.00000E+00	2.9057
11	1842	3.46487E-05	1.00908E+00	1.89494E-03	-2.86994E-03	-1.40836E-04	0.00000E+00	3.1867
12	2000	1.90887E-05	1.00857E+00	1.07467E-03	-1.61507E-03	-7.88453E-05	0.00000E+00	3.4648
13	2157	1.03993E-05	1.00828E+00	6.04506E-04	-9.01222E-04	-4.38123E-05	0.00000E+00	3.7405
14	2301	5.60560E-06	1.00811E+00	3.38157E-04	-4.98790E-04	-2.41962E-05	0.00000E+00	4.0005
15	2445	2.96516E-06	1.00802E+00	1.87611E-04	-2.73636E-04	-1.32073E-05	0.00000E+00	4.2595
16	2589	1.53430E-06	1.00797E+00	1.03265E-04	-1.48199E-04	-7.12133E-06	0.00000E+00	4.5185
17	2733	7.73066E-07	1.00794E+00	5.64927E-05	-7.91937E-05	-3.79190E-06	0.00000E+00	4.7778

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	4.48923E-05	9	1.00001E+00	7
2	1	23	4.26333E-05	6	1.00002E+00	10
3	1	1	4.67628E-05	6	1.00002E+00	11
4	1	1	4.80345E-05	4	1.00002E+00	15
5	1	1	4.03032E-05	3	1.00002E+00	20
6	1	1	3.37705E-05	3	1.00003E+00	20
7	1	1	2.81555E-05	2	1.00003E+00	29
8	1	1	2.58802E-05	2	1.00004E+00	46
9	1	1	2.58666E-05	1	1.00004E+00	58
10	1	1	2.59078E-05	1	1.00003E+00	58
11	1	1	2.56745E-05	1	1.00003E+00	58
12	1	1	3.11512E-05	1	1.00003E+00	58
13	1	1	3.25172E-05	1	1.00003E+00	58
14	1	1	3.20010E-05	1	1.00003E+00	58
15	2	58	4.03558E-07	45	1.00000E+00	58
16	2	58	1.10728E-06	58	1.00000E+00	58
17	2	58	1.27237E-06	58	1.00000E+00	58
18	2	58	1.24004E-06	58	1.00000E+00	58
19	2	58	1.48152E-06	58	1.00000E+00	58
20	2	58	1.19809E-06	46	9.99999E-01	58
21	2	58	1.68405E-06	58	1.00000E+00	58
22	2	58	1.52920E-06	58	9.99999E-01	58
23	1	49	1.82093E-05	49	1.00003E+00	58
24	1	49	4.99113E-05	50	1.00010E+00	58
25	1	50	7.24016E-05	50	1.00010E+00	58
26	1	50	7.94274E-05	50	1.00017E+00	58
27	2	58	1.56805E-06	58	9.99998E-01	58

18	2769	1.29363E-10	1.00797E+00	4.93372E-05	-3.31795E-05	-3.80416E-07	0.00000E+00	4.8518

final monitor lambda 1.00797E+00 production/absorption 1.01073E+00 angular flux on 16

elapsed time 4.85 min.

logical assignments
master library 11
working library 0
scratch file 18
new library 1
p r o b l e m d e s c r i p t i o n
igr--geometry (0/1/2/3--inf mad/slab/cyl/sphere 1
izm--number of zones or material regions 2
ms--mixing table length 7
ibl--shielded cross section edit option (0/1--no/yes) 0
ibr--bondarenko factor edit option (0/1--no/yes) 0
issopt--dancoff factor option 0
convergence criterion 1.00000E-03
geometry correction factor for wigner rational approximation 1.000E+00
3q array has 7 entries.
4q array has 7 entries.
5q array has 7 entries.
6q array has 2 entries.
7q array has 2 entries.
8q array has 2 entries.
9q array has 2 entries.
10q array has 7 entries.
11q array has 2 entries.
m i x i n g t a b l e

entry	mixture	isotope	number density	new identifier
1	1	92235	1.54343E-04	92235
2	1	92238	2.88333E-03	92238
3	1	8016	3.29092E-02	8016
4	2	8016	3.33757E-02	208016
5	1	9019	6.07534E-03	9019
6	1	1001	5.36677E-02	1001
7	2	1001	6.67514E-02	201001

geometry and material description

zone	mixture	outer dimension	temperature	extra xs	type (0/1--fuel/mod)
1	1	1.00000E+00	2.93000E+02	0.00000E+00	0
2	2	6.00000E+00	2.93000E+02	0.00000E+00	0

2394 locations of 100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical 1
copy 1001 HYDROGEN from log 11 to log 18 bondarenko trigger 0
copy 1001 HYDROGEN from log 18 to log 1 bondarenko trigger 0
copy 1001 HYDROGEN from log 18 to log 1 bondarenko trigger 0
copy 8016 OXYGEN-16 from log 11 to log 18 bondarenko trigger 0
copy 8016 OXYGEN-16 from log 18 to log 1 bondarenko trigger 0
copy 8016 OXYGEN-16 from log 18 to log 1 bondarenko trigger 0
copy 9019 FLUORINE from log 11 to log 1 bondarenko trigger 0
copy 92235 URANIUM-235 from log 11 to log 1 bondarenko trigger 0
copy 92238 URANIUM-238 from log 11 to log 1 bondarenko trigger 0

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMUM CONCENTRATION SEARCH            UOXSPOP3.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  1400.0 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    1$$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I20.5025 55.5025
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      Y
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.07434E+00	6.29954E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0707
2	224	1.10441E-02	9.96460E-01	-2.53565E+00	-6.68945E-01	-5.72957E-02	0.00000E+00	0.4338
3	435	4.00976E-03	1.07479E+00	7.82511E-02	-2.43404E-01	-1.76975E-02	0.00000E+00	0.7802
4	634	2.14738E-03	1.05771E+00	6.16986E-02	-1.33883E-01	-8.79004E-03	0.00000E+00	1.1113
5	829	1.17902E-03	1.04218E+00	4.22182E-02	-8.08325E-02	-4.67453E-03	0.00000E+00	1.4363
6	1008	6.52018E-04	1.03147E+00	2.67432E-02	-4.75409E-02	-2.55167E-03	0.00000E+00	1.7412
7	1181	3.60729E-04	1.02479E+00	1.61285E-02	-2.73935E-02	-1.40835E-03	0.00000E+00	2.0378
8	1349	1.98614E-04	1.02083E+00	9.41307E-03	-1.55457E-02	-7.78808E-04	0.00000E+00	2.3290
9	1515	1.08654E-04	1.01856E+00	5.37320E-03	-8.71305E-03	-4.29882E-04	0.00000E+00	2.6165
10	1679	5.91066E-05	1.01726E+00	3.02482E-03	-4.83784E-03	-2.36785E-04	0.00000E+00	2.9018
11	1838	3.19125E-05	1.01653E+00	1.68665E-03	-2.66726E-03	-1.29911E-04	0.00000E+00	3.1802
12	1996	1.70175E-05	1.01612E+00	9.31519E-04	-1.45894E-03	-7.07107E-05	0.00000E+00	3.4577
13	2144	8.97196E-06	1.01590E+00	5.11038E-04	-7.90691E-04	-3.82458E-05	0.00000E+00	3.7223
14	2288	4.64491E-06	1.01577E+00	2.78259E-04	-4.24681E-04	-2.04716E-05	0.00000E+00	3.9822
15	2433	2.34573E-06	1.01570E+00	1.50164E-04	-2.25195E-04	-1.08112E-05	0.00000E+00	4.2422
16	257.	1.15121E-06	1.01566E+00	8.05669E-05	-1.17677E-04	-5.63928E-06	0.00000E+00	4.5022

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	6.59874E-05	9	1.00002E+00	7
2	1	23	6.30496E-05	6	1.00003E+00	10
3	1	1	6.82288E-05	6	1.00002E+00	11
4	1	1	7.00147E-05	4	1.00002E+00	15
5	1	1	5.85468E-05	3	1.00004E+00	20
6	1	1	4.89036E-05	3	1.00004E+00	20
7	1	1	4.07978E-05	2	1.00005E+00	29
8	1	1	3.76884E-05	2	1.00005E+00	46
9	1	1	3.78018E-05	1	1.00005E+00	58
10	1	1	3.79433E-05	1	1.00005E+00	58
11	1	1	3.76062E-05	1	1.00005E+00	58
12	1	1	4.57009E-05	1	1.00004E+00	58
13	1	1	4.77543E-05	1	1.00004E+00	58
14	1	1	4.71034E-05	1	1.00004E+00	58
15	2	58	5.36394E-07	44	1.00000E+00	58
16	2	58	1.46005E-06	58	1.00000E+00	58
17	2	58	1.67914E-06	58	1.00000E+00	58
18	2	58	1.63661E-06	58	1.00000E+00	58
19	2	58	1.94664E-06	58	1.00000E+00	58
20	2	58	1.55388E-06	44	9.99999E-01	58
21	2	58	2.21048E-06	58	9.99999E-01	58
22	2	58	2.00681E-06	58	9.99999E-01	58
23	1	48	2.33847E-05	49	1.00004E+00	58
24	1	49	6.50038E-05	49	1.00013E+00	58
25	1	49	9.41431E-05	49	1.00013E+00	58
26	2	58	2.84832E-06	58	9.99996E-01	58
27	2	58	2.38006E-06	58	9.99998E-01	58

17	2614	1.34514E-10	1.01570E+00	7.36404E-06	-4.80615E-05	-5.60508E-07	0.00000E+00	4.5773

final monitor lambda 1.01570E+00 production/absorption 1.01850E+00 angular flux on 16

elapsed time 4.55 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       2 entries.
        7q array has       2 entries.
        8q array has       2 entries.
        9q array has       2 entries.
       10q array has       7 entries.
       11q array has       2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     1.80066E-04          92235
   2        1     92238     3.36388E-03          92238
   3        1      8016     3.28133E-02           8016
   4        2      8016     3.33757E-02         208016
   5        1      9019     7.08790E-03           9019
   6        1      1001     5.14508E-02           1001
   7        2      1001     6.67514E-02         201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1        1.00000E+00    2.93000E+02    0.00000E+00             0
   2       2        6.00000E+00    2.93000E+02    0.00000E+00             0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
   module CSASI    will be called
     UO2F2 SOLUTION OPTIMUM CONCENTRATION SEARCH              UOXSPOP4Z.CJW
     27GROUPNDF4                    INFHOMMEDIUM
     SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
   module XSDRN    will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I20.5025 55.5025
     36$$  23R1 35R2
     39$$  1 2
     40$$  F3
       T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	4.44089E-16	1.10275E+00	5.86581E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0713
2	224	1.08057E-02	1.01784E+00	-2.18874E+00	-6.39901E-01	-5.80850E-02	0.00000E+00	0.4348
3	436	4.36977E-03	1.07039E+00	8.20670E-02	-2.45986E-01	-1.94265E-02	0.00000E+00	0.7827
4	637	2.31211E-03	1.05428E+00	6.42108E-02	-1.43903E-01	-9.45361E-03	0.00000E+00	1.1158
5	832	1.24085E-03	1.04022E+00	4.32952E-02	-8.59253E-02	-4.89558E-03	0.00000E+00	1.4420
6	1012	6.70143E-04	1.03058E+00	2.68844E-02	-4.94612E-02	-2.60705E-03	0.00000E+00	1.7475
7	1185	3.62678E-04	1.02459E+00	1.58788E-02	-2.78594E-02	-1.40781E-03	0.00000E+00	2.0443
8	1353	1.95355E-04	1.02110E+00	9.07598E-03	-1.54671E-02	-7.62386E-04	0.00000E+00	2.3343
9	1519	1.04467E-04	1.01912E+00	5.07349E-03	-8.48146E-03	-4.12043E-04	0.00000E+00	2.6228
10	1683	5.54898E-05	1.01801E+00	2.79677E-03	-4.60553E-03	-2.22139E-04	0.00000E+00	2.9075
11	1841	2.92192E-05	1.01740E+00	1.52751E-03	-2.48211E-03	-1.19255E-04	0.00000E+00	3.1857
12	1999	1.51555E-05	1.01706E+00	8.25996E-04	-1.32615E-03	-6.34363E-05	0.00000E+00	3.4630
13	2146	7.74784E-06	1.01688E+00	4.43663E-04	-7.01072E-04	-3.34989E-05	0.00000E+00	3.7260
14	2295	3.86752E-06	1.01678E+00	2.36421E-04	-3.66653E-04	-1.74706E-05	0.00000E+00	3.9922
15	2442	1.87309E-06	1.01672E+00	1.25082E-04	-1.88946E-04	-8.98892E-06	0.00000E+00	4.2550
16	2586	8.72096E-07	1.01669E+00	6.58878E-05	-9.58394E-05	-4.56247E-06	0.00000E+00	4.5140

	grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
	1	1	1	7.16262E-05	9	1.00002E+00	7
	2	1	1	6.59478E-05	6	1.00004E+00	10
	3	1	1	7.35625E-05	6	1.00003E+00	11
	4	1	1	7.52551E-05	4	1.00003E+00	15
	5	1	1	6.25122E-05	3	1.00004E+00	20
	6	1	1	5.19438E-05	3	1.00005E+00	20
	7	1	1	4.29223E-05	2	1.00006E+00	29
	8	1	1	3.96195E-05	2	1.00006E+00	46
	9	1	1	3.93803E-05	1	1.00006E+00	58
	10	1	1	3.93018E-05	1	1.00005E+00	58
	11	1	1	3.87293E-05	1	1.00005E+00	58
	12	1	1	4.69521E-05	1	1.00004E+00	58
	13	1	1	4.89468E-05	1	1.00004E+00	58
	14	1	1	4.82310E-05	1	1.00004E+00	58
	15	2	58	5.14021E-07	44	1.00000E+00	58
	16	2	58	1.42010E-06	58	1.00000E+00	58
	17	2	58	1.63592E-06	58	1.00000E+00	58
	18	2	58	1.59633E-06	58	1.00000E+00	58
	19	2	58	1.90038E-06	58	1.00000E+00	58
	20	2	58	1.53295E-06	44	9.99999E-01	58
	21	2	58	2.18657E-06	58	9.99999E-01	58
	22	2	58	1.98873E-06	58	9.99999E-01	58
	23	1	49	2.33967E-05	49	1.00004E+00	58
	24	1	49	6.41589E-05	49	1.00012E+00	58
	25	1	49	9.28527E-05	49	1.00013E+00	58
	26	2	58	2.62862E-06	58	9.99996E-01	58
	27	2	58	2.19674E-06	58	9.99998E-01	58

17	2623	1.39183E-10	1.01672E+00	6.11959E-06	-3.83822E-05	-3.34441E-07	0.00000E+00	4.5902

final monitor lambda 1.01672E+00 production/absorption 1.01955E+00 angular flux on 16

elapsed time 4.59 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
imm--number of zones or material regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
       3q array has      7 entries.
       4q array has      7 entries.
       5q array has      7 entries.
       6q array has      2 entries.
       7q array has      2 entries.
       8q array has      2 entries.
       9q array has      2 entries.
      10q array has      7 entries.
      11q array has      2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     2.05790E-04          92235
   2        1     92238     3.84444E-03          92238
   3        1      8016     3.27174E-02           8016
   4        2      8016     3.33757E-02         208016
   5        1      9019     8.10045E-03           9019
   6        1      1001     4.92339E-02           1001
   7        2      1001     6.67514E-02         201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1        1.00000E+00    2.93000E+02    0.00000E+00            0
   2       2        6.00000E+00    2.93000E+02    0.00000E+00            0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    U02F2 SOLUTION OPTIMUM CONCENTRATION SEARCH            UOXSP05.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  1800.0 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    :3$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    1[illegible]  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I20.5025 55.5025
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      T
 WARNING: an "END" statement is assumed at end of input fi
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	1.11022E-16	1.12487E+00	5.45794E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0725
2	224	1.07345E-02	1.02822E+00	-1.90992E+00	-6.11504E-01	-5.94098E-02	0.00000E+00	0.4357
3	436	4.66600E-03	1.06218E+00	8.57672E-02	-2.52434E-01	-2.08364E-02	0.00000E+00	0.7837
4	637	2.43273E-03	1.04701E+00	6.65811E-02	-1.52955E-01	-9.92002E-03	0.00000E+00	1.1170
5	832	1.27823E-03	1.03415E+00	4.42558E-02	-9.01104E-02	-5.01620E-03	0.00000E+00	1.4428
6	1012	6.76211E-04	1.02532E+00	2.69928E-02	-5.08468E-02	-2.61548E-03	0.00000E+00	1.7487
7	1185	3.58702E-04	1.01987E+00	1.56434E-02	-2.80640E-02	-1.38519E-03	0.00000E+00	2.0462
8	1353	1.89376E-04	1.01672E+00	8.77453E-03	-1.52724E-02	-7.36170E-04	0.00000E+00	2.3362
9	1519	9.91986E-05	1.01497E+00	4.81450E-03	-8.20988E-03	-3.90467E-04	0.00000E+00	2.6237
10	1681	5.15866E-05	1.01399E+00	2.60642E-03	-4.37019E-03	-2.06622E-04	0.00000E+00	2.9065
11	1839	2.65128E-05	1.01346E+00	1.39710E-03	-2.30743E-03	-1.08680E-04	0.00000E+00	3.1838
12	1989	1.34256E-05	1.01317E+00	7.42614E-04	-1.20671E-03	-5.67258E-05	0.00000E+00	3.4512
13	2139	6.65538E-06	1.01302E+00	3.91571E-04	-6.24113E-04	-2.92902E-05	0.00000E+00	3.7185
14	2289	3.20720E-06	1.01293E+00	2.04958E-04	-3.18379E-04	-1.49329E-05	0.00000E+00	3.9857
15	2438	1.48611E-06	1.01289E+00	1.06645E-04	-1.59826E-04	-7.50216E-06	0.00000E+00	4.2512
16	2583	6.44641E-07	1.01286E+00	5.51665E-05	-7.86071E-05	-3.68934E-06	0.00000E+00	4.5123

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	7.88171E-05	9	1.00002E+00	7
2	1	1	7.12646E-05	6	1.00004E+00	10
3	1	1	7.89856E-05	6	1.00003E+00	11
4	1	1	8.03194E-05	4	1.00003E+00	15
5	1	1	6.70117E-05	3	1.00004E+00	20
6	1	1	5.53605E-05	3	1.00005E+00	20
7	1	1	4.53911E-05	2	1.00006E+00	29
8	1	1	4.20189E-05	2	1.00006E+00	46
9	1	1	4.15052E-05	1	1.00006E+00	58
10	1	1	4.13131E-05	1	1.00006E+00	58
11	1	1	4.05737E-05	1	1.00006E+00	58
12	1	1	4.91180E-05	1	1.00005E+00	58
13	1	1	5.11110E-05	1	1.00004E+00	58
14	1	1	5.03398E-05	1	1.00004E+00	58
15	2	58	5.00259E-07	45	1.00000E+00	58
16	2	58	1.38379E-06	58	1.00000E+00	58
17	2	58	1.59497E-06	58	1.00000E+00	58
18	2	58	1.55843E-06	58	1.00000E+00	58
19	2	58	1.85826E-06	58	1.00000E+00	58
20	2	58	1.52984E-06	46	9.99999E-01	58
21	2	58	2.17229E-06	58	9.99999E-01	58
22	2	58	2.01253E-06	58	9.99999E-01	58
23	1	49	2.34751E-05	49	1.00004E+00	58
24	1	49	6.35622E-05	49	1.00012E+00	58
25	1	49	9.19220E-05	49	1.00013E+00	58
26	2	58	1.69160E-06	58	9.99997E-01	58
27	2	58	1.34005E-06	58	9.99998E-01	58

17	2620	1.43466E-10	1.01288E+00	5.05549E-06	-3.08938E-05	-1.12397E-07	0.00000E+00	4.5880

final monitor lambda 1.01288E+00 production/absorption 1.01572E+00 angular flux on 16

elapsed time 4.59 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       2 entries.
        7q array has       2 entries.
        8q array has       2 entries.
        9q array has       2 entries.
       10q array has       7 entries.
       11q array has       2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     2.31514E-04          92235
   2        1     92238     4.32499E-03          92238
   3        1      8016     3.26215E-02           8016
   4        2      8016     3.33757E-02         208016
   5        1      9019     9.51801E-03           9019
   6        1      1001     4.70169E-02           1001
   7        2      1001     6.67514E-02         201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1         1.00000E+00    2.93000E+02    0.00000E+00             0
   2       2         6.00000E+00    2.93000E+02    0.00000E+00             0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI     will be ca..ed
     UO2F2 SOLUTION OPTIMUM CONCENTRATION SEARCH              UOXSPOP6.CJW
     27GROUPNDF4                  INFHOMMEDIUM
     SOLNUO2F2     1  2000.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O           2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module X5DRN     will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I20.5025 55.5025
     36$$  23R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	1.14187E+00	5.07739E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0733
2	225	1.07898E-02	1.03027E+00	-1.68191E+00	-5.94483E-01	-6.10889E-02	0.00000E+00	0.4375
3	439	4.90653E-03	1.05118E+00	8.94584E-02	-2.61437E-01	-2.19524E-02	0.00000E+00	0.7872
4	642	2.51570E-03	1.03691E+00	6.88765E-02	-1.61252E-01	-1.02186E-02	0.00000E+00	1.1233
5	839	1.29537E-03	1.02498E+00	4.51288E-02	-9.35687E-02	-5.05521E-03	0.00000E+00	1.4518
6	1023	6.71701E-04	1.01680E+00	2.70404E-02	-5.17766E-02	-2.58407E-03	0.00000E+00	1.7632
7	1199	3.49872E-04	1.01174E+00	1.53988E-02	-2.80276E-02	-1.34498E-03	0.00000E+00	2.0643
8	1368	1.81649E-04	1.00884E+00	8.49942E-03	-1.49845E-02	-7.03836E-04	0.00000E+00	2.3555
9	1535	9.35636E-05	1.00724E+00	4.59433E-03	-7.92370E-03	-3.67760E-04	0.00000E+00	2.6447
10	1697	4.78114E-05	1.00635E+00	2.45199E-03	-4.15022E-03	-1.91711E-04	0.00000E+00	2.9275
11	1855	2.41067E-05	1.00588E+00	1.29614E-03	-2.15558E-03	-9.92870E-05	0.00000E+00	3.2048
12	2004	1.19490E-05	1.00562E+00	6.79612E-04	-1.10815E-03	-5.10011E-05	0.00000E+00	3.4703
13	2154	5.76089E-06	1.00548E+00	3.53194E-04	-5.62412E-04	-2.58405E-05	0.00000E+00	3.7375
14	2306	2.69239E-06	1.00540E+00	1.82634E-04	-2.80942E-04	-1.29468E-05	0.00000E+00	4.0078
15	2455	1.19268E-06	1.00536E+00	9.38192E-05	-1.37982E-04	-6.37108E-06	0.00000E+00	4.2733

grp	to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	2	19	1.27614E-05	27	1.00000E+00	7
2	2	1	1	8.95582E-05	6	1.00005E+00	10
3	3	2	20	9.82219E-06	10	9.99999E-01	12
4	4	2	20	7.27390E-06	8	9.99999E-01	15
5	5	1	1	8.76393E-05	3	1.00006E+00	20
6	6	1	1	7.28416E-05	3	1.00007E+00	20
7	7	1	1	6.01952E-05	2	1.00008E+00	29
8	8	1	1	5.61355E-05	2	1.00009E+00	46
9	9	1	1	5.79296E-05	2	1.00008E+00	46
10	10	1	1	5.63400E-05	1	1.00008E+00	58
11	11	1	1	5.56604E-05	1	1.00008E+00	58
12	12	1	1	6.77899E-05	1	1.00007E+00	58
13	13	1	1	7.08430E-05	1	1.00006E+00	58
14	14	1	1	7.01655E-05	1	1.00006E+00	58
15	15	2	58	6.89233E-07	44	1.00000E+00	58
16	16	2	58	1.85502E-06	58	1.00000E+00	58
17	17	2	58	2.13466E-06	58	1.00000E+00	58
18	18	2	58	2.08585E-06	58	1.00000E+00	58
19	19	2	58	2.47475E-06	58	1.00000E+00	58
20	20	2	58	2.00578E-06	44	9.99999E-01	58
21	21	2	58	2.88933E-06	58	9.99999E-01	58
22	22	2	58	2.66992E-06	58	9.99999E-01	58
23	23	1	48	3.04246E-05	48	1.00005E+00	58
24	24	1	48	8.36034E-05	49	1.00016E+00	58
25	25	2	57	1.11844E-06	57	9.99999E-01	58
26	26	2	58	2.29189E-06	58	9.99996E-01	58
27	27	2	58	1.79868E-06	58	9.99998E-01	58

16	2496	1.47432E-10	1.00540E+00	9.26898E-06	-5.36472E-05	-3.48091E-07	0.00000E+00	4.3547

final monitor lambda 1.00540E+00 production/absorption 1.00824E+00 angular flux on 16

elapsed time 4.35 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       2 entries.
        7q array has       2 entries.
        8q array has       2 entries.
        9q array has       2 entries.
       10q array has       7 entries.
       11q array has       2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     2.57238E-04          92235
   2        1     92238     4.80555E-03          92238
   3        1      8016     3.25255E-02           8016
   4        2      8016     3.33757E-02         208016
   5        1      9019     1.01256E-02           9019
   6        1      1001     4.48000E-02           1001
   7        2      1001     6.67514E-02         201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1        1.00000E+00    2.93000E+02    0.00000E+00             0
   2       2        6.00000E+00    2.93000E+02    0.00000E+00             0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
      UO2F2 SOLUTION OPTIMUM CONCENTRATION SEARCH              UOXSPOP7.CJW
      27GROUPNDF4                  INFHOMMEDIUM
      SOLNUO2F2    1  2200.0 0 1.0 293   92235 5.02  92238 94.98  END
      H2O          2  1.0  293  END
      END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
      SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
      0$$  A3 2  E
      1$$  3 2 58 1 0   2 2 16 3 1
       10 50 0 0 0
      2$$  -2 0 0 0 0    0 -1 0 0 0
      3$$  0 0 0 1 0     0 0 0 0 0
           0 0
      5**  A4 0  0  E
        T
      13$$  1 2
      14$$  1 2
      15**  F1
        T
      34**  F1
        T
      35**  22I0 34I20.5025 55.5025
      36$$  23R1 35R2
      39$$  1 2
      40$$  F3
        T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	3.33067E-16	1.15476E+00	4.72533E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0725
2	226	1.09387E-02	1.02609E+00	-1.49292E+00	-5.83831E-01	-6.29682E-02	0.00000E+00	0.4378
3	442	5.09981E-03	1.03805E+00	9.32295E-02	-2.72215E-01	-2.28059E-02	0.00000E+00	0.7910
4	647	2.56726E-03	1.02460E+00	7.11484E-02	-1.68976E-01	-1.03766E-02	0.00000E+00	1.1290
5	846	1.29602E-03	1.01339E+00	4.59344E-02	-9.64408E-02	-5.02855E-03	0.00000E+00	1.4602
6	1033	6.59731E-04	1.00567E+00	2.70609E-02	-5.23577E-02	-2.52476E-03	0.00000E+00	1.7750
7	1211	3.37525E-04	1.00092E+00	1.51487E-02	-2.78227E-02	-1.29232E-03	0.00000E+00	2.0790
8	1381	1.72338E-04	9.98210E-01	8.23128E-03	-1.46174E-02	-6.66108E-04	0.00000E+00	2.3720
9	1549	8.73040E-05	9.96720E-01	4.38599E-03	-7.60520E-03	-3.43026E-04	0.00000E+00	2.6623
10	1712	4.38434E-05	9.95906E-01	2.30932E-03	-3.92098E-03	-1.76244E-04	0.00000E+00	2.9458
11	1870	2.16813E-05	9.95469E-01	1.20482E-03	-2.00400E-03	-8.99085E-05	0.00000E+00	3.2235
12	2020	1.05103E-05	9.95235E-01	6.23671E-04	-1.01288E-03	-4.54604E-05	0.00000E+00	3.4905
13	2170	4.92818E-06	9.95110E-01	3.20111E-04	-5.04661E-04	-2.26393E-05	0.00000E+00	3.7580
14	2323	2.22304E-06	9.95041E-01	1.63710E-04	-2.46971E-04	-1.11403E-05	0.00000E+00	4.0290
15	2472	9.31274E-07	9.95004E-01	8.31334E-05	-1.18468E-04	-5.36384E-06	0.00000E+00	4.2945

	grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
	1	1 2	17	1.40698E-05	8	9.99999E-01	7
	2	2 1	1	9.08081E-05	6	1.00005E+00	10
	3	3 2	20	1.03810E-05	10	9.99999E-01	12
	4	4 2	20	9.53058E-06	40	1.00000E+00	14
	5	5 1	1	8.86397E-05	4	1.00006E+00	18
	6	6 1	1	7.26567E-05	3	1.00008E+00	20
	7	7 1	1	5.97260E-05	2	1.00009E+00	29
	8	8 1	1	5.57891E-05	2	1.00009E+00	46
	9	9 1	1	5.76038E-05	2	1.00008E+00	46
	10	10 1	1	5.77453E-05	2	1.00008E+00	46
	11	11 1	1	5.51303E-05	1	1.00008E+00	58
	12	12 1	1	6.72125E-05	1	1.00007E+00	58
	13	13 1	1	7.02460E-05	1	1.00006E+00	58
	14	14 1	1	6.96798E-05	1	1.00006E+00	58
	15	15 2	18	1.93047E-06	44	1.00000E+00	46
	16	16 2	58	1.86550E-06	58	1.00000E+00	46
	17	17 2	58	2.11183E-06	58	1.00000E+00	58
	18	18 2	58	2.06557E-06	58	1.00000E+00	58
	19	19 2	58	2.45253E-06	58	1.00000E+00	58
	20	20 2	58	2.00064E-06	44	9.99999E-01	58
	21	21 2	58	2.89438E-06	58	9.99999E-01	58
	22	22 2	58	2.66475E-06	58	9.99999E-01	58
	23	23 1	48	3.06221E-05	48	1.00005E+00	58
	24	24 1	48	8.30708E-05	49	1.00016E+00	58
	25	25 2	58	1.16200E-06	58	9.99999E-01	58
	26	26 2	58	2.53673E-06	58	9.99996E-01	58
	27	27 2	58	2.01605E-06	58	9.99997E-01	58
16	2513	1.51137E-10	9.95030E-01	8.01479E-06	-4.56859E-05	-7.92791E-08	0.00000E+00	4.3760

final monitor lambda 9.95030E-01 production/absorption 9.97865E-01 angular flux on 16

elapsed time 4.38 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       2 entries.
        7q array has       2 entries.
        8q array has       2 entries.
        9q array has       2 entries.
       10q array has       7 entries.
       11q array has       2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     2.82961E-04          92235
   2        1     92238     5.28610E-03          92238
   3        1      8016     3.24296E-02           8016
   4        2      8016     3.33757E-02         208016
   5        1      9019     1.11381E-02           9019
   6        1      1001     4.25830E-02           1001
   7        2      1001     6.67514E-02         201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1        1.00000E+00    2.93000E+02    0.00000E+00             0
   2       2        6.00000E+00    2.93000E+02    0.00000E+00             0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE CONCENTRATION   SPHERE               UOXSPOP8.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLNUO2F2    1  1500.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I20.5025 55.5025
     36$$  23R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.08940E+00	6.07955E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0740
2	224	1.09011E-02	1.00872E+00	-2.35231E+00	-6.51250E-01	-5.76112E-02	0.00000E+00	0.4375
3	435	4.19820E-03	1.07315E+00	6.01813E-02	-2.44102E-01	-1.86030E-02	0.00000E+00	0.7833
4	636	2.23566E-03	1.05655E+00	6.29777E-02	-1.39028E-01	-9.14831E-03	0.00000E+00	1.1167
5	831	1.21329E-03	1.04179E+00	4.27743E-02	-8.35065E-02	-4.79897E-03	0.00000E+00	1.4427
6	1010	6.63060E-04	1.03163E+00	2.68278E-02	-4.85848E-02	-2.58705E-03	0.00000E+00	1.7473
7	1183	3.62569E-04	1.02532E+00	1.60040E-02	-2.76724E-02	-1.41137E-03	0.00000E+00	2.0440
8	1351	1.97294E-04	1.02162E+00	9.23694E-03	-1.55221E-02	-7.71750E-04	0.00000E+00	2.3343
9	1517	1.06640E-04	1.01951E+00	5.21424E-03	-8.59894E-03	-4.21241E-04	0.00000E+00	2.6227
10	1681	5.72914E-05	1.01831E+00	2.90284E-03	-4.71865E-03	-2.29418E-04	0.00000E+00	2.9073
11	1840	3.05270E-05	1.01765E+00	1.60085E-03	-2.57060E-03	-1.24425E-04	0.00000E+00	3.1865
12	1998	1.60516E-05	1.01728E+00	8.74548E-04	-1.38892E-03	-6.69332E-05	0.00000E+00	3.4638
13	2142	8.33250E-06	1.01708E+00	4.74613E-04	-7.43279E-04	-3.57637E-05	0.00000E+00	3.7228
14	2290	4.23279E-06	1.01697E+00	2.55407E-04	-3.93780E-04	-1.88796E-05	0.00000E+00	3.9875
15	2436	2.09591E-06	1.01691E+00	1.36512E-04	-2.05780E-04	-9.84679E-06	0.00000E+00	4.2492
16	2580	9.99166E-07	1.01687E+00	7.24118E-05	-1.05898E-04	-5.05287E-06	0.00000E+00	4.5093

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	6.92335E-05	9	1.00002E+00	7
2	1	23	6.49226E-05	6	1.00003E+00	10
3	1	1	7.12970E-05	6	1.00003E+00	11
4	1	1	7.31380E-05	4	1.00003E+00	15
5	1	1	6.09095E-05	3	1.00004E+00	20
6	1	1	5.07509E-05	3	1.00005E+00	20
7	1	1	4.21137E-05	2	1.00005E+00	29
8	1	1	3.88768E-05	2	1.00006E+00	46
9	1	1	3.87927E-05	1	1.00005E+00	58
10	1	1	3.88093E-05	1	1.00005E+00	58
11	1	1	3.83399E-05	1	1.00005E+00	58
12	1	1	4.65253E-05	1	1.00004E+00	58
13	1	1	4.85511E-05	1	1.00004E+00	58
14	1	1	4.78575E-05	1	1.00004E+00	58
15	2	58	5.23534E-07	44	1.00000E+00	58
16	2	58	1.43654E-06	58	1.00000E+00	58
17	2	58	1.65354E-06	58	1.00000E+00	58
18	2	58	1.61261E-06	58	1.00000E+00	58
19	2	58	1.91910E-06	58	1.00000E+00	58
20	2	58	1.54001E-06	44	9.99999E-01	58
21	2	58	2.19429E-06	58	9.99999E-01	58
22	2	58	1.99380E-06	58	9.99999E-01	58
23	1	49	2.33884E-05	49	1.00004E+00	58
24	1	49	6.45350E-05	49	1.00012E+00	58
25	1	49	9.34313E-05	49	1.00013E+00	58
26	2	58	2.61084E-06	58	9.99996E-01	58
27	2	58	2.18385E-06	58	9.99998E-01	58

17	2617	1.36902E-10	1.01690E+00	6.68466E-06	-4.26916E-05	-4.40116E-07	0.00000E+00	4.5852

final monitor lambda 1.01690E+00 production/absorption 1.01972E+00 angular flux on 16

elapsed time 4.59 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
isnopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       2 entries.
        7q array has       2 entries.
        8q array has       2 entries.
        9q array has       2 entries.
       10q array has       7 entries.
       11q array has       2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     1.92928E-04          92235
   2        1     92238     3.60416E-03          92238
   3        1      8016     3.27653E-02           8016
   4        2      8016     3.33757E-02         208016
   5        1      9019     7.59416E-03           9019
   6        1      1001     5.03423E-02           1001
   7        2      1001     6.67514E-02         201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1        1.00000E+00    2.93000E+02    0.00000E+00             0
   2       2        6.00000E+00    2.93000E+02    0.00000E+00             0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMIZE CONCENTRATION   SPHERE              UOXSPOP9.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  1700.0 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    1$$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I20.5025 55.5025
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.11453E+00	5.65852E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0750
2	224	1.07519E-02	1.02423E+00	-2.04206E+00	-6.22706E-01	-5.86923E-02	0.00000E+00	0.4387
3	436	4.52537E-03	1.06670E+00	8.39241E-02	-2.48823E-01	-2.01700E-02	0.00000E+00	0.7855
4	637	2.37752E-03	1.05106E+00	6.54086E-02	-1.48535E-01	-9.70958E-03	0.00000E+00	1.1188
5	832	1.26231E-03	1.03764E+00	4.37874E-02	-8.81179E-02	-4.96716E-03	0.00000E+00	1.4447
6	1012	6.74562E-04	1.02843E+00	2.69436E-02	-5.02139E-02	-2.61657E-03	0.00000E+00	1.7503
7	1185	3.61337E-04	1.02273E+00	1.57600E-02	-2.79914E-02	-1.39887E-03	0.00000E+00	2.0480
8	1353	1.92640E-04	1.01942E+00	8.92127E-03	-1.53820E-02	-7.50249E-04	0.00000E+00	2.3382
9	1519	1.01931E-04	1.01756E+00	4.93938E-03	-8.34919E-03	-4.01581E-04	0.00000E+00	2.6257
10	1681	5.35741E-05	1.01653E+00	2.69802E-03	-4.48803E-03	-2.14488E-04	0.00000E+00	2.9083
11	1839	2.78519E-05	1.01596E+00	1.45904E-03	-2.39357E-03	-1.13902E-04	0.00000E+00	3.1858
12	1991	1.42714E-05	1.01565E+00	7.81966E-04	-1.26456E-03	-6.00011E-05	0.00000E+00	3.4558
13	2140	7.19257E-06	1.01548E+00	4.16258E-04	-6.61324E-04	-3.13545E-05	0.00000E+00	3.7212
14	2289	3.53259E-06	1.01539E+00	2.19629E-04	-3.41613E-04	-1.61449E-05	0.00000E+00	3.9878
15	2438	1.66536E-06	1.01534E+00	1.15026E-04	-1.73470E-04	-8.19210E-06	0.00000E+00	4.2532
16	2583	7.49790E-07	1.01531E+00	6.00100E-05	-8.65367E-05	-4.09334E-06	0.00000E+00	4.5142

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	7.67641E-05	9	1.00002E+00	7
2	1	1	6.96575E-05	6	1.00004E+00	10
3	1	1	7.73947E-05	6	1.00003E+00	11
4	1	1	7.88970E-05	4	1.00003E+00	15
5	1	1	6.58847E-05	3	1.00004E+00	20
6	1	1	5.45331E-05	3	1.00005E+00	20
7	1	1	4.48259E-05	2	1.00006E+00	29
8	1	1	4.13823E-05	2	1.00006E+00	46
9	1	1	4.09779E-05	1	1.00006E+00	58
10	1	1	4.08557E-05	1	1.00006E+00	58
11	1	1	4.02117E-05	1	1.00006E+00	58
12	1	1	4.87190E-05	1	1.00005E+00	58
13	1	1	5.07443E-05	1	1.00004E+00	58
14	1	1	4.99919E-05	1	1.00004E+00	58
15	2	58	4.85423E-07	45	1.00000E+00	58
16	2	58	1.38510E-06	58	1.00000E+00	58
17	2	58	1.60432E-06	58	1.00000E+00	58
18	2	58	1.56648E-06	58	1.00000E+00	58
19	2	58	1.86225E-06	58	1.00000E+00	58
20	2	58	1.48816E-06	46	9.99999E-01	58
21	2	58	2.15199E-06	58	9.99999E-01	58
22	2	58	1.96231E-06	58	9.99999E-01	58
23	1	49	2.34237E-05	49	1.00004E+00	58
24	1	49	6.38383E-05	49	1.00012E+00	58
25	1	49	9.23562E-05	49	1.00013E+00	58
26	2	58	2.48546E-06	58	9.99997E-01	58
27	2	58	1.98982E-06	58	9.99998E-01	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
17	2620	1.41368E-10	1.01533E+00	5.54707E-06	-3.43285E-05	-2.15591E-07	0.00000E+00	4.5902

final monitor

lambda 1.01533E+00 production/absorption 1.01817E+00 angular flux on 16

elapsed time 4.59 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                  1
izm--number of zones or material regions                         2
ms--mixing table length                                          7
ibl--shielded cross section edit option (0/1--no/yes)            0
ibr--bondarenko factor edit option (0/1--no/yes)                 0
issopt--dancoff factor option                                    0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       2 entries.
        7q array has       2 entries.
        8q array has       2 entries.
        9q array has       2 entries.
       10q array has       7 entries.
       11q array has       2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     2.18652E-04           92235
   2        1     92238     4.08471E-03           92238
   3        1      8016     3.26694E-02            8016
   4        2      8016     3.33757E-02          208016
   5        1      9019     8.60673E-03            9019
   6        1      1001     4.81254E-02            1001
   7        2      1001     6.67514E-02          201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1        1.00000E+00    2.93000E+02    0.00000E+00             0
   2       2        6.00000E+00    2.93000E+02    0.00000E+00             0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER              UOXCYOP1.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  1000.0 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    1$$  2 2 51 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  15I0 34I14.25 49.25
    36$$  16R1 35R2
    39$$  1 2
    40$$  F3
      T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	1.11022E-16	9.76000E-01	7.44221E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0823
2	215	1.29202E-02	8.59424E-01	-3.80923E+00	-7.99821E-01	-6.01598E-02	0.00000E+00	1.3540
3	414	2.88641E-03	1.03869E+00	7.35463E-02	-2.81705E-01	-1.22731E-02	0.00000E+00	2.5375
4	606	1.41888E-03	1.02788E+00	5.30609E-02	-1.04983E-01	-5.70719E-03	0.00000E+00	3.6828
5	785	7.64850E-04	1.01415E+00	3.42362E-02	-5.77929E-02	-3.03102E-03	0.00000E+00	4.7558
6	960	4.19222E-04	1.00494E+00	2.08890E-02	-3.30171E-02	-1.65812E-03	0.00000E+00	5.8073
7	1128	2.31157E-04	9.99267E-01	1.23368E-02	-1.87616E-02	-9.18312E-04	0.00000E+00	6.8198
8	1294	1.27493E-04	9.95911E-01	7.13699E-03	-1.05963E-02	-5.10875E-04	0.00000E+00	7.8213
9	1458	7.04299E-05	9.93944E-01	4.08521E-03	-5.95807E-03	-2.85477E-04	0.00000E+00	8.8128
10	1616	3.89028E-05	9.92800E-01	2.32616E-03	-3.34622E-03	-1.59942E-04	0.00000E+00	9.7703
11	1767	2.14589E-05	9.92137E-01	1.32116E-03	-1.87809E-03	-8.97382E-05	0.00000E+00	10.6887
12	1911	1.18246E-05	9.91752E-01	7.50457E-04	-1.05406E-03	-5.04599E-05	0.00000E+00	11.5693
13	2055	6.47761E-06	9.91529E-01	4.26021E-04	-5.91644E-04	-2.83440E-05	0.00000E+00	12.4498
14	2200	3.53092E-06	9.91400E-01	2.42252E-04	-3.31680E-04	-1.59376E-05	0.00000E+00	13.3360
15	2344	1.91734E-06	9.91323E-01	1.38480E-04	-1.86206E-04	-8.99802E-06	0.00000E+00	14.2157
16	2488	1.03998E-06	9.91277E-01	7.99869E-05	-1.05098E-04	-5.12732E-06	0.00000E+00	15.0962

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	4.06235E-05	9	1.00001E+00	6
2	1	16	4.14851E-05	6	1.00002E+00	9
3	1	16	4.46179E-05	6	1.00001E+00	10
4	1	16	4.65297E-05	4	1.00001E+00	13
5	1	16	3.67010E-05	3	1.00002E+00	17
6	1	1	3.06234E-05	3	1.00002E+00	17
7	1	1	2.44449E-05	2	1.00003E+00	26
8	1	1	2.19026E-05	2	1.00003E+00	43
9	1	1	2.06839E-05	1	1.00003E+00	51
10	1	1	2.01376E-05	1	1.00003E+00	51
11	1	1	1.94102E-05	1	1.00003E+00	51
12	1	1	2.29921E-05	1	1.00002E+00	51
13	1	1	2.35671E-05	1	1.00002E+00	51
14	1	1	2.27721E-05	1	1.00002E+00	51
15	2	51	5.06744E-07	38	1.00000E+00	51
16	2	51	1.34983E-06	51	1.00000E+00	51
17	2	51	1.54760E-06	51	1.00000E+00	51
18	2	51	1.50281E-06	51	1.00000E+00	51
19	2	51	1.80152E-06	51	1.00000E+00	51
20	2	51	1.41990E-06	37	9.99999E-01	51
21	2	51	1.96994E-06	51	9.99999E-01	51
22	2	51	1.79233E-06	51	9.99999E-01	51
23	1	41	2.29028E-05	42	1.00004E+00	51
24	1	42	6.30041E-05	42	1.00012E+00	51
25	1	42	9.12518E-05	42	1.00012E+00	51
26	1	42	9.97649E-05	42	1.00022E+00	51
27	2	51	2.34598E-06	51	9.99998E-01	51

17	2524	-3.77281E-08	9.91310E-01	6.85791E-06	-4.69945E-05	-6.08216E-07	0.00000E+00	15.3628

final monitor

lambda 9.91309E-01 production/absorption 9.93375E-01 angular flux on 16

elapsed time 15.36 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOP2.CJW
     27GROUPNDF4                  INFHOMMEDIUM
     SOLNUO2F2    1  1200.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
     CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  2 2 51 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  15I0 34I14.25 49.25
     36$$  16R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	1.11022E-16	1.02402E+00	6.99927E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0842
2	215	1.22548E-02	9.13165E-01	-3.21054E+00	-7.47303E-01	-5.93869E-02	0.00000E+00	1.3558
3	414	3.35431E-03	1.05018E+00	7.84174E-02	-2.66507E-01	-1.43749E-02	0.00000E+00	2.5403
4	606	1.64465E-03	1.04095E+00	5.59189E-02	-1.16491E-01	-6.63020E-03	0.00000E+00	3.6845
5	788	8.61587E-04	1.02925E+00	3.53744E-02	-6.41547E-02	-3.40577E-03	0.00000E+00	4.7750
6	963	4.58806E-04	1.02130E+00	2.10657E-02	-3.57221E-02	-1.80630E-03	0.00000E+00	5.8257
7	1131	2.45672E-04	1.01646E+00	1.21139E-02	-1.97353E-02	-9.71313E-04	0.00000E+00	6.8392
8	1297	1.31532E-04	1.01364E+00	6.81807E-03	-1.08289E-02	-5.25090E-04	0.00000E+00	7.8405
9	1460	7.05346E-05	1.01202E+00	3.79806E-03	-5.91565E-03	-2.85385E-04	0.00000E+00	8.8257
10	1618	3.78117E-05	1.01109E+00	2.10637E-03	-3.22932E-03	-1.55614E-04	0.00000E+00	9.7833
11	1762	2.02690E-05	1.01055E+00	1.16769E-03	-1.76337E-03	-8.51567E-05	0.00000E+00	10.6637
12	1911	1.08326E-05	1.01025E+00	6.47747E-04	-9.64009E-04	-4.66816E-05	0.00000E+00	11.5720
13	2060	5.76710E-06	1.01007E+00	3.60274E-04	-5.27334E-04	-2.56463E-05	0.00000E+00	12.4800
14	2208	3.06340E-06	1.00997E+00	2.01618E-04	-2.89119E-04	-1.41632E-05	0.00000E+00	13.3817
15	2352	1.62181E-06	1.00990E+00	1.13834E-04	-1.59340E-04	-7.87576E-06	0.00000E+00	14.2625
16	2496	8.59101E-07	1.00987E+00	6.52158E-05	-8.85815E-05	-4.43885E-06	0.00000E+00	15.1428

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	4.13683E-05	9	1.00001E+00	6
2	1	16	4.28576E-05	6	1.00002E+00	9
3	1	16	4.58766E-05	6	1.00001E+00	10
4	1	16	4.77549E-05	4	1.00001E+00	13
5	1	16	3.72391E-05	3	1.00002E+00	17
6	1	1	3.05683E-05	3	1.00002E+00	17
7	1	1	2.42532E-05	2	1.00003E+00	26
8	1	1	2.16999E-05	2	1.00003E+00	43
9	1	1	2.02962E-05	1	1.00003E+00	51
10	1	1	1.95971E-05	1	1.00003E+00	51
11	1	1	1.87349E-05	1	1.00002E+00	51
12	1	1	2.21000E-05	1	1.00002E+00	51
13	1	1	2.25749E-05	1	1.00002E+00	51
14	1	1	2.17673E-05	1	1.00002E+00	51
15	2	51	4.92716E-07	38	1.00000E+00	51
16	2	51	1.31548E-06	51	1.00000E+00	51
17	2	51	1.50703E-06	51	1.00000E+00	51
18	2	51	1.46403E-06	51	1.00000E+00	51
19	2	51	1.75771E-06	51	1.00000E+00	51
20	2	51	1.39330E-06	37	9.99999E-01	51
21	2	51	1.93359E-06	51	1.00000E+00	51
22	2	51	1.75634E-06	51	9.99999E-01	51
23	1	42	2.28601E-05	42	1.00004E+00	51
24	1	42	6.21064E-05	42	1.00012E+00	51
25	1	42	8.98873E-05	42	1.00012E+00	51
26	1	42	9.82506E-05	42	1.00022E+00	51
27	2	51	2.42748E-06	51	9.99998E-01	51

17	2532	-3.76955E-08	1.00989E+00	5.93706E-06	-3.90006E-05	-5.21772E-07	0.00000E+00	15.4095

final monitor

lambda 1.00989E+00 production/absorption 1.01201E+00 angular flux on 16

elapsed time 15.41 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOP3.CJW
     27GROUPNDF4                  INFHOMMEDIUM
     SOLNUO2F2    1  1400.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
     CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  2 2 51 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  15I0 34I14.25 49.25
     36$$  16R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	1.06112E+00	6.57944E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0842
2	215	1.18412E-02	9.48406E-01	-2.75252E+00	-7.06244E-01	-5.94628E-02	0.00000E+00	1.3565
3	414	3.75067E-03	1.05269E+00	8.27580E-02	-2.61164E-01	-1.61780E-02	0.00000E+00	2.5402
4	607	1.82270E-03	1.04512E+00	5.83820E-02	-1.26527E-01	-7.34669E-03	0.00000E+00	3.6908
5	790	9.31125E-04	1.03522E+00	3.62807E-02	-6.92044E-02	-3.66634E-03	0.00000E+00	4.7860
6	965	4.83662E-04	1.02837E+00	2.11494E-02	-3.76581E-02	-1.89443E-03	0.00000E+00	5.8375
7	1133	2.52608E-04	1.02420E+00	1.18881E-02	-2.03058E-02	-9.93980E-04	0.00000E+00	6.8500
8	1299	1.31882E-04	1.02180E+00	6.53858E-03	-1.08719E-02	-5.24694E-04	0.00000E+00	7.8515
9	1460	6.90055E-05	1.02043E+00	3.56286E-03	-5.79737E-03	-2.78835E-04	0.00000E+00	8.8255
10	1618	3.60350E-05	1.01965E+00	1.93310E-03	-3.09065E-03	-1.48581E-04	0.00000E+00	9.7832
11	1766	1.88347E-05	1.01921E+00	1.05018E-03	-1.64822E-03	-7.96040E-05	0.00000E+00	10.6857
12	1916	9.81355E-06	1.01895E+00	5.72072E-04	-8.81340E-04	-4.27783E-05	0.00000E+00	11.5995
13	2066	5.10959E-06	1.01881E+00	3.13725E-04	-4.72571E-04	-2.31367E-05	0.00000E+00	12.5130
14	2215	2.66304E-06	1.01872E+00	1.73941E-04	-2.55079E-04	-1.26360E-05	0.00000E+00	13.4212
15	2359	1.38176E-06	1.01867E+00	9.75934E-05	-1.38901E-04	-6.96072E-06	0.00000E+00	14.3018

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	6.32547E-05	51	9.99985E-01	6
2	1	16	6.49685E-05	6	1.00003E+00	9
3	1	16	6.87806E-05	6	1.00002E+00	10
4	1	16	7.11973E-05	4	1.00002E+00	13
5	1	16	5.59079E-05	3	1.00003E+00	17
6	1	1	4.59552E-05	3	1.00004E+00	17
7	1	1	3.66177E-05	2	1.00004E+00	26
8	1	1	3.29931E-05	2	1.00004E+00	43
9	1	1	3.11417E-05	1	1.00004E+00	51
10	1	1	3.02331E-05	1	1.00004E+00	51
11	1	1	2.90418E-05	1	1.00004E+00	51
12	1	1	3.44282E-05	1	1.00003E+00	51
13	1	1	3.52925E-05	1	1.00003E+00	51
14	1	1	3.41901E-05	1	1.00003E+00	51
15	2	51	6.47130E-07	37	1.00000E+00	51
16	2	51	1.74072E-06	51	1.00000E+00	51
17	2	51	2.00199E-06	51	1.00000E+00	51
18	2	51	1.94371E-06	51	1.00000E+00	51
19	2	51	2.32103E-06	51	1.00000E+00	51
20	2	51	1.78722E-06	37	9.99999E-01	51
21	2	51	2.52370E-06	51	9.99999E-01	51
22	2	51	2.28431E-06	51	9.99999E-01	51
23	1	41	2.94502E-05	41	1.00005E+00	51
24	1	41	8.12474E-05	42	1.00016E+00	51
25	2	50	8.88647E-07	36	1.00000E+00	51
26	2	50	1.84379E-06	51	9.99997E-01	51
27	2	51	3.39353E-06	51	9.99997E-01	51

16	2397	-3.77054E-08	1.01871E+00	9.26290E-06	-5.93903E-05	-8.20656E-07	0.00000E+00	14.5865

final monitor lambda 1.01871E+00 production/absorption 1.02086E+00 angular flux on 16

elapsed time 14.59 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOP4.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLNUO2F2    1  1500.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
   module XSDRN    will be called
     CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  2 2 51 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  15I0 34I14.25 49.25
     36$$  16R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-4.44089E-16	1.07652E+00	6.37843E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0853
2	215	1.17118E-02	9.60583E-01	-2.56206E+00	-6.89417E-01	-5.97536E-02	0.00000E+00	1.3568
3	416	3.92253E-03	1.05171E+00	8.47889E-02	-2.60958E-01	-1.69622E-02	0.00000E+00	2.5515
4	609	1.89525E-03	1.04492E+00	5.95119E-02	-1.31070E-01	-7.63354E-03	0.00000E+00	3.7022
5	792	9.57219E-04	1.03579E+00	3.66813E-02	-7.13401E-02	-3.76070E-03	0.00000E+00	4.7980
6	967	4.91520E-04	1.02941E+00	2.11712E-02	-3.84090E-02	-1.92031E-03	0.00000E+00	5.8487
7	1135	2.53805E-04	1.02553E+00	1.17770E-02	-2.04790E-02	-9.96484E-04	0.00000E+00	6.8612
8	1301	1.31007E-04	1.02330E+00	6.41093E-03	-1.08428E-02	-5.20468E-04	0.00000E+00	7.8635
9	1462	6.77724E-05	1.02203E+00	3.45873E-03	-5.71889E-03	-2.73781E-04	0.00000E+00	8.8375
10	1614	3.50502E-05	1.02130E+00	1.86134E-03	-3.01800E-03	-1.44679E-04	0.00000E+00	9.7623
11	1764	1.81045E-05	1.02089E+00	1.00244E-03	-1.59455E-03	-7.67778E-05	0.00000E+00	10.6758
12	1918	9.32555E-06	1.02066E+00	5.41934E-04	-8.44172E-04	-4.09078E-05	0.00000E+00	11.6115
13	2070	4.79998E-06	1.02052E+00	2.95259E-04	-4.48551E-04	-2.19561E-05	0.00000E+00	12.5360
14	2219	2.46482E-06	1.02044E+00	1.62555E-04	-2.39952E-04	-1.18852E-05	0.00000E+00	13.4432
15	2363	1.25856E-06	1.02039E+00	9.06834E-05	-1.29404E-04	-6.49522E-06	0.00000E+00	14.3237

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	6.50916E-05	51	9.99985E-01	6
2	1	16	6.64639E-05	6	1.00003E+00	9
3	1	16	7.02346E-05	6	1.00002E+00	10
4	1	16	7.26315E-05	4	1.00002E+00	13
5	1	16	5.68671E-05	3	1.00003E+00	17
6	1	1	4.67752E-05	3	1.00004E+00	17
7	1	1	3.72073E-05	2	1.00005E+00	26
8	1	1	3.35400E-05	2	1.00005E+00	43
9	1	1	3.16076E-05	1	1.00004E+00	51
10	1	1	3.06519E-05	1	1.00004E+00	51
11	1	1	2.94060E-05	1	1.00004E+00	51
12	1	1	3.48583E-05	1	1.00003E+00	51
13	1	1	3.57813E-05	1	1.00003E+00	51
14	1	1	3.47582E-05	1	1.00003E+00	51
15	2	51	6.33869E-07	37	1.00000E+00	51
16	2	51	1.71877E-06	51	1.00000E+00	51
17	2	51	1.97808E-06	51	1.00000E+00	51
18	2	51	1.92112E-06	51	1.00000E+00	51
19	2	51	2.29558E-06	51	1.00000E+00	51
20	2	51	1.77178E-06	37	9.99999E-01	51
21	2	51	2.50480E-06	51	9.99999E-01	51
22	2	51	2.26814E-06	51	9.99999E-01	51
23	1	41	2.95004E-05	41	1.00005E+00	51
24	1	42	8.09449E-05	42	1.00016E+00	51
25	2	50	8.89109E-07	36	1.00000E+00	51
26	2	50	1.85416E-06	51	9.99997E-01	51
27	2	51	3.25343E-06	51	9.99997E-01	51

16	2401	-3.77234E-08	1.02043E+00	8.78616E-06	-5.49751E-05	-7.33620E-07	0.00000E+00	14.6010

final monitor

lambda 1.02043E+00 production/absorption 1.02259E+00 angular flux on 16

elapsed time 14.60 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOP5.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLN"O2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
     CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  2 2 51 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       Y
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  15I0 34I14.25 49.25
     36$$  16R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.09018E+00	6.18349E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0842
2	215	1.16258E-02	9.69777E-01	-2.39204E+00	-6.74785E-01	-6.01798E-02	0.00000E+00	1.3558
3	416	4.07796E-03	1.04962E+00	8.67567E-02	-2.61966E-01	-1.76701E-02	0.00000E+00	2.5503
4	609	1.95761E-03	1.04357E+00	6.05892E-02	-1.35338E-01	-7.87640E-03	0.00000E+00	3.7012
5	794	9.77464E-04	1.03517E+00	3.70320E-02	-7.32350E-02	-3.83161E-03	0.00000E+00	4.8078
6	969	4.96898E-04	1.02917E+00	2.11844E-02	-3.90236E-02	-1.93644E-03	0.00000E+00	5.8587
7	1136	2.53996E-04	1.02553E+00	1.16751E-02	-2.06009E-02	-9.95104E-04	0.00000E+00	6.8657
8	1302	1.29747E-04	1.02344E+00	6.29635E-03	-1.07984E-02	-5.14774E-04	0.00000E+00	7.8680
9	1463	6.64168E-05	1.02225E+00	3.36641E-03	-5.63861E-03	-2.68267E-04	0.00000E+00	8.8420
10	1613	3.40120E-05	1.02158E+00	1.79718E-03	-2.94721E-03	-1.40589E-04	0.00000E+00	9.7558
11	1763	1.73753E-05	1.02119E+00	9.60360E-04	-1.54298E-03	-7.39581E-05	0.00000E+00	10.6693
12	1917	8.85612E-06	1.02097E+00	5.15724E-04	-8.09441E-04	-3.91075E-05	0.00000E+00	11.6050
13	2070	4.51539E-06	1.02085E+00	2.79609E-04	-4.26750E-04	-2.08679E-05	0.00000E+00	12.5350
14	2219	2.29687E-06	1.02077E+00	1.53411E-04	-2.26865E-04	-1.12444E-05	0.00000E+00	13.4430
15	2364	1.16268E-06	1.02073E+00	8.54786E-05	-1.21764E-04	-6.12944E-06	0.00000E+00	14.3282

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	6.56401E-05	51	9.99984E-01	6
2	1	16	6.68537E-05	6	1.00003E+00	9
3	1	16	7.05148E-05	6	1.00002E+00	10
4	1	16	6.81207E-05	4	1.00002E+00	13
5	1	16	5.67660E-05	3	1.00003E+00	17
6	1	1	4.67924E-05	3	1.00004E+00	17
7	1	1	3.71413E-05	2	1.00005E+00	26
8	1	1	3.35317E-05	2	1.00005E+00	43
9	1	1	3.15367E-05	1	1.00004E+00	51
10	1	1	3.05273E-05	1	1.00004E+00	51
11	1	1	2.92187E-05	1	1.00004E+00	51
12	1	1	3.46728E-05	1	1.00003E+00	51
13	1	1	3.55910E-05	1	1.00003E+00	51
14	1	1	3.45925E-05	1	1.00003E+00	51
15	2	51	6.25314E-07	38	1.00000E+00	51
16	2	51	1.70276E-06	51	1.00000E+00	51
17	2	51	1.96012E-06	51	1.00000E+00	51
18	2	51	1.90410E-06	51	1.00000E+00	51
19	2	51	2.27640E-06	51	1.00000E+00	51
20	2	51	1.76063E-06	37	9.99999E-01	51
21	2	51	2.49087E-06	51	9.99999E-01	51
22	2	51	2.25509E-06	51	9.99999E-01	51
23	1	41	2.95316E-05	41	1.00005E+00	51
24	1	42	8.06738E-05	42	1.00016E+00	51
25	2	50	8.87630E-07	36	1.00000E+00	51
26	2	50	1.85552E-06	35	1.00000E+00	51
27	2	51	3.28555E-06	51	9.99997E-01	51

16	2402	-3.77488E-08	1.02076E+00	8.45818E-06	-5.16020E-05	-6.69031E-07	0.00000E+00	14.6065

final monitor
lambda 1.02076E+00 production/absorption 1.02293E+00 angular flux on 16

elapsed time 14.61 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOP6.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUO2F2    1  1700.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  295  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
  0$$  A3 2  E
  1$$  2 2 51 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  15I0 34I14.25 49.25
  36$$  16R1 35R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	1.10227E+00	5.99481E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0840
2	215	1.15777E-02	9.76371E-01	-2.23954E+00	-6.62171E-01	-6.67188E-02	0.00000E+00	1.3555
3	416	4.21780E-03	1.04660E+00	8.86777E-02	-2.63951E-01	-1.83041E-02	0.00000E+00	2.5512
4	609	2.01054E-03	1.04123E+00	6.16252E-02	-1.39362E-01	-8.07868E-03	0.00000E+00	3.7008
5	794	9.93476E-04	1.03345E+00	3.73749E-02	-7.49459E-02	-3.88523E-03	0.00000E+00	4.8077
6	969	4.99894E-04	1.02781E+00	2.11886E-02	-3.95440E-02	-1.94343E-03	0.00000E+00	5.8595
7	1136	2.52968E-04	1.02437E+00	1.15709E-02	-2.06668E-02	-9.69175E-04	0.00000E+00	6.8665
8	1302	1.27928E-04	1.02241E+00	6.18422E-03	-1.07266E-02	-5.07026E-04	0.00000E+00	7.8678
9	1462	6.48417E-05	1.02129E+00	3.27885E-03	-5.54773E-03	-2.61953E-04	0.00000E+00	8.8363
10	1611	3.28704E-05	1.02065E+00	1.73668E-03	-2.87314E-03	-1.36129E-04	0.00000E+00	9.7447
11	1765	1.66140E-05	1.02030E+00	9.21277E-04	-1.49060E-03	-7.10240E-05	0.00000E+00	10.6800
12	1923	8.40841E-06	1.02009E+00	4.92536E-04	-7.75914E-04	-3.73826E-05	0.00000E+00	11.6377
13	2076	4.26500E-06	1.01997E+00	2.66561E-04	-4.07231E-04	-1.99027E-05	0.00000E+00	12.5678
14	2225	2.14023E-06	1.01989E+00	1.45637E-04	-2.15442E-04	-1.06479E-05	0.00000E+00	13.4758
15	2371	1.06793E-06	1.01985E+00	8.08422E-05	-1.14715E-04	-5.77035E-06	0.00000E+00	14.3673

		grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
		1	1	1	6.62900E-05	51	9.99984E-01	6
		2	1	16	6.75991E-05	6	1.00003E+00	9
		3	1	16	6.76911E-05	6	1.00002E+00	10
		4	1	16	6.86329E-05	4	1.00002E+00	13
		5	1	16	5.71840E-05	3	1.00003E+00	17
		6	1	1	4.66921E-05	3	1.00004E+00	17
		7	1	1	3.70435E-05	2	1.00005E+00	26
		8	1	1	3.35041E-05	2	1.00005E+00	43
		9	1	1	3.15979E-05	1	1.00005E+00	51
		10	1	1	3.06450E-05	1	1.00004E+00	51
		11	1	1	2.93909E-05	1	1.00004E+00	51
		12	1	1	3.49621E-05	1	1.00003E+00	51
		13	1	1	3.59431E-05	1	1.00003E+00	51
		14	1	1	3.50050E-05	1	1.00003E+00	51
		15	2	51	6.16555E-07	38	1.00000E+00	51
		16	2	51	1.68628E-06	51	1.00000E+00	51
		17	2	51	1.94153E-06	51	1.00000E+00	51
		18	2	51	1.88651E-06	51	1.00000E+00	51
		19	2	51	2.25665E-06	51	1.00000E+00	51
		20	2	51	1.74893E-06	37	9.99999E-01	51
		21	2	51	2.47665E-06	51	9.99999E-01	51
		22	2	51	2.24152E-06	51	9.99999E-01	51
		23	1	41	2.95973E-05	41	1.00005E+00	51
		24	1	42	8.04534E-05	42	1.00016E+00	51
		25	2	50	8.86548E-07	36	1.00000E+00	51
		26	2	50	1.85770E-06	36	1.00000E+00	51
		27	2	51	3.30479E-06	51	9.99997E-01	51
16	2409	-3.77806E-08	1.01988E+00	8.13611E-06	-4.84250E-05	-5.92154E-07	0.00000E+00	14.6450

final monitor

lambda 1.01988E+00 production/absorption 1.02206E+00 angular flux on 16

elapsed time 14.65 min.

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOP7.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUO2F2    1  1800.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
  0$$  A3 2  E
  1$$  2 2 51 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  15I0 34I14.25 49.25
  36$$  16R1 35R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	4.44089E-16	1.11291E+00	5.81260E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0840
2	215	1.15625E-02	9.80683E-01	-2.10212E+00	-6.51413E-01	-6.13494E-02	0.00000E+00	1.3555
3	416	4.34309E-03	1.04277E+00	9.05682E-02	-2.66735E-01	-1.88677E-02	0.00000E+00	2.5502
4	609	2.05478E-03	1.03804E+00	6.26293E-02	-1.43170E-01	-8.24365E-03	0.00000E+00	3.7008
5	795	1.00487E-03	1.03081E+00	3.76861E-02	-7.64740E-02	-3.92056E-03	0.00000E+00	4.8132
6	970	5.00919E-04	1.02545E+00	2.11882E-02	-3.99636E-02	-1.94288E-03	0.00000E+00	5.8640
7	1137	2.51127E-04	1.02220E+00	1.14710E-02	-2.06933E-02	-9.80210E-04	0.00000E+00	6.8720
8	1303	1.25798E-04	1.02034E+00	6.08023E-03	-1.06417E-02	-4.98138E-04	0.00000E+00	7.8733
9	1462	6.31548E-05	1.01928E+00	3.19831E-03	-5.45414E-03	-2.55241E-04	0.00000E+00	8.8365
10	1606	3.17154E-05	1.01868E+00	1.68195E-03	-2.80014E-03	-1.31629E-04	0.00000E+00	9.7170
11	1760	1.58720E-05	1.01834E+00	8.86415E-04	-1.44066E-03	-6.81657E-05	0.00000E+00	10.6527
12	1918	7.96964E-06	1.01814E+00	4.71795E-04	-7.44366E-04	-3.56968E-05	0.00000E+00	11.6103
13	2071	4.01022E-06	1.01802E+00	2.54550E-04	-3.88502E-04	-1.89260E-05	0.00000E+00	12.5402
14	2220	1.99395E-06	1.01795E+00	1.38780E-04	-2.04516E-04	-1.00880E-05	0.00000E+00	13.4483
15	2366	9.85742E-07	1.01791E+00	7.69965E-05	-1.08447E-04	-5.45551E-06	0.00000E+00	14.3403

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	6.66471E-05	51	9.99984E-01	6
2	1	16	6.77064E-05	6	1.00003E+00	9
3	1	16	6.75570E-05	6	1.00002E+00	10
4	1	16	6.84139E-05	4	1.00002E+00	13
5	1	16	5.69276E-05	3	1.00004E+00	17
6	1	1	4.64021E-05	3	1.00004E+00	17
7	1	16	3.67665E-05	2	1.00005E+00	26
8	1	1	3.32764E-05	2	1.00005E+00	43
9	1	1	3.13451E-05	1	1.00005E+00	51
10	1	1	3.03760E-05	1	1.00004E+00	51
11	1	1	2.90990E-05	1	1.00004E+00	51
12	1	1	3.46169E-05	1	1.00003E+00	51
13	1	1	3.55799E-05	1	1.00003E+00	51
14	1	1	3.46672E-05	1	1.00003E+00	51
15	2	51	6.10178E-07	38	1.00000E+00	51
16	2	51	1.67369E-06	51	1.00000E+00	51
17	2	51	1.92717E-06	51	1.00000E+00	51
18	2	51	1.87292E-06	51	1.00000E+00	51
19	2	51	2.24155E-06	51	1.00000E+00	51
20	2	51	1.74220E-06	37	9.99999E-01	51
21	2	51	2.46702E-06	51	9.99999E-01	51
22	2	51	2.23306E-06	51	9.99999E-01	51
23	1	41	2.96407E-05	41	1.00005E+00	51
24	1	42	8.02512E-05	42	1.00016E+00	51
25	2	50	8.81160E-07	37	1.00000E+00	51
26	2	50	1.85713E-06	37	1.00000E+00	51
27	2	51	3.24753E-06	51	9.99997E-01	51

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
16	2404	-3.78184E-08	1.01794E+00	7.87853E-06	-4.57392E-05	-5.31874E-07	0.00000E+00	14.6163

final monitor lambda 1.01794E+00 production/absorption 1.02012E+00 angular flux on 1(

elapsed time 14.62 min.

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
- module CSASI    will be called
  UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                  UOXCYOP6.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUO2F2    1  2000.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
- module XSDRN    will be called
  CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
  0$$  A3 2  E
  1$$  2 2 51 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  15I0 34I14.25 49.25
  36$$  16R1 35R2
  39$$  1 2
  40$$  F3
  41**  1 0
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	1.13050E+00	5.46803E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0833
2	216	1.16135E-02	9.83669E-01	-1.86501E+00	-6.34907E-01	-6.28090E-02	0.00000E+00	1.3632
3	417	4.55419E-03	1.03318E+00	9.43084E-02	-2.74154E-01	-1.97988E-02	0.00000E+00	2.5605
4	613	2.11950E-03	1.02958E+00	6.45538E-02	-1.50225E-01	-8.47223E-03	0.00000E+00	3.7305
5	800	1.01705E-03	1.02317E+00	3.82767E-02	-7.90830E-02	-3.94912E-03	0.00000E+00	4.8510
6	977	4.97194E-04	1.01834E+00	2.11516E-02	-4.05626E-02	-1.92025E-03	0.00000E+00	5.9155
7	1145	2.44955E-04	1.01535E+00	1.12659E-02	-2.06151E-02	-9.53167E-04	0.00000E+00	6.9307
8	1312	1.20683E-04	1.01364E+00	5.88480E-03	-1.04241E-02	-4.77270E-04	0.00000E+00	7.9405
9	1470	5.96132E-05	1.01267E+00	3.05529E-03	-5.25958E-03	-2.41221E-04	0.00000E+00	8.8998
10	1620	2.94269E-05	1.01211E+00	1.58713E-03	-2.66007E-03	-1.22720E-04	0.00000E+00	9.8153
11	1778	1.44849E-05	1.01180E+00	8.28139E-04	-1.34891E-03	-6.28087E-05	0.00000E+00	10.7757
12	1936	7.17502E-06	1.01162E+00	4.37879E-04	-6.88643E-04	-3.26332E-05	0.00000E+00	11.7358
13	2090	3.56708E-06	1.01150E+00	2.35527E-04	-3.56404E-04	-1.72163E-05	0.00000E+00	12.6733
14	2239	1.74470E-06	1.01144E+00	1.28146E-04	-1.86322E-04	-9.12727E-06	0.00000E+00	13.5832
15	2385	8.42679E-07	1.01140E+00	7.09791E-05	-9.80201E-05	-4.90594E-06	0.00000E+00	14.4765

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	6.75249E-05	51	9.99983E-01	6
2	1	16	6.79629E-05	6	1.00003E+00	9
3	1	16	6.73703E-05	6	1.00002E+00	10
4	1	16	6.80558E-05	4	1.00002E+00	13
5	1	16	7.12227E-05	4	1.00003E+00	16
6	1	1	4.60794E-05	3	1.00004E+00	17
7	1	16	3.67135E-05	2	1.00005E+00	26
8	1	1	3.32621E-05	2	1.00005E+00	43
9	1	1	3.35139E-05	2	1.00005E+00	43
10	1	1	3.09066E-05	1	1.00004E+00	51
11	1	1	2.96247E-05	1	1.00004E+00	51
12	1	1	3.53190E-05	1	1.00003E+00	51
13	1	1	3.63343E-05	1	1.00003E+00	51
14	1	1	3.54818E-05	1	1.00003E+00	51
15	2	51	5.99868E-07	38	1.00000E+00	51
16	2	51	1.65407E-06	51	1.00000E+00	51
17	2	51	1.90491E-06	51	1.00000E+00	51
18	2	51	1.85199E-06	51	1.00000E+00	51
19	2	51	2.21834E-06	51	1.00000E+00	51
20	2	51	1.73311E-06	37	9.99999E-01	51
21	2	51	2.45431E-06	51	9.99999E-01	51
22	2	51	2.22240E-06	51	9.99999E-01	51
23	1	42	2.97206E-05	42	1.00005E+00	51
24	1	42	7.99032E-05	42	1.00015E+00	51
25	2	50	8.75698E-07	37	1.00000E+00	51
26	2	50	1.86115E-06	37	1.00000E+00	51
27	2	51	3.21478E-06	51	9.99997E-01	51

16	2423	-3.79096E-08	1.01142E+00	7.40547E-06	-4.12979E-05	-3.89365E-07	0.00000E+00	14.7548

final monitor

lambda 1.01142E+00 production/absorption 1.01361E+00 angular flux on 16

elapsed time 14.75 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOP9.CJW
  27GROUPNDF4                 INFHOMMEDIUM
  SOLNUO2F2    1  2200.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
  0$$  A3 2  E
  1$$  2 2 51 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  15I0 34I14.25 49.25
  36$$  16R1 35R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	1.11022E-16	1.14395E+00	5.15078E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0843
2	216	1.17486E-02	9.80698E-01	-1.66855E+00	-6.24296E-01	-6.44246E-02	0.00000E+00	1.3623
3	417	4.71954E-03	1.02151E+00	9.80657E-02	-2.83424E-01	-2.04955E-02	0.00000E+00	2.5567
4	614	2.15796E-03	1.01883E+00	6.64287E-02	-1.56705E-01	-8.58803E-03	0.00000E+00	3.7293
5	802	1.01615E-03	1.01305E+00	3.87948E-02	-8.11829E-02	-3.92654E-03	0.00000E+00	4.8528
6	981	4.87735E-04	1.00857E+00	2.10849E-02	-4.08753E-02	-1.87622E-03	0.00000E+00	5.9255
7	1151	2.36247E-04	1.00578E+00	1.10561E-02	-2.04065E-02	-9.16964E-04	0.00000E+00	6.9492
8	1318	1.14552E-04	1.00417E+00	5.69677E-03	-1.01519E-02	-4.52796E-04	0.00000E+00	7.9570
9	1476	5.56752E-05	1.00326E+00	2.92121E-03	-5.04553E-03	-2.25823E-04	0.00000E+00	8.9143
10	1626	2.70460E-05	1.00274E+00	1.50132E-03	-2.51542E-03	-1.13505E-04	0.00000E+00	9.8280
11	1784	1.30886E-05	1.00245E+00	7.76349E-04	-1.25842E-03	-5.74356E-05	0.00000E+00	10.7857
12	1942	6.38537E-06	1.00227E+00	4.07921E-04	-6.34731E-04	-2.95964E-05	0.00000E+00	11.7430
13	2096	3.13565E-06	1.00217E+00	2.18938E-04	-3.25707E-04	-1.55510E-05	0.00000E+00	12.6785
14	2245	1.50683E-06	1.00210E+00	1.19040E-04	-1.69217E-04	-8.20780E-06	0.00000E+00	13.5868
15	2391	7.09652E-07	1.00207E+00	6.59377E-05	-8.84004E-05	-4.39157E-06	0.00000E+00	14.4785

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	16	7.12422E-05	8	1.00002E+00	6
2	1	16	6.81108E-05	6	1.00003E+00	9
3	1	16	6.72346E-05	5	1.00003E+00	11
4	1	16	6.75826E-05	5	1.00002E+00	12
5	1	16	7.07839E-05	4	1.00004E+00	16
6	1	1	4.57262E-05	3	1.00004E+00	17
7	1	16	3.62037E-05	2	1.00005E+00	26
8	1	1	3.29512E-05	2	1.00005E+00	43
9	1	1	3.32201E-05	2	1.00005E+00	43
10	1	1	3.26729E-05	2	1.00004E+00	43
11	1	1	2.97032E-05	1	1.00004E+00	51
12	1	1	3.54515E-05	1	1.00004E+00	51
13	1	1	3.64686E-05	1	1.00003E+00	51
14	1	1	3.56648E-05	1	1.00003E+00	51
15	2	12	1.22814E-06	38	1.00000E+00	43
16	2	51	1.64054E-06	51	1.00000E+00	43
17	2	51	1.89135E-06	51	1.00000E+00	51
18	2	51	1.83962E-06	51	1.00000E+00	51
19	2	51	2.20541E-06	51	1.00000E+00	51
20	2	51	1.72909E-06	37	9.99999E-01	51
21	2	51	2.45058E-06	51	9.99999E-01	51
22	2	51	2.21573E-06	51	9.99999E-01	51
23	1	42	2.98548E-05	42	1.00005E+00	51
24	1	42	7.96423E-05	42	1.00015E+00	51
25	2	50	8.72628E-07	37	1.00000E+00	51
26	2	51	2.05569E-06	51	9.99997E-01	51
27	2	51	3.25218E-06	51	9.99997E-01	51

16	2429	-3.80187E-08	1.00209E+00	6.92760E-06	-3.73833E-05	-2.54356E-07	0.00000E+00	14.7558

final monitor

lambda 1.00209E+00 production/absorption 1.00427E+00 angular flux on 16

elapsed time 14.76 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOF1.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  1000.0 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    1$$  1 2 50 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  9I0 39I7.1 47.1
    36$$  10R1 40R2
    39$$  1 2
    40$$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	9.54419E-01	7.73261E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0670
2	216	1.35986E-02	8.11881E-01	-4.29066E+00	-8.31988E-01	-6.18717E-02	0.00000E+00	0.3242
3	405	2.63812E-03	1.01574E+00	7.54277E-02	-3.05337E-01	-1.10436E-02	0.00000E+00	0.5575
4	598	1.17465E-03	1.01225E+00	4.86936E-02	-9.80007E-02	-4.65747E-03	0.00000E+00	0.7938
5	783	5.83398E-04	1.00353E+00	2.84534E-02	-4.83324E-02	-2.29450E-03	0.00000E+00	1.0227
6	959	2.99441E-04	9.97539E-01	1.60089E-02	-2.53678E-02	-1.18364E-03	0.00000E+00	1.2443
7	1128	1.56932E-04	9.93847E-01	8.89488E-03	-1.35088E-02	-6.26976E-04	0.00000E+00	1.4592
8	1289	8.37919E-05	9.91625E-01	4.94706E-03	-7.28408E-03	-3.39415E-04	0.00000E+00	1.6672
9	1440	4.54542E-05	9.90299E-01	2.77226E-03	-3.98373E-03	-1.87106E-04	0.00000E+00	1.8657
10	1584	2.50850E-05	9.89502E-01	1.57260E-03	-2.21152E-03	-1.05083E-04	0.00000E+00	2.0588
11	1728	1.40388E-05	9.89021E-01	9.03571E-04	-1.24747E-03	-5.99477E-05	0.00000E+00	2.2510
12	1873	7.97992E-06	9.88727E-01	5.26846E-04	-7.14348E-04	-3.47774E-05	0.00000E+00	2.4443
13	2017	4.61570E-06	9.88545E-01	3.12391E-04	-4.16045E-04	-2.05484E-05	0.00000E+00	2.6375
14	2161	2.71825E-06	9.88430E-01	1.88571E-04	-2.46850E-04	-1.23734E-05	0.00000E+00	2.8297
15	2305	1.62636E-06	9.88356E-01	1.15806E-04	-1.49243E-04	-7.58408E-06	0.00000E+00	3.0230
16	2449	9.84023E-07	9.88309E-01	7.22054E-05	-9.17979E-05	-4.71973E-06	0.00000E+00	3.2152

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	10	1.82475E-05	47	9.99998E-01	6
2	1	10	1.81283E-05	25	9.99996E-01	9
3	1	10	1.91932E-05	23	9.99997E-01	10
4	1	10	2.17569E-05	18	9.99997E-01	12
5	1	10	1.75573E-05	4	1.00000E+00	16
6	1	9	1.30815E-05	3	1.00001E+00	17
7	1	9	1.03581E-05	3	1.00001E+00	24
8	1	10	6.07935E-06	2	1.00001E+00	45
9	1	1	4.97545E-06	2	1.00001E+00	45
10	1	1	4.37549E-06	16	9.99995E-01	45
11	1	17	3.97761E-06	17	9.99995E-01	45
12	1	17	4.83057E-06	18	9.99996E-01	45
13	1	18	4.97827E-06	18	9.99996E-01	45
14	1	19	4.79589E-06	19	9.99996E-01	45
15	2	10	3.87425E-07	31	1.00000E+00	45
16	2	50	9.50342E-07	50	1.00000E+00	45
17	2	50	1.28579E-06	50	1.00000E+00	45
18	2	50	1.24885E-06	50	1.00000E+00	45
19	2	50	1.49755E-06	50	1.00000E+00	45
20	2	50	1.12057E-06	31	9.99999E-01	50
21	2	50	1.61299E-06	50	1.00000E+00	50
22	2	50	1.45883E-06	50	9.99999E-01	50
23	1	36	2.33376E-05	37	1.00004E+00	50
24	1	37	6.27397E-05	37	1.00012E+00	50
25	1	37	9.08290E-05	37	1.00012E+00	50
26	1	37	9.93355E-05	37	1.00022E+00	50
27	2	49	1.29145E-06	50	9.99998E-01	50

17	2485	-3.76123E-08	9.88341E-01	6.48335E-06	-4.39315E-05	-6.80865E-07	0.00000E+00	3.2718

final monitor

lambda 9.88340E-01 production/absorption 9.88982E-01 angular flux on 16

elapsed time 3.27 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI     will be called
      UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOP2.CJW
      27GROUPNDF4                INFHOMMEDIUM
      SOLNUO2F2     1  1200.0 0 1.0 293   92235 5.02  92238 94.98  END
      H2O           2  1.0  293  END
      END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN     will be called
      SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
      0$$  A3 2  E
      1$$  1 2 50 1 0   2 2 16 3 1
       10 50 0 0 0
      2$$  -2 0 0 0 0    0 -1 0 0 0
      3$$  0 0 0 1 0     0 0 0 0 0
           0 0
      5**  A4 0  0  E
        T
      13$$  1 2
      14$$  1 2
      15**  F1
        T
      34**  F1
        T
      35**  9I0 39I7.1 47.1
      36$$  10R1 40R2
      39$$  1 2
      40$$  F3
        T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-4.44089E-16	1.00391E+00	7.34303E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0688
2	216	1.29772E-02	8.64639E-01	-3.64784E+00	-7.81740E-01	-6.11025E-02	0.00000E+00	0.3258
3	410	3.06019E-03	1.02982E+00	8.04132E-02	-2.87399E-01	-1.28557E-02	0.00000E+00	0.5628
4	604	1.35696E-03	1.02890E+00	5.10747E-02	-1.08071E-01	-5.38783E-03	0.00000E+00	0.8012
5	789	6.54966E-04	1.02226E+00	2.91854E-02	-5.33371E-02	-2.57180E-03	0.00000E+00	1.0300
6	966	3.26439E-04	1.01740E+00	1.60085E-02	-2.72766E-02	-1.28709E-03	0.00000E+00	1.2522
7	1134	1.66646E-04	1.01432E+00	8.68188E-03	-1.41322E-02	-6.64384E-04	0.00000E+00	1.4665
8	1294	8.68020E-05	1.01244E+00	4.72107E-03	-7.43212E-03	-3.51373E-04	0.00000E+00	1.6735
9	1443	4.61230E-05	1.01131E+00	2.59612E-03	-3.97455E-03	-1.90069E-04	0.00000E+00	1.8703
10	1587	2.50052E-05	1.01062E+00	1.45001E-03	-2.16604E-03	-1.05090E-04	0.00000E+00	2.0623
11	1737	1.37975E-05	1.01021E+00	8.23303E-04	-1.20349E-03	-5.92413E-05	0.00000E+00	2.2610
12	1886	7.76871E-06	1.00995E+00	4.76360E-04	-6.81601E-04	-3.41095E-05	0.00000E+00	2.4578
13	2030	4.45471E-06	1.00979E+00	2.80751E-04	-3.93976E-04	-2.00232E-05	0.00000E+00	2.6503
14	2174	2.60794E-06	1.00969E+00	1.68788E-04	-2.32363E-04	-1.20080E-05	0.00000E+00	2.8433
15	2318	1.55804E-06	1.00962E+00	1.03565E-04	-1.40072E-04	-7.35707E-06	0.00000E+00	3.0355
16	2462	9.43420E-07	1.00958E+00	6.46531E-05	-8.61821E-05	-4.58535E-06	0.00000E+00	3.2287

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	10	1.92281E-05	47	9.99998E-01	6
2	1	10	1.87407E-05	25	9.99996E-01	9
3	1	10	1.97743E-05	23	9.99997E-01	10
4	1	10	2.24521E-05	5	1.00000E+00	12
5	1	10	1.79985E-05	4	1.00001E+00	16
6	1	10	1.43424E-05	4	1.00001E+00	16
7	1	9	1.06042E-05	3	1.00001E+00	24
8	1	10	6.21570E-06	2	1.00001E+00	45
9	1	1	5.05260E-06	2	1.00001E+00	45
10	1	1	4.40747E-06	16	9.99995E-01	45
11	1	17	4.01910E-06	17	9.99995E-01	45
12	1	17	4.85439E-06	18	9.99996E-01	45
13	1	18	5.00855E-06	19	9.99996E-01	45
14	1	19	4.83366E-06	19	9.99996E-01	45
15	2	10	4.34706E-07	31	1.00000E+00	45
16	2	50	8.99525E-07	50	1.00000E+00	45
17	2	50	1.26913E-06	50	1.00000E+00	45
18	2	50	1.23256E-06	50	1.00000E+00	45
19	2	50	1.47966E-06	50	1.00000E+00	45
20	2	50	1.10815E-06	31	9.99999E-01	45
21	2	50	1.59458E-06	50	1.00000E+00	50
22	2	50	1.44096E-06	50	9.99999E-01	50
23	1	36	2.32829E-05	37	1.00004E+00	50
24	1	37	6.23249E-05	37	1.00012E+00	50
25	1	37	9.01985E-05	37	1.00012E+00	50
26	1	37	9.86452E-05	37	1.00022E+00	50
27	2	49	1.31428E-06	50	9.99998E-01	50

17	2498	-3.75680E-08	1.00961E+00	6.22522E-06	-4.07997E-05	-7.09034E-07	0.00000E+00	3.2855

final monitor

lambda 1.00961E+00 production/absorption 1.01027E+00 angular flux on 16

- elapsed time 3.29 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
   UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOP3.CJW
   27GROUPNDF4                INFHOMMEDIUM
   SOLNUO2F2    1  1400.0 0 1.0 293   92235 5.02  92238 94.98  END
   H2O          2  1.0  293  END
   END COMP
  secondary module o0o008   has been called.
  module o0o008   is finished.
  secondary module o0o002   has been called.
  module o0o002   is finished.
  secondary module o0o007   has been called.
  module o0o007   is finished.
  module csasi    is finished.
 module XSDRN    will be called
   SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
   0$$  A3 2  E
   1$$  1 2 50 1 0   2 2 16 3 1
    10 50 0 0 0
   2$$  -2 0 0 0 0    0 -1 0 0 0
   3$$  0 0 0 1 0     0 0 0 0 0
        0 0
   5**  A4 0  0  E
     T
   13$$  1 2
   14$$  1 2
   15**  F1
     T
   34**  F1
     T
   35**  9I0 39I7.1 47.1
   36$$  10R1 40R2
   39$$  1 2
   40$$  F3
     T
WARNING: an "END" statement is assumed at end of input file
  module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	2.22045E-16	1.04240E+00	6.97481E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0688
2	215	1.25845E-02	9.00031E-01	-3.15461E+00	-7.42091E-01	-6.10753E-02	0.00000E+00	0.3250
3	411	3.41409E-03	1.03486E+00	8.47415E-02	-2.79432E-01	-1.43928E-02	0.00000E+00	0.5638
4	607	1.49888E-03	1.03637E+00	5.30405E-02	-1.16657E-01	-5.94973E-03	0.00000E+00	0.8030
5	793	7.05433E-04	1.03155E+00	2.97078E-02	-5.71839E-02	-2.76287E-03	0.00000E+00	1.0337
6	970	3.43005E-04	1.02764E+00	1.59445E-02	-2.85751E-02	-1.34851E-03	0.00000E+00	1.2560
7	1138	1.71207E-04	1.02504E+00	8.47101E-03	-1.44643E-02	-6.81189E-04	0.00000E+00	1.4693
8	1296	8.74476E-05	1.02343E+00	4.52493E-03	-7.44984E-03	-3.53808E-04	0.00000E+00	1.6753
9	1440	4.56802E-05	1.02244E+00	2.45[illegible]E-03	-3.91384E-03	-1.88520E-04	0.00000E+00	1.8675
10	1590	2.44022E-05	1.02183E+00	1.35250E-03	-2.10126E-03	-1.02942E-04	0.00000E+00	2.0652
11	1740	1.33295E-05	1.02146E+00	7.61699E-04	-1.15393E-03	-5.75683E-05	0.00000E+00	2.2632
12	1889	7.45587E-06	1.02123E+00	4.38596E-04	-6.48715E-04	-3.29903E-05	0.00000E+00	2.4608
13	2035	4.26299E-06	1.02108E+00	2.58054E-04	-3.73488E-04	-1.93380E-05	0.00000E+00	2.6548
14	2179	2.49223E-06	1.02099E+00	1.55106E-04	-2.20028E-04	-1.15954E-05	0.00000E+00	2.8470
15	2323	1.48883E-06	1.02093E+00	9.52488E-05	-1.32667E-04	-7.11073E-06	0.00000E+00	3.0402

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	10	3.03152E-05	50	9.99996E-01	6
2	1	10	2.90365E-05	25	9.99993E-01	9
3	1	10	3.05592E-05	23	9.99995E-01	10
4	1	10	3.47422E-05	5	1.00000E+00	12
5	1	10	2.76262E-05	4	1.00001E+00	16
6	1	10	2.20276E-05	4	1.00001E+00	16
7	1	9	1.63594E-05	3	1.00001E+00	24
8	1	10	9.64176E-06	2	1.00001E+00	45
9	1	1	7.93770E-06	2	1.00001E+00	45
10	1	1	6.98197E-06	17	9.99992E-01	[illegible]
11	1	17	6.34906E-06	17	9.99992E-01	45
12	1	17	7.66847E-06	18	9.99993E-01	45
13	1	19	7.93614E-06	19	9.99994E-01	45
14	1	19	7.66358E-06	19	9.99993E-01	45
15	2	10	7.10095E-07	31	1.00000E+00	45
16	2	50	1.42713E-06	50	1.00000E+00	45
17	2	50	1.67656E-06	50	1.00000E+00	45
18	2	50	1.62734E-06	50	1.00000E+00	45
19	2	50	1.94714E-06	50	1.00000E+00	45
20	2	50	1.44297E-06	31	9.99999E-01	45
21	2	50	2.07857E-06	50	9.99999E-01	50
22	2	50	1.87961E-06	50	9.99999E-01	50
23	1	36	3.02520E-05	36	1.00005E+00	50
24	1	36	8.16133E-05	37	1.00016E+00	50
25	2	49	7.33519E-07	30	1.00000E+00	50
26	2	50	1.97566E-06	50	9.99997E-01	50
27	2	49	1.81117E-06	50	9.99998E-01	50

16	2361	-3.75663E-08	1.02098E+00	9.70193E-06	-6.13464E-05	-1.16290E-06	0.00000E+00	3.0988

final monitor lambda 1.02098E+00 production/absorption 1.02165E+00 angular flux on 16

elapsed time 3.10 min.

```
        primary modul» ·  ess and input record ( scale driver - 10/31/90 - 14:00 )
   module CSASI    will ·  called
     UO2F2 SOLUTION   OP ZIMIZE CONCENTRATION   SLAB            UOXSLOP4.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLNUO2F2    1  ·500.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
   module XSDRN    will be called
     SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  1 2 50 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
        T
     34**  F1
        T
     35**  9I0 39I7.1 47.1
     36$$  10R1 40R2
     39$$  1 2
     40$$  F3
        T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	1.05846E+00	6.79889E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0687
2	215	1.24583E-02	9.12595E-01	-2.94916E+00	-7.25689E-01	-6.12805E-02	0.00000E+00	0.3250
3	412	3.56608E-03	1.03514E+00	8.67253E-02	-2.77967E-01	-1.50553E-02	0.00000E+00	0.5648
4	608	1.55597E-03	1.03774E+00	5.39125E-02	-1.20469E-01	-6.17287E-03	0.00000E+00	0.8037
5	794	7.23917E-04	1.03370E+00	2.99180E-02	-5.87614E-02	-2.83115E-03	0.00000E+00	1.0343
6	971	3.48120E-04	1.03018E+00	1.59005E-02	-2.90521E-02	-1.36666E-03	0.00000E+00	1.2570
7	1139	1.72039E-04	1.02778E+00	8.37120E-03	-1.45534E-02	-6.83883E-04	0.00000E+00	1.4710
8	1297	8.71081E-05	1.02627E+00	4.43679E-03	-7.42695E-03	-3.52411E-04	0.00000E+00	1.6763
9	1441	4.51771E-05	1.02533E+00	2.38874E-03	-3.87175E-03	-1.86614E-04	0.00000E+00	1.8685
10	1591	2.39932E-05	1.02476E+00	1.31178E-03	-2.08601E-03	-1.01420E-04	0.00000E+00	2.0662
11	1741	1.30538E-05	1.02440E+00	7.36556E-04	-1.12949E-03	-5.65487E-05	0.00000E+00	2.2648
12	1891	7.28484E-06	1.02418E+00	4.23486E-04	-6.33270E-04	-3.23598E-05	0.00000E+00	2.4625
13	2038	4.16887E-06	1.02404E+00	2.49335E-04	-3.64365E-04	-1.89907E-05	0.00000E+00	2.6575
14	2182	2.43360E-06	1.02395E+00	1.49857E-04	-2.14765E-04	-1.13805E-05	0.00000E+00	2.8508
15	2326	1.45126E-06	1.02389E+00	9.19627E-05	-1.29395E-04	-6.97323E-06	0.00000E+00	3.0430

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	10	3.08491E-05	50	9.99996E-01	6
2	1	10	2.93391E-05	31	9.99993E-01	9
3	1	10	3.07673E-05	23	9.99995E-01	10
4	1	10	3.50110E-05	5	1.00001E+00	12
5	1	10	2.77464E-05	4	1.00001E+00	16
6	1	10	2.21365E-05	4	1.00001E+00	16
7	1	9	1.64779E-05	3	1.00001E+00	24
8	1	10	9.68801E-06	2	1.00001E+00	45
9	1	1	8.00377E-06	2	1.00001E+00	45
10	1	1	7.03806E-06	17	9.99992E-01	45
11	1	17	6.45690E-06	18	9.99992E-01	45
12	1	18	7.80776E-06	19	9.99993E-01	45
13	1	19	8.10537E-06	19	9.99993E-01	45
14	1	19	7.81605E-06	19	9.99993E-01	45
15	2	10	7.31239E-07	31	1.00000E+00	45
16	2	50	1.42142E-06	50	1.00000E+00	45
17	2	50	1.67089E-06	50	1.00000E+00	45
18	2	50	1.62187E-06	50	1.00000E+00	45
19	2	50	1.94057E-06	50	1.00000E+00	45
20	2	50	1.43784E-06	31	9.99999E-01	45
21	2	50	2.07215E-06	50	9.99999E-01	50
22	2	50	1.87257E-06	50	9.99999E-01	50
23	1	36	3.02282E-05	36	1.00005E+00	50
24	1	37	8.14205E-05	37	1.00016E+00	50
25	2	49	7.31938E-07	30	1.00000E+00	50
26	2	50	1.97146E-06	50	9.99997E-01	50
27	2	49	1.81953E-06	50	9.99998E-01	50

16	2[illegible]	4	-3.75784E-08	1.02394E+00	9.67238E-06	-5.95774E-05	-1.17205E-06	0.00000E+00	3.1015

[illegible]al monitor

lambda 1.02394E+00 production/absorption 1.02461E+00 angular flux on 16

[illegible] elapsed time 3.10 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOP5.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
     SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  1 2 50 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  9I0 39I7.1 47.1
     36$$  10R1 40R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	1.11022E-16	1.07278E+00	6.62853E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0703
2	215	1.23714E-02	9.22337E-01	-2.76563E+00	-7.11313E-01	-6.16021E-02	0.00000E+00	0.3268
3	413	3.70248E-03	1.03429E+00	8.86197E-02	-2.77748E-01	-1.56495E-02	0.00000E+00	0.5685
4	609	1.60463E-03	1.03790E+00	5.47274E-02	-1.24003E-01	-6.36094E-03	0.00000E+00	0.8075
5	795	7.38446E-04	1.03456E+00	3.01023E-02	-6.01446E-02	-2.88365E-03	0.00000E+00	1.0370
6	972	3.51449E-04	1.03107E+00	1.58513E-02	-2.94354E-02	-1.37784E-03	0.00000E+00	1.2597
7	1140	1.72084E-04	1.02914E+00	8.27526E-03	-1.46024E-02	-6.83522E-04	0.00000E+00	1.4737
8	1298	8.64317E-05	1.02772E+00	4.35472E-03	-7.38855E-03	-3.49697E-04	0.00000E+00	1.6788
9	1442	4.45344E-05	1.02683E+00	2.33158E-03	-3.82459E-03	-1.84153E-04	0.00000E+00	1.8718
10	1592	2.35289E-05	1.02628E+00	1.27519E-03	-2.02971E-03	-9.96708E-05	0.00000E+00	2.0698
11	1742	1.27575E-05	1.02594E+00	7.14260E-04	-1.10535E-03	-5.54395E-05	0.00000E+00	2.2675
12	1892	7.10691E-06	1.02572E+00	4.10248E-04	-6.18406E-04	-3.16954E-05	0.00000E+00	2.4653
13	2039	4.06528E-06	1.02558E+00	2.41557E-04	-3.55573E-04	-1.86041E-05	0.00000E+00	2.6612
14	2183	2.37349E-06	1.02550E+00	1.45275E-04	-2.09644E-04	-1.11563E-05	0.00000E+00	2.8533
15	2327	1.41632E-06	1.02544E+00	8.92350E-05	-1.26413E-04	-6.84301E-06	0.00000E+00	3.0455

	grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
	1	1	10	3.12540E-05	50	9.99996E-01	6
	2	1	10	2.94763E-05	31	9.99993E-01	9
	3	1	10	3.08571E-05	23	9.99995E-01	10
	4	1	10	3.51249E-05	5	1.00001E+00	12
	5	1	10	2.77518E-05	4	1.00001E+00	16
	6	1	10	2.21256E-05	4	1.00001E+00	16
	7	1	9	1.64686E-05	3	1.00001E+00	24
	8	1	10	9.64333E-06	2	1.00001E+00	45
	9	1	1	7.94202E-06	2	1.00001E+00	45
	10	1	1	6.96981E-06	17	9.99992E-01	45
	11	1	17	6.40894E-06	18	9.99992E-01	45
	12	1	19	7.75447E-06	19	9.99993E-01	45
	13	1	19	8.05743E-06	19	9.99994E-01	45
	14	1	19	7.76059E-06	20	9.99993E-01	45
	15	2	10	7.57150E-07	31	1.00000E+00	45
	16	2	50	1.44159E-06	50	1.00000E+00	45
	17	2	50	1.66135E-06	50	1.00000E+00	45
	18	2	50	1.61282E-06	50	1.00000E+00	45
	19	2	50	1.93033E-06	50	1.00000E+00	45
	20	2	50	1.42939E-06	31	9.99999E-01	45
	21	2	50	2.06302E-06	50	9.99999E-01	50
	22	2	50	1.86242E-06	50	9.99999E-01	50
	23	1	36	3.02410E-05	36	1.00005E+00	50
	24	1	37	8.12744E-05	37	1.00016E+00	50
	25	2	49	7.24749E-07	30	1.00000E+00	50
	26	2	50	1.96686E-06	50	9.99997E-01	50
	27	2	49	1.83516E-06	50	9.99998E-01	50

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
16	2365	-3.75979E-08	1.02548E+00	9.68886E-06	-5.80777E-05	-1.18342E-06	0.00000E+00	3.1042

final monitor lambda 1.02548E+00 production/absorption 1.02616E+00 angular flux on 16

- elapsed time 3.10 min.

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 - module CSASI    will be called
   UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOP6.CJW
   27GROUPNDF4                INFHOMMEDIUM
   SOLNUO2F2    1  1700.0 0 1.0 293   92235 5.02  92238 94.98  END
   H2O          2  1.0  293  END
   END COMP
  secondary module o0o008   has been called.
  module o0o008   is finished.
  secondary module o0o002   has been called.
  module o0o002   is finished.
  secondary module o0o007   has been called.
  module o0o007   is finished.
  module csasi    is finished.
 - module XSDRN    will be called
   SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
   0$$  A3 2  E
   1$$  1 2 50 1 0   2 2 16 3 1
    10 50 0 0 0
   2$$  -2 0 0 0 0    0 -1 0 0 0
   3$$  0 0 0 1 0     0 0 0 0 0
        0 0
   5**  A4 0  0  E
     T
   13$$  1 2
   14$$  1 2
   15**  F1
     T
   34**  F1
     T
   35**  9I0 39I7.1 47.1
   36$$  10R1 40R2
   39$$  1 2
   40$$  F3
     T
WARNING. an "END" statement is assumed at end of input file
  module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.08551E+00	6.46387E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0695
2	215	1.23190E-02	9.29615E-01	-2.60088E+00	-6.98795E-01	-6.20201E-02	0.00000E+00	0.3258
3	413	3.82438E-03	1.03249E+00	9.04489E-02	-2.78543E-01	-1.61789E-02	0.00000E+00	0.5675
4	608	1.64553E-03	1.03702E+00	5.54969E-02	-1.27296E-01	-6.51682E-03	0.00000E+00	0.8055
5	793	7.49427E-04	1.03429E+00	3.02668E-02	-6.13593E-02	-2.92208E-03	0.00000E+00	1.0343
6	970	3.53070E-04	1.03140E+00	1.57947E-02	-2.97350E-02	-1.38245E-03	0.00000E+00	1.2568
7	1136	1.71450E-04	1.02931E+00	8.18236E-03	-1.46140E-02	-6.80535E-04	0.00000E+00	1.4690
8	1294	8.54167E-05	1.02796E+00	4.27635E-03	-7.33589E-03	-3.45694E-04	0.00000E+00	1.6742
9	1441	4.37435E-05	1.02711E+00	2.27778E-03	-3.77116E-03	-1.81121E-04	0.00000E+00	1.8693
10	1591	2.30013E-05	1.02658E+00	1.24132E-03	-1.99132E-03	-9.76733E-05	0.00000E+00	2.0677
11	1741	1.24345E-05	1.02625E+00	6.93885E-04	-1.08075E-03	-5.42218E-05	0.00000E+00	2.2657
12	1891	6.91868E-06	1.02604E+00	3.98327E-04	-6.03644E-04	-3.09862E-05	0.00000E+00	2.4633
13	2038	3.95789E-06	1.02591E+00	2.34651E-04	-3.47030E-04	-1.81990E-05	0.00000E+00	2.6593
14	2182	2.31197E-06	1.02582E+00	1.41254E-04	-2.04751E-04	-1.09241E-05	0.00000E+00	2.8513
15	2326	1.38075E-06	1.02577E+00	8.68621E-05	-1.23597E-04	-6.70870E-06	0.00000E+00	3.0437

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	10	3.16160E-05	50	9.99996E-01	6
2	1	10	2.95732E-05	31	9.99993E-01	9
3	1	10	3.09048E-05	23	9.99995E-01	10
4	1	10	3.51881E-05	5	1.00001E+00	12
5	1	10	2.77180E-05	4	1.00001E+00	16
6	1	10	2.20832E-05	4	1.00001E+00	16
7	1	9	1.64386E-05	3	1.00001E+00	24
8	1	10	9.58838E-06	2	1.00001E+00	45
9	1	1	7.87731E-06	2	1.00001E+00	45
10	1	1	6.90091E-06	17	9.99992E-01	45
11	1	17	6.35698E-06	18	9.99992E-01	45
12	1	19	7.71142E-06	19	9.99993E-01	45
13	1	19	8.00444E-06	19	9.99994E-01	45
14	1	19	7.70045E-06	20	9.99993E-01	45
15	2	10	7.80535E-07	31	1.00000E+00	45
16	2	50	1.43729E-06	50	1.00000E+00	45
17	2	50	1.65553E-06	50	1.00000E+00	45
18	2	50	1.60732E-06	50	1.00000E+00	45
19	2	50	1.92505E-06	50	1.00000E+00	45
20	2	50	1.43325E-06	31	9.99999E-01	45
21	2	50	2.05964E-06	50	9.99999E-01	50
22	2	50	1.86378E-06	50	9.99999E-01	50
23	1	36	3.02595E-05	36	1.00005E+00	50
24	1	37	8.11488E-05	37	1.00016E+00	50
25	2	49	7.24651E-07	30	1.00000E+00	50
26	2	50	1.94492E-06	50	9.99997E-01	50
27	2	50	1.93298E-06	50	9.99998E-01	50

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
16	2364	-3.76241E-08	1.02581E+00	9.72569E-06	-5.67082E-05	-1.19179E-06	0.00000E+00	3.1122

final monitor lambda 1.02581E+00 production/absorption 1.02648E+00 angular flux on 16

elapsed time 3.11 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOP7.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  1800.0 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
    SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    1$$  1 2 50 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  9I0 39I7.1 47.1
    36$$  10R1 40R2
    39$$  1 2
    40$$  F3
      T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.09678E+00	6.30509E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0717
2	215	1.22963E-02	9.34726E-01	-2.45236E+00	-6.37983E-01	-6.25164E-02	0.00000E+00	0.3268
3	413	3.93261E-03	1.02988E+00	9.22263E-02	-2.80168E-01	-1.66463E-02	0.00000E+00	0.5685
4	608	1.67912E-03	1.03526E+00	5.62246E-02	-1.30368E-01	-6.64251E-03	0.00000E+00	0.8065
5	793	7.57090E-04	1.03305E+00	3.04096E-02	-6.24169E-02	-2.94750E-03	0.00000E+00	1.0365
6	970	3.53383E-04	1.03041E+00	1.57370E-02	-2.99633E-02	-1.38199E-03	0.00000E+00	1.2578
7	1136	1.70202E-04	1.02844E+00	8.09219E-03	-1.45978E-02	-6.75216E-04	0.00000E+00	1.4703
8	1292	8.42377E-05	1.02714E+00	4.20478E-03	-7.27387E-03	-3.41028E-04	0.00000E+00	1.6745
9	1441	4.29014E-05	1.02632E+00	2.22968E-03	-3.71770E-03	-1.77873E-04	0.00000E+00	1.8713
10	1592	2.24362E-05	1.02581E+00	1.21058E-03	-1.95360E-03	-9.55278E-05	0.00000E+00	2.0698
11	1742	1.21061E-05	1.02549E+00	6.75702E-04	-1.05666E-03	-5.29747E-05	0.00000E+00	2.2675
12	1892	6.72199E-06	1.02529E+00	3.87597E-04	-5.89424E-04	-3.02419E-05	0.00000E+00	2.4662
13	2039	3.84195E-06	1.02516E+00	2.28305E-04	-3.38558E-04	-1.77604E-05	0.00000E+00	2.6612
14	2183	2.24464E-06	1.02508E+00	1.37524E-04	-1.99779E-04	-1.06690E-05	0.00000E+00	2.8537
15	2327	1.34194E-06	1.02502E+00	8.46702E-05	-1.20719E-04	-6.56120E-06	0.00000E+00	3.0467

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	10	3.20351E-05	50	9.99996E-01	6
2	1	10	2.97144E-05	31	9.99993E-01	9
3	1	10	3.09999E-05	23	9.99995E-01	10
4	1	10	3.53073E-05	5	1.00001E+00	12
5	1	10	2.77246E-05	4	1.00001E+00	16
6	1	10	2.20743E-05	4	1.00001E+00	16
7	1	9	1.64546E-05	3	1.00001E+00	24
8	1	10	9.56743E-06	2	1.00001E+00	45
9	1	1	7.84857E-06	2	1.00001E+00	45
10	1	1	6.86873E-06	2	1.00001E+00	45
11	1	17	6.34053E-06	18	9.99992E-01	45
12	1	19	7.71282E-06	19	9.99993E-01	45
13	1	19	8.00237E-06	19	9.99994E-01	45
14	1	19	7.69403E-06	20	9.99993E-01	45
15	2	10	8.00077E-07	31	1.00000E+00	45
16	2	50	1.43039E-06	50	1.00000E+00	45
17	2	50	1.64853E-06	50	1.00000E+00	45
18	2	50	1.60053E-06	50	1.00000E+00	45
19	2	50	1.91784E-06	50	1.00000E+00	45
20	2	50	1.43227E-06	31	9.99999E-01	45
21	2	50	2.05284E-06	50	9.99999E-01	45
22	2	50	1.86065E-06	50	9.99999E-01	50
23	1	36	3.02845E-05	36	1.00005E+00	50
24	1	37	8.10381E-05	37	1.00016E+00	50
25	2	49	7.25787E-07	30	1.00000E+00	50
26	2	50	1.91617E-06	50	9.99997E-01	50
27	2	50	1.89345E-06	50	9.99998E-01	50

16	2365	-3.76562E-08	1.02506E+00	9.76392E-06	-5.53484E-05	-1.19434E-06	0.00000E+00	3.1052

final monitor lambda 1.02506E+00 production/absorption 1.02574E+00 angular flux on 16

elapsed time 3.11 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
      UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOP8.CJW
      27GROUPNDF4                INFHOMMEDIUM
      SOLNUO2F2    1  2000.0 0 1.0 293   92235 5.02  92238 94.98  END
      H2O          2  1.0  293  END
      END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
      SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
      0$$  A3 2  E
      1$$  1 2 50 1 0   2 2 16 3 1
       10 50 0 0 0
      2$$  -2 0 0 0 0    0 -1 0 0 0
      3$$  0 0 0 1 0     0 0 0 0 0
           0 0
      5**  A4 0  0  E
        T
      13$$  1 2
      14$$  1 2
      15**  F1
        T
      34**  F1
        T
      35**  9I0 39I7.1 47.1
      36$$  10R1 40R2
      39$$  1 2
      40$$  F3
        T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.11562E+00	6.00545E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0695
2	215	1.23248E-02	9.39577E-01	-2.19596E+00	-6.70953E-01	-6.36781E-02	0.00000E+00	0.3258
3	413	4.11215E-03	1.02272E+00	9.56777E-02	-2.85349E-01	-1.74102E-02	0.00000E+00	0.5675
4	607	1.72722E-03	1.02954E+00	5.75894E-02	-1.35956E-01	-6.81510E-03	0.00000E+00	0.8047
5	792	7.63902E-04	1.02818E+00	3.06456E-02	-6.41411E-02	-2.96508E-03	0.00000E+00	1.0333
6	968	3.50433E-04	1.02591E+00	1.56106E-02	-3.02346E-02	-1.36743E-03	0.00000E+00	1.2550
7	1133	1.66238E-04	1.02411E+00	7.91835E-03	-1.44904E-02	-6.59009E-04	0.00000E+00	1.4663
8	1284	8.12312E-05	1.02291E+00	4.07042E-03	-7.12119E-03	-3.29239E-04	0.00000E+00	1.6650
9	1434	4.09182E-05	1.02214E+00	2.14021E-03	-3.59920E-03	-1.70238E-04	0.00000E+00	1.8638
10	1585	2.12189E-05	1.02165E+00	1.15538E-03	-1.87482E-03	-9.08787E-05	0.00000E+00	2.0625
11	1736	1.13876E-05	1.02134E+00	6.42938E-04	-1.00818E-03	-5.02377E-05	0.00000E+00	2.2612
12	1886	6.32843E-06	1.02115E+00	3.69153E-04	-5.61404E-04	-2.87334E-05	0.00000E+00	2.4588
13	2035	3.61904E-06	1.02102E+00	2.17858E-04	-3.23003E-04	-1.69043E-05	0.00000E+00	2.6565
14	2179	2.11528E-06	1.02094E+00	1.31481E-04	-1.90905E-04	-1.01714E-05	0.00000E+00	2.8487
15	2323	1.26471E-06	1.02089E+00	8.10598E-05	-1.15530E-04	-6.26387E-06	0.00000E+00	3.0418

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	10	3.27136E-05	50	9.99995E-01	6
2	1	10	2.99141E-05	31	9.99993E-01	9
3	1	10	3.11019E-05	23	9.99995E-01	10
4	1	10	3.32729E-05	6	1.00001E+00	12
5	1	10	2.76370E-05	4	1.00001E+00	16
6	1	10	2.19563E-05	4	1.00001E+00	16
7	1	9	1.64231E-05	3	1.00001E+00	24
8	1	10	9.51877E-06	2	1.00001E+00	45
9	1	1	7.86850E-06	2	1.00001E+00	45
10	1	1	6.88529E-06	2	1.00001E+00	45
11	1	17	6.40231E-06	18	9.99992E-01	45
12	1	19	7.82683E-06	19	9.99993E-01	45
13	1	19	8.10830E-06	19	9.99994E-01	45
14	1	19	7.78230E-06	20	9.99993E-01	45
15	2	10	8.27273E-07	31	1.00000E+00	45
16	2	50	1.42566E-06	50	1.00000E+00	45
17	2	50	1.63734E-06	50	1.00000E+00	45
18	2	50	1.58978E-06	50	1.00000E+00	45
19	2	50	1.90600E-06	50	1.00000E+00	45
20	2	50	1.42660E-06	31	9.99999E-01	45
21	2	50	2.04208E-06	50	9.99999E-01	45
22	2	50	1.85177E-06	50	9.99999E-01	50
23	1	36	3.03347E-05	36	1.00005E+00	50
24	1	37	8.08485E-05	37	1.00016E+00	50
25	2	49	7.23542E-07	31	1.00000E+00	50
26	2	50	1.91800E-06	50	9.99997E-01	50
27	2	50	1.85800E-06	50	9.99998E-01	50

16	2361	-3.77363E-08	1.02093E+00	9.86937E-06	-5.29490E-05	-1.18790E-06	0.00000E+00	3.1005

final mor :tor
1 mbda 1.02093E+00 production/absorption 1.02160E+00 angular flux on 16

elapsed time 3.10 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
   module CSASI    will be called
     UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOP9.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLNUO2F2    1  2200.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
   module XSDRN    will be called
     SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  1 2 50 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  9I0 39I7.1 47.1
     36$$  10R1 40R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-4.44089E-16	1.13031E+00	5.73032E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0685
2	215	1.24297E-02	9.38735E-01	-1.98344E+00	-6.59302E-01	-6.49743E-02	0.00000E+00	0.3250
3	413	4.24897E-03	1.01353E+00	9.90618E-02	-2.92464E-01	-1.79714E-02	0.00000E+00	0.5658
4	609	1.75316E-03	1.02153E+00	5.68491E-02	-1.40925E-01	-6.89622E-03	0.00000E+00	0.8057
5	794	7.61338E-04	1.02074E+00	3.08245E-02	-6.54193E-02	-2.94613E-03	0.00000E+00	1.0343
6	970	3.43498E-04	1.01873E+00	1.54654E-02	-3.02978E-02	-1.33776E-03	0.00000E+00	1.2560
7	1135	1.60623E-04	1.01704E+00	7.74542E-03	-1.42940E-02	-6.36578E-04	0.00000E+00	1.4673
8	1285	7.75632E-05	1.01589E+00	3.94307E-03	-6.93419E-03	-3.14938E-04	0.00000E+00	1.6650
9	1436	3.87105E-05	1.01515E+00	2.05933E-03	-3.46996E-03	-1.61715E-04	0.00000E+00	1.8638
10	1588	1.99755E-05	1.01468E+00	1.10834E-03	-1.79584E-03	-8.60805E-05	0.00000E+00	2.0643
11	1739	1.06954E-05	1.01438E+00	6.16457E-04	-9.63116E-04	-4.75608E-05	0.00000E+00	2.2630
12	1889	5.94293E-06	1.01419E+00	3.54330E-04	-5.36176E-04	-2.72371E-05	0.00000E+00	2.4607
13	2038	3.40276E-06	1.01407E+00	2.09570E-04	-3.08935E-04	-1.60608E-05	0.00000E+00	2.6575
14	2182	1.99167E-06	1.01399E+00	1.26786E-04	-1.83002E-04	-9.68724E-06	0.00000E+00	2.8505
15	2326	1.19253E-06	1.01394E+00	7.83478E-05	-1.11016E-04	-5.98009E-06	0.00000E+00	3.0427

grp	to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	10	3.41133E-05	50	9.99995E-01	6
2	2	1	10	2.99550E-05	31	9.99993E-01	9
3	3	1	10	3.10407E-05	7	1.00001E+00	10
4	4	1	10	3.31586E-05	6	1.00001E+00	12
5	5	1	10	2.74191E-05	4	1.00001E+00	16
6	6	1	10	2.17505E-05	4	1.00001E+00	16
7	7	1	9	1.62926E-05	3	1.00001E+00	24
8	8	1	10	9.38180E-06	2	1.00001E+00	45
9	9	1	1	7.76383E-06	2	1.00001E+00	45
10	10	1	1	6.78757E-06	2	1.00001E+00	45
11	11	1	19	6.29411E-06	19	9.99992E-01	45
12	12	1	19	7.71523E-06	19	9.99993E-01	45
13	13	1	19	7.97611E-06	20	9.99994E-01	45
14	14	1	20	7.66409E-06	20	9.99993E-01	45
15	15	2	10	8.54957E-07	31	1.00000E+00	45
16	16	2	50	1.41773E-06	50	1.00000E+00	45
17	17	2	50	1.62653E-06	50	1.00000E+00	45
18	18	2	50	1.57933E-06	50	1.00000E+00	45
19	19	2	50	1.89444E-06	50	1.00000E+00	45
20	20	2	50	1.41980E-06	31	9.99999E-01	45
21	21	2	50	2.03201E-06	50	9.99999E-01	45
22	22	2	50	1.83669E-06	50	9.99999E-01	45
23	23	1	36	3.03890E-05	36	1.00005E+00	50
24	24	1	37	8.06824E-05	37	1.00016E+00	50
25	25	2	49	7.20486E-07	31	1.00000E+00	50
26	26	2	50	1.91272E-06	31	1.00000E+00	50
27	27	2	50	1.82959E-06	50	9.99998E-01	50

16	2364	-3.78347E-08	1.01397E+00	1.00212E-05	-5.09543E-05	-1.17596E-06	0.00000E+00	3.1015

final monitor
lambda 1.01397E+00 production/absorption 1.01464E+00 angular flux on 16

elapsed time 3.10 min.

TABLE # 2

Calculated K_{eff} Values for Different Neutron Cross Section Sets

U0XSP0P7.CJW U0XCY0P7.CJW U0XSL0P7.CJW

NEUTRON CROSS SECTION SET	SPHERE	CYLINDER	SLAB
123 GROUP	1.02180 A	1.02376 A	1.02389 A
HANSEN-ROACH	1.00130 B	1.00746 B	1.01693 B

Table 5

Variation of K_{eff} with Sphere Size and Constant Total Mass of U

VOLUME (L)	K_{eff}
36	0.99615
40	1.00039
42	1.00120
43	1.00132
44	1.00130
46	1.00077
48	0.99966
50	0.99812
52	0.99621
54	0.99385
56	0.99124

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI     will be called
      UO2F2 SOLUTION OPTIMIZE CONCENTRATION   SPHERE                UOXSPOPA.CJW
      123GROUPGMTH                  INFHOMMEDIUM
      SOLNUO2F2     1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
      H2O           2  1.0  293  END
      END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN     will be called
      SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
      0$$  A3 2  E
      1$$  3 2 58 1 0   2 2 16 3 1
       10 50 0 0 0
      2$$  -2 0 0 0 0    0 -1 0 0 0
      3$$  0 0 0 1 0     0 0 0 0 0
           0 0
      5**  A4 0  0  E
        T
      13$$  1 2
      14$$  1 2
      15**  F1
        T
      34**  F1
        T
      35**  22I0 34I20.5025 55.5025
      36$$  23R1 35R2
      39$$  1 2
      40$$  F3
        T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

```
                                                    121    121     2    58  8.06973E-07    58  1.00000E+00    58
                                                    122    122     2    58  9.28792E-07    58  1.00000E+00    58
                                                    123    123     2    58  1.50109E-06    58  9.99999E-01    58
   21 10660  8.49237E-11  1.02180E+00  1.07747E-05 -6.58922E-05 -2.43376E-07  0.00000E+00      31.3185
          final monitor
                   lambda  1.02180E+00          production/absorption  1.02472E+00          angular flux on  16
 elapsed time  31.32 min.
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE CONCENTRATION   SPHERE               UOXSPOFB.CJW
     HANSEN-ROACH                 INFHOMMEDIUM
     SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
   module XSDRN    will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I20.5025 55.5025
     36$$  23R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	2.22045E-16	1.13284E+00	-1.32841E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0567
2	107	4.07820E-06	1.06363E+00	6.10558E-02	-5.87482E-03	0.00000E+00	0.00000E+00	0.2023
3	204	1.50559E-06	1.02906E+00	3.25302E-02	-3.56914E-03	0.00000E+00	0.00000E+00	0.3340
4	291	7.18900E-07	1.01323E+00	1.53868E-02	-1.62213E-03	0.00000E+00	0.00000E+00	0.4530
5	372	3.20687E-07	1.00637E+00	6.78054E-03	-7.03060E-04	0.00000E+00	0.00000E+00	0.5648
6	453	1.38107E-07	1.00343E+00	2.91489E-03	-3.00394E-04	0.00000E+00	0.00000E+00	0.6757
7	521	1.10404E-07	1.00219E+00	1.24237E-03	-1.29116E-04	0.00000E+00	0.00000E+00	0.7697
8	574	1.09855E-07	1.00166E+00	5.31189E-04	-5.50203E-05	0.00000E+00	0.00000E+00	0.8430
9	621	7.50715E-08	1.00143E+00	2.25273E-04	-2.28308E-05	0.00000E+00	0.00000E+00	0.9080
10	661	6.13176E-08	1.00133E+00	9.48015E-05	-9.40382E-06	0.00000E+00	0.00000E+00	0.9630

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	2	9	2.16228E-05	58	9.99998E-01	8
2	2	8	2.34575E-05	58	9.99997E-01	10
3	2	9	1.46294E-05	58	9.99998E-01	15
4	2	9	1.89685E-05	4	9.99996E-01	18
5	2	10	1.45073E-05	3	9.99996E-01	25
6	2	13	7.06809E-06	2	9.99999E-01	29
7	2	13	6.71474E-06	2	9.99998E-01	46
8	2	13	6.28455E-06	2	9.99999E-01	46
9	2	13	5.86939E-06	2	9.99999E-01	46
10	2	13	4.15655E-06	2	1.00000E+00	46
11	2	13	3.76014E-06	2	1.00000E+00	46
12	2	13	3.77294E-06	2	1.00000E+00	46
13	2	13	3.40557E-06	2	1.00000E+00	46
14	2	13	3.52820E-06	2	1.00000E+00	46
15	1	1	3.38979E-05	1	9.99884E-01	58
16	1	1	1.78573E-05	1	9.99760E-01	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
11	691	3.65244E-10	1.00130E+00	3.58740E-05	-2.86524E-06	0.00000E+00	0.00000E+00	1.0150

final monitor lambda 1.00130E+00 production/absorption 1.00381E+00 angular flux on 16

elapsed time 1.01 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI     will be called
      UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOPA.CJW
      123GR/'^^MTH                  INFHOMMEDIUM
      SOLNUO..2      1  1600.0 0 1.0 293    92235 5.02  92238 94.98  END
      H2O            2  1.0  293  END
      END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
      CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
      0$$  A3 2  E
      1$$  2 2 51 1 0   2 2 16 3 1
       10 50 0 0 0
      2$$  -2 0 0 0 0    0 -1 0 0 0
      3$$  0 0 0 1 0     0 0 0 0 0
           0 0
      5**  A4 0  0  E
        T
      13$$  1 2
      14$$  1 2
      15**  F1
         T
      34**  F1
         T
      35**  15I0 34I14.25 49.25
      36$$  16R1 35R2
      39$$  1 2
      40$$  F3
         T
WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

```
                                                    121    121     2    51  4.59106E-07    51  1.00000E+00    51
                                                    122    122     2    51  7.06311E-07    51  1.00000E+00    51
                                                    123    123     2    51  1.31114E-06    51  9.99999E-01    51
   Z1 10255 -2.18718E-08  1.02376E+00  9.97341E-06 -6.14431E-05 -3.40135E-07  0.00000E+00      77.0440
          final monitor
                  lambda  1.02376E+00          production/absorption  1.02600E+00          angular flux on  16
 - elapsed time  77.04 min.
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI     will be called
     UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYOPB.CJW
     HANSEN-ROACH                  INFHOMMEDIUM
     SOLNUO2F2     1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O           2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN     will be called
     CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  2 2 51 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  15I0 34I14.25 49.25
     36$$  16R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-6.66134E-16	1.07342E+00	-7.34162E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.0668
2	99	3.50666E-06	1.02903E+00	4.13197E-02	-3.63503E-03	0.00000E+00	0.00000E+00	0.6217
3	185	6.40082E-07	1.01433E+00	1.43132E-02	-1.60085E-03	0.00000E+00	0.00000E+00	1.1042
4	266	1.32249E-07	1.00959E+00	4.67675E-03	-5.05737E-04	0.00000E+00	0.00000E+00	1.5590
5	334	3.63803E-08	1.00812E+00	1.46041E-03	-1.58165E-04	0.00000E+00	0.00000E+00	1.9407
6	383	6.28783E-08	1.00766E+00	4.53782E-04	-4.92843E-05	0.00000E+00	0.00000E+00	2.2163
7	423	3.45321E-10	1.00752E+00	1.38609E-04	-1.39529E-05	0.00000E+00	0.00000E+00	2.4417
8	455	9.39252E-08	1.00748E+00	4.18125E-05	-4.53968E-06	0.00000E+00	0.00000E+00	2.6220

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	8.58124E-05	51	1.00001E+00	7
2	1	1	7.77905E-05	7	9.99983E-01	9
3	1	1	7.44676E-05	4	9.99975E-01	13
4	1	1	6.45919E-05	4	9.99969E-01	16
5	1	1	4.95771E-05	3	9.99962E-01	23
6	1	1	4.26628E-05	2	9.99961E-01	26
7	1	1	4.11135E-05	2	9.99964E-01	43
8	1	1	3.97299E-05	2	9.99967E-01	43
9	1	1	3.83111E-05	2	9.99970E-01	43
10	1	1	4.48959E-05	2	9.99978E-01	43
11	1	1	4.51481E-05	2	9.99980E-01	43
12	1	1	4.35090E-05	2	9.99980E-01	43
13	1	51	1.10824E-05	2	9.99996E-01	43
14	1	50	5.00579E-06	51	1.00000E+00	43
15	1	17	1.43501E-05	32	9.99942E-01	51
16	1	1	5.22110E-06	1	9.99934E-01	51

9	471	-1.10993E-07	1.00746E+00	1.26368E-05	1.08660E-06	0.00000E+00	0.00000E+00	2.7453

final monitor lambda 1.00746E+00 production/absorption 1.00938E+00 angular flux on 16

elapsed time 2.75 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
- module CSASI    will be called
  UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOPA.CJW
  123GROUPGMTH                INFHOMMEDIUM
  SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
- module XSDRN    will be called
  SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
  0$$  A3 2  E
  1$$  1 2 50 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  9I0 39I7.1 47.1
  36$$  10R1 40R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
  module xsdrn    is finished.
```

```
                                                    120    120     2    50  7.92432E-07    27  1.00000E+00    50
                                                    121    121     2    50  3.33771E-07    27  1.00000E+00    50
                                                    122    122     2    50  4.77700E-07    27  1.00000E+00    50
                                                    123    123     2    50  1.04633E-06    27  1.00000E+00    50
  22 10127 -2.18191E-08  1.02389E+00  8.84197E-06 -5.79677E-05 -5.71615E-07  0.00000E+00      25.4853
          final monitor
                lambda  1.02389E+00          production/absorption  1.02460E+00          angular flux on  16
 elapsed time  25.49 min.
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLOPE.CJW
  HANSEN-ROACH                INFHOMMEDIUM
  SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
  0$$  A3 2  E
  1$$  1 2 50 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     9 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  9I0 39I7.1 47.1
  36$$  10R1 40R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	2.99760E-15	1.01001E+00	-1.00121E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.0532
2	97	1.15665E-06	1.01629E+00	-6.23221E-03	1.61169E-03	0.00000E+00	0.00000E+00	0.1465
3	168	-1.20811E-07	1.01688E+00	-5.60461E-04	6.18168E-05	0.00000E+00	0.00000E+00	0.2168
4	232	-1.13691E-07	1.01693E+00	-4.89361E-05	4.02380E-06	0.00000E+00	0.00000E+00	0.2800

grp	to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	1	3.65567E-05	50	9.99994E-01	6
2	2	1	1	3.31395E-05	50	9.99993E-01	8
3	3	1	10	3.25218E-05	5	1.00001E+00	12
4	4	1	1	2.67986E-05	4	1.00001E+00	16
5	5	1	1	1.90095E-05	3	1.00001E+00	23
6	6	1	1	1.39851E-05	2	1.00001E+00	25
7	7	1	49	1.26223E-05	2	1.00001E+00	45
8	8	1	47	1.25698E-05	2	1.00001E+00	45
9	9	1	19	1.00001E-05	19	9.99993E-01	45
10	10	1	19	1.19734E-05	19	9.99995E-01	45
11	11	1	21	1.23923E-05	21	9.99995E-01	45
12	12	1	21	1.20765E-05	21	9.99995E-01	45
13	13	1	50	1.23933E-05	28	9.99996E-01	45
14	14	1	30	1.16163E-05	30	9.99994E-01	45
15	15	1	49	6.81979E-05	49	9.99738E-01	50
16	16	1	1	8.36893E-07	24	9.99988E-01	50

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
5	248	-1.10075E-07	1.01693E+00	-3.79648E-06	2.44782E-07	0.00000E+00	0.00000E+00	0.3048

final monitor lambda 1.01693E+00 production/absorption 1.01746E+00 angular flux on 16

elapsed time 0.30 min.

TABLE 4
Calculated K_{eff} Values for Different Neutron Cross Section Sets

NEUTRON CROSS SECTION SET	SPHERE	CYLINDER	SLAB
123 GROUP	1.02180	1.02376	1.02389
HANSEN-ROACH	1.01672	1.00746	1.02548

Table 3
Variation of K_{eff} with Sphere Size and Constant Total Mass of U
40X5PV02.CJW

VOLUME (L)	K_{eff}	
36	0.99615	1
40	1.00039	2
42	1.00120	A
43	1.00132	C
44	1.00130	3
46	1.00077	B
48	0.99966	4
50	0.99812	5
52	0.99621	6
54	0.99385	7
56	0.99124	8

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U                UOXSPVO1.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  1055.56 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
    0S$  A3 2  E
    1S$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2S$  -2 0 0 0 0    0 -1 0 0 0
    3S$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13S$  1 2
    14S$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I20.484 55.484
    36S$  23R1 35R2
    39S$  1 2
    40S$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	1.00504E+00	7.10474E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0732
2	224	1.20016E-02	9.22196E-01	-3.37839E+00	-7.51274E-01	-5.78169E-02	0.00000E+00	0.4367
3	435	3.22512E-03	1.06689E+00	7.11200E-02	-2.55451E-01	-1.39613E-02	0.00000E+00	0.7837
4	634	1.74317E-03	1.04850E+00	5.68262E-02	-1.13774E-01	-7.10615E-03	0.00000E+00	1.1142
5	829	1.00055E-03	1.02990E+00	3.99500E-02	-6.92095E-02	-3.98877E-03	0.00000E+00	1.4402
6	1008	5.80196E-04	1.01691E+00	2.62945E-02	-4.24016E-02	-2.29227E-03	0.00000E+00	1.7440
7	1182	3.36487E-04	1.00858E+00	1.65605E-02	-2.55815E-02	-1.32735E-03	0.00000E+00	2.0425
8	1350	1.94478E-04	1.00346E+00	1.01195E-02	-1.52179E-02	-7.69628E-04	0.00000E+00	2.3325
9	1516	1.11771E-04	1.00040E+00	6.05225E-03	-8.94983E-03	-4.45217E-04	0.00000E+00	2.6208
10	1682	6.38961E-05	9.98584E-01	3.56699E-03	-5.21432E-03	-2.5679	0000E+00	2.9083
11	1843	3.64030E-05	9.97517E-01	2.08463E-03	-3.01806E-03	-1.478	+00	3.1902
12	2001	2.05587E-05	9.96899E-01	1.20769E-03	-1.73739E-03	-8.46*	+00	3.4677
13	2159	1.14933E-05	9.96544E-01	6.93695E-04	-9.92043E-04	-4.809	0E+00	3.7450
14	2308	6.37427E-06	9.96339E-01	3.96402E-04	-5.62139E-04	-2.71	00E+00	4.0107
15	2452	3.49180E-06	9.96222E-01	2.25173E-04	-3.16451E-04	-1.5	00E+00	4.2707
16	2596	1.87819E-06	9.96156E-01	1.26856E-04	-1.76425E-04	-8.4	0E+00	4.5295
17	2740	9.87504E-07	9.96119E-01	7.08592E-05	-9.70969E-05	-4.6	E+00	4.7885

grp	r iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	3.75613E-05	9	1.00001E+00	7
2	1	23	3.86467E-05	6	1.00002E+00	10
3	1	23	4.02819E-05	6	1.00001E+00	11
4	1	1	4.08433E-05	4	1.00001E+00	15
5	1	1	3.43190E-05	3	1.00002E+00	20
6	1	1	2.88925E-05	3	1.00003E+00	20
7	1	1	2.44953E-05	2	1.00003E+00	29
8	1	1	2.26376E-05	2	1.00003E+00	46
9	1	1	2.30445E-05	1	1.00003E+00	58
10	1	1	2.33287E-05	1	1.00003E+00	58
11	1	1	2.33123E-05	1	1.00003E+00	58
12	1	1	2.84313E-05	1	1.00003E+00	58
13	1	1	2.98031E-05	1	1.00002E+00	58
14	1	1	2.94247E-05	1	1.00002E+00	58
15	2	58	4.22448E-07	45	1.00000E+00	58
16	2	58	1.14883E-06	58	1.00000E+00	58
17	2	58	1.31990E-06	58	1.00000E+00	58
18	2	58	1.28517E-06	58	1.00000E+00	58
19	2	58	1.53293E-06	58	1.00000E+00	58
20	2	58	1.22835E-06	46	9.99999E-01	58
21	2	58	1.72295E-06	58	1.00000E+00	58
22	2	58	1.56505E-06	58	9.99999E-01	58
23	1	49	1.82123E-05	49	1.00003E+00	58
24	1	49	5.07660E-05	49	1.00010E+00	58
25	1	49	7.35544E-05	49	1.00010E+00	58
26	1	50	8.07009E-05	50	1.00018E+00	58
27	2	58	1.56734E-06	58	9.[illegible]998E-01	58

18	2776	1.04132E-10	9.96150E-01	6.02227E-06	-4.17314E-05	-5.24807E-07	0.00000E+00	4.8638

final monitor lambda 9.96150E-01 production/absorption 9.98868E-01 angular flux on 16

elapsed time 4.86 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U                UOXSPVO2.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUO2F2    1  950.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
  0$$  A3 2  E
  1$$  3 2 58 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  Z2I0 34I21.216 56.216
  36$$  23R1 35R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
  module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	2.22045E-16	9.80038E-01	7.32310E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0743
2	224	1.22006E-02	9.03750E-01	-3.69284E+00	-7.71814E-01	-5.77140E-02	0.00000E+00	0.4368
3	434	2.88570E-03	1.07532E+00	6.41251E-02	-2.54694E-01	-1.25216E-02	0.00000E+00	0.7818
4	633	1.58771E-03	1.05724E+00	5.21830E-02	-1.03025E-01	-6.51361E-03	0.00000E+00	1.1133
5	827	9.43856E-04	1.03790E+00	3.76045E-02	-6.36838E-02	-3.79859E-03	0.00000E+00	1.4373
6	1004	5.67674E-04	1.02408E+00	2.55380E-02	-4.03403E-02	-2.26607E-03	0.00000E+00	1.7393
7	1180	3.40586E-04	1.01503E+00	1.66178E-02	-2.52075E-02	-1.35706E-03	0.00000E+00	2.0407
8	1351	2.03806E-04	1.00928E+00	1.05047E-02	-1.55153E-02	-8.13660E-04	0.00000E+00	2.3345
9	1519	1.21415E-04	1.00572E+00	6.50512E-03	-9.44682E-03	-4.86982E-04	0.00000E+00	2.6245
10	1685	7.19837E-05	1.00355E+00	3.96982E-03	-5.70080E-03	-2.90615E-04	0.00000E+00	2.9128
11	1849	4.25100E-05	1.00224E+00	2.39885E-03	-3.41652E-03	-1.72995E-04	0.00000E+00	3.1975
12	2009	2.49857E-05	1.00145E+00	1.43910E-03	-2.03672E-03	-1.02638E-04	0.00000E+00	3.4777
13	2167	1.45559E-05	1.00098E+00	8.56185E-04	-1.20682E-03	-6.04686E-05	0.00000E+00	3.7550
14	2325	8.40887E-06	1.00071E+00	5.05632E-04	-7.09453E-04	-3.53934E-05	0.00000E+00	4.0333
15	2475	4.82390E-06	1.00054E+00	2.97161E-04	-4.14275E-04	-2.06139E-05	0.00000E+00	4.2998
16	2619	2.74193E-06	1.00045E+00	1.73768E-04	-2.40500E-04	-1.19298E-05	0.00000E+00	4.5597
17	2763	1.53580E-06	1.00039E+00	1.00851E-04	-1.38508E-04	-6.83314E-06	0.00000E+00	4.8188
18	2907	8.43058E-07	1.00036E+00	5.79647E-05	-7.88271E-05	-3.86015E-06	0.00000E+00	5.0780

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	23	1.95346E-05	9	1.00001E+00	7
2	1	23	2.38992E-05	6	1.00001E+00	10
3	1	23	2.33849E-05	5	1.00001E+00	12
4	1	23	2.42661E-05	4	1.00001E+00	15
5	1	23	2.13671E-05	3	1.00001E+00	20
6	1	23	1.71835E-05	3	1.00001E+00	20
7	1	1	1.29954E-05	2	1.00002E+00	29
8	1	1	1.21320E-05	2	1.00002E+00	46
9	1	1	1.27504E-05	1	1.00002E+00	58
10	1	1	1.31212E-05	1	1.00002E+00	58
11	1	1	1.33029E-05	1	1.00002E+00	58
12	1	1	1.63843E-05	1	1.00001E+00	58
13	1	1	1.73011E-05	1	1.00001E+00	58
14	1	1	1.71860E-05	1	1.00001E+00	58
15	2	58	3.43160E-07	45	1.00000E+00	58
16	2	58	9.20875E-07	58	1.00000E+00	58
17	2	58	1.05511E-06	58	1.00000E+00	58
18	2	58	1.02699E-06	58	1.00000E+00	58
19	2	58	1.22839E-06	58	1.00000E+00	58
20	2	58	1.00239E-06	46	1.00000E+00	58
21	2	58	1.38102E-06	58	1.00000E+00	58
22	2	58	1.26174E-06	58	1.00000E+00	58
23	1	49	1.43247E-05	49	1.00002E+00	58
24	1	50	4.00813E-05	50	1.00008E+00	58
25	1	50	5.82342E-05	50	1.00006E+00	58
26	1	50	6.39095E-05	50	1.00014E+00	58
27	2	50	1.19103E-06	58	9.99999E-01	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
19	2943	1.72212E-10	1.00039E+00	4.85328E-06	-3.46335E-05	-4.75700E-07	0.00000E+00	5.1530

final monitor lambda 1.00039E+00 production/absorption 1.00298E+00 angular flux on 16

elapsed time 5.15 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U                UOXSPVO3.CJW
     27GROUPNDF4                  INFHOMMEDIUM
     SOLNUO2F2    1  863.636 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I21.901 56.901
     36$$  23R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	9.56403E-01	7.51154E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0732
2	223	1.24522E-02	8.82591E-01	-3.99457E+00	-7.92517E-01	-5.79326E-02	0.00000E+00	0.4350
3	432	2.59094E-03	1.07918E+00	5.82951E-02	-2.57343E-01	-1.12547E-02	0.00000E+00	0.7792
4	630	1.44046E-03	1.06177E+00	4.81974E-02	-9.38542E-02	-5.92972E-03	0.00000E+00	1.1087
5	824	8.81924E-04	1.04206E+00	3.54418E-02	-5.85388E-02	-3.57265E-03	0.00000E+00	1.4328
6	1001	5.46887E-04	1.02769E+00	2.46914E-02	-3.81171E-02	-2.20034E-03	0.00000E+00	1.7347
7	1177	3.38342E-04	1.01805E+00	1.65332E-02	-2.45420E-02	-1.35885E-03	0.00000E+00	2.0360
8	1348	2.08999E-04	1.01174E+00	1.07776E-02	-1.55785E-02	-8.40393E-04	0.00000E+00	2.3297
9	1515	1.28444E-04	1.00773E+00	6.88252E-03	-9.78676E-03	-5.18285E-04	0.00000E+00	2.6190
10	1680	7.85353E-05	1.00521E+00	4.32858E-03	-6.08923E-03	-3.18502E-04	0.00000E+00	2.9055
11	1845	4.77870E-05	1.00365E+00	2.69203E-03	-3.75949E-03	-1.95006E-04	0.00000E+00	3.1920
12	2006	2.89954E-05	1.00268E+00	1.66292E-03	-2.30777E-03	-1.19154E-04	0.00000E+00	3.4732
13	2164	1.74762E-05	1.00209E+00	1.01972E-03	-1.40995E-03	-7.24090E-05	0.00000E+00	3.7513
14	2322	1.04512E-05	1.00174E+00	6.20475E-04	-8.55516E-04	-4.37131E-05	0.00000E+00	4.0287
15	2480	6.20922E-06	1.00152E+00	3.75359E-04	-5.15539E-04	-2.62494E-05	0.00000E+00	4.3063
16	2630	3.66865E-06	1.00139E+00	2.26171E-04	-3.08984E-04	-1.56964E-05	0.00000E+00	4.5735
17	2774	2.15249E-06	1.00131E+00	1.35710E-04	-1.84306E-04	-9.33771E-06	0.00000E+00	4.8325
18	2918	1.24760E-06	1.00126E+00	8.08714E-05	-1.09206E-04	-5.50381E-06	0.00000E+00	5.0917

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	23	1.06769E-05	58	9.99997E-01	7
2	1	23	1.32042E-05	48	9.99996E-01	10
3	1	23	1.32118E-05	45	9.99997E-01	12
4	1	23	1.35996E-05	32	9.99997E-01	15
5	1	23	1.22351E-05	30	9.99996E-01	20
6	1	23	9.81970E-06	30	9.99995E-01	20
7	1	24	6.35792E-06	28	9.99994E-01	29
8	1	24	4.64353E-06	26	9.99994E-01	58
9	1	25	4.54550E-06	26	9.99994E-01	58
10	1	26	4.52535E-06	27	9.99994E-01	58
11	1	26	4.46841E-06	27	9.99994E-01	58
12	1	27	5.39346E-06	28	9.99995E-01	58
13	1	27	5.57283E-06	28	9.99996E-01	58
14	1	10	5.46625E-06	28	9.99995E-01	58
15	2	58	3.74474E-07	45	1.00000E+00	58
16	2	58	9.96138E-07	58	1.00000E+00	58
17	2	58	1.14208E-06	58	1.00000E+00	58
18	2	58	1.11058E-06	58	1.00000E+00	58
19	2	58	1.32445E-06	58	1.00000E+00	58
20	2	58	1.06672E-06	46	9.99999E-01	58
21	2	58	1.47031E-06	58	1.00000E+00	58
22	2	58	1.34523E-06	58	9.99999E-01	58
23	1	49	1.46768E-05	49	1.00002E+00	58
24	1	49	4.20776E-05	50	1.00008E+00	58
25	1	50	6.10954E-05	50	1.00008E+00	58
26	1	50	6.70235E-05	50	1.00015E+00	58
27	2	58	1.37625E-06	58	9.99999E-01	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
19	2954	1.74226E-10	1.00130E+00	6.73984E-06	-4.95719E-05	-7.66835E-07	0.00000E+00	5.1657

final monitor lambda 1.00130E+00 production/absorption 1.00378E+00 angular flux on 16

- elapsed time 5.17 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U                UOXSPVO4.CJW
     Z7GROUPNDF4                  INFHOMMEDIUM
     SOLNUO2F2    1  791.667 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
     SPE...S OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I22.545 57.545
     36$$  23R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	4.44089E-16	9.34095E-01	7.67555E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0723
2	223	1.27317E-02	8.60024E-01	-4.28424E+00	-8.12797E-01	-5.83558E-02	0.00000E+00	0.4348
3	432	2.33661E-03	1.07954E+00	5.33558E-02	-2.62500E-01	-1.01557E-02	0.00000E+00	0.7780
4	630	1.30480E-03	1.06305E+00	4.47434E-02	-8.60153E-02	-5.37811E-03	0.00000E+00	1.1075
5	824	8.19138E-04	1.04323E+00	3.34623E-02	-5.38214E-02	-3.33228E-03	0.00000E+00	1.4325
6	1002	5.21640E-04	1.02853E+00	2.38226E-02	-3.58708E-02	-2.11080E-03	0.00000E+00	1.7357
7	1176	3.31979E-04	1.01840E+00	1.63674E-02	-2.37134E-02	-1.34132E-03	0.00000E+00	2.0340
8	1347	2.10402E-04	1.01165E+00	1.09445E-02	-1.54671E-02	-8.51020E-04	0.00000E+00	2.3278
9	1514	1.32760E-04	1.00724E+00	7.17292E-03	-9.97126E-03	-5.38489E-04	0.00000E+00	2.6172
10	1679	8.34028E-05	1.00441E+00	4.63240E-03	-6.36953E-03	-3.39650E-04	0.00000E+00	2.9037
11	1844	5.21752E-05	1.00260E+00	2.95911E-03	-4.03920E-03	-2.13517E-04	0.00000E+00	3.1903
12	2007	3.25385E-05	1.00146E+00	1.87642E-03	-2.54688E-03	-1.33889E-04	0.00000E+00	3.4738
13	2167	2.02151E-05	1.00074E+00	1.18281E-03	-1.59890E-03	-8.36915E-05	0.00000E+00	3.7542
14	2325	1.24795E-05	1.00029E+00	7.40661E-04	-9.98765E-04	-5.20259E-05	0.00000E+00	4.0315
15	2483	7.65448E-06	1.00001E+00	4.60782E-04	-6.19998E-04	-3.21593E-05	0.00000E+00	4.3098
16	2641	4.66835E-06	9.99836E-01	2.85219E-04	-3.82622E-04	-1.97827E-05	0.00000E+00	4.5872
17	2791	2.83456E-06	9.99730E-01	1.75944E-04	-2.35002E-04	-1.21253E-05	0.00000E+00	4.8537
18	2935	1.71321E-06	9.99664E-01	1.08210E-04	-1.43794E-04	-7.40544E-06	0.00000E+00	5.1135
19	3079	1.02537E-06	9.99624E-01	6.61612E-05	-8.75441E-05	-4.48752E-06	0.00000E+00	5.3727

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	1.41429E-05	9	9.99998E-01	7
2	1	1	1.30163E-05	5	9.99996E-01	11
3	1	1	1.41829E-05	5	9.99997E-01	12
4	1	1	1.42466E-05	4	9.99997E-01	15
5	1	1	1.23387E-05	3	9.99995E-01	20
6	1	1	1.06715E-05	3	9.99993E-01	20
7	1	3	7.78953E-06	2	9.99992E-01	29
8	1	2	5.54611E-06	1	9.99993E-01	58
9	1	2	4.97722E-06	1	9.99994E-01	58
10	1	1	4.38639E-06	1	9.99994E-01	58
11	1	1	3.81589E-06	1	9.99995E-01	58
12	1	1	4.13568E-06	1	9.99996E-01	58
13	1	1	3.93688E-06	1	9.99997E-01	58
14	1	1	3.52214E-06	1	9.99997E-01	58
15	2	58	3.00443E-07	46	1.00000E+00	58
16	2	58	7.93949E-07	58	1.00000E+00	58
17	2	58	9.08515E-07	58	1.00000E+00	58
18	2	58	8.83448E-07	58	1.00000E+00	58
19	2	58	1.05662E-06	58	1.00000E+00	58
20	2	58	8.66680E-07	46	1.00000E+00	58
21	2	58	1.17693E-06	58	1.00000E+00	58
22	2	58	1.08233E-06	58	1.00000E+00	58
23	1	49	1.16626E-05	49	1.00002E+00	58
24	1	50	3.33853E-05	50	1.00006E+00	58
25	1	50	4.85475E-05	50	1.00007E+00	58
26	1	50	5.32665E-05	50	1.00012E+00	58
27	1	50	8.51369E-05	50	1.00013E+00	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
20	3114	7.51332E-11	9.99657E-01	5.43898E-06	-4.06183E-05	-6.45829E-07	0.00000E+00	5.4468

final monitor lambda 9.99657E-01 production/absorption 1.00203E+00 angular flux on 16

elapsed time 5.45 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U                UOXSPV05.CJW
     27GROUPNDF4                  INFHOMMEDIUM
     SOLNUO2F2    1  760.00 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I22.854  57.854
     36$$  23R1 35RZ
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	2.22045E-16	9.23415E-01	7.74974E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0725
2	223	1.28766E-02	8.48503E-01	-4.42473E+00	-8.22663E-01	-5.86176E-02	0.00000E+00	0.4342
3	432	2.22296E-03	1.07867E+00	5.11542E-02	-2.65799E-01	-9.66444E-03	0.00000E+00	0.7782
4	630	1.24174E-03	1.06270E+00	4.31836E-02	-8.25263E-02	-5.11837E-03	0.00000E+00	1.1078
5	824	7.88268E-04	1.04291E+00	3.25366E-02	-5.16241E-02	-3.21118E-03	0.00000E+00	1.4318
6	1002	5.08062E-04	1.02811E+00	2.33878E-02	-3.47623E-02	-2.06036E-03	0.00000E+00	1.7350
7	1177	3.27305E-04	1.01781E+00	1.62474E-02	-2.32512E-02	-1.32570E-03	0.00000E+00	2.0342
8	1348	2.10011E-04	1.01086E+00	1.09938E-02	-1.53504E-02	-8.51508E-04	0.00000E+00	2.3290
9	1515	1.34174E-04	1.00628E+00	7.29409E-03	-1.00185E-02	-5.45419E-04	0.00000E+00	2.6183
10	1681	8.53434E-05	1.00329E+00	4.76863E-03	-6.47924E-03	-3.48184E-04	0.00000E+00	2.9058
11	1846	5.40964E-05	1.00137E+00	3.08541E-03	-4.16026E-03	-2.21664E-04	0.00000E+00	3.1922
12	2010	3.41733E-05	1.00013E+00	1.98095E-03	-2.65692E-03	-1.40714E-04	0.00000E+00	3.4777
13	2170	2.15242E-05	9.99342E-01	1.26484E-03	-1.68933E-03	-8.91048E-05	0.00000E+00	3.7578
14	2328	1.34734E-05	9.98844E-01	8.02278E-04	-1.06925E-03	-5.61159E-05	0.00000E+00	4.0352
15	2486	8.38344E-06	9.98532E-01	5.05608E-04	-6.72629E-04	-3.51508E-05	0.00000E+00	4.3128
16	2644	5.18991E-06	9.98336E-01	3.17092E-04	-4.20777E-04	-2.19199E-05	0.00000E+00	4.5902
17	2798	3.19986E-06	9.98213E-01	1.98172E-04	-2.62050E-04	-1.36218E-05	0.00000E+00	4.8628
18	2944	1.96570E-06	9.98137E-01	1.23525E-04	-1.62628E-04	-8.43997E-06	0.00000E+00	5.1248
19	3088	1.19987E-06	9.98089E-01	7.66811E-05	-1.00547E-04	-5.20212E-06	0.00000E+00	5.3837

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	2.60959E-05	8	9.99995E-01	7
2	1	1	2.50690E-05	5	9.99990E-01	11
3	1	1	2.83502E-05	5	9.99993E-01	12
4	1	1	2.89305E-05	4	9.99993E-01	15
5	1	1	2.46580E-05	3	9.99988E-01	20
6	1	1	2.11298E-05	3	9.99985E-01	20
7	1	1	1.64617E-05	2	9.99983E-01	29
8	1	1	1.28564E-05	1	9.99982E-01	58
9	1	1	1.23030E-05	1	9.99984E-01	58
10	1	1	1.15480E-05	1	9.99985E-01	58
11	1	1	1.07480E-05	1	9.99986E-01	58
12	1	1	1.24628E-05	1	9.99989E-01	58
13	1	1	1.26019E-05	1	9.99990E-01	58
14	1	1	1.20240E-05	1	9.99990E-01	58
15	2	58	3.13685E-07	58	1.00000E+00	58
16	2	58	8.23512E-07	58	1.00000E+00	58
17	2	58	9.42285E-07	58	1.00000E+00	58
18	2	58	9.15908E-07	58	1.00000E+00	58
19	2	58	1.09427E-06	58	1.00000E+00	58
20	2	58	8.93521E-07	46	1.00000E+00	58
21	2	58	1.21320E-06	58	1.00000E+00	58
22	2	58	1.11637E-06	58	1.00000E+00	58
23	1	49	1.18941E-05	49	1.00002E+00	58
24	1	50	3.42791E-05	50	1.00007E+00	58
25	1	50	4.98679E-05	50	1.00007E+00	58
26	1	50	5.47162E-05	50	1.00012E+00	58
27	1	50	8.74597E-05	50	1.00013E+00	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
20	3123	2.21022E-10	9.98128E-01	6.28335E-06	-4.73250E-05	-7.73690E-07	0.00000E+00	5.4568

final monitor lambda 9.98129E-01 production/absorption 1.00045E+00 angular flux on 16

elapsed time 5.46 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U                UOXSPVO6.CJW
  27GROUPNDF4                  INFHOMMEDIUM
  SOLNUO2F2    1  730.769 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
  0$$  A3 2  E
  1$$  3 2 58 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  Z2I0 34I23.155 58.155
  36$$  Z3R1 35R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	3.33067E-16	9.13071E-01	7.81933E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0720
2	223	1.30230E-02	8.36937E-01	-4.56243E+00	-8.32318E-01	-5.89028E-02	0.00000E+00	0.4345
3	432	2.11748E-03	1.07722E+00	4.91057E-02	-2.69488E-01	-9.20884E-03	0.00000E+00	0.7778
4	630	1.18189E-03	1.06180E+00	4.17216E-02	-7.92926E-02	-4.87029E-03	0.00000E+00	1.1075
5	824	7.58038E-04	1.04209E+00	3.16513E-02	-4.95321E-02	-3.09111E-03	0.00000E+00	1.4325
6	1003	4.94126E-04	1.02722E+00	2.29559E-02	-3.36721E-02	-2.00745E-03	0.00000E+00	1.7363
7	1177	3.22002E-04	1.01678E+00	1.61129E-02	-2.27702E-02	-1.30699E-03	0.00000E+00	2.0348
8	1348	2.09023E-04	1.00966E+00	1.10248E-02	-1.52051E-02	-8.49315E-04	0.00000E+00	2.3297
9	1515	1.35121E-04	1.00491E+00	7.39966E-03	-1.00395E-02	-5.50345E-04	0.00000E+00	2.6178
10	1682	8.69727E-05	1.00178E+00	4.89466E-03	-6.56937E-03	-3.55417E-04	0.00000E+00	2.9072
11	1847	5.57989E-05	9.99741E-01	3.20482E-03	-4.26818E-03	-2.28922E-04	0.00000E+00	3.1937
12	2012	3.56599E-05	9.98417E-01	2.08112E-03	-2.75797E-03	-1.46951E-04	0.00000E+00	3.4802
13	2174	2.27350E-05	9.97562E-01	1.34419E-03	-1.77379E-03	-9.41340E-05	0.00000E+00	3.7630
14	2332	1.44438E-05	9.97013E-01	8.64115E-04	-1.13682E-03	-6.01143E-05	0.00000E+00	4.0405
15	2490	9.11819E-06	9.96665E-01	5.51679E-04	-7.25102E-04	-3.81503E-05	0.00000E+00	4.3187
16	2648	5.72255E-06	9.96444E-01	3.50444E-04	-4.59659E-04	-2.41064E-05	0.00000E+00	4.5963
17	2806	3.57576E-06	9.96305E-01	2.21637E-04	-2.90034E-04	-1.51660E-05	0.00000E+00	4.8737
18	2955	2.22621E-06	9.96217E-01	1.39753E-04	-1.82235E-04	-9.51129E-06	0.00000E+00	5.1390
19	3099	1.38412E-06	9.96161E-01	8.80224E-05	-1.14206E-04	-5.95865E-06	0.00000E+00	5.3982

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	4.27901E-05	8	9.99991E-01	7
2	1	1	4.12192E-05	5	9.99983E-01	11
3	1	1	4.57924E-05	5	9.99987E-01	12
4	1	1	4.68906E-05	4	9.99988E-01	15
5	1	1	4.02071E-05	3	9.99980E-01	20
6	1	1	3.41864E-05	3	9.99976E-01	20
7	1	1	2.70673E-05	2	9.99971E-01	29
8	1	1	2.21377E-05	1	9.99970E-01	58
9	1	1	2.18770E-05	1	9.99972E-01	58
10	1	1	2.11885E-05	1	9.99973E-01	58
11	1	1	2.03478E-05	1	9.99974E-01	58
12	1	1	2.40224E-05	1	9.99979E-01	58
13	1	1	2.45885E-05	1	9.99981E-01	58
14	1	1	2.37073E-05	1	9.99981E-01	58
15	2	58	3.22305E-07	58	1.00000E+00	58
16	2	58	8.46489E-07	58	1.00000E+00	58
17	2	58	9.69152E-07	58	1.00000E+00	58
18	2	58	9.41820E-07	58	1.00000E+00	58
19	2	58	1.12461E-06	58	1.00000E+00	58
20	2	58	9.14681E-07	46	1.00000E+00	58
21	2	58	1.24339E-06	58	1.00000E+00	58
22	2	58	1.14445E-06	58	1.00000E+00	58
23	1	1	1.27753E-05	1	9.99979E-01	58
24	1	49	3.52570E-05	50	1.00007E+00	58
25	1	50	5.12435E-05	50	1.00007E+00	58
26	1	50	5.62205E-05	50	1.00012E+00	58
27	1	50	8.98692E-05	50	1.00014E+00	58

20	3134	1.43657E-10	9.96206E-01	7.19862E-06	-5.44993E-05	-9.13928E-07	0.00000E+00	5.4723

final monitor

lambda 9.96206E-01 production/absorption 9.98475E-01 angular flux on 16

elapsed time 5.47 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI     will be called
     UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U                UOXSPV07.CJW
     27GROUPNDF4                  INFHOMMEDIUM
     SOLNUO2F2     1  703.70 0 1.0 293   92235 5.02  92238 94.98  END
     H2O           2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I23.448  58.448
     36$$  23R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	3.33067E-16	9.02974E-01	7.88479E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0740
2	223	1.31700E-02	8.25355E-01	-4.69745E+00	-8.41747E-01	-5.92060E-02	0.00000E+00	0.4357
3	432	2.01957E-03	1.07524E+00	4.71962E-02	-2.73520E-01	-8.78663E-03	0.00000E+00	0.7797
4	630	1.12522E-03	1.06038E+00	4.03506E-02	-7.62956E-02	-4.63418E-03	0.00000E+00	1.1092
5	824	7.28595E-04	1.04079E+00	3.08058E-02	-4.75434E-02	-2.97295E-03	0.00000E+00	1.4333
6	1003	4.79996E-04	1.02589E+00	2.25293E-02	-3.26051E-02	-1.95285E-03	0.00000E+00	1.7383
7	1177	3.16194E-04	1.01533E+00	1.59670E-02	-2.22764E-02	-1.28573E-03	0.00000E+00	2.0357
8	1348	2.07516E-04	1.00806E+00	1.10398E-02	-1.50358E-02	-8.44762E-04	0.00000E+00	2.3305
9	1516	1.35637E-04	1.00316E+00	7.49054E-03	-1.00370E-02	-5.53410E-04	0.00000E+00	2.6208
10	1683	8.82955E-05	9.99897E-01	5.01042E-03	-6.64077E-03	-3.61361E-04	0.00000E+00	2.9098
11	1848	5.72959E-05	9.97741E-01	3.31757E-03	-4.36321E-03	-2.35334E-04	0.00000E+00	3.1967
12	2013	3.70427E-05	9.96329E-01	2.17875E-03	-2.85130E-03	-1.52759E-04	0.00000E+00	3.4832
13	2175	2.38976E-05	9.95407E-01	1.42333E-03	-1.85482E-03	-9.89692E-05	0.00000E+00	3.7658
14	2335	1.53576E-05	9.94809E-01	9.25000E-04	-1.20234E-03	-6.38960E-05	0.00000E+00	4.0462
15	2493	9.82215E-06	9.94424E-01	5.97970E-04	-7.75868E-04	-4.10718E-05	0.00000E+00	4.3235
16	2651	6.24813E-06	9.94177E-01	3.84396E-04	-4.98150E-04	-2.62700E-05	0.00000E+00	4.6008
17	2809	3.95712E-06	9.94019E-01	2.46047E-04	-3.18244E-04	-1.67351E-05	0.00000E+00	4.8782
18	2963	2.49798E-06	9.93919E-01	1.57028E-04	-2.02518E-04	-1.06297E-05	0.00000E+00	5.1508
19	3109	1.57303E-06	9.93854E-01	1.00022E-04	-1.28515E-04	-6.73759E-06	0.00000E+00	5.4128
20	3253	9.86541E-07	9.93814E-01	6.35358E-05	-8.13448E-05	-4.25569E-06	0.00000E+00	5.6717

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	3.21964E-05	8	9.99993E-01	7
2	1	1	3.09087E-05	5	9.99987E-01	11
3	1	1	3.50744E-05	5	9.99990E-01	12
4	1	1	3.59881E-05	4	9.99991E-01	15
5	1	1	3.06413E-05	3	9.99985E-01	20
6	1	1	2.62214E-05	3	9.99981E-01	20
7	1	1	2.08004E-05	2	9.99978E-01	29
8	1	1	1.68181E-05	1	9.99977E-01	58
9	1	1	1.64436E-05	1	9.99979E-01	58
10	1	1	1.57613E-05	1	9.99980E-01	58
11	1	1	1.49796E-05	1	9.99981E-01	58
12	1	1	1.76273E-05	1	9.99985E-01	58
13	1	1	1.80187E-05	1	9.99986E-01	58
14	1	1	1.73583E-05	1	9.99986E-01	58
15	2	58	2.51021E-07	58	1.00000E+00	58
16	2	58	6.55397E-07	58	1.00000E+00	58
17	2	58	7.48511E-07	58	1.00000E+00	58
18	2	58	7.27641E-07	58	1.00000E+00	58
19	2	58	8.71933E-07	58	1.00000E+00	58
20	2	58	7.25043E-07	46	1.00000E+00	58
21	2	58	9.71279E-07	58	1.00000E+00	58
22	2	58	8.97966E-07	58	1.00000E+00	58
23	1	49	9.52077E-06	49	1.00002E+00	58
24	1	50	2.73316E-05	50	1.00005E+00	58
25	1	50	3.97475E-05	50	1.00005E+00	58
26	1	50	4.36129E-05	50	1.00010E+00	58
27	1	50	6.96909E-05	50	1.00010E+00	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
21	3288	-8.57781E-12	9.93846E-01	5.15010E-06	-3.91618E-05	-6.47340E-07	0.00000E+00	5.7458

final monitor

lambda 9.93846E-01 production/absorption 9.96067E-01 angular flux on 15

elapsed time 5.75 min

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U                UOXSPVO8.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  678.571 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
    0$$  A5 ?  E
    1$$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I23.734 58.734
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	8.93168E-01	7.94640E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0732
2	223	1.33164E-02	8.13836E-01	-4.82980E+00	-8.50935E-01	-5.95218E-02	0.00000E+00	0.4357
3	432	1.92860E-03	1.07280E+00	4.54098E-02	-2.77838E-01	-8.39530E-03	0.00000E+00	0.7788
4	630	1.07162E-03	1.05853E+00	3.90609E-02	-7.35135E-02	-4.41006E-03	0.00000E+00	1.1085
5	824	7.00051E-04	1.03908E+00	2.99971E-02	-4.56535E-02	-2.85744E-03	0.00000E+00	1.4335
6	1005	4.65558E-04	1.02421E+00	2.20986E-02	-3.15585E-02	-1.89633E-03	0.00000E+00	1.7403
7	1179	3.09924E-04	1.01355E+00	1.58068E-02	-2.17649E-02	-1.26214E-03	0.00000E+00	2.0385
8	1350	2.05606E-04	1.00616E+00	1.10409E-02	-1.48446E-02	-8.38318E-04	0.00000E+00	2.3333
9	1519	1.35801E-04	1.00111E+00	7.56906E-03	-1.00151E-02	-5.54927E-04	0.00000E+00	2.6245
10	1686	8.94062E-05	9.97716E-01	5.11900E-03	-6.69745E-03	-3.66376E-04	0.00000E+00	2.9136
11	1851	5.86562E-05	9.95450E-01	3.42666E-03	-4.44948E-03	-2.41163E-04	0.00000E+00	3.2002
12	2016	3.83461E-05	9.93950E-01	2.27503E-03	-2.93947E-03	-1.58235E-04	0.00000E+00	3.4867
13	2179	2.50103E-05	9.92961E-01	1.50215E-03	-1.93302E-03	-1.03601E-04	0.00000E+00	3.7705
14	2339	1.62686E-05	9.92311E-01	9.87384E-04	-1.26689E-03	-6.75637E-05	0.00000E+00	4.0508
15	2497	1.05300E-05	9.91888E-01	6.45556E-04	-8.27096E-04	-4.39910E-05	0.00000E+00	4.3288
16	2655	6.78112E-06	9.91614E-01	4.19719E-04	-5.37217E-04	-2.84648E-05	0.00000E+00	4.6065
17	2813	4.34964E-06	9.91437E-01	2.71769E-04	-3.47274E-04	-1.83502E-05	0.00000E+00	4.8838
18	2971	2.77842E-06	9.91323E-01	1.75307E-04	-2.23602E-04	-1.17847E-05	0.00000E+00	5.1612
19	3120	1.76953E-06	9.91249E-01	1.12793E-04	-1.43450E-04	-7.54789E-06	0.00000E+00	5.4265
20	3264	1.12777E-06	9.91202E-01	7.25797E-05	-9.18717E-05	-4.83708E-06	0.00000E+00	5.6867

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	4.67903E-05	8	9.99989E-01	7
2	1	1	4.50248E-05	5	9.99981E-01	11
3	1	1	5.03010E-05	5	9.99986E-01	12
4	1	1	5.16633E-05	4	9.99987E-01	15
5	1	1	4.42194E-05	3	9.99978E-01	20
6	1	1	3.76446E-05	3	9.99973E-01	20
7	1	1	3.01013E-05	2	9.99968E-01	29
8	1	1	2.49744E-05	1	9.99966E-01	58
9	1	1	2.48690E-05	1	9.99968E-01	58
10	1	1	2.42583E-05	1	9.99969E-01	58
11	1	1	2.34528E-05	1	9.99970E-01	58
12	1	1	2.78401E-05	1	9.99976E-01	58
13	1	1	2.86163E-05	1	9.99978E-01	58
14	1	1	2.76906E-05	1	9.99978E-01	58
15	2	58	2.56354E-07	58	1.00000E+00	58
16	2	58	6.71035E-07	58	1.00000E+00	58
17	2	58	7.66936E-07	58	1.00000E+00	58
18	2	58	7.45463E-07	58	1.00000E+00	58
19	2	58	8.93029E-07	58	1.00000E+00	58
20	2	58	7.39689E-07	46	1.00000E+00	58
21	2	58	9.93043E-07	58	1.00000E+00	58
22	2	58	9.17909E-07	58	1.00000E+00	58
23	1	1	1.17590E-05	1	9.99981E-01	58
24	1	50	2.81401E-05	50	1.00005E+00	58
25	1	50	4.09230E-05	50	1.00006E+00	58
26	1	50	4.48941E-05	50	1.00010E+00	58
27	1	50	7.17422E-05	50	1.00011E+00	58

21	3299	2.16299E-10	9.91238E-01	5.87648E-06	-4.47423E-05	-7.54805E-07	0.00000E+00	5.7597

final monitor lambda 9.91239E-01 production/absorption 9.93414E-01 angular flux on 16

- elapsed time 5.76 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=36KGS U                UOXSPVO9.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  655.17 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
    0$$  A3 2  E
    1$$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I24.013 59.013
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	8.83619E-01	8.00454E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0740
2	222	1.34619E-02	8.02396E-01	-4.95961E+00	-8.[illegible]83E-01	-5.98467E-02	0.00000E+00	0.4347
3	431	1.84406E-03	1.06996E+00	4.37355E-02	-2.82405E-01	-8.03257E-03	0.00000E+00	0.7778
4	629	1.02100E-03	1.05626E+00	3.78463E-02	-7.09292E-02	-4.19770E-03	0.00000E+00	1.1075
5	823	6.72470E-04	1.03699E+00	2.92238E-02	-4.38584E-02	-2.74503E-03	0.00000E+00	1.4325
6	1005	4.51396E-04	1.02215E+00	2.16841E-02	-3.05454E-02	-1.84021E-03	0.00000E+00	1.7412
7	1179	3.03448E-04	1.01143E+00	1.56439E-02	-2.12583E-02	-1.23730E-03	0.00000E+00	2.0385
8	1350	2.03294E-04	1.00392E+00	1.10292E-02	-1.46395E-02	-8.30033E-04	0.00000E+00	2.3333
9	1520	1.35600E-04	9.98755E-01	7.63429E-03	-9.97368E-03	-5.54853E-04	0.00000E+00	2.6263
10	1687	9.01986E-05	9.95237E-01	5.21575E-03	-6.73646E-03	-3.70059E-04	0.00000E+00	2.9157
11	1852	5.97809E-05	9.92868E-01	3.52692E-03	-4.52126E-03	-2.46022E-04	0.00000E+00	3.2022
12	2017	3.94874E-05	9.91284E-01	2.36552E-03	-3.01726E-03	-1.63051E-04	0.00000E+00	3.4885
13	2180	2.60480E-05	9.90227E-01	1.57891E-03	-2.00504E-03	-1.07925E-04	0.00000E+00	3.7723
14	2340	1.71175E-05	9.89527E-01	1.04836E-03	-1.32826E-03	-7.11869E-05	0.00000E+00	4.0523
15	2498	1.11978E-05	9.89066E-01	6.92371E-04	-8.75947E-04	-4.67548E-05	0.00000E+00	4.3300
16	2656	7.29133E-06	9.88765E-01	4.54821E-04	-5.74889E-04	-3.05728E-05	0.00000E+00	4.6073
17	2814	4.73057E-06	9.88568E-01	2.97606E-04	-3.75625E-04	-1.99230E-05	0.00000E+00	4.8847
18	2972	3.05770E-06	9.88439E-01	1.94041E-04	-2.44529E-04	-1.29378E-05	0.00000E+00	5.1630
19	3123	1.97207E-06	9.88356E-01	1.26244E-04	-1.58675E-04	-8.38426E-06	0.00000E+00	5.4310
20	3269	1.27281E-06	9.88301E-01	8.21498E-05	-1.02831E-04	-5.43651E-06	0.00000E+00	5.6930

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	6.15892E-05	8	9.99985E-01	7
2	1	1	5.92201E-05	5	9.99974E-01	11
3	1	1	6.45625E-05	5	9.99981E-01	12
4	1	1	6.75396E-05	4	9.99982E-01	15
5	1	1	5.85249E-05	3	9.99971E-01	20
6	1	1	4.70697E-05	2	9.99962E-01	23
7	1	1	3.99723E-05	2	9.99957E-01	29
8	1	1	3.33720E-05	1	9.99955E-01	58
9	1	1	3.33340E-05	1	9.99957E-01	58
10	1	1	3.26053E-05	1	9.99959E-01	58
11	1	1	3.16035E-05	1	9.99960E-01	58
12	1	1	3.75996E-05	1	9.99967E-01	58
13	1	1	3.88665E-05	1	9.99969E-01	58
14	1	1	3.76654E-05	1	9.99969E-01	58
15	2	58	2.63649E-07	58	1.00000E+00	58
16	2	58	6.91884E-07	58	1.00000E+00	58
17	2	58	7.91556E-07	58	1.00000E+00	58
18	2	58	7.69257E-07	58	1.00000E+00	58
19	2	58	9.20734E-07	58	1.00000E+00	58
20	2	58	7.57577E-07	46	1.00000E+00	58
21	2	58	1.02030E-06	58	1.00000E+00	58
22	2	58	9.42830E-07	58	1.00000E+00	58
23	1	1	1.43517E-05	1	9.99977E-01	58
24	1	50	2.89740E-05	50	1.00005E+00	58
25	1	50	4.21422E-05	50	1.00006E+00	58
26	1	50	4.62254E-05	50	1.00010E+00	58
27	1	50	7.38645E-05	50	1.00011E+00	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
21	3304	1.00564E-10	9.88343E-01	6.62942E-06	-5.07161E-05	-8.60591E-07	0.00000E+00	5.7672

final monitor lambda 9.88343E-01 production/absorption 9.90474E-01 angular flux on 16

elapsed time 5.77 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMIZE VOLUME    MASS=38KGS U              UOXSPVO0.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  633.13 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION
    0$$  A3 2  E
    1$$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  2210 34I24.286 59.286
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-4.44089E-16	8.74326E-01	8.05945E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0740
2	222	1.36056E-02	7.91084E-01	-5.08693E+00	-8.68583E-01	-6.01771E-02	0.00000E+00	0.4357
3	431	1.76537E-03	1.06677E+00	4.21605E-02	-2.87178E-01	-7.69607E-03	0.00000E+00	0.7790
4	629	9.73208E-04	1.05365E+00	3.66995E-02	-6.85252E-02	-3.99683E-03	0.00000E+00	1.1087
5	823	6.45898E-04	1.03458E+00	2.84835E-02	-4.21535E-02	-2.63610E-03	0.00000E+00	1.4327
6	1005	4.37705E-04	1.01978E+00	2.12892E-02	-2.95698E-02	-1.78537E-03	0.00000E+00	1.7412
7	1181	2.96304E-04	1.00906E+00	1.54590E-02	-2.07505E-02	-1.20955E-03	0.00000E+00	2.0422
8	1352	2.00555E-04	1.00145E+00	1.09985E-02	-1.44044E-02	-8.19804E-04	0.00000E+00	2.3370
9	1523	1.35132E-04	9.96164E-01	7.68813E-03	-9.91280E-03	-5.53560E-04	0.00000E+00	2.6310
10	1690	9.07878E-05	9.92533E-01	5.30488E-03	-6.76270E-03	-3.72852E-04	0.00000E+00	2.9202
11	1855	6.07757E-05	9.90063E-01	3.62296E-03	-4.58417E-03	-2.50318E-04	0.00000E+00	3.2068
12	2020	4.05504E-05	9.88396E-01	2.45420E-03	-3.08977E-03	-1.67533E-04	0.00000E+00	3.4933
13	2183	2.70233E-05	9.87272E-01	1.65453E-03	-2.07378E-03	-1.11993E-04	0.00000E+00	3.7768
14	2344	1.79352E-05	9.86521E-01	1.10925E-03	-1.38749E-03	-7.45811E-05	0.00000E+00	4.0588
15	2502	1.18668E-05	9.86021E-01	7.40411E-04	-9.24292E-04	-4.95197E-05	0.00000E+00	4.3362
16	2660	7.81143E-06	9.85691E-01	4.91455E-04	-6.13232E-04	-3.27200E-05	0.00000E+00	4.6138
17	2818	5.12513E-06	9.85473E-01	3.24951E-04	-4.04943E-04	-2.15507E-05	0.00000E+00	4.8912
18	2976	3.35132E-06	9.85329E-01	2.14131E-04	-2.66487E-04	-1.41488E-05	0.00000E+00	5.1685
19	3133	2.18423E-06	9.85235E-01	1.40669E-04	-1.74788E-04	-9.26041E-06	0.00000E+00	5.4448
20	3282	1.42276E-06	9.85173E-01	9.23273E-05	-1.14361E-04	-6.05701E-06	0.00000E+00	5.7105

grp to grp	inner iters	mfd int.	max. flux difference	maf int.	max. scale factor	coarse mesh
1	1	1	7.22677E-05	8	9.99982E-01	7
2	1	1	6.96771E-05	5	9.99968E-01	11
3	1	1	8.05050E-05	5	9.99976E-01	12
4	1	1	8.44235E-05	4	9.99978E-01	15
5	1	1	7.12540E-05	3	9.99964E-01	20
6	1	1	5.86678E-05	2	9.99953E-01	23
7	1	1	5.02165E-05	2	9.99946E-01	29
8	1	1	4.26690E-05	1	9.[illegible]E-01	58
9	1	1	4.31073E-05	1	9.[illegible]E-01	58
10	1	1	4.26056E-05	1	9.[illegible]E-01	58
11	1	1	4.13987E-05	1	9.[illegible]E-01	58
12	1	1	4.95696E-05	1	9.99957E-01	58
13	1	1	5.13303E-05	1	9.99960E-01	58
14	1	1	5.00192E-05	1	9.99959E-01	58
15	2	58	2.74189E-07	58	1.00000E+00	58
16	2	58	7.18927E-07	58	1.00000E+00	58
17	2	58	8.22859E-07	58	1.00000E+00	58
18	2	58	7.99365E-07	58	1.00000E+00	58
19	2	58	9.55804E-07	58	1.00000E+00	58
20	2	58	7.[illegible]184E-07	46	1.00000E+00	58
21	2	58	1.05467E-06	58	1.00000E+00	58
22	2	58	9.75913E-07	58	1.00000E+00	58
23	1	1	1.74509E-05	1	9.99972E-01	58
24	1	49	2.98562E-05	50	1.00006E+00	58
25	1	50	4.33967E-05	50	1.00006E+00	58
26	1	50	4.76010E-05	50	1.00010E+00	58
27	1	50	7.60686E-05	50	1.00011E+00	58

21	3317	2.35677E-10	9.85219E-01	7.42330E-06	-5.68034E-05	-9.70736E-07	0.00000E+00	5.7837

final monitor lambda 9.85220E-01 production/absorption 9.87307E-01 angular flux on 16

elapsed time 5.78 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE VOLUME  MASS=38KGS U     SPHERE     UOXSPVOA.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLNUO2F2    1  904.76 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module KSDRN    will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION  VOL=42L
     0$$  A3 2  E
     1$$  3 2 58 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  22I0 34I21.564 56.564
     36$$  23R1 35R2
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-4.44089E-16	9.68050E-01	7.42069E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0770
2	223	1.23216E-02	8.93414E-01	-3.84525E+00	-7.82189E-01	-5.77914E-02	0.00000E+00	0.4385
3	432	2.73299E-03	1.07775E+00	6.10843E-02	-2.55656E-01	-1.18666E-02	0.00000E+00	0.7827
4	630	1.51281E-03	1.05996E+00	5.01176E-02	-9.82599E-02	-6.21886E-03	0.00000E+00	1.1123
5	824	9.13202E-04	1.04040E+00	3.64997E-02	-6.10598E-02	-3.68848E-03	0.00000E+00	1.4365
6	1001	5.57954E-04	1.02628E+00	2.51192E-02	-3.92370E-02	-2.23686E-03	0.00000E+00	1.7385
7	1177	3.40134E-04	1.01691E+00	1.65898E-02	-2.49013E-02	-1.36097E-03	0.00000E+00	2.0387
8	1347	2.07012E-04	1.01086E+00	1.06594E-02	-1.55756E-02	-8.29540E-04	0.00000E+00	2.3325
9	1514	1.25328E-04	1.00707E+00	6.70727E-03	-9.64131E-03	-5.04234E-04	0.00000E+00	2.6208
10	1679	7.54699E-05	1.00473E+00	4.15621E-03	-5.91020E-03	-3.05393E-04	0.00000E+00	2.9075
11	1843	4.52463E-05	1.00329E+00	2.54811E-03	-3.59556E-03	-1.84381E-04	0.00000E+00	3.1932
12	2003	2.70081E-05	1.00241E+00	1.55058E-03	-2.17487E-03	-1.10963E-04	0.00000E+00	3.4732
13	2161	1.59922E-05	1.00189E+00	9.35863E-04	-1.30782E-03	-6.63427E-05	0.00000E+00	3.7505
14	2319	9.39824E-06	1.00157E+00	5.60755E-04	-7.80608E-04	-3.94244E-05	0.00000E+00	4.0278
15	2474	5.48733E-06	1.00139E+00	3.34286E-04	-4.62952E-04	-2.33128E-05	0.00000E+00	4.3017
16	2618	3.18328E-06	1.00127E+00	1.98494E-04	-2.73121E-04	-1.37230E-05	0.00000E+00	4.5607
17	2762	1.82576E-06	1.00121E+00	1.17129E-04	-1.60160E-04	-8.01094E-06	0.00000E+00	4.8207
18	2906	1.02899E-06	1.00117E+00	6.84539E-05	-9.29757E-05	-4.61650E-06	0.00000E+00	5.0797

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	23	1.60929E-05	58	9.99995E-01	7
2	1	23	1.97994E-05	48	9.99992E-01	10
3	1	23	1.95312E-05	45	9.99995E-01	12
4	1	23	2.02270E-05	4	1.00000E+00	15
5	1	23	1.79275E-05	30	9.99993E-01	20
6	1	23	1.44535E-05	6	1.00001E+00	20
7	1	24	9.67014E-06	6	1.00001E+00	29
8	1	1	7.98037E-06	1	1.00001E+00	58
9	1	1	8.78310E-06	1	1.00001E+00	58
10	1	1	9.31797E-06	1	1.00001E+00	58
11	1	1	9.69913E-06	1	1.00001E+00	58
12	1	1	1.21280E-05	1	1.00001E+00	58
13	1	1	1.29333E-05	1	1.00001E+00	58
14	1	1	1.29479E-05	1	1.00001E+00	58
15	2	58	9.59500E-07	45	1.00000E+00	58
16	2	58	9.59227E-07	58	1.00000E+00	58
17	2	58	1.09928E-06	58	1.00000E+00	58
18	2	58	1.06942E-06	58	1.00000E+00	58
19	2	58	1.27704E-06	58	1.00000E+00	58
20	2	58	1.03447E-06	46	1.00000E+00	58
21	2	58	1.42567E-06	58	1.00000E+00	58
22	2	58	1.30352E-06	58	9.99999E-01	58
23	1	49	1.44777E-05	49	1.00002E+00	58
24	1	50	4.10151E-05	50	1.00008E+00	58
25	1	50	5.96178E-05	50	1.00008E+00	58
26	1	50	6.53959E-05	50	1.00014E+00	58
27	2	58	1.35203E-06	58	9.99999E-01	58

19	2942	1.20979E-10	1.00120E+00	5.71412E-06	-4.14956E-05	-6.06219E-07	0.00000E+00	5.1550

final monitor lambda 1.00120E+00 production/absorption 1.00374E+00 angular flux on 16

- elapsed time 5.16 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 SOLUTION OPTIMIZE VOLUME  MASS=38KGS U     SPHERE     UOXSPVOB.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  826.09 0 1.0 293   92235 5.02  92238 94.98  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION  VOL=46L
    0$$  A3 2  E
    1$$  3 2 55 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  22I0 34I22.227 57.227
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	4.44089E-16	9.45090E-01	7.59633E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0730
2	223	1.25898E-02	8.71410E-01	-4.14089E+00	-8.02744E-01	-5.81250E-02	0.00000E+00	0.4355
3	432	2.45910E-03	1.07973E+00	5.57316E-02	-2.59663E-01	-1.06852E-02	0.00000E+00	0.7788
4	630	1.37108E-03	1.06276E+00	4.64129E-02	-8.97854E-02	-5.64893E-03	0.00000E+00	1.1085
5	824	8.50443E-04	1.04296E+00	3.44313E-02	-5.61270E-02	-3.45323E-03	0.00000E+00	1.4325
6	1002	5.34652E-04	1.02840E+00	2.42584E-02	-3.69917E-02	-2.15778E-03	0.00000E+00	1.7365
7	1176	3.35871E-04	1.01848E+00	1.64702E-02	-2.41500E-02	-1.35317E-03	0.00000E+00	2.0348
8	1347	2.10098E-04	1.01195E+00	1.08747E-02	-1.55500E-02	-8.47452E-04	0.00000E+00	2.3287
9	1514	1.30825E-04	1.00774E+00	7.03496E-03	-9.89447E-03	-5.29350E-04	0.00000E+00	2.6180
10	1680	8.10908E-05	1.00506E+00	4.48367E-03	-6.23779E-03	-3.29588E-04	0.00000E+00	2.9055
11	1845	5.00413E-05	1.00338E+00	2.82656E-03	-3.90351E-03	-2.04508E-04	0.00000E+00	3.1918
12	2007	3.07868E-05	1.00232E+00	1.76915E-03	-2.42891E-03	-1.26600E-04	0.00000E+00	3.4750
13	2166	1.88438E-05	1.00167E+00	1.10004E-03	-1.50443E-03	-7.80386E-05	0.00000E+00	3.7542
14	2324	1.14589E-05	1.00127E+00	6.79360E-04	-9.26509E-04	-4.78381E-05	0.00000E+00	4.0313
15	2482	6.92153E-06	1.00102E+00	4.16949E-04	-5.67016E-04	-2.91585E-05	0.00000E+00	4.3087
16	2636	4.15984E-06	1.00087E+00	2.54820E-04	-3.45054E-04	-1.77005E-05	0.00000E+00	4.5817
17	2782	2.48670E-06	1.00078E+00	1.55177E-04	-2.09064E-04	-1.07007E-05	0.00000E+00	4.8435
18	2926	1.47368E-06	1.00072E+00	9.40049E-05	-1.26021E-04	-6.42548E-06	0.00000E+00	5.1025

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	1.78814E-05	9	9.99998E-01	7
2	1	1	1.83717E-05	6	9.99995E-01	10
3	1	1	1.86020E-05	5	9.99996E-01	12
4	1	1	1.86252E-05	4	9.99996E-01	15
5	1	1	1.59224E-05	3	9.99993E-01	20
6	1	1	1.37193E-05	3	9.99991E-01	20
7	1	1	1.01859E-05	2	9.99990E-01	29
8	1	2	7.17647E-06	1	9.99990E-01	58
9	1	2	6.36871E-06	1	9.99992E-01	58
10	1	1	5.52809E-06	1	9.99993E-01	58
11	1	1	4.72114E-06	1	9.99994E-01	58
12	1	1	5.11889E-06	1	9.99996E-01	58
13	1	1	4.90792E-06	1	9.99996E-01	58
14	1	1	4.44815E-06	1	9.99996E-01	58
15	2	58	3.92334E-07	44	1.00000E+00	58
16	2	58	1.03587E-06	58	1.00000E+00	58
17	2	58	1.18682E-06	58	1.00000E+00	58
18	2	58	1.15353E-06	58	1.00000E+00	58
19	2	58	1.37406E-06	58	1.00000E+00	58
20	2	58	1.10180E-06	44	9.99999E-01	58
21	2	58	1.51719E-06	58	1.00000E+00	58
22	2	58	1.38941E-06	58	9.99999E-01	58
23	1	49	1.48945E-05	49	1.00002E+00	58
24	1	49	4.31873E-05	49	1.00008E+00	58
25	1	49	6.27117E-05	49	1.00009E+00	58
26	1	50	6.87229E-05	49	1.00015E+00	58
27	2	58	1.40166E-06	58	9.99999E-01	58

19	2962	2.03509E-10	1.00077E+00	7.80536E-06	-5.80237E-05	-9.32113E-07	0.00000E+00	5.1775

final monitor lambda 1.00077E+00 production/absorption 1.00319E+00 angular flux on 16

elapsed time 5.18 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION OPTIMIZE VOLUME  MASS=38KGS U     SPHERE     UOXSPVOC.CJW
  27GROUPNDF4                INFBOMMEDIUM
  SOLNUO2F2    1  883.721 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION  VOL=43L
  0$$  A3 2  E
  1$$  3 2 58 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  22I0 34I21.733 56.733
  36$$  23R1 35R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	9.62185E-01	7.46695E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0723
2	223	1.23861E-02	8.88040E-01	-3.92033E+00	-7.87376E-01	-5.78558E-02	0.00000E+00	0.4368
3	432	2.66073E-03	1.07857E+00	5.96647E-02	-2.56427E-01	-1.15554E-02	0.00000E+00	0.7810
4	630	1.47629E-03	1.06096E+00	4.91430E-02	-9.60175E-02	-6.07336E-03	0.00000E+00	1.1113
5	824	8.97600E-04	1.04131E+00	3.59666E-02	-5.97873E-02	-3.63105E-03	0.00000E+00	1.4375
6	1001	5.52581E-04	1.02706E+00	2.49069E-02	-3.86786E-02	-2.21934E-03	0.00000E+00	1.7393
7	1177	3.39377E-04	1.01755E+00	1.65650E-02	-2.47274E-02	-1.36054E-03	0.00000E+00	2.0417
8	1348	2.08111E-04	1.01137E+00	1.07218E-02	-1.55827E-02	-8.35413E-04	0.00000E+00	2.3362
9	1515	1.26955E-04	1.00747E+00	6.79724E-03	-9.71830E-03	-5.11543E-04	0.00000E+00	2.6267
10	1680	7.70442E-05	1.00504E+00	4.24374E-03	-6.00246E-03	-3.12111E-04	0.00000E+00	2.9138
11	1845	4.65220E-05	1.00354E+00	2.62000E-03	-3.67868E-03	-1.89716E-04	0.00000E+00	3.2013
12	2006	2.80061E-05	1.00262E+00	1.60656E-03	-2.24141E-03	-1.15071E-04	0.00000E+00	3.4833
13	2164	1.67429E-05	1.00206E+00	9.77891E-04	-1.35908E-03	-6.94048E-05	0.00000E+00	3.7617
14	2322	9.92869E-06	1.00172E+00	5.90634E-04	-8.18326E-04	-4.15810E-05	0.00000E+00	4.0398
15	2480	5.84706E-06	1.00152E+00	3.54658E-04	-4.89279E-04	-2.47746E-05	0.00000E+00	4.3183
16	2629	3.42219E-06	1.00140E+00	2.12077E-04	-2.90884E-04	-1.46938E-05	0.00000E+00	4.5845
17	2773	1.98686E-06	1.00133E+00	1.26241E-04	-1.72029E-04	-8.66138E-06	0.00000E+00	4.8445
18	2917	1.13767E-06	1.00128E+00	7.45819E-05	-1.00980E-04	-5.05646E-06	0.00000E+00	5.1047

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	23	1.33053E-05	58	9.99997E-01	7
2	1	23	1.64259E-05	48	9.99994E-01	10
3	1	23	1.62964E-05	45	9.99996E-01	12
4	1	23	1.68383E-05	32	9.99997E-01	15
5	1	23	1.50124E-05	30	9.99995E-01	20
6	1	23	1.21098E-05	30	9.99993E-01	20
7	1	24	7.98751E-06	26	9.99993E-01	29
8	1	24	5.85168E-06	26	9.99992E-01	58
9	1	25	5.73388E-06	27	9.99993E-01	58
10	1	8	5.76906E-06	8	1.00001E+00	58
11	1	7	6.01493E-06	7	1.00001E+00	58
12	1	6	7.60301E-06	6	1.00001E+00	58
13	1	5	8.20518E-06	4	1.00001E+00	58
14	1	1	8.35466E-06	1	1.00001E+00	58
15	2	58	3.66551E-07	45	1.00000E+00	58
16	2	58	9.76602E-07	58	1.00000E+00	58
17	2	58	1.11942E-06	58	1.00000E+00	58
18	2	58	1.08878E-06	58	1.00000E+00	58
19	2	58	1.29937E-06	58	1.00000E+00	58
20	2	58	1.04955E-06	46	1.00000E+00	58
21	2	58	1.44668E-06	58	1.00000E+00	58
22	2	58	1.32307E-06	58	9.99999E-01	58
23	1	49	1.45854E-05	49	1.00002E+00	58
24	1	49	4.15415E-05	50	1.00008E+00	58
25	1	50	6.03500E-05	50	1.00008E+00	58
26	1	50	6.62014E-05	50	1.00015E+00	58
27	2	58	1.36379E-06	58	9.99999E-01	58

19	2953	2.03474E-10	1.00132E+00	6.22702E-06	-4.54757E-05	-6.87928E-07	0.00000E+00	5.1797

final monitor lambda 1.00132E+00 production/absorption 1.00383E+00 angular flux on 16

elapsed time 5.18 min.

TABLE 4
Infinite Mass of UF_6

UF6INHO?.CJW

H/U	K_{eff}
0	0.70857 ± 0.00156
0.3	0.84412 ± 0.00240
1.0	1.04523 ± 0.00295

TABLE 7
Infinite Cubic Array of UF_6 Cylinders (K_{eff})

H/U	DENSITY OF INTERSPERSED WATER			
	0	0.05	0.1	1.0
0	0.68912±0.00169	0.76521±0.00302	0.68109±0.00265	0.52353±0.00254
0.3	0.81438±0.00222	0.82539±0.00296	0.74378±0.00265	0.63170±0.00269
1.0	1.00380±0.00313	0.96483±0.00305	0.90778±0.00334	0.82969±0.00338

TABLE 8
Infinite Planar Array of UF_6 Cylinders (K_{eff})

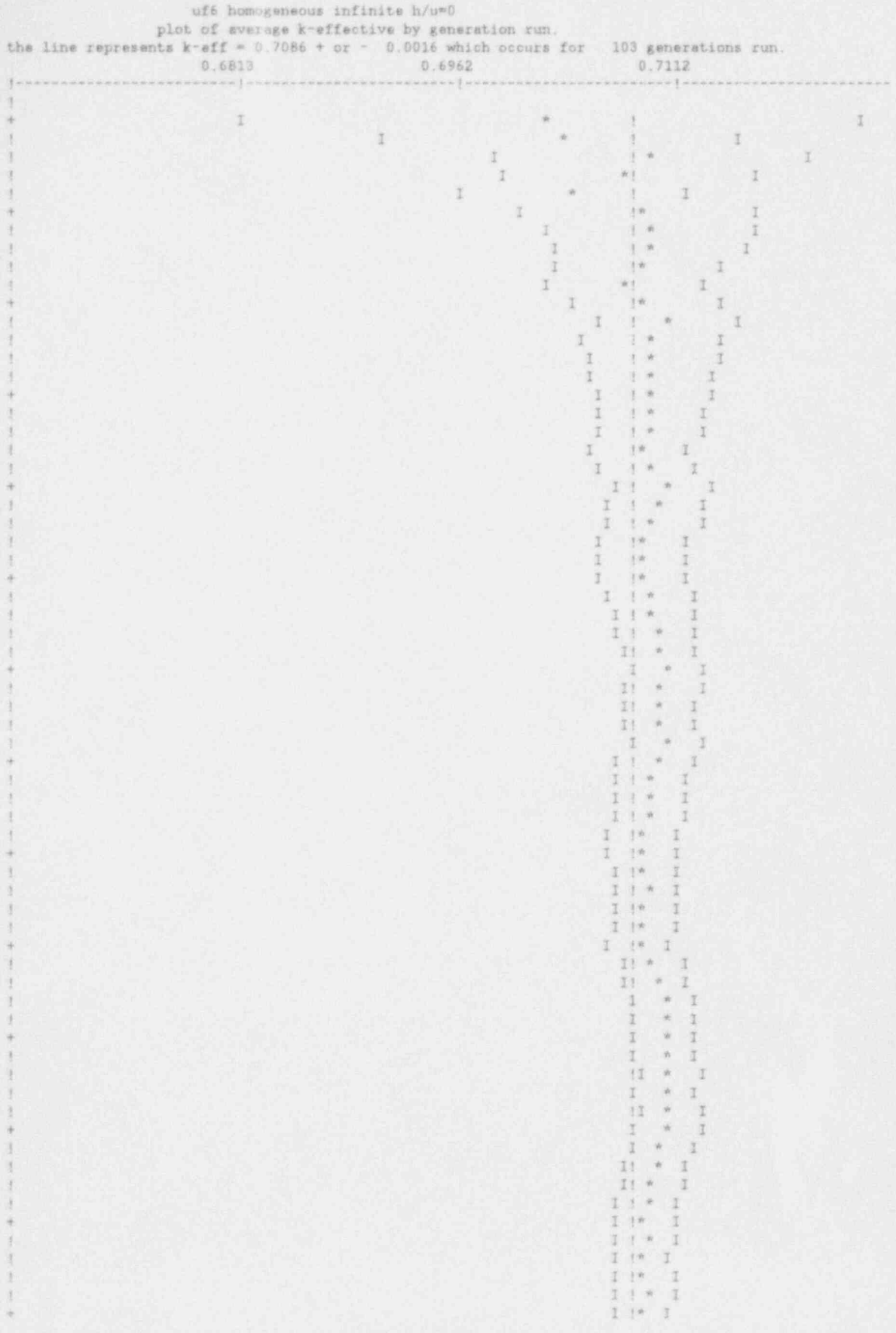
H/U	DENSITY OF INTERSPERSED WATER			
	0	0.05	0.1	1.0
0	0.47939±0.00182	0.56384±0.00258	0.55289±0.00245	0.52182±0.00241
0.3	0.61132±0.00275	0.66415±0.00292	0.65750±0.00288	0.62957±0.00312
1.0	0.83554±0.00384	0.85437±0.00336	0.85389±0.00321	0.83360±0.00392

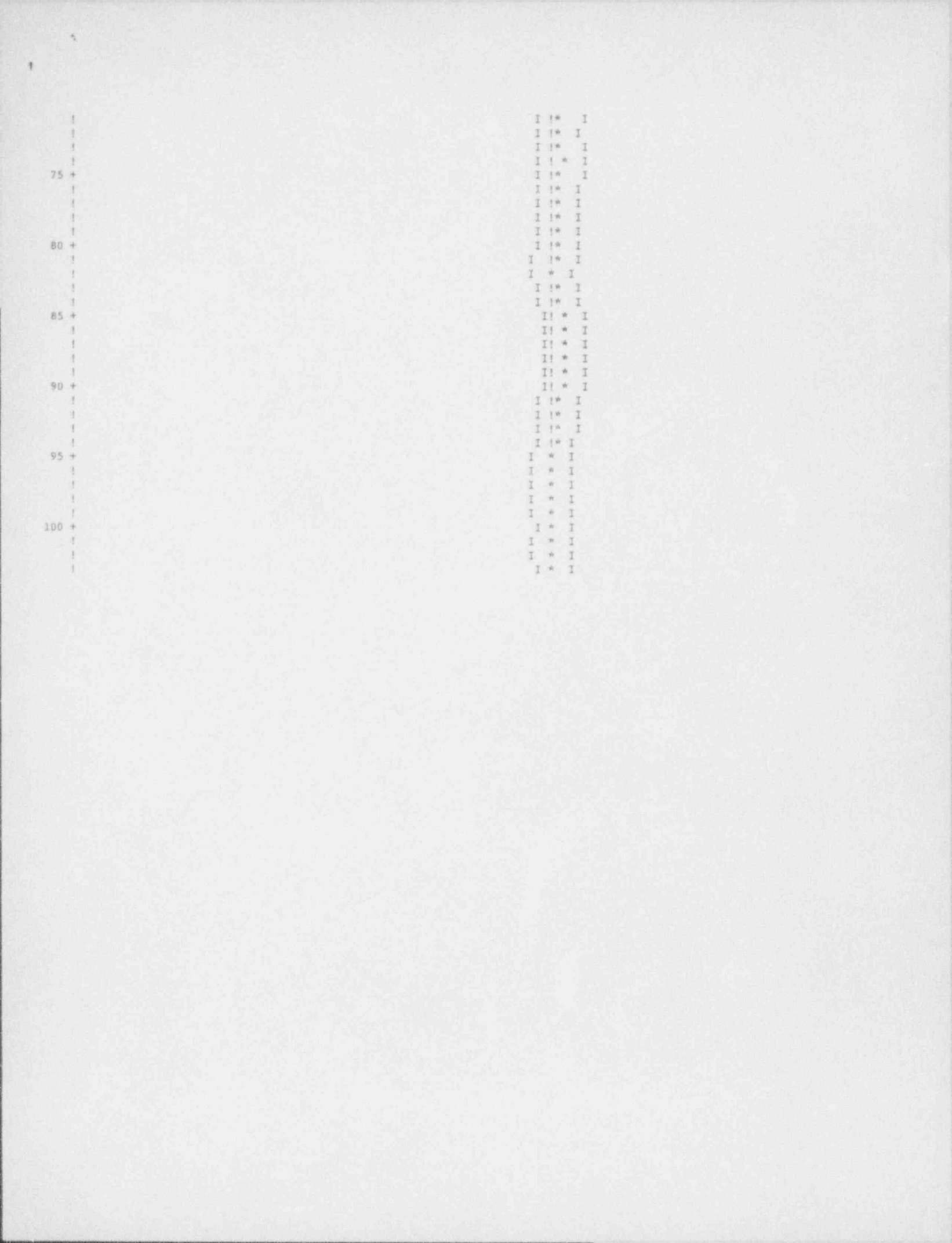
```
********************************************* ********************************
 #CSAS25
 UF6 HOMOGENEOUS INFINITE                          UF61NHO1.CJW
 27GROUPNDF4                  INFHOMMEDIUM
 UF6      1  1.0 293  92235 5.02  92238 94.98  END
 END COMP
 UF6 HOMOGENEOUS INFINITE H/U=0
 READ PARM  RUN=YES PLT=NO TME=45 END PARM
 READ GEOM
 GLOBAL UNIT  1
 COM='INFINITE MASS OF UF6'
 CUBE       1  1    2P1000.
 END GEOM
 READ BNDS  ALL=MIRROR  END BNDS
 READ PLOT
 TTL='X - Y  SLICE AT Z = 0.0'
 PLT=NO PIC=MIXTURE XUL=-35 YUL=35 ZUL=0 XLR=35 YLR=-35 ZLR=0
 UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
 NCH='VFW' END
 END PLOT
 END DATA
 END
********************************************************************************
```

uf6 homogeneous infinite h/u=0

lifetime = 1.84727E-06 + or - 1.74163E-08 generation time = 1.36081E-06 + or - 2.46570E-08

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.70857	+ or - 0.00156	0.70701 to 0.71013	0.70545 to 0.71168	0.70389 to 0.71324	30000
4	0.70884	+ or - 0.00155	0.70729 to 0.71039	0.70574 to 0.71194	0.70419 to 0.71349	29700
5	0.70869	+ or - 0.00156	0.70713 to 0.71025	0.70557 to 0.71180	0.70401 to 0.71336	29400
6	0.70872	+ or - 0.00157	0.70715 to 0.71029	0.70557 to 0.71187	0.70400 to 0.71344	29100
7	0.70851	+ or - 0.00158	0.70694 to 0.71009	0.70536 to 0.71167	0.70378 to 0.71324	28800
8	0.70859	+ or - 0.00159	0.70700 to 0.71019	0.70541 to 0.71178	0.70382 to 0.71337	28500
9	0.70884	+ or - 0.00159	0.70726 to 0.71043	0.70567 to 0.71202	0.70408 to 0.71361	28200
10	0.70854	+ or - 0.00158	0.70697 to 0.71012	0.70539 to 0.71169	0.70381 to 0.71327	27900
11	0.70846	+ or - 0.00159	0.70686 to 0.71005	0.70527 to 0.71164	0.70368 to 0.71323	27600
12	0.70846	+ or - 0.00161	0.70685 to 0.71007	0.70524 to 0.71168	0.70363 to 0.71328	27300
17	0.70839	+ or - 0.00165	0.70674 to 0.71005	0.70508 to 0.71170	0.70343 to 0.71336	25800
22	0.70828	+ or - 0.00176	0.70652 to 0.71004	0.70477 to 0.71179	0.70301 to 0.71355	24300
27	0.70813	+ or - 0.00181	0.70632 to 0.70994	0.70452 to 0.71175	0.70271 to 0.71355	22800
32	0.70807	+ or - 0.00190	0.70617 to 0.70997	0.70428 to 0.71186	0.70238 to 0.71376	21300
37	0.70760	+ or - 0.00199	0.70560 to 0.70959	0.70361 to 0.71158	0.70161 to 0.71358	19800
42	0.70781	+ or - 0.00207	0.70575 to 0.70988	0.70368 to 0.71195	0.70162 to 0.71401	18300
47	0.70784	+ or - 0.00219	0.70565 to 0.71003	0.70346 to 0.71222	0.70127 to 0.71441	16800
52	0.70719	+ or - 0.00225	0.70494 to 0.70944	0.70269 to 0.71169	0.70043 to 0.71394	15300
57	0.70551	+ or - 0.00225	0.70326 to 0.70776	0.70100 to 0.71002	0.69875 to 0.71227	13800
62	0.70623	+ or - 0.00231	0.70392 to 0.70853	0.70161 to 0.71084	0.69930 to 0.71315	12300
67	0.70765	+ or - 0.00243	0.70522 to 0.71007	0.70279 to 0.71250	0.70037 to 0.71493	10800
72	0.70720	+ or - 0.00250	0.70470 to 0.70970	0.70221 to 0.71220	0.69971 to 0.71469	9300
77	0.70669	+ or - 0.00293	0.70376 to 0.70961	0.70083 to 0.71254	0.69790 to 0.71547	7800
82	0.70811	+ or - 0.00323	0.70488 to 0.71133	0.70166 to 0.71456	0.69843 to 0.71779	6300
87	0.70330	+ or - 0.00315	0.70016 to 0.70645	0.69701 to 0.70960	0.69386 to 0.71275	4800
92	0.70319	+ or - 0.00412	0.69908 to 0.70731	0.69496 to 0.71143	0.69085 to 0.71554	3300


uf6 homogeneous infinite h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.7086 + or - 0.0016 which occurs for 103 generations run.
0.6813
0.6962
0.7112
5
10
15
20
25
30
35
40
45
50
55
60
65
70



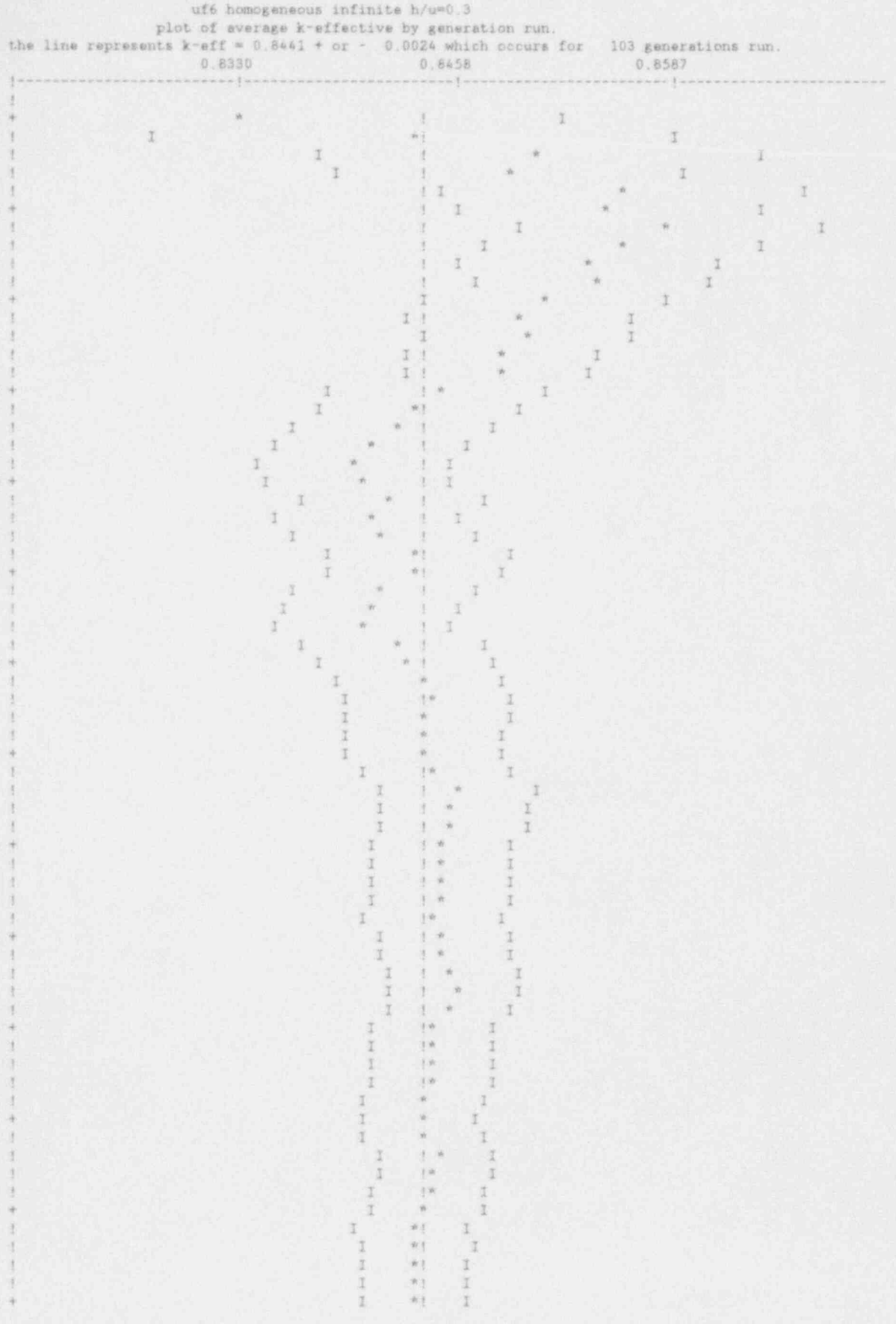
```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       3
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       3 entries.
        7q array has       3 entries.
        8q array has       3 entries.
        9q array has       3 entries.
       10q array has       7 entries.
       11q array has       3 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     4.21729E-04          92235
   2        1     92238     7.87847E-03          92238
   3        1      9019     4.98012E-02           9019
   4        2      6012     3.92503E-03           6012
   5        2     26000     8.34982E-02          26000
   6        3      1001     6.67514E-11           1001
   7        3      8016     3.33757E-11           8016
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1      1         1.00000E+00    2.93000E+02    0.00000E+00            0
   2      2         6.00000E+00    2.93000E+02    0.00000E+00            0
   3      3         1.10000E+01    2.93000E+02    0.00000E+00            0
     2427 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log  1    bondarenko trigger 0
copy      6012   CARBON-12       from log 11 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     26000   IRON            from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
******************************      ****************************************
#CSAS25
UF6 HOMOGENEOUS INFINITE                              UF6INHO2.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6      1  1.0 293  92235 5.02  92238 94.98  END
H        1  0  2.49006-3  293  END
END COMP
UF6 HOMOGENEOUS INFINITE H/U=0.3
READ PARM  RUN=YES PLT=NO TME=45 END PARM
READ GEOM
GLOBAL UNIT  1
COM='INFINITE MASS OF UF6'
CUBE       1  1    2P1000.
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC='XTURE XUL=-35 YUL=35 ZUL=0 XLR=35 YLR=-35 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VFW' END
END PLOT
END DATA
END
******************************************************************************
```

uf6 homogeneous infinite h/u=0.3

lifetime = 4.63041E-06 + or - 4.91918E-08 generation time = 5.07369E-06 + or - 7.62335E-08

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.84412	+ or - 0.00240	0.84172 to 0.84652	0.83933 to 0.84891	0.83693 to 0.85131	30000
4	0.84404	+ or - 0.00242	0.84162 to 0.84646	0.83920 to 0.84888	0.83678 to 0.85130	29700
5	0.84435	+ or - 0.00242	0.84192 to 0.84677	0.83950 to 0.84919	0.83707 to 0.85162	29400
6	0.84413	+ or - 0.00244	0.84169 to 0.84657	0.83925 to 0.84901	0.83681 to 0.85145	29100
7	0.84384	+ or - 0.00245	0.84139 to 0.84628	0.83894 to 0.84873	0.83650 to 0.85118	28800
8	0.84386	+ or - 0.00247	0.84139 to 0.84633	0.83891 to 0.84880	0.83644 to 0.85128	28500
9	0.84337	+ or - 0.00245	0.84092 to 0.84582	0.83847 to 0.84827	0.83602 to 0.85072	28200
10	0.84330	+ or - 0.00248	0.84082 to 0.84577	0.83835 to 0.84825	0.83587 to 0.85073	27900
11	0.84286	+ or - 0.00246	0.84039 to 0.84532	0.83793 to 0.84778	0.83547 to 0.85024	27600
12	0.84298	+ or - 0.00249	0.84049 to 0.84547	0.83801 to 0.84795	0.83552 to 0.85044	27300
17	0.84315	+ or - 0.00260	0.84055 to 0.84576	0.83794 to 0.84836	0.83534 to 0.85096	25800
22	0.84451	+ or - 0.00263	0.84188 to 0.84715	0.83924 to 0.84978	0.83661 to 0.85242	24300
27	0.84515	+ or - 0.00267	0.84248 to 0.84782	0.83981 to 0.85049	0.83713 to 0.85317	22800
32	0.84534	+ or - 0.00266	0.84268 to 0.84799	0.84002 to 0.85065	0.83736 to 0.85331	21300
37	0.84397	+ or - 0.00265	0.84132 to 0.84662	0.83867 to 0.84927	0.83602 to 0.85191	19800
42	0.84290	+ or - 0.00270	0.84020 to 0.84560	0.83751 to 0.84829	0.83481 to 0.85099	18300
47	0.84355	+ or - 0.00288	0.84067 to 0.84643	0.83778 to 0.84931	0.83490 to 0.85219	16800
52	0.84254	+ or - 0.00299	0.83955 to 0.84554	0.83656 to 0.84853	0.83356 to 0.85153	15300
57	0.84355	+ or - 0.00316	0.84039 to 0.84671	0.83722 to 0.84988	0.83406 to 0.85304	13800
62	0.84312	+ or - 0.00321	0.83990 to 0.84633	0.83669 to 0.84954	0.83348 to 0.85276	12300
67	0.84489	+ or - 0.00328	0.84161 to 0.84817	0.83834 to 0.85145	0.83506 to 0.85473	10800
72	0.84591	+ or - 0.00370	0.84221 to 0.84961	0.83851 to 0.85331	0.83482 to 0.85701	9300
77	0.84609	+ or - 0.00412	0.84197 to 0.85020	0.83785 to 0.85432	0.83373 to 0.85844	7800
82	0.84272	+ or - 0.00443	0.83829 to 0.84714	0.83386 to 0.85157	0.82943 to 0.85600	6300
87	0.84272	+ or - 0.00528	0.83743 to 0.84800	0.83215 to 0.85328	0.82687 to 0.85856	4800
92	0.84090	+ or - 0.00525	0.83565 to 0.84616	0.83040 to 0.85141	0.82514 to 0.85666	3300


uf6 homogeneous infinite h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.8441 + or - 0.0024 which occurs for 103 generations run.
0.8330
0.8458
0.8587
5
10
15
20
25
30
35
40
45
50
55
60
65
70


75
80
85
90
95
100

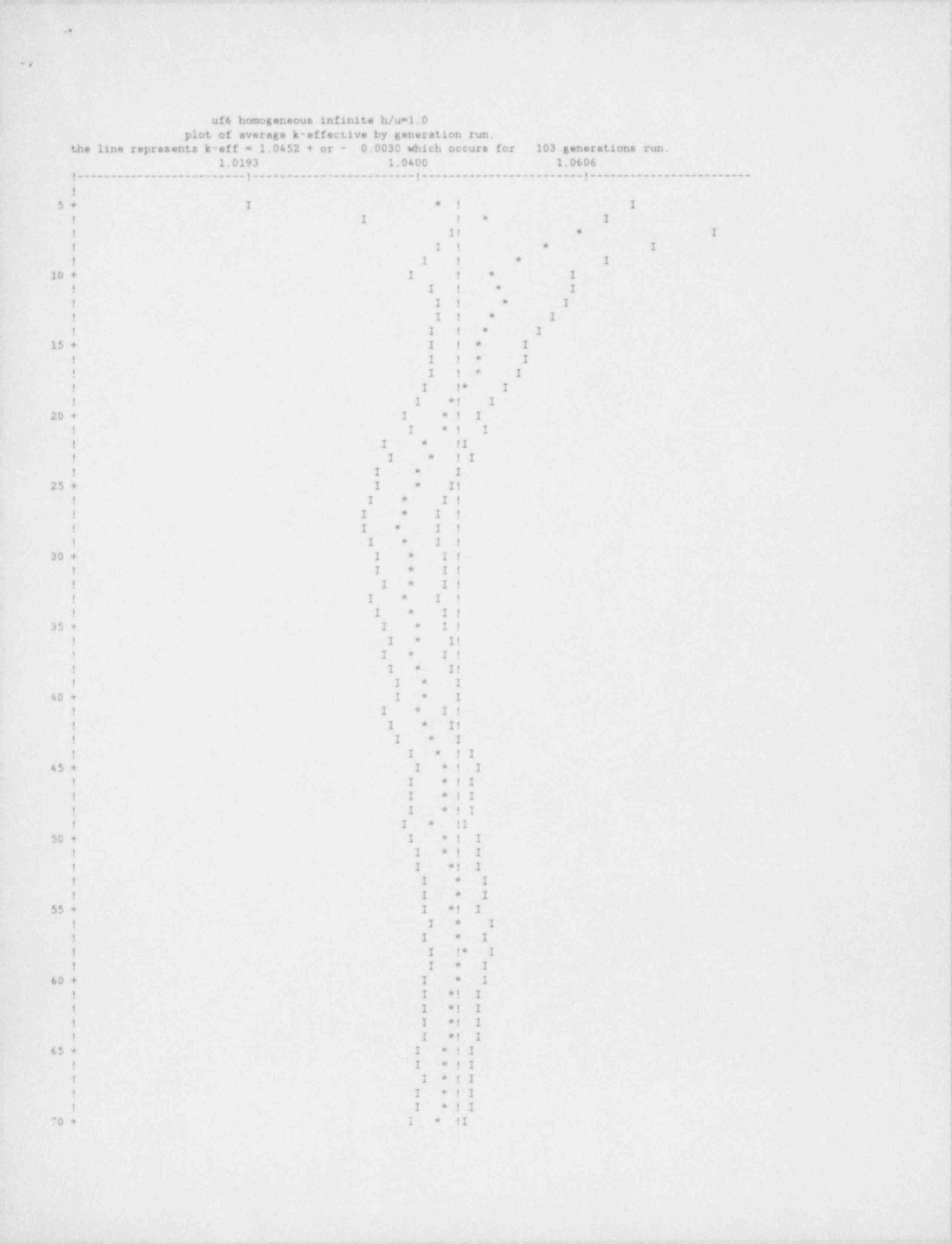
```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                    1
izm--number of zones or material regions                           3
ms--mixing table length                                            8
ibl--shielded cross section edit option (0/1--no/yes)              0
ibr--bondarenko factor edit option (0/1--no/yes)                   0
issopt--dancoff factor option                                      0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       8 entries.
        4q array has       8 entries.
        5q array has       8 entries.
        6q array has       3 entries.
        7q array has       3 entries.
        8q array has       3 entries.
        9q array has       3 entries.
       10q array has       8 entries.
       11q array has       3 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     4.21729E-04          92235
   2        1     92238     7.87847E-03          92238
   3        1      9019     4.98012E-02           9019
   4        1      1001     2.49006E-03           1001
   5        3      1001     6.67514E-11         301001
   6        2      6012     3.92503E-03           6012
   7        2     26000     8.34982E-02          26000
   8        3      8016     3.33757E-11           8016
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1        1.00000E+00    2.93000E+02    0.00000E+00             0
   2       2        6.00000E+00    2.93000E+02    0.00000E+00             0
   3       3        1.10000E+01    2.93000E+02    0.00000E+00             0
     2516 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      6012   CARBON-12       from log 11 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     26000   IRON            from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
********************************************************************************
#CSAS25
UF6 HOMOGENEOUS INFINITE                              UF6INHO3.CJW
27GROUPNDF4                    INFHOMMEDIUM
UF6      1  1.0 293  92235 5.02  92238 94.98  END
H        1  0  8.3002-3  293  END
END COMP
UF6 HOMOGENEOUS INFINITE H/U=1.0
READ PARM  RUN=YES PLT=NO TME=45 END PARM
READ GEOM
GLOBAL UNIT  1
COM='INFINITE MASS OF UF6'
CUBE       1  1    2P1000.
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-35 YUL=35 ZUL=0 XLR=35 YLR= 35 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VFW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 homogeneous infinite h/u=1.0

lifetime = 9.49277E-06 + or - 8.22140E-08 generation time = 1.06821E-05 + or - 9.74131E-08

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	1.04523	+ or - 0.00295	1.04228 to 1.04819	1.03933 to 1.05114	1.03637 to 1.05409	30000
4	1.04549	+ or - 0.00297	1.04252 to 1.04847	1.03955 to 1.05144	1.03658 to 1.05441	29700
5	1.04528	+ or - 0.00299	1.04228 to 1.04827	1.03929 to 1.05126	1.03630 to 1.05426	29400
6	1.04512	+ or - 0.00302	1.04210 to 1.04814	1.03908 to 1.05116	1.03606 to 1.05418	29100
7	1.04459	+ or - 0.00301	1.04158 to 1.04760	1.03858 to 1.05060	1.03557 to 1.05361	28800
8	1.04468	+ or - 0.00304	1.04164 to 1.04771	1.03861 to 1.05075	1.03557 to 1.05378	28500
9	1.04477	+ or - 0.00307	1.04171 to 1.04784	1.03864 to 1.05091	1.03557 to 1.05397	28200
10	1.04493	+ or - 0.00310	1.04184 to 1.04803	1.03874 to 1.05112	1.03564 to 1.05422	27900
11	1.04477	+ or - 0.00313	1.04165 to 1.04790	1.03852 to 1.05103	1.03540 to 1.05415	27600
12	1.04469	+ or - 0.00316	1.04153 to 1.04785	1.03837 to 1.05101	1.03521 to 1.05417	27300
17	1.04487	+ or - 0.00334	1.04153 to 1.04821	1.03819 to 1.05155	1.03484 to 1.05489	25800
22	1.04622	+ or - 0.00345	1.04277 to 1.04967	1.03933 to 1.05311	1.03588 to 1.05656	24300
27	1.04732	+ or - 0.00360	1.04372 to 1.05091	1.04012 to 1.05451	1.03652 to 1.05811	22800
32	1.04748	+ or - 0.00383	1.04366 to 1.05131	1.03983 to 1.05514	1.03600 to 1.05897	21300
37	1.04807	+ or - 0.00400	1.04406 to 1.05207	1.04006 to 1.05608	1.03606 to 1.06008	19800
42	1.04783	+ or - 0.00420	1.04364 to 1.05203	1.03944 to 1.05623	1.03524 to 1.06043	18300
47	1.04666	+ or - 0.00443	1.04222 to 1.05109	1.03779 to 1.05552	1.03336 to 1.05996	16800
52	1.04623	+ or - 0.00463	1.04159 to 1.05086	1.03696 to 1.05549	1.03233 to 1.06012	15300
57	1.04534	+ or - 0.00490	1.04044 to 1.05024	1.03553 to 1.05515	1.03063 to 1.06005	13800
62	1.04670	+ or - 0.00531	1.04140 to 1.05201	1.03609 to 1.05731	1.03078 to 1.06262	12300
67	1.04726	+ or - 0.00580	1.04146 to 1.05306	1.03565 to 1.05887	1.02985 to 1.06467	10800
72	1.04824	+ or - 0.00625	1.04199 to 1.05449	1.03573 to 1.06075	1.02948 to 1.06700	9300
77	1.04854	+ or - 0.00696	1.04158 to 1.05551	1.03461 to 1.06247	1.02765 to 1.06944	7800
82	1.04519	+ or - 0.00791	1.03728 to 1.05310	1.02938 to 1.06101	1.02147 to 1.06892	6300
87	1.04808	+ or - 0.00810	1.03998 to 1.05617	1.03189 to 1.06427	1.02379 to 1.07236	4800
92	1.03940	+ or - 0.01020	1.02921 to 1.04960	1.01901 to 1.05980	1.00882 to 1.06999	3300


uf6 homogeneous infinite h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 1.0452 + or - 0.0030 which occurs for 103 generations run.
1.0193
1.0400
1.0606
5
10
15
20
25
30
35
40
45
50
55
60
65
70


75
80
85
90
95
100

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                    1
izm--number of zones or material regions                           3
ms--mixing table length                                            8
ibl--shielded cross section edit option (0/1--no/yes)              0
ibr--bondarenko factor edit option (0/1--no/yes)                   0
issopt--dancoff factor option                                      0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has      6 entries.
        4q array has      8 entries.
        5q array has      8 entries.
        6q array has      3 entries.
        7q array has      3 entries.
        8q array has      3 entries.
        9q array has      3 entries.
       10q array has      8 entries.
       11q array has      3 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1       92235     4.21729E-04            92235
   2        1       92238     7.87847E-03            92238
   3        1        9019     4.98012E-02             9019
   4        1        1001     8.30020E-03             1001
   5        3        1001     6.67514E-11           301001
   6        2        6012     3.92503E-03             6012
   7        2       26000     8.34982E-02            26000
   8        3        8016     3.33757E-11             8016
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1         1.00000E+00    2.93000E+02    0.00000E+00              0
   2       2         6.00000E+00    2.93000E+02    0.00000E+00              0
   3       3         1.10000E+01    2.93000E+02    0.00000E+00              0
     2516 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      6012   CARBON-12       from log 11 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     26000   IRON            from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

TABLE 6
Infinite Mass of UF_6

H/U	K_{eff}
0	0.70857 ± 0.00156
0.3	0.84412 ± 0.00240
1.0	1.04523 ± 0.00295

TABLE 5
Infinite Cubic Array of UF_6 Cylinders (K_{eff})

UF6INCY?.CJW

H/U	DENSITY OF INTERSPERSED WATER			
	0	0.05	0.1	1.0
0	0.68912±0.00169 [1]	0.76521±0.00302 [4]	0.68109±0.00265 [7]	0.52353±0.00254 [A]
0.3	0.81438±0.00222 [2]	0.82539±0.00296 [5]	0.74378±0.00265 [8]	0.63170±0.00269 [B]
1.0	1.00380±0.00313 [3]	0.96483±0.00305 [6]	0.90778±0.00334 [9]	0.82969±0.00338 [C]

TABLE 8
Infinite Planar Array of UF_6 Cylinders (K_{eff})

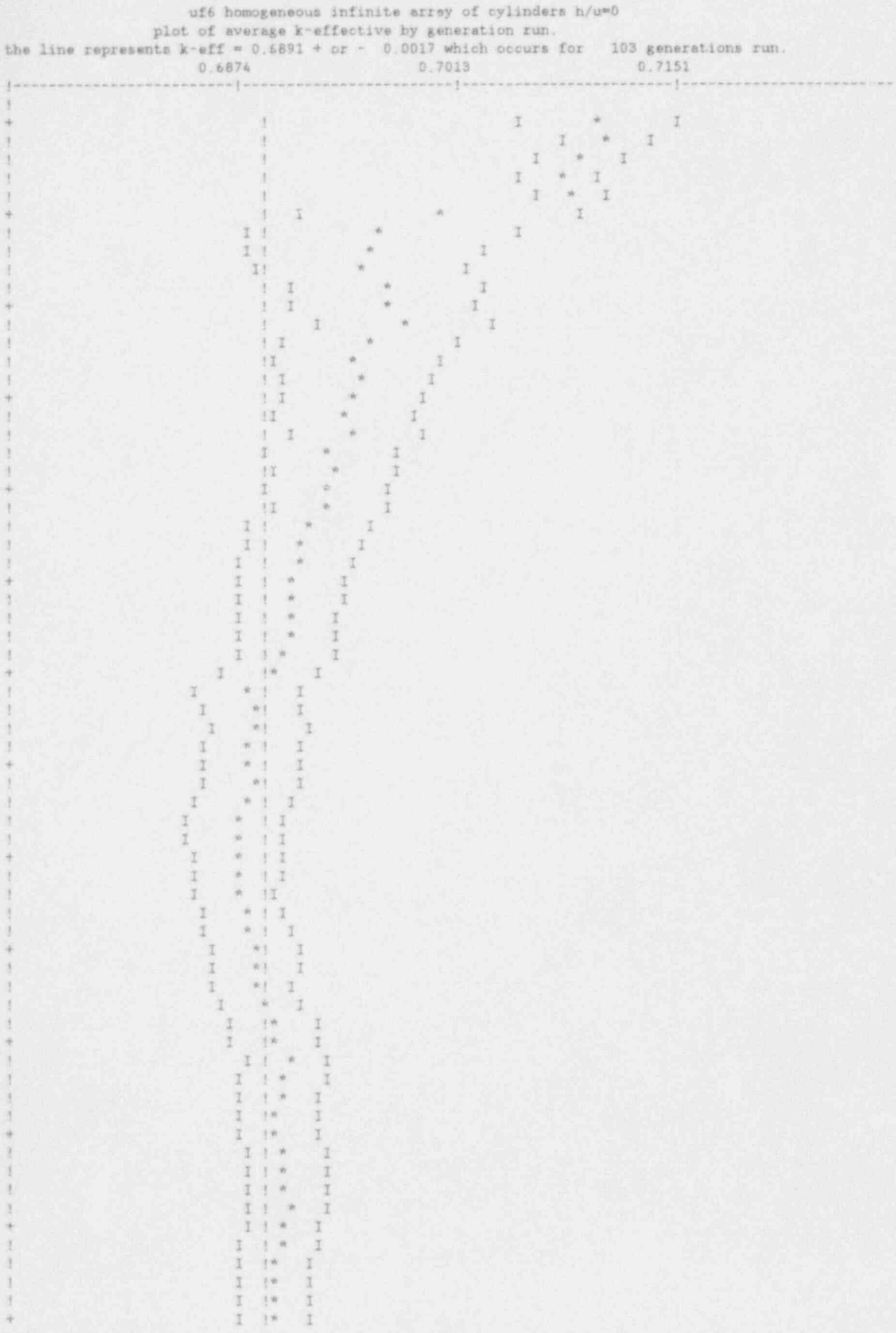
H/U	DENSITY OF INTERSPERSED WATER			
	0	0.05	0.1	1.0
0	0.47939±0.00182	0.56384±0.00258	0.55289±0.00245	0.52182±0.00241
0.3	0.61132±0.00275	0.66415±0.00292	0.65750±0.00288	0.62957±0.00312
1.0	0.83554±0.00384	0.85437±0.00336	0.85389±0.00321	0.83360±0.00392

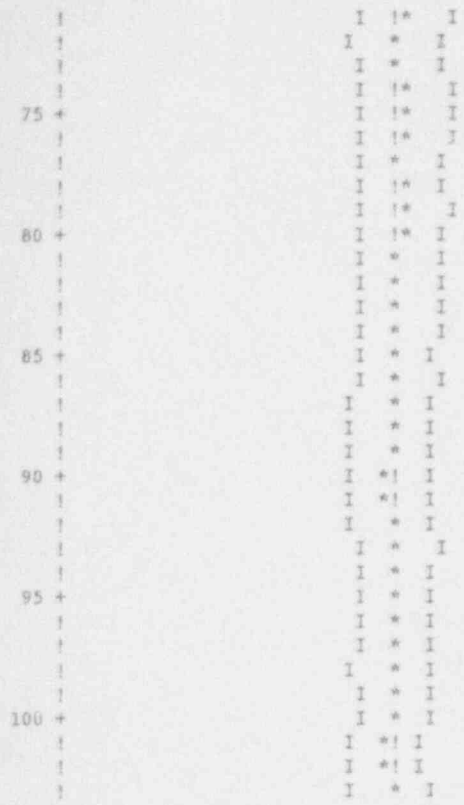
```
=csas25
UF6 CYLINDERS INFINITE ARRAY                                    UF6INCY1.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL  2  1.0  END
H2O          3  0.000000001  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
```

uf6 homogeneous infinite array of cylinders h/u=0

lifetime = 6.54585E-06 + or - 9.27770E-08 generation time = 4.79810E-06 + or - 1.22467E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.68912	+ or - 0.00169	0.68744 to 0.69081	0.68575 to 0.69249	0.68407 to 0.69418	30000
4	0.68886	+ or - 0.00168	0.68718 to 0.69054	0.68550 to 0.69222	0.68382 to 0.69391	29700
5	0.68869	+ or - 0.00169	0.68700 to 0.69038	0.68531 to 0.69207	0.68362 to 0.69376	29400
6	0.68845	+ or - 0.00169	0.68676 to 0.69014	0.68507 to 0.69183	0.68338 to 0.69352	29100
7	0.68828	+ or - 0.00170	0.68658 to 0.68998	0.68488 to 0.69168	0.68318 to 0.69338	28800
8	0.68813	+ or - 0.00171	0.68642 to 0.68984	0.68471 to 0.69155	0.68300 to 0.69326	28500
9	0.68786	+ or - 0.00171	0.68615 to 0.68956	0.68444 to 0.69127	0.68274 to 0.69298	28200
10	0.68828	+ or - 0.00167	0.68661 to 0.68995	0.68493 to 0.69162	0.68326 to 0.69330	27900
11	0.68846	+ or - 0.00168	0.68678 to 0.69014	0.68510 to 0.69182	0.68342 to 0.69350	27600
12	0.68845	+ or - 0.00170	0.68675 to 0.69014	0.68505 to 0.69184	0.68335 to 0.69354	27300
17	0.68799	+ or - 0.00174	0.68626 to 0.68973	0.68452 to 0.69146	0.68279 to 0.69320	25800
22	0.68775	+ or - 0.00182	0.68592 to 0.68957	0.68410 to 0.69140	0.68228 to 0.69322	24300
27	0.68822	+ or - 0.00187	0.68635 to 0.69009	0.68448 to 0.69196	0.68261 to 0.69383	22800
32	0.68841	+ or - 0.00200	0.68641 to 0.69041	0.68441 to 0.69241	0.68241 to 0.69441	21300
37	0.68940	+ or - 0.00198	0.68743 to 0.69138	0.68545 to 0.69336	0.68347 to 0.69534	19800
42	0.68980	+ or - 0.00206	0.68774 to 0.69186	0.68568 to 0.69393	0.68362 to 0.69599	18300
47	0.69040	+ or - 0.00216	0.68824 to 0.69256	0.68608 to 0.69472	0.68393 to 0.69688	16800
52	0.68950	+ or - 0.00223	0.68727 to 0.69173	0.68504 to 0.69396	0.68281 to 0.69619	15300
57	0.68752	+ or - 0.00202	0.68550 to 0.68955	0.68348 to 0.69157	0.68146 to 0.69359	13800
62	0.68689	+ or - 0.00217	0.68472 to 0.68905	0.68256 to 0.69122	0.68039 to 0.69338	12300
67	0.68786	+ or - 0.00227	0.68559 to 0.69012	0.68333 to 0.69239	0.68106 to 0.69465	10800
72	0.68845	+ or - 0.00256	0.68589 to 0.69101	0.68332 to 0.69358	0.68076 to 0.69614	9300
77	0.68788	+ or - 0.00280	0.68507 to 0.69068	0.68227 to 0.69348	0.67947 to 0.69629	7800
82	0.68771	+ or - 0.00306	0.68465 to 0.69077	0.68159 to 0.69382	0.67853 to 0.69688	6300
87	0.68830	+ or - 0.00393	0.68438 to 0.69223	0.68045 to 0.69615	0.67653 to 0.70008	4800
92	0.68882	+ or - 0.00558	0.68324 to 0.69440	0.67767 to 0.69997	0.67209 to 0.70555	3300


uf6 homogeneous infinite array of cylinders h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.6891 + or - 0.0017 which occurs for 103 generations run.
0.6874
0.7013
0.7151
5
10
15
20
25
30
35
40
45
50
55
60
65
70

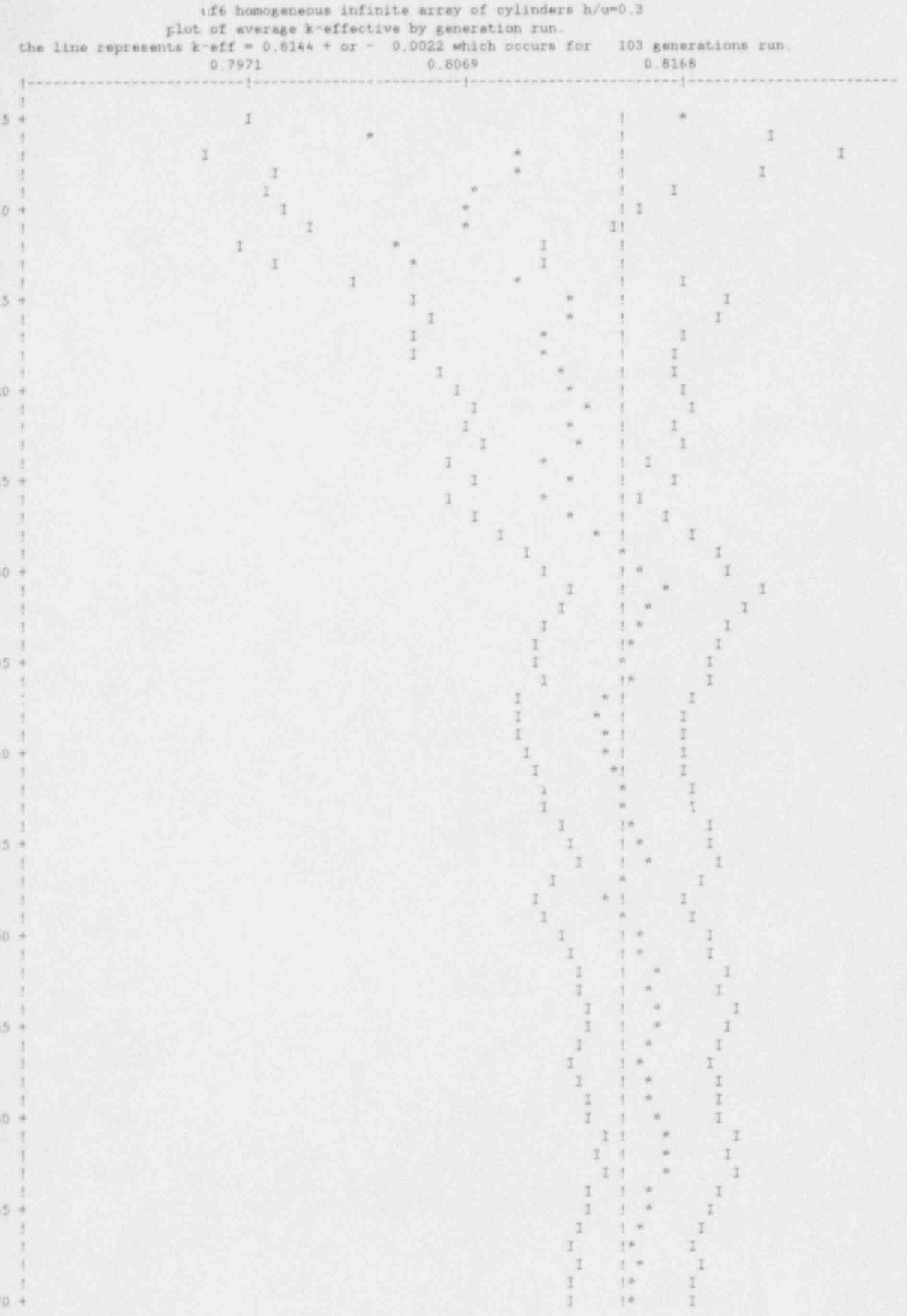

75
80
85
90
95
100

```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE ARRAY                                  UF6INCY2.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
H            1  0  2.49006-3  293  END
CARBONSTEEL  2  1.0  END
H2O          3  0.000000001  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0.3
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=0.3

lifetime = 1.40776E-05 + or - 4.13764E-07 generation time = 1.28113E-05 + or - 4.34401E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.81438	+ or - 0.00222	0.81216 to 0.81660	0.80994 to 0.81882	0.80772 to 0.82104	30000
4	0.81455	+ or - 0.00224	0.81232 to 0.81679	0.81008 to 0.81903	0.80784 to 0.82126	29700
5	0.81433	+ or - 0.00225	0.81208 to 0.81658	0.80983 to 0.81883	0.80759 to 0.82108	29400
6	0.81473	+ or - 0.00223	0.81250 to 0.81697	0.81026 to 0.81920	0.80803 to 0.82144	29100
7	0.81457	+ or - 0.00225	0.81232 to 0.81683	0.81007 to 0.81908	0.80782 to 0.82133	28800
8	0.81464	+ or - 0.00228	0.81236 to 0.81691	0.81009 to 0.81919	0.80781 to 0.82146	28500
9	0.81482	+ or - 0.00229	0.81253 to 0.81712	0.81024 to 0.81941	0.80795 to 0.82170	28200
10	0.81494	+ or - 0.00231	0.81262 to 0.81725	0.81031 to 0.81957	0.80800 to 0.82188	27900
11	0.81502	+ or - 0.00234	0.81268 to 0.81736	0.81034 to 0.81969	0.80801 to 0.82203	27600
12	0.81542	+ or - 0.00233	0.81309 to 0.81775	0.81076 to 0.82008	0.80843 to 0.82240	27300
17	0.81497	+ or - 0.00239	0.81258 to 0.81735	0.81019 to 0.81974	0.80780 to 0.82213	25800
22	0.81500	+ or - 0.00252	0.81247 to 0.81752	0.80995 to 0.82004	0.80743 to 0.82256	24300
27	0.81523	+ or - 0.00259	0.81264 to 0.81781	0.81005 to 0.82040	0.80746 to 0.82299	22800
32	0.81390	+ or - 0.00263	0.81127 to 0.81653	0.80863 to 0.81916	0.80600 to 0.82179	21300
37	0.81469	+ or - 0.00274	0.81215 to 0.81763	0.80941 to 0.82037	0.80667 to 0.82311	19800
42	0.81459	+ or - 0.00295	0.81164 to 0.81754	0.80869 to 0.82049	0.80573 to 0.82344	18300
47	0.81444	+ or - 0.00302	0.81142 to 0.81746	0.80840 to 0.82048	0.80538 to 0.82350	16800
52	0.81319	+ or - 0.00305	0.81013 to 0.81624	0.80708 to 0.81930	0.80402 to 0.82235	15300
57	0.81355	+ or - 0.00323	0.81032 to 0.81679	0.80708 to 0.82002	0.80385 to 0.82325	13800
62	0.81191	+ or - 0.00343	0.80848 to 0.81534	0.80505 to 0.81877	0.80162 to 0.82220	12300
67	0.81401	+ or - 0.00353	0.81048 to 0.81754	0.80694 to 0.82107	0.80341 to 0.82461	10800
72	0.81280	+ or - 0.00392	0.80889 to 0.81672	0.80497 to 0.82063	0.80105 to 0.82455	9300
77	0.81202	+ or - 0.00436	0.80767 to 0.81638	0.80331 to 0.82074	0.79895 to 0.82509	7800
82	0.81256	+ or - 0.00502	0.80754 to 0.81757	0.79852 to 0.81859	0.79350 to 0.82361	6300
87	0.80547	+ or - 0.00544	0.80002 to 0.81091	0.79458 to 0.81635	0.78914 to 0.82179	4800
92	0.81079	+ or - 0.00603	0.80476 to 0.81681	0.79873 to 0.82284	0.79271 to 0.82887	3300


of6 homogeneous infinite array of cylinders h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.8144 + or - 0.0022 which occurs for 103 generations run.
0.7971
0.8069
0.8168
5
10
15
20
25
30
35
40
45
50
55
60
65
70

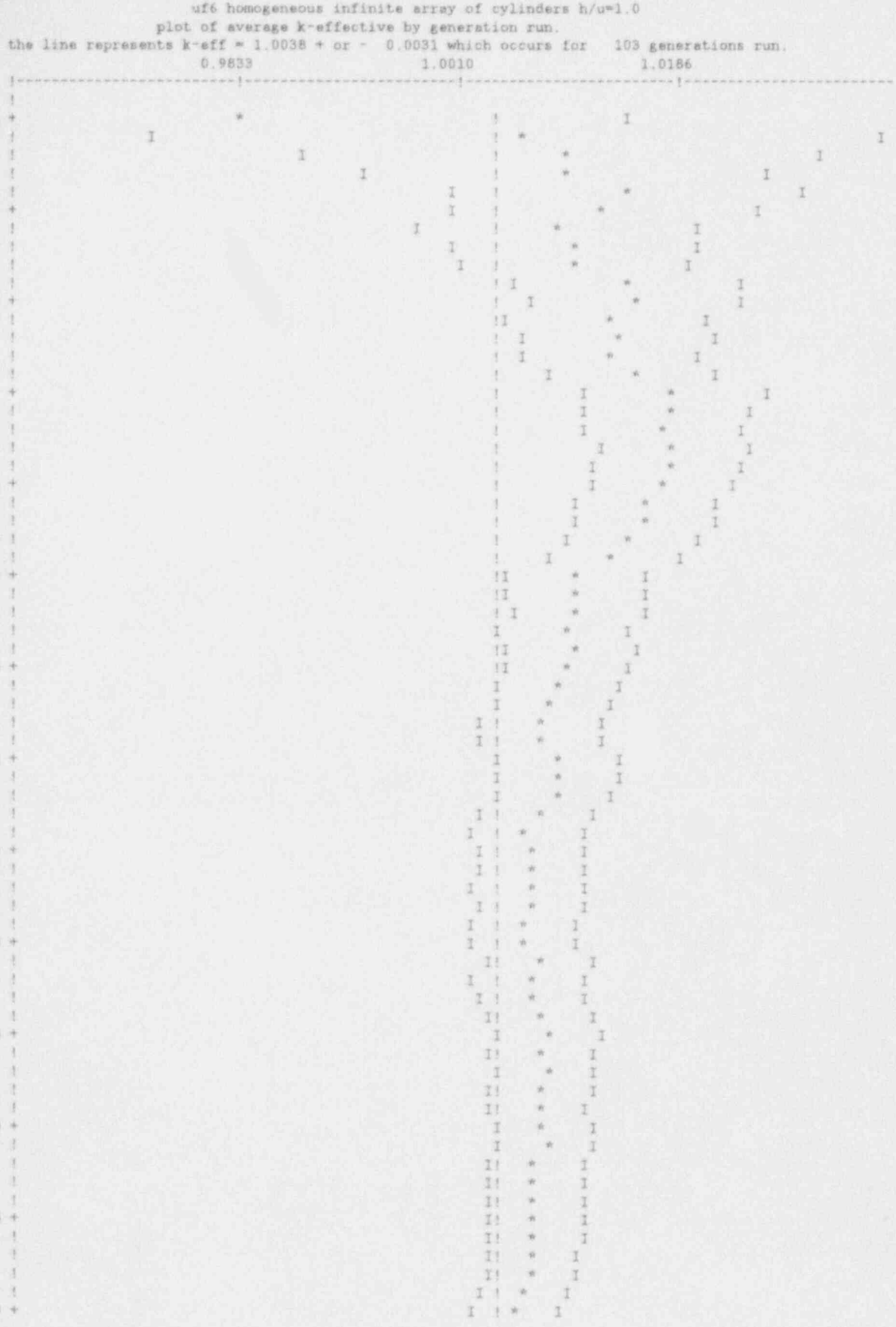
75
80
85
90
95
100

```
********************************************************************************
 #CSAS25
 UF6 CYLINDERS INFINITE ARRAY                                  UF6INCY3.CJW
 27GROUPNDF4                  INFHOMMEDIUM
 UF6          1  1.0 293  92235 5.02  92238 94.98  END
 H            1  0  8.3002-3  293  END
 CARBONSTEEL  2  1.0  END
 H2O          3  0.000000001  END
 END COMP
 UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=1.0
 READ PARM  RUN=YES PLT=NO  TME=150 END PARM
 READ GEOM
 GLOBAL UNIT  1
 COM='ONE UF6 CYLINDER'
 CYLINDER   1  1  36.83  2P95.25
 CYLINDER   2  1  38.10  2P96.52
 CUBOID     3  1  4P53.34  2P111.76
 END GEOM
 READ BNDS  ALL=MIRROR  END BNDS
 READ PLOT
 TTL='X - Y  SLICE AT Z = 0.0'
 PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
 UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
 NCH='VUCW' END
 END PLOT
 END DATA
 END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=1.0

lifetime = 2.38503E-05 + or - 7.17941E-07 generation time = 2.10233E-05 + or - 5.15690E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	1.00360	+ or - 0.00313	1.00067 to 1.00693	0.99754 to 1.01007	0.99440 to 1.01320	30000
4	1.00369	+ or - 0.00316	1.00053 to 1.00685	0.99736 to 1.01001	0.99420 to 1.01318	29700
5	1.00422	+ or - 0.00315	1.00107 to 1.00737	0.99792 to 1.01052	0.99477 to 1.01367	29400
6	1.00373	+ or - 0.00314	1.00059 to 1.00687	0.99744 to 1.01002	0.99430 to 1.01316	29100
7	1.00356	+ or - 0.00317	1.00039 to 1.00673	0.99722 to 1.00990	0.99404 to 1.01307	28800
8	1.00349	+ or - 0.00320	1.00029 to 1.00670	0.99708 to 1.00990	0.99388 to 1.01311	28500
9	1.00309	+ or - 0.00321	0.99988 to 1.00630	0.99666 to 1.00952	0.99345 to 1.01273	28200
10	1.00312	+ or - 0.00325	0.99987 to 1.00637	0.99662 to 1.00961	0.99337 to 1.01286	27900
11	1.00334	+ or - 0.00328	1.00007 to 1.00662	0.99679 to 1.00989	0.99352 to 1.01317	27600
12	1.00313	+ or - 0.00331	0.99983 to 1.00644	0.99652 to 1.00974	0.99322 to 1.01305	27300
17	1.00213	+ or - 0.00341	0.99872 to 1.00554	0.99530 to 1.00896	0.99189 to 1.01237	25800
22	1.00051	+ or - 0.00348	0.99704 to 1.00399	0.99356 to 1.00747	0.99009 to 1.01094	24300
27	0.99990	+ or - 0.00367	0.99623 to 1.00356	0.99256 to 1.00723	0.98890 to 1.01090	22800
32	1.00099	+ or - 0.00378	0.99721 to 1.00477	0.99343 to 1.00855	0.98965 to 1.01233	21300
37	1.00126	+ or - 0.00401	0.99725 to 1.00527	0.99324 to 1.00928	0.98923 to 1.01329	19800
42	1.00057	+ or - 0.00418	0.99639 to 1.00476	0.99220 to 1.00894	0.98802 to 1.01312	18300
47	1.00158	+ or - 0.00443	0.99716 to 1.00601	0.99273 to 1.01044	0.98830 to 1.01487	16800
52	1.00107	+ or - 0.00456	0.99651 to 1.00563	0.99195 to 1.01019	0.98739 to 1.01474	15300
57	0.99876	+ or - 0.00471	0.99405 to 1.00347	0.98934 to 1.00818	0.98463 to 1.01289	13800
62	0.99891	+ or - 0.00512	0.99379 to 1.00403	0.98867 to 1.00915	0.98355 to 1.01427	12300
67	0.99843	+ or - 0.00576	0.99266 to 1.00419	0.98690 to 1.00996	0.98114 to 1.01572	10800
72	0.99890	+ or - 0.00652	0.99238 to 1.00542	0.98585 to 1.01195	0.97933 to 1.01847	9300
77	1.00014	+ or - 0.00737	0.99277 to 1.00751	0.98540 to 1.01488	0.97803 to 1.02225	7800
82	1.00186	+ or - 0.00783	0.99403 to 1.00968	0.98620 to 1.01751	0.97837 to 1.02534	6300
87	0.99138	+ or - 0.00756	0.98382 to 0.99894	0.97626 to 1.00650	0.96871 to 1.01405	4800
92	0.99399	+ or - 0.01074	0.98325 to 1.00472	0.97251 to 1.01546	0.96178 to 1.02620	3300


uf6 homogeneous infinite array of cylinders h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 1.0038 + or - 0.0031 which occurs for 103 generations run.
0.9833
1.0010
1.0186
5
10
75
20
25
30
35
40
45
50
55
60
65
70

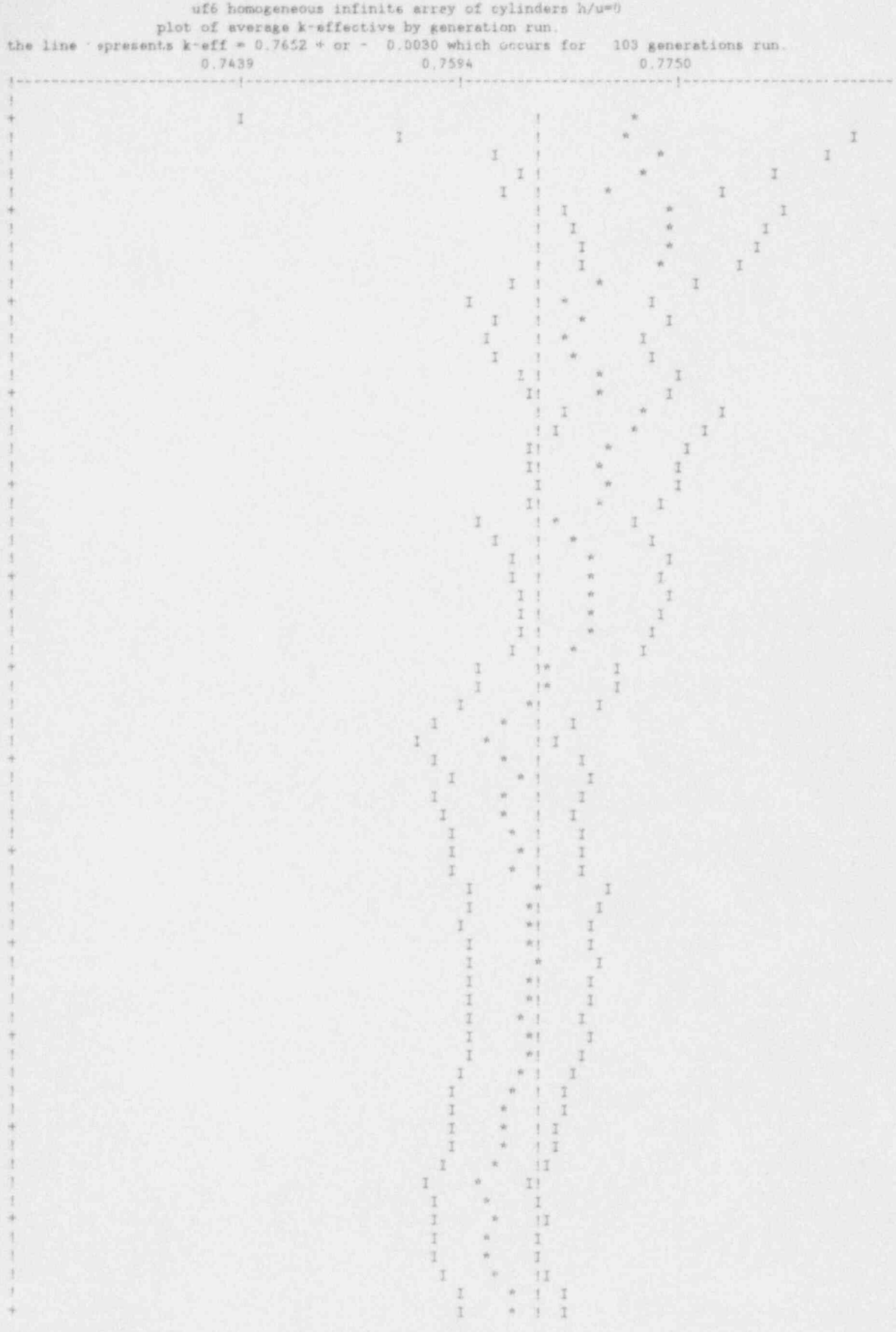

75
80
85
90
95
100

```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE ARRAY                                  UF6INCY4.CJW
27GROUPNDF4                    INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL   2  1.0  END
H2O           3  0.05  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=0

lifetime = 5.25897E-04 + or - 5.04572E-06 generation time = 3.65487E-04 + or - 5.60993E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.76521	+ or - 0.00302	0.76218 to 0.76823	0.75916 to 0.77125	0.75613 to 0.77428	30000
4	0.76542	+ or - 0.00305	0.76237 to 0.76847	0.75933 to 0.77152	0.75628 to 0.77456	29700
5	0.76506	+ or - 0.00306	0.76201 to 0.76812	0.75895 to 0.77118	0.75589 to 0.77423	29400
6	0.76501	+ or - 0.00309	0.76192 to 0.76810	0.75883 to 0.77118	0.75574 to 0.77427	29100
7	0.76483	+ or - 0.00312	0.76171 to 0.76794	0.75860 to 0.77106	0.75548 to 0.77418	28800
8	0.76479	+ or - 0.00315	0.76164 to 0.76794	0.75849 to 0.77109	0.75534 to 0.77423	28500
9	0.76486	+ or - 0.00318	0.76168 to 0.76804	0.75850 to 0.77122	0.75532 to 0.77440	28200
10	0.76447	+ or - 0.00319	0.76128 to 0.76766	0.75809 to 0.77085	0.75490 to 0.77404	27900
11	0.76437	+ or - 0.00322	0.76115 to 0.76759	0.75792 to 0.77082	0.75470 to 0.77404	27600
12	0.76427	+ or - 0.00326	0.76101 to 0.76753	0.75775 to 0.77079	0.75449 to 0.77405	27300
17	0.76488	+ or - 0.00339	0.76149 to 0.76828	0.75809 to 0.77167	0.75470 to 0.77506	25800
22	0.76362	+ or - 0.00350	0.76012 to 0.76712	0.75662 to 0.77063	0.75312 to 0.77413	24300
27	0.76485	+ or - 0.00358	0.76127 to 0.76844	0.75768 to 0.77202	0.75410 to 0.77560	22800
32	0.76369	+ or - 0.00376	0.75993 to 0.76746	0.75617 to 0.77122	0.75241 to 0.77498	21300
37	0.76550	+ or - 0.00385	0.76165 to 0.76934	0.75780 to 0.77319	0.75396 to 0.77704	19800
42	0.76654	+ or - 0.00380	0.76274 to 0.77033	0.75895 to 0.77413	0.75515 to 0.77792	18300
47	0.76519	+ or - 0.00391	0.76128 to 0.76910	0.75737 to 0.77301	0.75346 to 0.77691	16800
52	0.76579	+ or - 0.00423	0.76156 to 0.77002	0.75732 to 0.77425	0.75309 to 0.77849	15300
57	0.76675	+ or - 0.00456	0.76219 to 0.77130	0.75763 to 0.77586	0.75308 to 0.78041	13800
62	0.76969	+ or - 0.00486	0.76482 to 0.77455	0.75996 to 0.77942	0.75509 to 0.78428	123
67	0.77160	+ or - 0.00506	0.76654 to 0.77666	0.76148 to 0.78172	0.75641 to 0.78679	108
72	0.76769	+ or - 0.00520	0.76248 to 0.77289	0.75728 to 0.77809	0.75208 to 0.78329	9300
77	0.76425	+ or - 0.00572	0.75853 to 0.76997	0.75282 to 0.77569	0.74710 to 0.78141	7800
82	0.76391	+ or - 0.00590	0.75801 to 0.76981	0.75211 to 0.77571	0.74622 to 0.78161	6300
87	0.76205	+ or - 0.00752	0.75453 to 0.76956	0.74701 to 0.77708	0.73949 to 0.78460	4800
92	0.76487	+ or - 0.00934	0.75552 to 0.77421	0.74618 to 0.78356	0.73683 to 0.79290	3300


uf6 homogeneous infinite arrey of cylinders h/u=0
plot of average k-effective by generation run.
the line · epresents k-eff = 0.7652 + or - 0.0030 which occurs for 103 generations run.
0.7439
0.7594
0.7750


75
80
85
90
95
100

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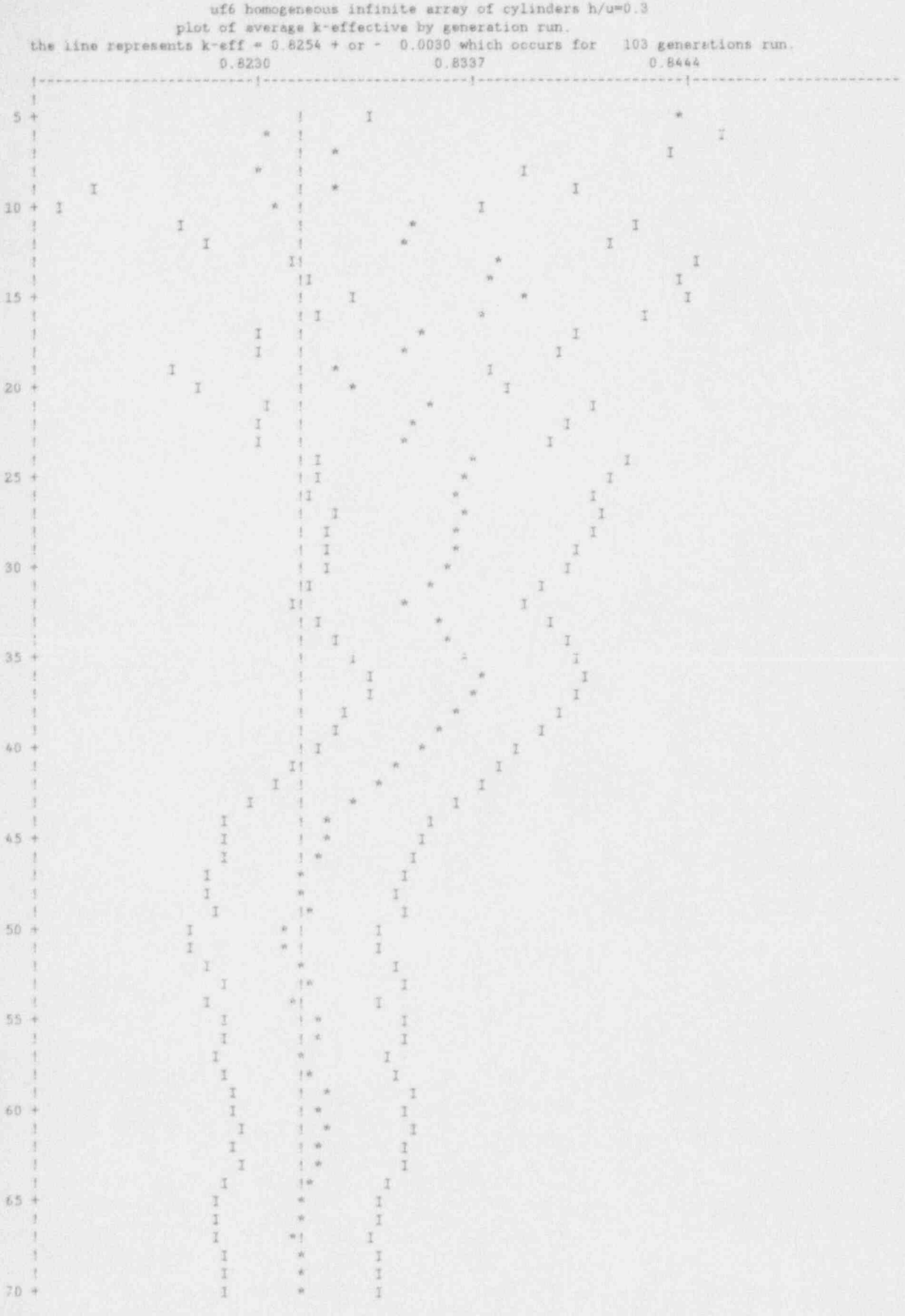
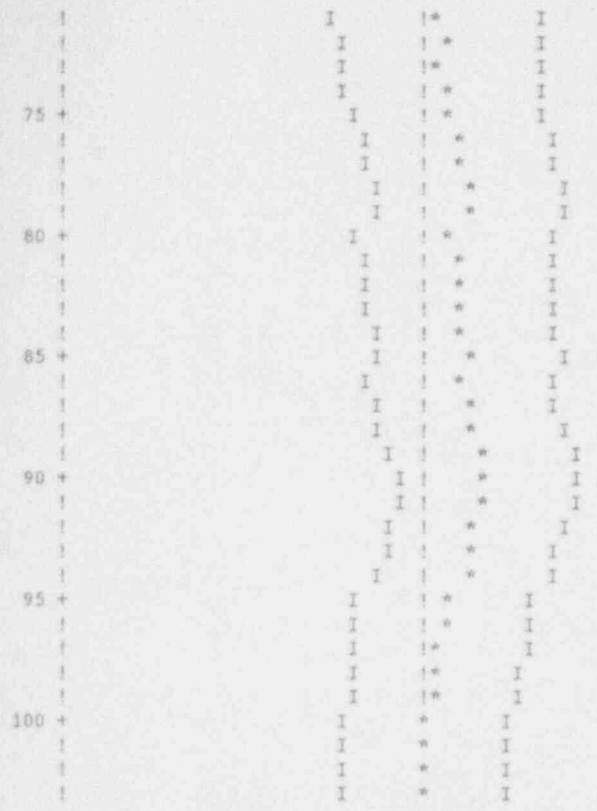
********************************************************************************
=CSAS25
UF6 CYLINDERS INFINITE ARRAY                                  UF6INCY5.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
H            1  0  2.49006-3  293  END
CARBONSTEEL  2  1.0  END
H2O          3  0.05  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0.3
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=0.3

lifetime = 4.19413E-04 + or - 5.40732E-06 generation time = 2.65256E-04 + or - 5.50917E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.82539	+ or - 0.00296	0.82244 to 0.82835	0.81948 to 0.83131	0.81652 to 0.83427	30000
4	0.82536	+ or - 0.00299	0.82237 to 0.82835	0.81939 to 0.83134	0.81640 to 0.83432	29700
5	0.82501	+ or - 0.00300	0.82201 to 0.82800	0.81901 to 0.83100	0.81602 to 0.83400	29400
6	0.82545	+ or - 0.00299	0.82246 to 0.82845	0.81947 to 0.83144	0.81647 to 0.83444	29100
7	0.82532	+ or - 0.00302	0.82230 to 0.82834	0.81927 to 0.83136	0.81625 to 0.83438	28800
8	0.82552	+ or - 0.00305	0.82247 to 0.82857	0.81943 to 0.83161	0.81638 to 0.83466	28500
9	0.82529	+ or - 0.00307	0.82222 to 0.82836	0.81915 to 0.83143	0.81608 to 0.83450	28200
10	0.82550	+ or - 0.00310	0.82241 to 0.82860	0.81931 to 0.83170	0.81622 to 0.83479	27900
11	0.82492	+ or - 0.00307	0.82185 to 0.82800	0.81877 to 0.83107	0.81570 to 0.83414	27600
12	0.82489	+ or - 0.00311	0.82178 to 0.82799	0.81867 to 0.83110	0.81556 to 0.83421	27300
17	0.82445	+ or - 0.00319	0.82127 to 0.82764	0.81808 to 0.83083	0.81489 to 0.83402	25800
22	0.82410	+ or - 0.00318	0.82092 to 0.82728	0.81774 to 0.83046	0.81457 to 0.83363	24300
27	0.82279	+ or - 0.00322	0.81957 to 0.82601	0.81635 to 0.82923	0.81313 to 0.83245	22800
32	0.82327	+ or - 0.00342	0.81985 to 0.82669	0.81643 to 0.83011	0.81301 to 0.83353	21300
37	0.82095	+ or - 0.00348	0.81746 to 0.82443	0.81398 to 0.82792	0.81049 to 0.83140	19800
42	0.82299	+ or - 0.00364	0.81935 to 0.82663	0.81572 to 0.83026	0.81208 to 0.83390	18300
47	0.82530	+ or - 0.00375	0.82155 to 0.82905	0.81779 to 0.83281	0.81404 to 0.83656	16800
52	0.82549	+ or - 0.00386	0.82163 to 0.82935	0.81776 to 0.83321	0.81390 to 0.83708	15300
57	0.82541	+ or - 0.00381	0.82160 to 0.82922	0.81779 to 0.83303	0.81398 to 0.83684	13800
62	0.82415	+ or - 0.00403	0.82013 to 0.82818	0.81610 to 0.83221	0.81207 to 0.83623	12300
67	0.82626	+ or - 0.00432	0.82195 to 0.83058	0.81763 to 0.83490	0.81331 to 0.83922	10800
72	0.82397	+ or - 0.00481	0.81916 to 0.82879	0.81435 to 0.83360	0.80954 to 0.83841	9300
77	0.82205	+ or - 0.00553	0.81652 to 0.82758	0.81099 to 0.83311	0.80546 to 0.83864	7800
82	0.82147	+ or - 0.00588	0.81560 to 0.82735	0.80972 to 0.83323	0.80384 to 0.83911	6300
87	0.81752	+ or - 0.00667	0.81085 to 0.82419	0.80418 to 0.83086	0.79751 to 0.83753	4800
92	0.81077	+ or - 0.00753	0.80324 to 0.81830	0.79571 to 0.82584	0.78818 to 0.83337	3300


uf6 homogeneous infinite array of cylinders h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.8254 + or - 0.0030 which occurs for 103 generations run.
0.8230
0.8337
0.8444


75
80
85
90
95
100

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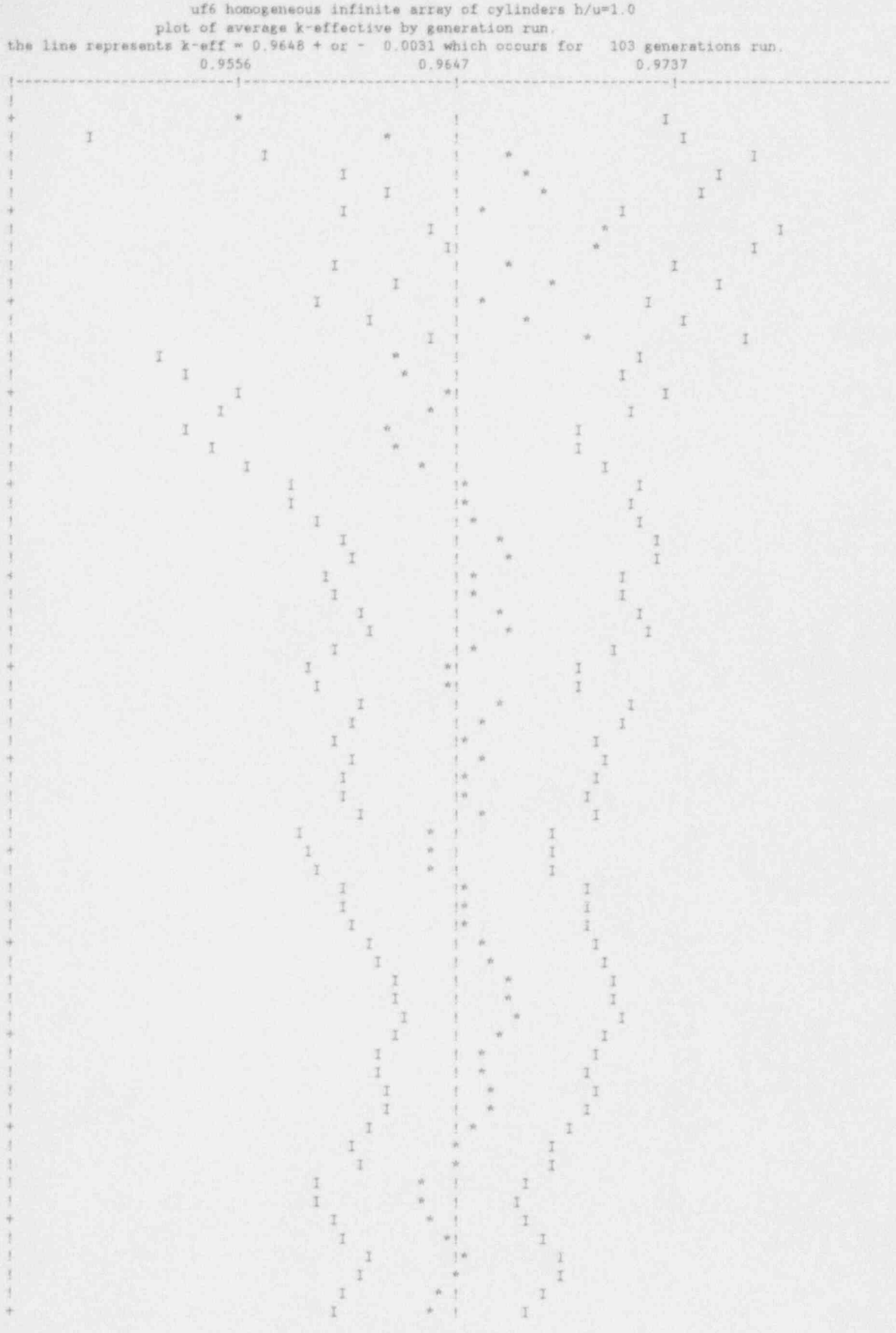
********************************************************************************
 #CSAS25
 UF6 CYLINDERS INFINITE ARRAY                                  UF6INCY6.CJW
 27GROUPNDF4                    INFHOMMEDIUM
 UF6          1  1.0 293  92235 5.02  92238 94.98  END
 H            1  0  8.3002-3  293  END
 CARBONSTEEL  2  1.0  END
 H2O          3  0.05  END
 END COMP
 UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=1.0
 READ PARM  RUN=YES PLT=NO  TME=150 END PARM
 READ GEOM
 GLOBAL UNIT  1
 COM='ONE UF6 CYLINDER'
 CYLINDER   1  1  36.83  2P95.25
 CYLINDER   2  1  38.10  2P96.52
 CUBOID     3  1  4P53.34  2P111.76
 END GEOM
 READ BNDS  ALL=MIRROR  END BNDS
 READ PLOT
 TTL='X - Y  SLICE AT Z = 0.0'
 PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
 UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
 NCH='VUCW' END
 END PLOT
 END DATA
 END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=1.0

lifetime = 2.97248E-04 + or - 4.98203E-06 generation time = 1.62354E-04 + or - 3.84827E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.96483	+ or - 0.00305	0.96178 to 0.96788	0.95873 to 0.97093	0.95568 to 0.97399	30000
4	0.96474	+ or - 0.00308	0.96166 to 0.96782	0.95858 to 0.97090	0.95550 to 0.97399	29700
5	0.96502	+ or - 0.00310	0.96192 to 0.96812	0.95882 to 0.97122	0.95572 to 0.97432	29400
6	0.96492	+ or - 0.00313	0.96179 to 0.96805	0.95865 to 0.97118	0.95552 to 0.97431	29100
7	0.96474	+ or - 0.00316	0.96158 to 0.96790	0.95842 to 0.97106	0.95527 to 0.97422	28800
8	0.96468	+ or - 0.00319	0.96149 to 0.96787	0.95829 to 0.97106	0.95510 to 0.97425	28500
9	0.96460	+ or - 0.00322	0.96138 to 0.96783	0.95815 to 0.97105	0.95493 to 0.97427	28200
10	0.96475	+ or - 0.00326	0.96149 to 0.96800	0.95824 to 0.97126	0.95498 to 0.97452	27900
11	0.96429	+ or - 0.00326	0.96103 to 0.96755	0.95777 to 0.97081	0.95451 to 0.97406	27600
12	0.96424	+ or - 0.00329	0.96095 to 0.96754	0.95766 to 0.97083	0.95436 to 0.97413	27300
17	0.96395	+ or - 0.00339	0.96056 to 0.96734	0.95717 to 0.97073	0.95378 to 0.97412	25800
22	0.96552	+ or - 0.00327	0.96225 to 0.96879	0.95898 to 0.97206	0.95571 to 0.97533	24300
27	0.96458	+ or - 0.00344	0.96114 to 0.96802	0.95771 to 0.97146	0.95427 to 0.97490	22800
32	0.96409	+ or - 0.00360	0.96049 to 0.96769	0.95689 to 0.97129	0.95329 to 0.97489	21300
37	0.96394	+ or - 0.00362	0.96031 to 0.96756	0.95669 to 0.97118	0.95306 to 0.97481	19800
42	0.96463	+ or - 0.00387	0.96076 to 0.96850	0.95688 to 0.97237	0.95301 to 0.97624	18300
47	0.96449	+ or - 0.00376	0.96073 to 0.96825	0.95698 to 0.97201	0.95322 to 0.97577	16800
52	0.96291	+ or - 0.00403	0.95888 to 0.96694	0.95485 to 0.97097	0.95083 to 0.97500	15300
57	0.96350	+ or - 0.00437	0.95913 to 0.96786	0.95476 to 0.97223	0.95039 to 0.97660	13800
62	0.96486	+ or - 0.00469	0.96016 to 0.96955	0.95547 to 0.97425	0.95077 to 0.97894	12300
67	0.96418	+ or - 0.00433	0.95984 to 0.96851	0.95551 to 0.97285	0.95117 to 0.97718	10800
72	0.96581	+ or - 0.00456	0.96124 to 0.97037	0.95668 to 0.97494	0.95212 to 0.97950	9300
77	0.96843	+ or - 0.00520	0.96323 to 0.97363	0.95803 to 0.97883	0.95283 to 0.98403	7800
82	0.96752	+ or - 0.00610	0.96142 to 0.97361	0.95532 to 0.97971	0.94922 to 0.98581	6300
87	0.96418	+ or - 0.00726	0.95691 to 0.97144	0.94965 to 0.97870	0.94238 to 0.98597	4800
92	0.97079	+ or - 0.00692	0.96387 to 0.97772	0.95694 to 0.98464	0.95002 to 0.99156	3300


uf6 homogeneous infinite array of cylinders h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 0.9648 + or - 0.0031 which occurs for 103 generations run.
0.9556
0.9647
0.9737


75
80
85
90
95
100

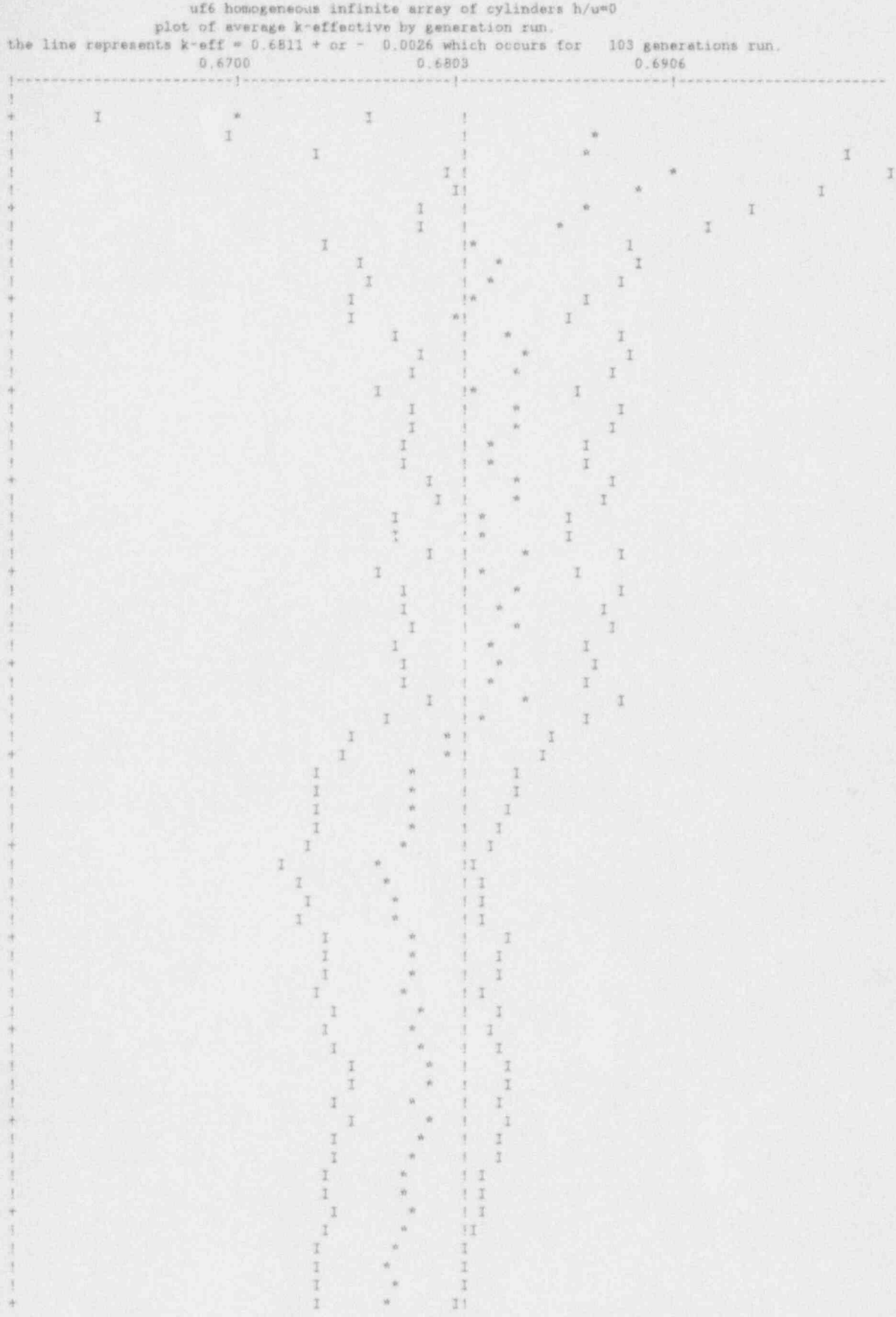
```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE ARRAY                                    UF6INCY7.CJW
27GROUPNDF4                    INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL  2  1.0  END
H2O          3  0.1  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=0

lifetime = 6.99323E-04 + or - 7.04549E-06 generation time = 4.04472E-04 + or - 6.52928E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.68109	+ or - 0.00265	0.67844 to 0.68374	0.67579 to 0.68639	0.67314 to 0.68904	30000
4	0.68114	+ or - 0.00268	0.67846 to 0.68382	0.67579 to 0.68649	0.67311 to 0.68917	29700
5	0.68132	+ or - 0.00270	0.67862 to 0.68402	0.67592 to 0.68671	0.67323 to 0.68941	29400
6	0.68090	+ or - 0.00269	0.67821 to 0.68359	0.67552 to 0.68629	0.67282 to 0.68898	29100
7	0.68087	+ or - 0.00272	0.67815 to 0.68359	0.67542 to 0.68631	0.67270 to 0.68903	28800
8	0.68059	+ or - 0.00274	0.67786 to 0.68333	0.67512 to 0.68606	0.67238 to 0.68880	28500
9	0.68057	+ or - 0.00276	0.67781 to 0.68334	0.67504 to 0.68610	0.67228 to 0.68887	28200
10	0.68067	+ or - 0.00279	0.67788 to 0.68346	0.67508 to 0.68625	0.67229 to 0.68905	27900
11	0.68070	+ or - 0.00282	0.67788 to 0.68352	0.67506 to 0.68635	0.67223 to 0.68917	27600
12	0.68105	+ or - 0.00283	0.67822 to 0.68389	0.67539 to 0.68672	0.67256 to 0.68955	27300
17	0.68079	+ or - 0.00297	0.67782 to 0.68375	0.67486 to 0.68672	0.67189 to 0.68968	25800
22	0.68061	+ or - 0.00310	0.67751 to 0.68370	0.67441 to 0.68680	0.67132 to 0.68990	24300
27	0.68088	+ or - 0.00323	0.67764 to 0.68411	0.67441 to 0.68734	0.67118 to 0.69058	22800
32	0.68043	+ or - 0.00319	0.67724 to 0.68363	0.67405 to 0.68682	0.67086 to 0.69001	21300
37	0.67974	+ or - 0.00330	0.67643 to 0.68304	0.67313 to 0.68634	0.66983 to 0.68964	19800
42	0.68276	+ or - 0.00315	0.67961 to 0.68592	0.67645 to 0.68907	0.67330 to 0.69223	18300
47	0.68412	+ or - 0.00325	0.68088 to 0.68737	0.67763 to 0.69062	0.67438 to 0.69387	16800
52	0.68377	+ or - 0.00340	0.68037 to 0.68718	0.67696 to 0.69058	0.67356 to 0.69398	15300
57	0.68322	+ or - 0.00357	0.67966 to 0.68679	0.67609 to 0.69035	0.67253 to 0.69392	13800
62	0.68465	+ or - 0.00360	0.68106 to 0.68825	0.67746 to 0.69185	0.67386 to 0.69545	12300
67	0.68754	+ or - 0.00371	0.68382 to 0.69125	0.68011 to 0.69496	0.67640 to 0.69867	10800
72	0.69001	+ or - 0.00407	0.68594 to 0.69407	0.68187 to 0.69814	0.67781 to 0.70221	9300
77	0.69096	+ or - 0.00474	0.68623 to 0.69570	0.68149 to 0.70043	0.67676 to 0.70517	7800
82	0.69070	+ or - 0.00548	0.68522 to 0.69619	0.67973 to 0.70167	0.67425 to 0.70716	6300
87	0.68973	+ or - 0.00659	0.68314 to 0.69633	0.67655 to 0.70292	0.66995 to 0.70951	4800
92	0.69008	+ or - 0.00752	0.68255 to 0.69760	0.67503 to 0.70512	0.66751 to 0.71264	3300

uf6 homogeneous infinite array of cylinders h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.6811 + or - 0.0026 which occurs for 103 generations run.



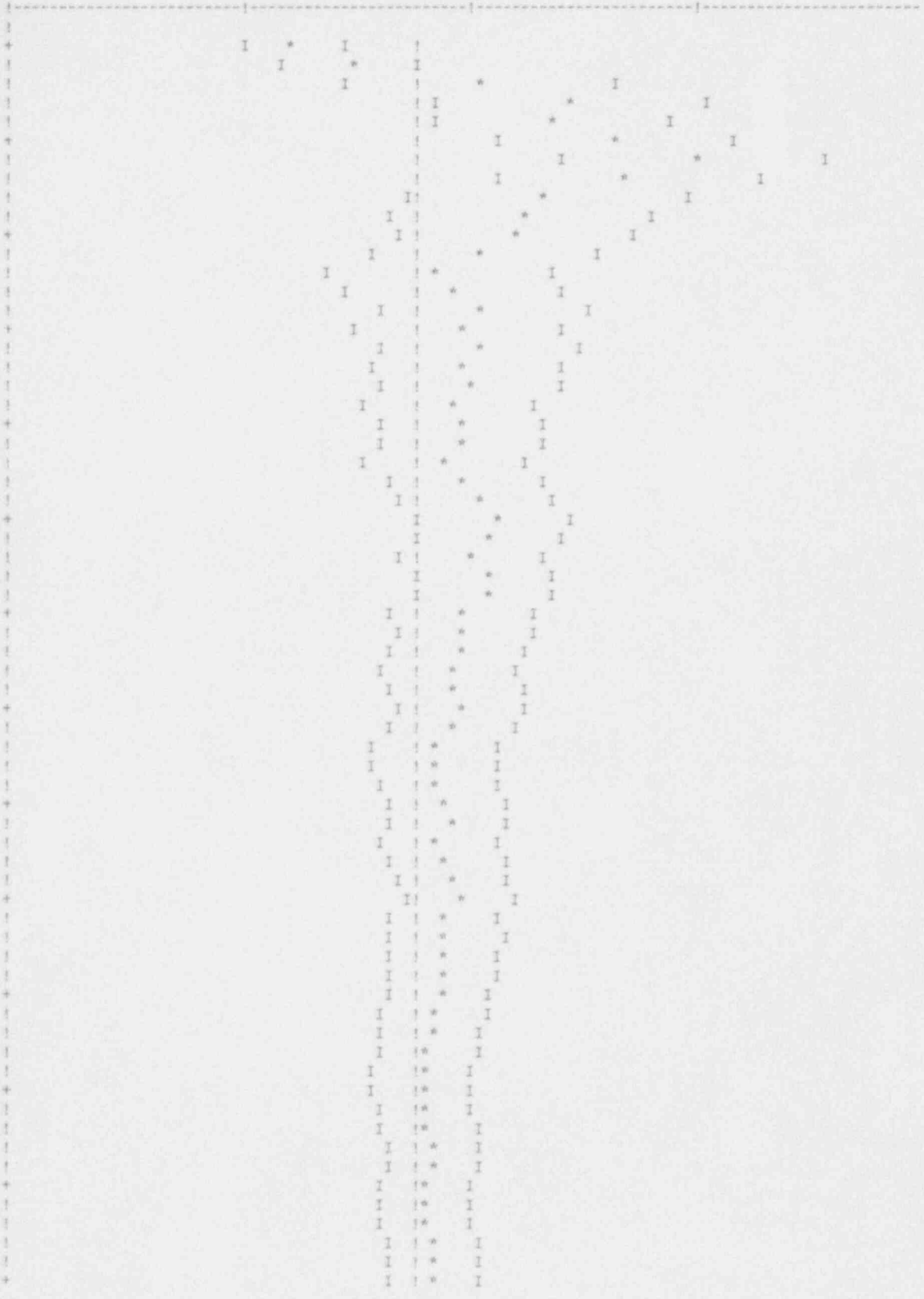
```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE ARRAY                                    UF6INCY8.CJW
27GROUPNDF4                 INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
H            1  0  2.490D6-3  293  END
CARBONSTEEL  2  1.0  END
H2O          3  0.1  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0.3
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

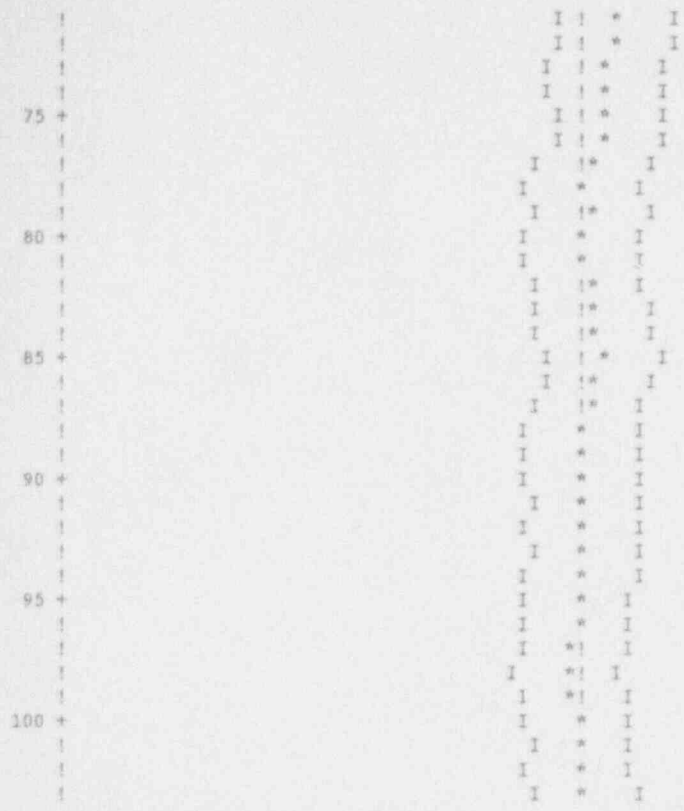
uf6 homogeneous infinite array of cylinders h/u=0.3

lifetime = 5.59023E-04 + or - 6.20765E-06 generation time = 2.85104E-04 + or - 4.04061E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.74378	+ or - 0.00265	0.74112 to 0.74643	0.73847 to 0.74908	0.73581 to 0.75174	30000
4	0.74390	+ or - 0.00268	0.74122 to 0.74657	0.73854 to 0.74925	0.73586 to 0.75193	29700
5	0.74395	+ or - 0.00270	0.74124 to 0.74665	0.73854 to 0.74936	0.73583 to 0.75206	29400
6	0.74392	+ or - 0.00273	0.74119 to 0.74665	0.73845 to 0.74938	0.73572 to 0.75212	29100
7	0.74360	+ or - 0.00274	0.74086 to 0.74635	0.73812 to 0.74909	0.73538 to 0.75183	28800
8	0.74325	+ or - 0.00275	0.74050 to 0.74600	0.73775 to 0.74874	0.73500 to 0.75149	28500
9	0.74322	+ or - 0.00278	0.74044 to 0.74599	0.73766 to 0.74877	0.73488 to 0.75155	28200
10	0.74279	+ or - 0.00278	0.74002 to 0.74557	0.73724 to 0.74834	0.73447 to 0.75112	27900
11	0.74219	+ or - 0.00274	0.73945 to 0.74493	0.73671 to 0.74766	0.73398 to 0.75040	27600
12	0.74239	+ or - 0.00276	0.73963 to 0.74515	0.73687 to 0.74791	0.73411 to 0.75067	27300
17	0.74358	+ or - 0.00284	0.74074 to 0.74642	0.73790 to 0.74926	0.73506 to 0.75210	25800
22	0.74307	+ or - 0.00294	0.74013 to 0.74601	0.73719 to 0.74895	0.73426 to 0.75189	24300
27	0.74322	+ or - 0.00308	0.74014 to 0.74630	0.73705 to 0.74938	0.73397 to 0.75247	22800
32	0.74232	+ or - 0.00318	0.73914 to 0.74550	0.73597 to 0.74867	0.73279 to 0.75185	21300
37	0.74247	+ or - 0.00329	0.73918 to 0.74575	0.73589 to 0.74904	0.73261 to 0.75232	19800
42	0.74313	+ or - 0.00344	0.73969 to 0.74656	0.73626 to 0.75000	0.73282 to 0.75343	18300
47	0.74286	+ or - 0.00366	0.73920 to 0.74652	0.73553 to 0.75019	0.73187 to 0.75385	16800
52	0.74195	+ or - 0.00376	0.73819 to 0.74571	0.73443 to 0.74947	0.73067 to 0.75323	15300
57	0.74275	+ or - 0.00414	0.73861 to 0.74689	0.73447 to 0.75103	0.73032 to 0.75517	13800
62	0.74289	+ or - 0.00460	0.73829 to 0.74749	0.73370 to 0.75208	0.72910 to 0.75668	12300
67	0.74351	+ or - 0.00516	0.73835 to 0.74867	0.73319 to 0.75382	0.72803 to 0.75898	10800
72	0.74017	+ or - 0.00564	0.73453 to 0.74582	0.72889 to 0.75146	0.72325 to 0.75710	9300
77	0.74231	+ or - 0.00628	0.73602 to 0.74859	0.72974 to 0.75487	0.72346 to 0.76115	7800
82	0.74336	+ or - 0.00589	0.73747 to 0.74924	0.73158 to 0.75513	0.72570 to 0.76101	6300
87	0.74293	+ or - 0.00621	0.73673 to 0.74914	0.73052 to 0.75535	0.72432 to 0.76155	4800
92	0.74515	+ or - 0.00756	0.73759 to 0.75270	0.73003 to 0.76026	0.72248 to 0.76781	3300

uf6 homogeneous infinite array of cylinders h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.7438 + or - 0.0027 which occurs for 103 generations run.




75
80
85
90
95
100

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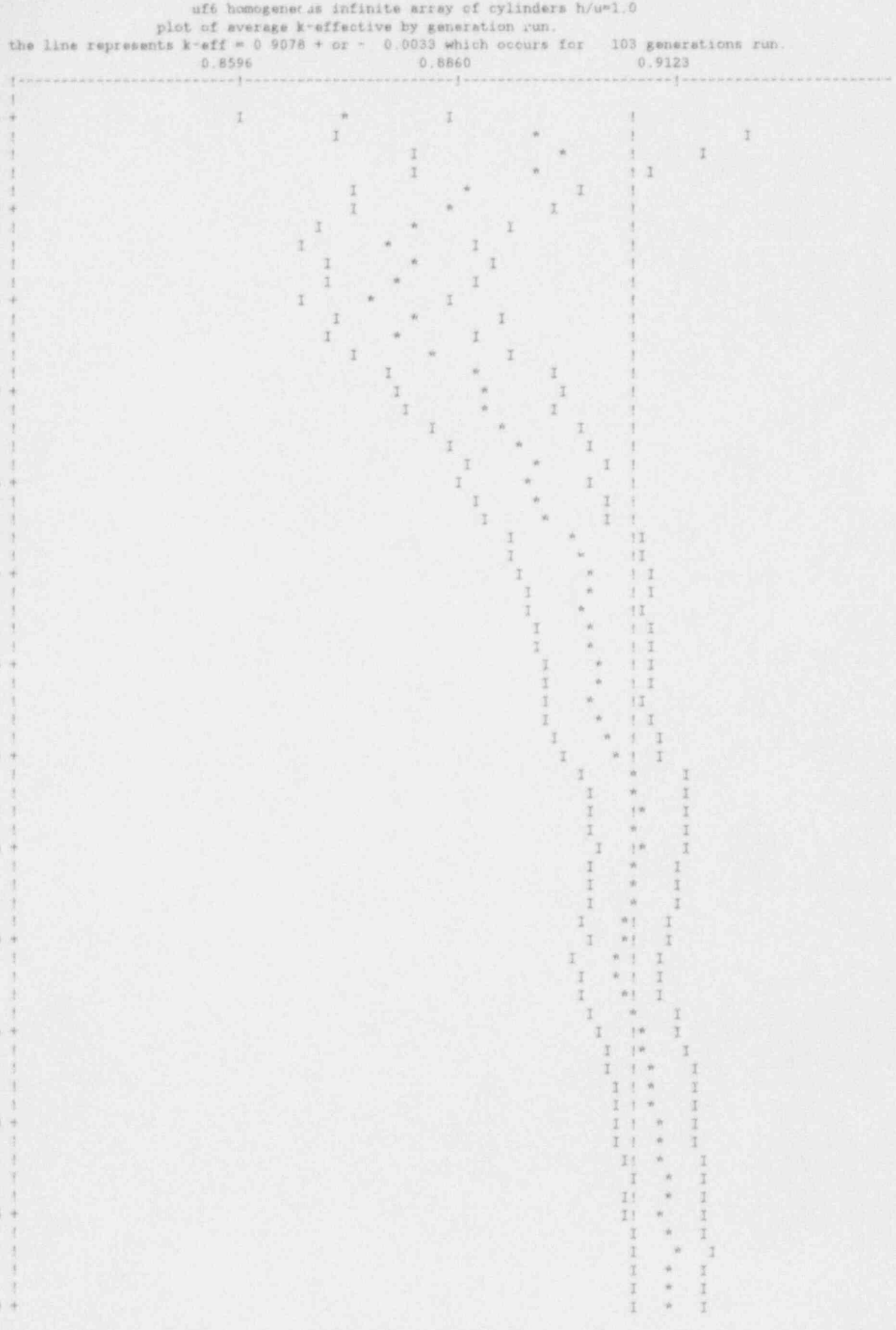
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE ARRAY                              UF6INCY9.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
H            1  0  8.3002-3  293  END
CARBON^TEEL  2  1.0  END
H2O          3  0.1  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=1.0
READ PARM  RUN=YES PLT=NO  TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-   ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=1.0

lifetime = 3.77122E-04 + or - 5.25332E-06 generation time = 1.56224E-04 + or - 3.31035E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.90778	+ or - 0.00334	0.90445 to 0.91112	0.90111 to 0.91445	0.89777 to 0.91779	30000
4	0.90827	+ or - 0.00333	0.90493 to 0.91160	0.90160 to 0.91493	0.89827 to 0.91827	29700
5	0.90850	+ or - 0.00336	0.90514 to 0.91186	0.90178 to 0.91522	0.89843 to 0.91858	29400
6	0.90813	+ or - 0.00337	0.90476 to 0.91151	0.90139 to 0.91488	0.89801 to 0.91825	29100
7	0.90816	+ or - 0.00341	0.90475 to 0.91157	0.90135 to 0.91498	0.89794 to 0.91839	28800
8	0.90843	+ or - 0.00343	0.90499 to 0.91186	0.90156 to 0.91530	0.89812 to 0.91873	28500
9	0.90908	+ or - 0.00341	0.90567 to 0.91249	0.90226 to 0.91589	0.89886 to 0.91930	28200
10	0.90946	+ or - 0.00342	0.90603 to 0.91288	0.90261 to 0.91630	0.89919 to 0.91973	27900
11	0.91009	+ or - 0.00340	0.90668 to 0.91349	0.90328 to 0.91689	0.89988 to 0.92029	27600
12	0.91076	+ or - 0.00337	0.90739 to 0.91413	0.90402 to 0.91750	0.90064 to 0.92087	27300
17	0.91236	+ or - 0.00334	0.90902 to 0.91571	0.90567 to 0.91905	0.90233 to 0.92240	25800
22	0.91144	+ or - 0.00345	0.90799 to 0.91489	0.90454 to 0.91835	0.90109 to 0.92180	24300
27	0.91117	+ or - 0.00363	0.90754 to 0.91480	0.90391 to 0.91843	0.90028 to 0.92206	22800
32	0.91037	+ or - 0.00372	0.90666 to 0.91409	0.90294 to 0.91781	0.89922 to 0.92152	21300
37	0.91036	+ or - 0.00392	0.90643 to 0.91428	0.90251 to 0.91820	0.89858 to 0.92213	19800
42	0.90770	+ or - 0.00397	0.90373 to 0.91167	0.89977 to 0.91564	0.89580 to 0.91960	18300
47	0.90806	+ or - 0.00419	0.90386 to 0.91225	0.89967 to 0.91644	0.89547 to 0.92064	16800
52	0.90963	+ or - 0.00445	0.90518 to 0.91407	0.90074 to 0.91852	0.89629 to 0.92296	15300
57	0.90560	+ or - 0.00448	0.90112 to 0.91008	0.89664 to 0.91456	0.89217 to 0.91904	13800
62	0.90302	+ or - 0.00477	0.89824 to 0.90779	0.89347 to 0.91257	0.88869 to 0.91734	12300
67	0.89977	+ or - 0.00489	0.89488 to 0.90466	0.88999 to 0.90955	0.88509 to 0.91444	10800
72	0.90051	+ or - 0.00557	0.89494 to 0.90608	0.88936 to 0.91165	0.88379 to 0.91722	9300
77	0.90615	+ or - 0.00585	0.90029 to 0.91200	0.89444 to 0.91785	0.88859 to 0.92370	7800
82	0.90268	+ or - 0.00612	0.89656 to 0.90880	0.89044 to 0.91492	0.88432 to 0.92104	6300
87	0.90014	+ or - 0.00639	0.89376 to 0.90653	0.88737 to 0.91292	0.88098 to 0.91931	4800
92	0.89346	+ or - 0.00743	0.88603 to 0.90090	0.87860 to 0.90833	0.87117 to 0.91576	3300


uf6 homogeneous infinite array of cylinders h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 0 9078 + or - 0.0033 which occurs for 103 generations run.
0.8596
0.8860
0.9123
5
10
15
20
25
30
35
40
45
50
55
60
65
70

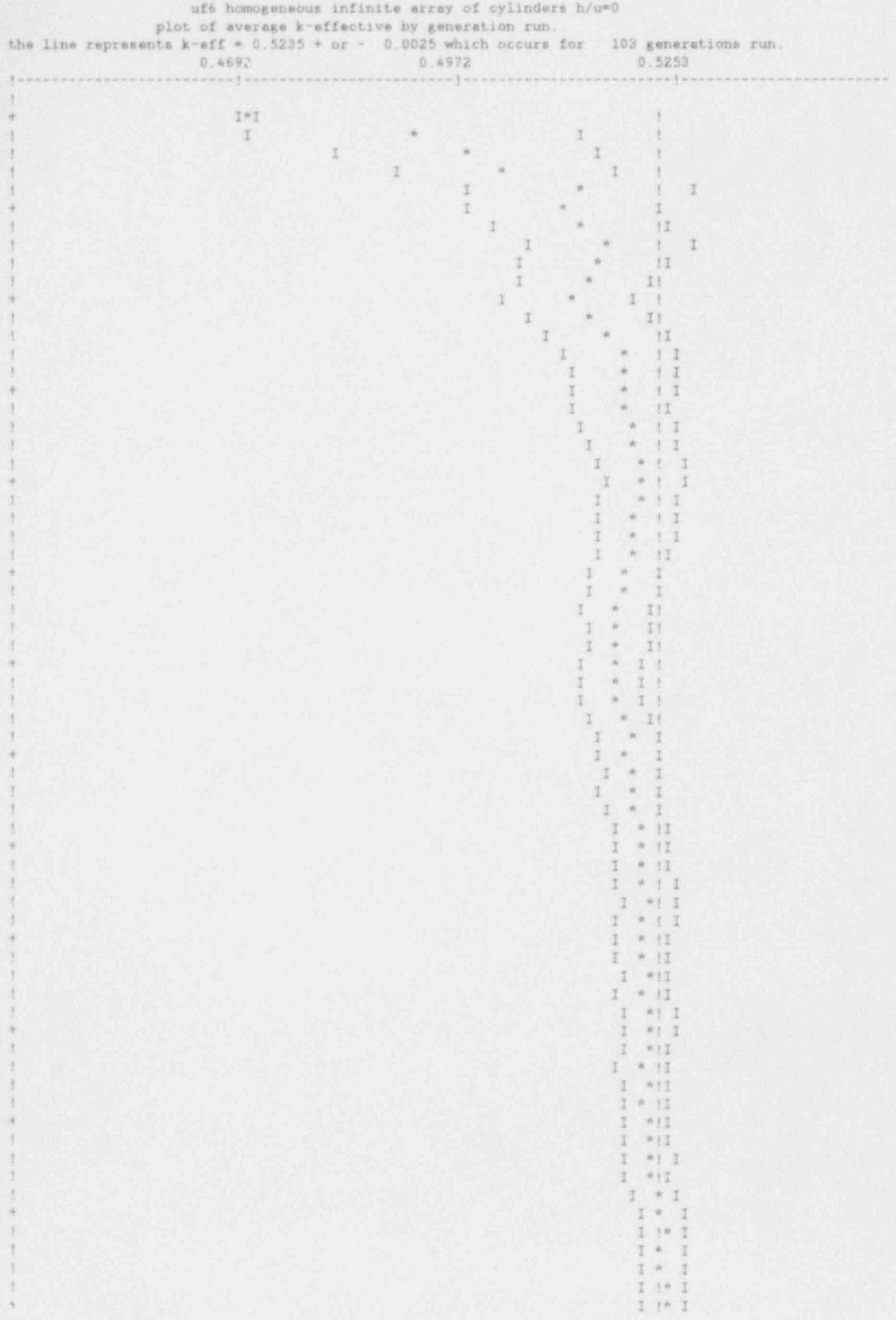

75
80
85
90
95
100

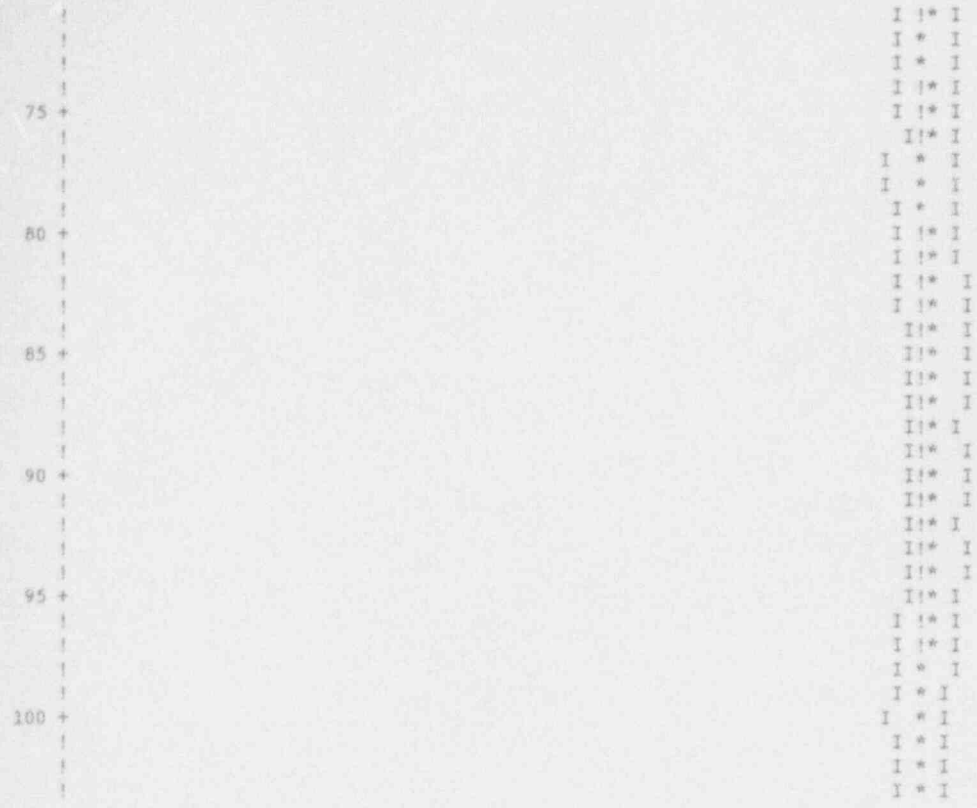
```
********************************************************************************
#CSAS25
UF6 CYLINDERS ,NFINITE ARRAY                                  UF6INCYA.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL  2  1.0  END
H2O          3  1.0  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER!
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=0

lifetime = 1.50302E-04 + or - 1.52366E-06 generation time = 3.62924E-05 + or - 6.70389E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.52353	+ or - 0.00254	0.52098 to 0.52607	0.51844 to 0.52862	0.51589 to 0.53116	30000
4	0.52408	+ or - 0.00251	0.52157 to 0.52659	0.51906 to 0.52910	0.51655 to 0.53161	29700
5	0.52460	+ or - 0.00248	0.52213 to 0.52708	0.51965 to 0.52956	0.51717 to 0.53204	29400
6	0.52450	+ or - 0.00250	0.52200 to 0.52700	0.51950 to 0.52950	0.51699 to 0.53201	29100
7	0.52455	+ or - 0.00253	0.52202 to 0.52707	0.51949 to 0.52960	0.51696 to 0.53213	28800
8	0.52457	+ or - 0.00255	0.52202 to 0.52712	0.51946 to 0.52968	0.51691 to 0.53223	28500
9	0.52419	+ or - 0.00255	0.52164 to 0.52674	0.51908 to 0.52929	0.51653 to 0.53185	28200
10	0.52447	+ or - 0.00256	0.52190 to 0.52703	0.51934 to 0.52960	0.51677 to 0.53216	27900
11	0.52443	+ or - 0.00259	0.52183 to 0.52702	0.51924 to 0.52961	0.51665 to 0.53221	27600
12	0.52416	+ or - 0.00261	0.52155 to 0.52676	0.51894 to 0.52937	0.51634 to 0.53198	27300
17	0.52463	+ or - 0.00268	0.52195 to 0.52731	0.51927 to 0.52999	0.51660 to 0.53267	25800
22	0.52438	+ or - 0.00282	0.52156 to 0.52720	0.51874 to 0.53002	0.51592 to 0.53284	24300
27	0.52443	+ or - 0.00299	0.52144 to 0.52741	0.51845 to 0.53040	0.51547 to 0.53338	22800
32	0.52574	+ or - 0.00312	0.52262 to 0.52886	0.51950 to 0.53197	0.51638 to 0.53509	21300
37	0.52661	+ or - 0.00332	0.52329 to 0.52993	0.51998 to 0.53325	0.51666 to 0.53657	19800
42	0.52588	+ or - 0.00343	0.52245 to 0.52931	0.51902 to 0.53275	0.51559 to 0.53618	18300
47	0.52485	+ or - 0.00368	0.52117 to 0.52853	0.51749 to 0.53222	0.51380 to 0.53590	16800
52	0.52509	+ or - 0.00388	0.52121 to 0.52897	0.51733 to 0.53285	0.51345 to 0.53673	15300
57	0.52580	+ or - 0.00420	0.52160 to 0.52999	0.51740 to 0.53419	0.51321 to 0.53839	13800
62	0.52501	+ or - 0.00467	0.52034 to 0.52968	0.51567 to 0.53435	0.51100 to 0.53902	12300
67	0.52271	+ or - 0.00453	0.51818 to 0.52724	0.51364 to 0.53178	0.50911 to 0.53631	10800
72	0.52252	+ or - 0.00509	0.51743 to 0.52761	0.51234 to 0.53269	0.50726 to 0.53778	9300
77	0.52325	+ or - 0.00508	0.51817 to 0.52833	0.51310 to 0.53341	0.50802 to 0.53848	7800
82	0.51910	+ or - 0.00536	0.51374 to 0.52446	0.50838 to 0.52981	0.50303 to 0.53517	6300
87	0.51671	+ or - 0.00640	0.51031 to 0.52311	0.50391 to 0.52951	0.49751 to 0.53591	4800
92	0.51274	+ or - 0.00886	0.50388 to 0.52160	0.49503 to 0.53046	0.48617 to 0.53932	3300


uf6 homogeneous infinite array of cylinders h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.5235 + or - 0.0025 which occurs for 103 generations run.
0.4692
0.4972
0.5253
5
10
15
20
25
30
35
40
45
50
55
60
65
70

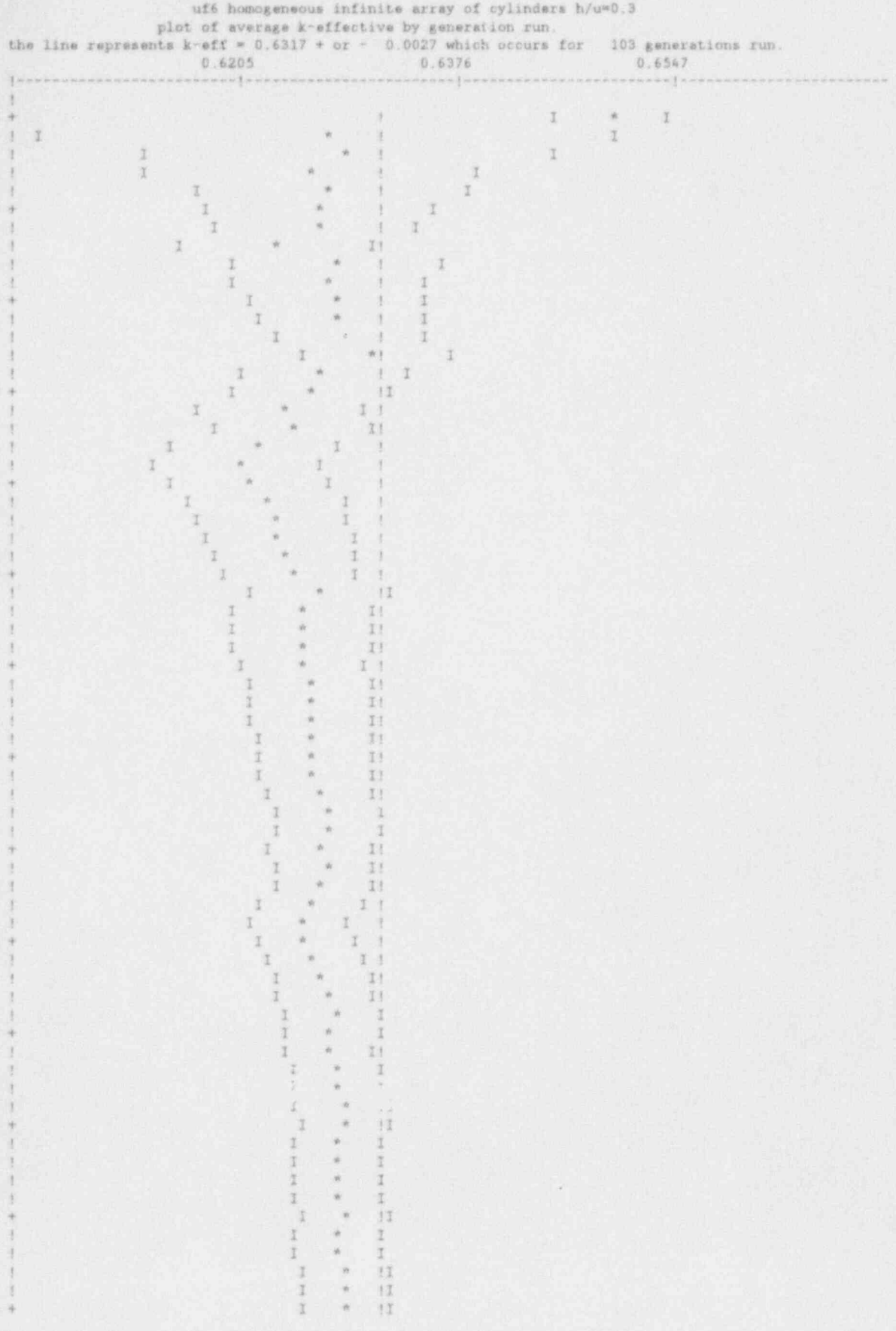

75
80
85
90
95
100

```
********************************************************************************
 #CSAS25
 UF6 CYLINDERS INFINITE ARRAY                              UF6INCYB.CJW
 27GROUPNDF4                INFHOMMEDIUM
 UF6          1  1.0 293  92235 5.02  92238 94.98  END
 H            1  0  2.49006-3  293  END
 CARBONSTEEL  2  1.0  END
 H2O          3  1.0  END
 END COMP
 UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0.3
 READ PARM  RUN=YES PLT=NO TME=150 END PARM
 READ GEOM
 GLOBAL UNIT  1
 COM='ONE UF6 CYLINDER'
 CYLINDER   1  1  36.83  2P95.25
 CYLINDER   2  1  38.10  2P96.52
 CUBOID     3  1  4P53.34  2P111.76
 END GEOM
 READ BNDS  ALL=MIRROR  END BNDS
 READ PLOT
 TTL='X - Y  SLICE AT Z = 0.0'
 PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
 UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
 NCH='VUCW' END
 END PLOT
 END DATA
 END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=0.3

lifetime = 1.20131E-04 + or - 1.36489E-06 generation time = 2.60184E-05 + or - 5.83773E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.63170	+ or - 0.00269	0.62901 to 0.63438	0.62633 to 0.63707	0.62364 to 0.63975	30000
4	0.63147	+ or - 0.00270	0.62876 to 0.63417	0.62606 to 0.63687	0.62336 to 0.63957	29700
5	0.63132	+ or - 0.00273	0.62859 to 0.63405	0.62587 to 0.63677	0.62314 to 0.63950	29400
6	0.63182	+ or - 0.00271	0.62911 to 0.63453	0.62640 to 0.63724	0.62369 to 0.63994	29100
7	0.63179	+ or - 0.00274	0.62906 to 0.63453	0.62632 to 0.63727	0.62358 to 0.64000	28800
8	0.63199	+ or - 0.00276	0.62923 to 0.63474	0.62647 to 0.63750	0.62371 to 0.64026	28500
9	0.63195	+ or - 0.00279	0.62916 to 0.63474	0.62637 to 0.63752	0.62358 to 0.64031	28200
10	0.63203	+ or - 0.00282	0.62921 to 0.63485	0.62640 to 0.63766	0.62358 to 0.64048	27900
11	0.63212	+ or - 0.00285	0.62928 to 0.63497	0.62643 to 0.63782	0.62359 to 0.64066	27600
12	0.63249	+ or - 0.00285	0.62964 to 0.63535	0.62679 to 0.63820	0.62393 to 0.64105	27300
17	0.63207	+ or - 0.00298	0.62909 to 0.63505	0.62610 to 0.63804	0.62312 to 0.64102	25800
22	0.63326	+ or - 0.00298	0.63028 to 0.63625	0.62729 to 0.63923	0.62431 to 0.64221	24300
27	0.63434	+ or - 0.00298	0.63136 to 0.63732	0.62838 to 0.64030	0.62540 to 0.64328	22800
32	0.63417	+ or - 0.00300	0.63118 to 0.63717	0.62818 to 0.64016	0.62519 to 0.64316	21300
37	0.63454	+ or - 0.00321	0.63133 to 0.63775	0.62812 to 0.64096	0.62491 to 0.64417	19800
42	0.63475	+ or - 0.00346	0.63129 to 0.63821	0.62782 to 0.64168	0.62436 to 0.64514	18300
47	0.63514	+ or - 0.00372	0.63142 to 0.63886	0.62771 to 0.64257	0.62399 to 0.64629	16800
52	0.63597	+ or - 0.00375	0.63223 to 0.63972	0.62848 to 0.64346	0.62473 to 0.64721	15300
57	0.63553	+ or - 0.00397	0.63156 to 0.63949	0.62759 to 0.64346	0.62363 to 0.64743	13800
62	0.63597	+ or - 0.00429	0.63167 to 0.64026	0.62738 to 0.64455	0.62309 to 0.64884	12300
67	0.63720	+ or - 0.00441	0.63279 to 0.64161	0.62838 to 0.64602	0.62397 to 0.65042	10800
72	0.63744	+ or - 0.00480	0.63264 to 0.64224	0.62783 to 0.64704	0.62303 to 0.65184	9300
77	0.63682	+ or - 0.00515	0.63167 to 0.64197	0.62651 to 0.64713	0.62136 to 0.65228	7800
82	0.63687	+ or - 0.00610	0.63076 to 0.64297	0.62466 to 0.64907	0.61856 to 0.65517	6300
87	0.63288	+ or - 0.00583	0.62705 to 0.63871	0.62122 to 0.64454	0.61539 to 0.65037	4800
92	0.63185	+ or - 0.00695	0.62490 to 0.63880	0.61796 to 0.64574	0.61101 to 0.65269	3300


uf6 homogeneous infinite array of cylinders h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.6317 + or - 0.0027 which occurs for 103 generations run.
0.6205
0.6376
0.6547

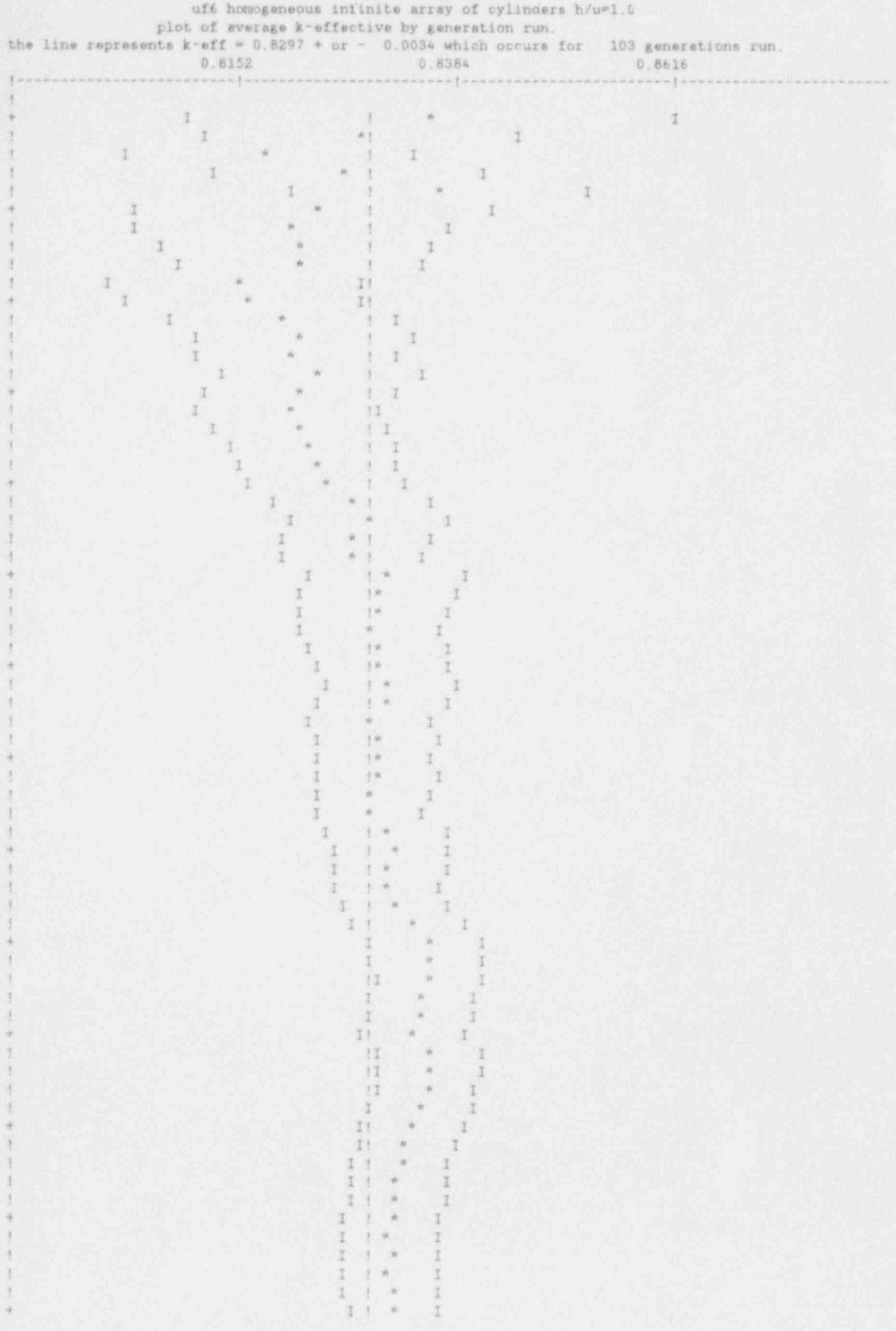

75
80
85
90
95
100

```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE ARRAY                                    UF6INCYC.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
H            1  0  8.3002-2  293  END
CARBONSTEEL  2  1.0  END
H2O          3  1.0  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=1.0
READ PARM  RUN=YES PLT=NO  TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=0 PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 homogeneous infinite array of cylinders h/u=1.0

lifetime = 8.48557E-05 + or - 9.34237E-07 generation time = 2.06261E-05 + or - 3.36743E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.82969	+ or - 0.00338	0.82631 to 0.83307	0.82293 to 0.83645	0.81955 to 0.83983	30000
4	0.82837	+ or - 0.00340	0.82497 to 0.83277	0.82257 to 0.83617	0.81917 to 0.83956	29700
5	0.82957	+ or - 0.00343	0.82614 to 0.83299	0.82271 to 0.83642	0.81928 to 0.83985	29400
6	0.82973	+ or - 0.00346	0.82627 to 0.83318	0.82281 to 0.83664	0.81935 to 0.84010	29100
7	0.83015	+ or - 0.00347	0.82668 to 0.83362	0.82321 to 0.83709	0.81974 to 0.84056	28800
8	0.82982	+ or - 0.00349	0.82633 to 0.83331	0.82284 to 0.83680	0.81935 to 0.84029	28500
9	0.82922	+ or - 0.00348	0.82575 to 0.83270	0.82227 to 0.83617	0.81879 to 0.83965	28200
10	0.83015	+ or - 0.00339	0.82676 to 0.83353	0.82338 to 0.83692	0.81999 to 0.84030	27900
11	0.83044	+ or - 0.00341	0.82703 to 0.83385	0.82362 to 0.83726	0.82021 to 0.84067	27600
12	0.83047	+ or - 0.00345	0.82702 to 0.83392	0.82358 to 0.83736	0.82013 to 0.84081	27300
17	0.83087	+ or - 0.00348	0.82739 to 0.83435	0.82391 to 0.83783	0.82043 to 0.84131	25800
22	0.83147	+ or - 0.00358	0.82789 to 0.83505	0.82431 to 0.83863	0.82073 to 0.84221	24300
27	0.82973	+ or - 0.00369	0.82604 to 0.83343	0.82234 to 0.83712	0.81865 to 0.84082	22800
32	0.82942	+ or - 0.00362	0.82580 to 0.83304	0.82218 to 0.83666	0.81856 to 0.84027	21300
37	0.82898	+ or - 0.00381	0.82517 to 0.83279	0.82135 to 0.83660	0.81754 to 0.84042	19800
42	0.82964	+ or - 0.00399	0.82565 to 0.83362	0.82166 to 0.83761	0.81768 to 0.84160	18300
47	0.82826	+ or - 0.00408	0.82419 to 0.83234	0.82011 to 0.83641	0.81604 to 0.84049	16800
52	0.82361	+ or - 0.00368	0.81994 to 0.82729	0.81626 to 0.83096	0.81259 to 0.83464	15300
57	0.82227	+ or - 0.00350	0.81898 to 0.82557	0.81568 to 0.82886	0.81238 to 0.83216	13800
62	0.82480	+ or - 0.00341	0.82139 to 0.82821	0.81798 to 0.83163	0.81456 to 0.83504	12300
67	0.82537	+ or - 0.00368	0.82169 to 0.82905	0.81802 to 0.83273	0.81434 to 0.83641	10800
72	0.82534	+ or - 0.00406	0.82128 to 0.82940	0.81722 to 0.83346	0.81316 to 0.83752	9300
77	0.82324	+ or - 0.00459	0.81865 to 0.82783	0.81406 to 0.83243	0.80946 to 0.83702	7800
82	0.82660	+ or - 0.00541	0.82119 to 0.83201	0.81577 to 0.83742	0.81036 to 0.84284	6300
87	0.83097	+ or - 0.00639	0.82457 to 0.83736	0.81818 to 0.84375	0.81178 to 0.85015	4800
92	0.83429	+ or - 0.00720	0.82709 to 0.84150	0.81989 to 0.84870	0.81269 to 0.85590	3300


uf6 homogeneous infinite array of cylinders h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 0.8297 + or - 0.0034 which occurs for 103 generations run.
0.8152
0.8384
0.8616

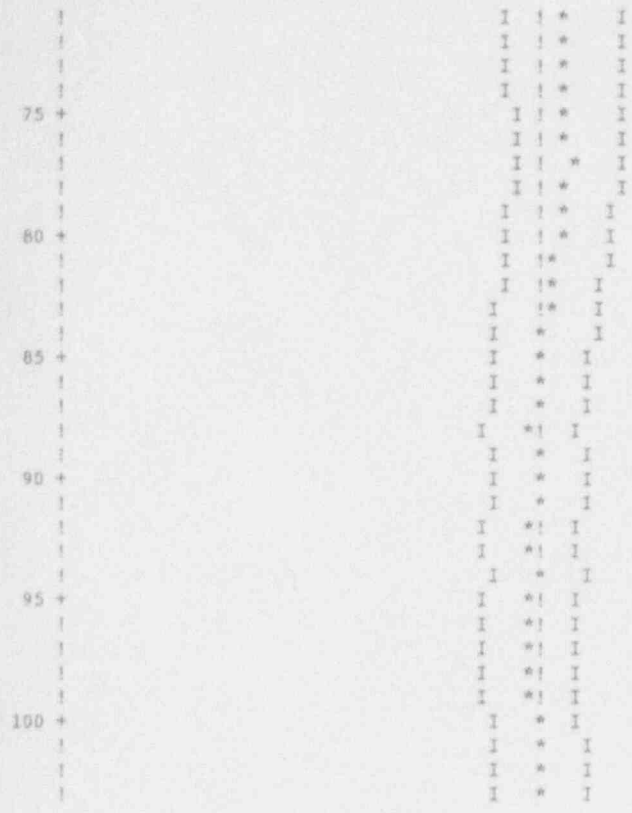

75
80
85
90
95
100

TABLE 6
Infinite Mass of UF_6

H/U	K_{eff}
0	0.70857 ± 0.00156
0.3	0.84412 ± 0.00240
1.0	1.04523 ± 0.00295

TABLE 7
Infinite Cubic Array of UF_6 Cylinders (K_{eff})

H/U	DENSITY OF INTERSPERSED WATER			
	0	0.05	0.1	1.0
0	0.68912±0.00169	0.76521±0.00302	0.68109±0.00265	0.52353±0.00254
0.3	0.81438±0.00222	0.82539±0.00296	0.74378±0.00265	0.63170±0.00269
1.0	1.00380±0.00313	0.96483±0.00305	0.90778±0.00334	0.82969±0.00338

TABLE 6 UF6IPCY?.CJW
Infinite Planar Array of UF_6 Cylinders (K_{eff})

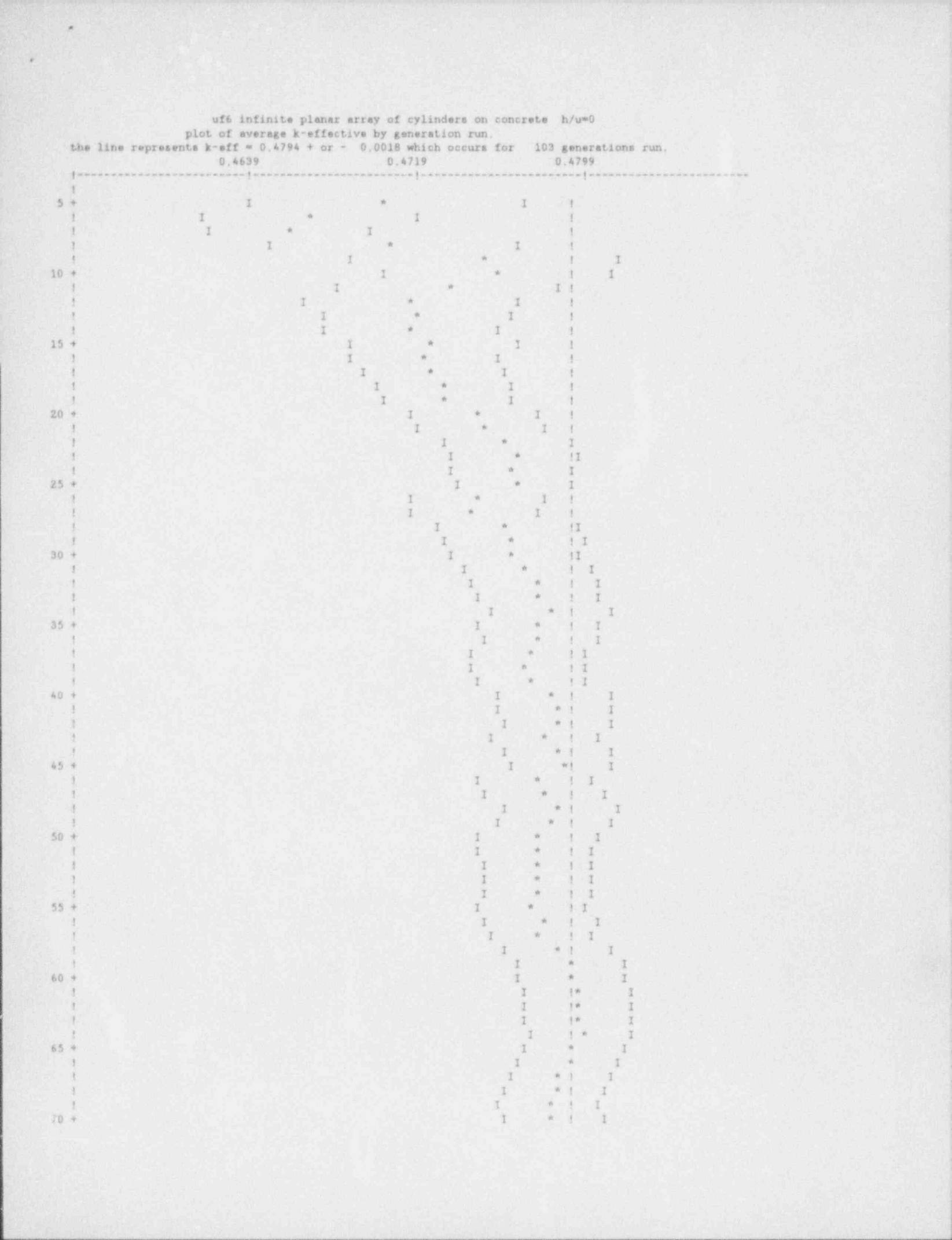
H/U	DENSITY OF INTERSPERSED WATER			
	0	0.05	0.1	1.0
0	0.47939±0.00182 1	0.56384±0.00258 4	0.55289±0.00245 7	0.52182±0.00241 A
0.3	0.61132±0.00275 2	0.66415±0.00292 5	0.65750±0.00288 8	0.62957±0.00312 B
1.0	0.83554±0.00384 3	0.85437±0.00336 6	0.85389±0.00321 9	0.83360±0.00392 C

```
=======================================================================
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                          UF6IPCY1.CJW
27GROUPNDF4                INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL   2  1.0  END
H2O           3  0.0000000001  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
=======================================================================
```

uf6 infinite planar array of cylinders on concrete h/u=0

lifetime = 2.21840E-04 + or - 6.35574E-06 generation time = 5.14983E-05 + or - 2.38992E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.47939	+ or - 0.00182	0.47757 to 0.48122	0.47574 to 0.48304	0.47392 to 0.48486	30000
4	0.47955	+ or - 0.00184	0.47771 to 0.48138	0.47588 to 0.48322	0.47404 to 0.48505	29700
5	0.47957	+ or - 0.00185	0.47772 to 0.48143	0.47586 to 0.48328	0.47401 to 0.48514	29400
6	0.47978	+ or - 0.00186	0.47792 to 0.48164	0.47605 to 0.48350	0.47419 to 0.48536	29100
7	0.47995	+ or - 0.00187	0.47808 to 0.48183	0.47621 to 0.48370	0.47433 to 0.48557	28800
8	0.47984	+ or - 0.00189	0.47795 to 0.48173	0.47606 to 0.48362	0.47417 to 0.48551	28500
9	0.47966	+ or - 0.00190	0.47776 to 0.48156	0.47586 to 0.48346	0.47396 to 0.48536	28200
10	0.47965	+ or - 0.00192	0.47772 to 0.48157	0.47580 to 0.48349	0.47388 to 0.48541	27900
11	0.47990	+ or - 0.00193	0.47797 to 0.48182	0.47605 to 0.48375	0.47412 to 0.48568	27600
12	0.48015	+ or - 0.00193	0.47822 to 0.48208	0.47629 to 0.48401	0.47436 to 0.48594	27300
17	0.48048	+ or - 0.00203	0.47845 to 0.48251	0.47642 to 0.48454	0.47439 to 0.48657	25800
22	0.48011	+ or - 0.00213	0.47798 to 0.48225	0.47584 to 0.48438	0.47371 to 0.48652	24300
27	0.48087	+ or - 0.00218	0.47868 to 0.48305	0.47650 to 0.48523	0.47432 to 0.48741	22800
32	0.48009	+ or - 0.00227	0.47782 to 0.48236	0.47555 to 0.48463	0.47328 to 0.48691	21300
37	0.48041	+ or - 0.00240	0.47801 to 0.48281	0.47561 to 0.48521	0.47322 to 0.48760	19800
42	0.47981	+ or - 0.00252	0.47729 to 0.48233	0.47477 to 0.48485	0.47225 to 0.48737	18300
47	0.48035	+ or - 0.00244	0.47791 to 0.48279	0.47547 to 0.48523	0.47303 to 0.48767	16800
52	0.48086	+ or - 0.00251	0.47835 to 0.48336	0.47584 to 0.48587	0.47334 to 0.48837	15300
57	0.48106	+ or - 0.00263	0.47843 to 0.48369	0.47580 to 0.48632	0.47317 to 0.48895	13800
62	0.47886	+ or - 0.00254	0.47632 to 0.48141	0.47377 to 0.48395	0.47123 to 0.48649	12300
67	0.48034	+ or - 0.00262	0.47772 to 0.48296	0.47510 to 0.48558	0.47248 to 0.48820	10800
72	0.48191	+ or - 0.00274	0.47918 to 0.48465	0.47644 to 0.48739	0.47370 to 0.49013	9300
77	0.48083	+ or - 0.00276	0.47807 to 0.48359	0.47531 to 0.48635	0.47254 to 0.48912	7800
82	0.48163	+ or - 0.00339	0.47824 to 0.48501	0.47485 to 0.48840	0.47146 to 0.49179	6300
87	0.48230	+ or - 0.00391	0.47839 to 0.48620	0.47448 to 0.49011	0.47057 to 0.49402	4800
92	0.47881	+ or - 0.00421	0.47460 to 0.48302	0.47038 to 0.48723	0.46617 to 0.49144	3300


uf6 infinite planar array of cylinders on concrete h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.4794 + or - 0.0018 which occurs for 103 generations run.
0.4639
0.4719
0.4799
5
10
15
20
25
30
35
40
45
50
55
60
65
70

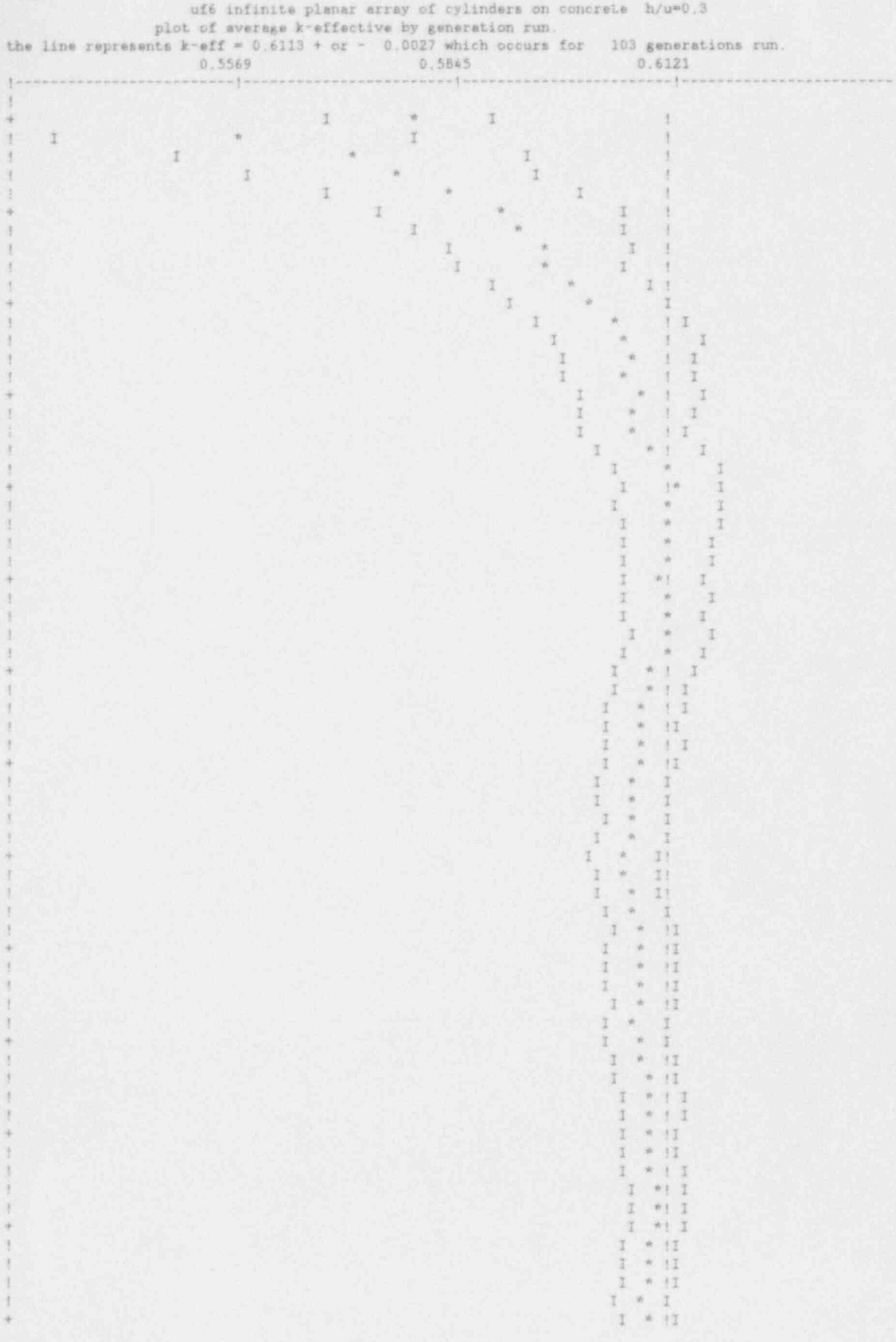

75
80
85
90
95
100

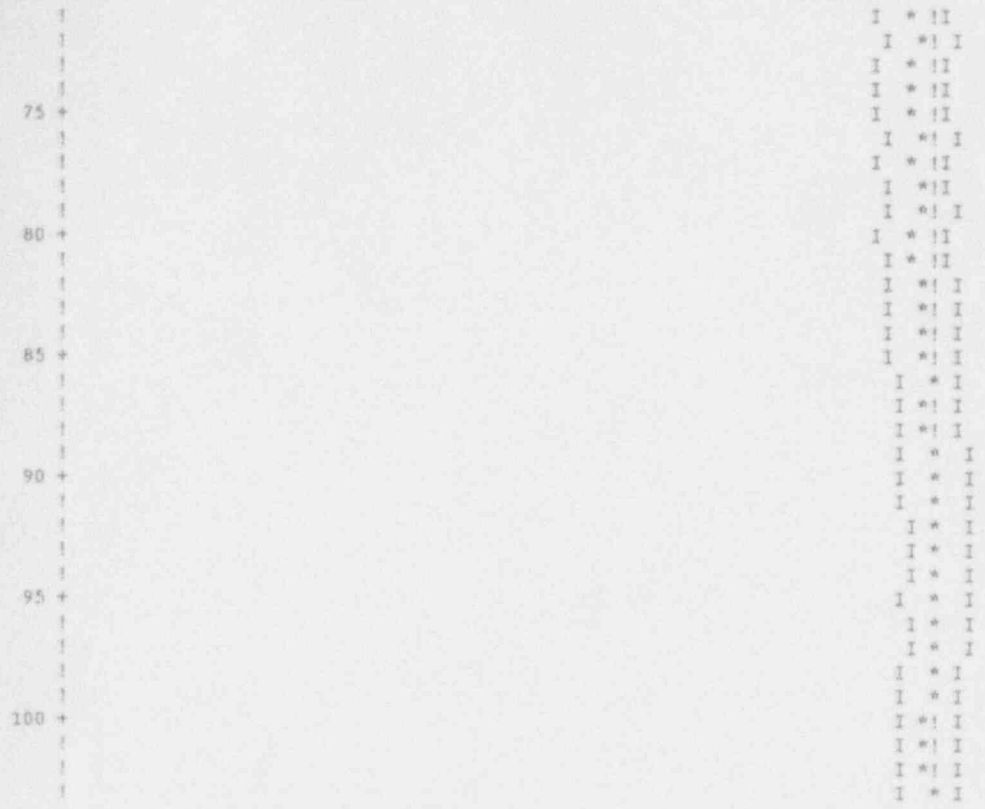
```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                              UF6IPCY2.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
H             1  0  2.49006-3  293  END
CARBONSTEEL   2  1.0  END
H2O           3  0.000000001  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=0.3
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID     4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=0.5

lifetime = 1.74350E-04 + or - 6.49920E-06 generation time = 2.94077E-05 + or - 1.24290E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.61132	+ or - 0.00275	0.60857 to 0.61407	0.60582 to 0.61682	0.60307 to 0.61957	30000
4	0.61153	+ or - 0.00277	0.60876 to 0.61430	0.60599 to 0.61707	0.60322 to 0.61984	29700
5	0.61197	+ or - 0.00276	0.60921 to 0.61474	0.60645 to 0.61750	0.60369 to 0.62026	29400
6	0.61300	+ or - 0.00259	0.61041 to 0.61559	0.60782 to 0.61818	0.60523 to 0.62077	29100
7	0.61296	+ or - 0.00262	0.61034 to 0.61558	0.60773 to 0.61820	0.60511 to 0.62082	28800
8	0.61313	+ or - 0.00264	0.61049 to 0.61577	0.60785 to 0.61841	0.60521 to 0.62105	28500
9	0.61303	+ or - 0.00267	0.61036 to 0.61570	0.60770 to 0.61836	0.60503 to 0.62103	28200
10	0.61289	+ or - 0.00269	0.61020 to 0.61558	0.60751 to 0.61827	0.60482 to 0.62096	27900
11	0.61290	+ or - 0.00272	0.61018 to 0.61562	0.60746 to 0.61835	0.60474 to 0.62107	27600
12	0.61287	+ or - 0.00275	0.61012 to 0.61562	0.60737 to 0.61837	0.60462 to 0.62112	27300
17	0.61210	+ or - 0.00286	0.60924 to 0.61496	0.60638 to 0.61782	0.60352 to 0.62068	25800
22	0.61230	+ or - 0.00301	0.60928 to 0.61531	0.60627 to 0.61832	0.60326 to 0.62134	24300
27	0.61116	+ or - 0.00311	0.60805 to 0.61426	0.60494 to 0.61737	0.60184 to 0.62047	22800
32	0.61131	+ or - 0.00331	0.60800 to 0.61462	0.60469 to 0.61793	0.60138 to 0.62124	21300
37	0.61269	+ or - 0.00342	0.60927 to 0.61611	0.60585 to 0.61952	0.60244 to 0.62294	19800
42	0.61384	+ or - 0.00354	0.61030 to 0.61739	0.60676 to 0.62093	0.60321 to 0.62447	18300
47	0.61500	+ or - 0.00370	0.61131 to 0.61870	0.60761 to 0.62240	0.60391 to 0.62610	16800
52	0.61427	+ or - 0.00382	0.61045 to 0.61809	0.60662 to 0.62191	0.60280 to 0.62573	15300
57	0.61369	+ or - 0.00393	0.60976 to 0.61762	0.60584 to 0.62154	0.60191 to 0.62547	13800
62	0.61342	+ or - 0.00430	0.60912 to 0.61772	0.60482 to 0.62203	0.60051 to 0.62633	12300
67	0.61431	+ or - 0.00469	0.60962 to 0.61900	0.60492 to 0.62370	0.60023 to 0.62839	10800
72	0.61431	+ or - 0.00493	0.60938 to 0.61925	0.60444 to 0.62418	0.59951 to 0.62911	9300
77	0.61589	+ or - 0.00512	0.61077 to 0.62101	0.60565 to 0.62612	0.60054 to 0.63124	7800
82	0.61532	+ or - 0.00567	0.60965 to 0.62099	0.60398 to 0.62666	0.59831 to 0.63233	6300
87	0.61374	+ or - 0.00648	0.60726 to 0.62022	0.60078 to 0.62669	0.59430 to 0.63317	4800
92	0.60609	+ or - 0.00766	0.59843 to 0.61375	0.59077 to 0.62141	0.58311 to 0.62908	3300


uf6 infinite planar array of cylinders on concrete h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.6113 + or - 0.0027 which occurs for 103 generations run.
0.5569
0.5845
0.6121
5
10
15
20
25
30
35
40
45
50
55
60
65
70

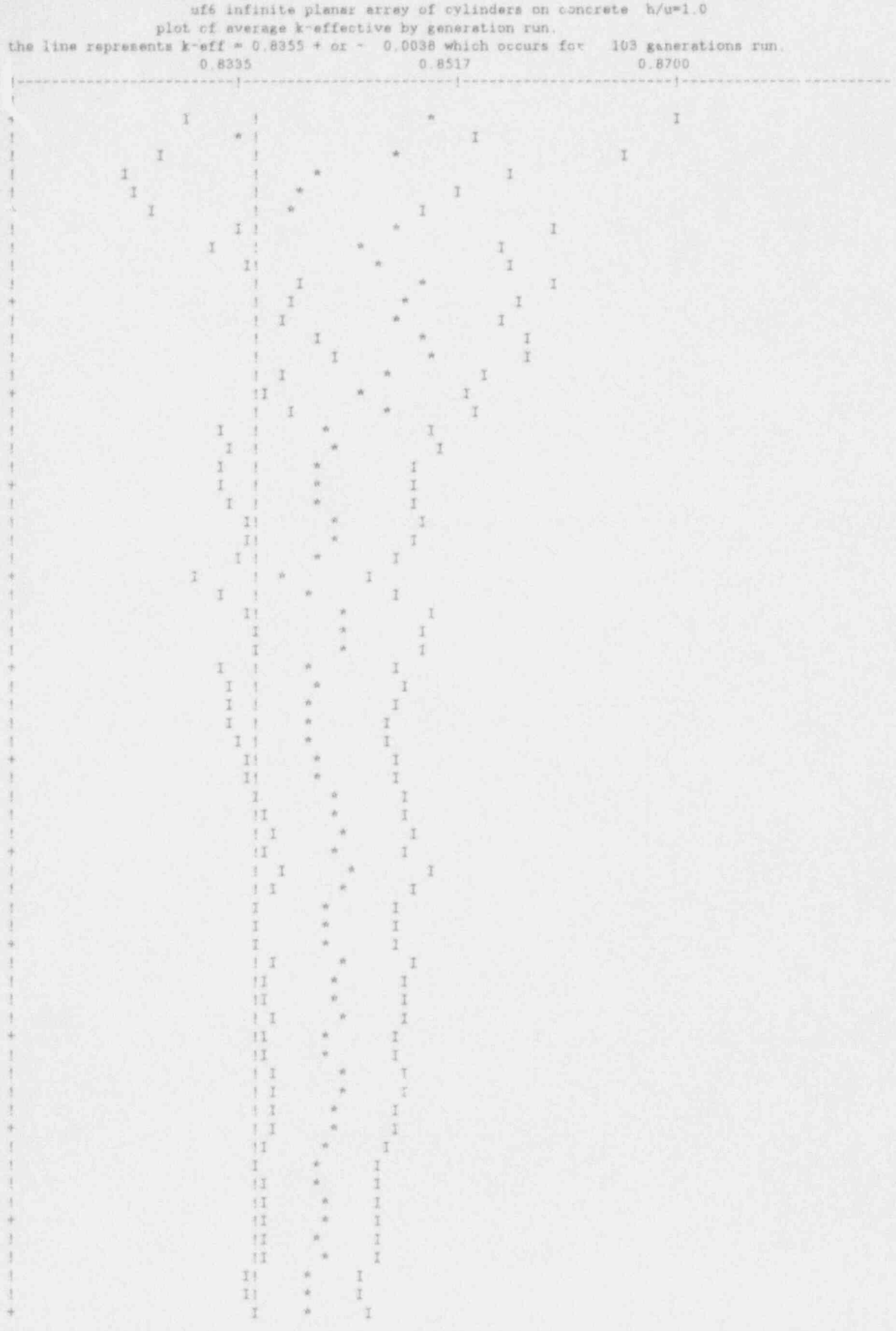

75
80
85
90
95
100

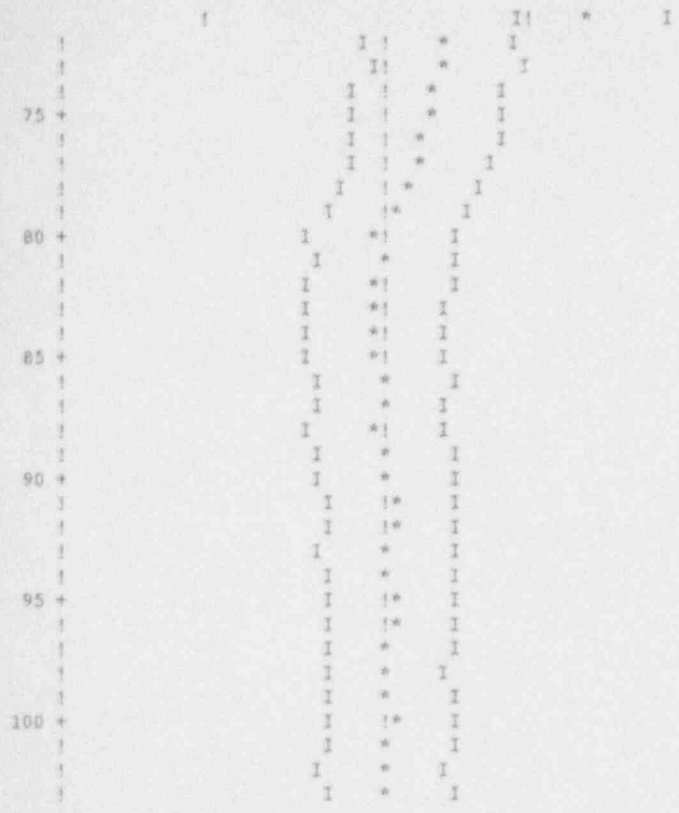
```
=======================================================================
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                          UF6IPCY3.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
H             1  0  8.3002-3  293  END
CARBONSTEEL   2  1.0  END
H2O           3  0.000000001  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=1.0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XPC=MIRROR  YPC=VACUUM  ZPC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
=======================================================================
```

uf6 infinite planar array of cylinders on concrete h/u=1.0

lifetime = 1.27602E-04 + or - 4.65432E-06 generation time = 2.18280E-05 + or - 5.75782E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.83554	+ or - 0.00384	0.83170 to 0.83938	0.82786 to 0.84322	0.82402 to 0.84705	30000
4	0.83519	+ or - 0.00386	0.83133 to 0.83905	0.82747 to 0.84291	0.82360 to 0.84678	29700
5	0.83525	+ or - 0.00390	0.83135 to 0.83915	0.82745 to 0.84305	0.82355 to 0.84695	29400
6	0.83560	+ or - 0.00393	0.83168 to 0.83953	0.82775 to 0.84345	0.82383 to 0.84738	29100
7	0.83507	+ or - 0.00393	0.83114 to 0.83900	0.82721 to 0.84293	0.82328 to 0.84686	28800
8	0.83528	+ or - 0.00397	0.83131 to 0.83925	0.82735 to 0.84321	0.82338 to 0.84718	28500
9	0.83534	+ or - 0.00401	0.83133 to 0.83935	0.82732 to 0.84335	0.82332 to 0.84736	28200
10	0.83535	+ or - 0.00405	0.83130 to 0.83940	0.82725 to 0.84345	0.82320 to 0.84751	27900
11	0.83455	+ or - 0.00401	0.83054 to 0.83857	0.82652 to 0.84258	0.82251 to 0.84660	27600
12	0.83471	+ or - 0.00406	0.83065 to 0.83876	0.82659 to 0.84280	0.82254 to 0.84687	27300
17	0.83332	+ or - 0.00420	0.82912 to 0.83753	0.82492 to 0.84172	0.82071 to 0.84593	25800
22	0.83425	+ or - 0.00426	0.82999 to 0.83852	0.82572 to 0.84278	0.82146 to 0.84704	24300
27	0.83350	+ or - 0.00450	0.82900 to 0.83800	0.82451 to 0.84249	0.82001 to 0.84699	22800
32	0.83275	+ or - 0.00446	0.82830 to 0.83721	0.82384 to 0.84167	0.81938 to 0.84613	21300
37	0.83323	+ or - 0.00465	0.82858 to 0.83788	0.82393 to 0.84253	0.81927 to 0.84718	19800
42	0.83155	+ or - 0.00490	0.82664 to 0.83645	0.82174 to 0.84135	0.81683 to 0.84626	18300
47	0.82994	+ or - 0.00490	0.82505 to 0.83484	0.82015 to 0.83974	0.81525 to 0.84464	16800
52	0.82950	+ or - 0.00509	0.82442 to 0.83459	0.81933 to 0.83967	0.81425 to 0.84476	15300
57	0.82729	+ or - 0.00515	0.82214 to 0.83244	0.81699 to 0.83758	0.81184 to 0.84273	13800
62	0.82853	+ or - 0.00571	0.82282 to 0.83424	0.81711 to 0.83995	0.81140 to 0.84566	12300
67	0.82617	+ or - 0.00639	0.81979 to 0.83256	0.81340 to 0.83894	0.80702 to 0.84533	10800
72	0.82845	+ or - 0.00676	0.82168 to 0.83521	0.81492 to 0.84198	0.80815 to 0.84874	9300
77	0.83009	+ or - 0.00734	0.82276 to 0.83743	0.81542 to 0.84477	0.80808 to 0.85211	7800
82	0.83783	+ or - 0.00728	0.83055 to 0.84511	0.82328 to 0.85238	0.81600 to 0.85966	6300
87	0.83810	+ or - 0.00871	0.82938 to 0.84681	0.82067 to 0.85553	0.81195 to 0.86424	4800
92	0.83402	+ or - 0.01101	0.82301 to 0.84503	0.81200 to 0.85604	0.80100 to 0.86704	3300


uf6 infinite planar arrey of cylinders on concrete h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 0.8355 + or - 0.0038 which occurs for 103 ganerations run.
0.8335
0.8517
0.8700
5
10
15
20
25
30
35
40
45
50
55
60
65
70

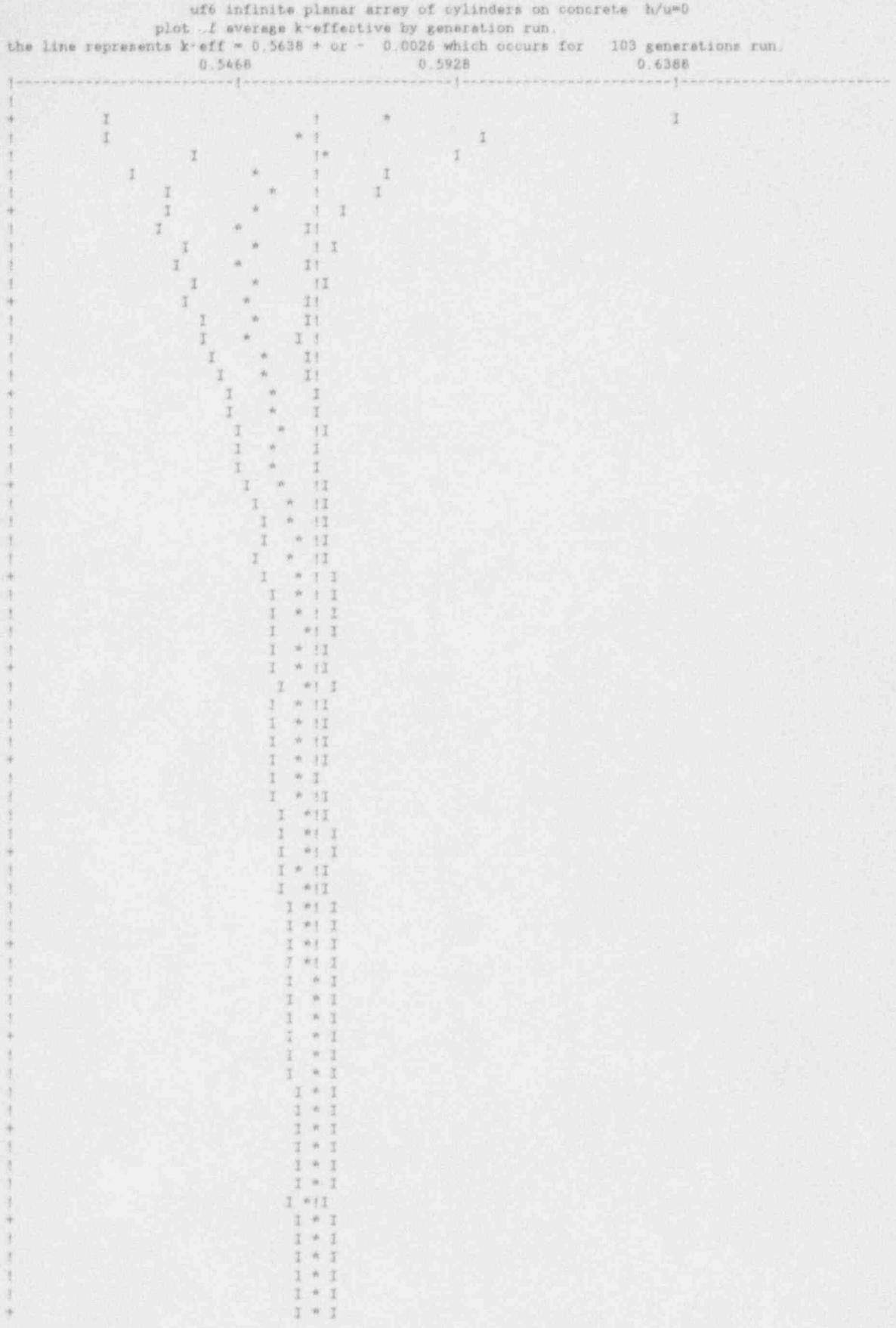

75
80
85
90
95
100

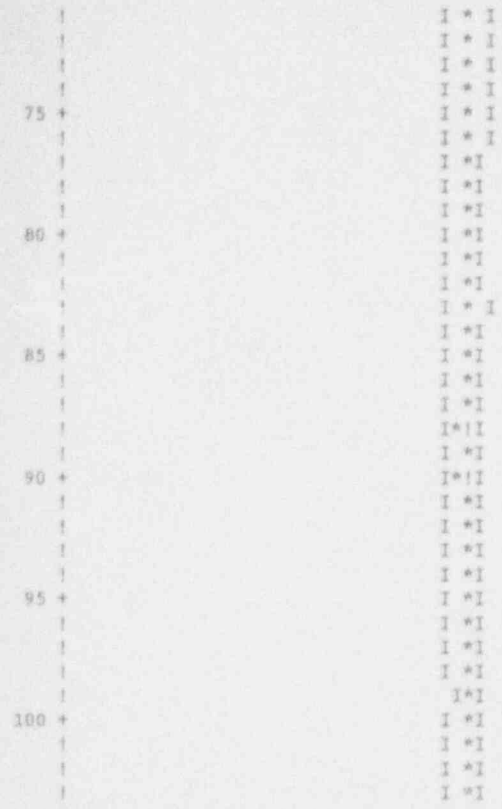
```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                              UF6IPCY4.CJW
27GROUPNDF4                    1NFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL   2  1.0  END
H2O           3  0.05  END
PEG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=0
·∠AD PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID     4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 KLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=0

lifetime = 1.60499E-03 + or - 1.98822E-05 generation time = 4.13257E-04 + or - 1.00625E-05

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.56384	+ or - 0.00258	0.56126 to 0.56643	0.55867 to 0.56901	0.55609 to 0.57159	30000
4	0.56308	+ or - 0.00250	0.56059 to 0.56558	0.55809 to 0.56808	0.55560 to 0.57057	29700
5	0.56352	+ or - 0.00248	0.56104 to 0.56601	0.55856 to 0.56849	0.55608 to 0.57097	29400
6	0.56395	+ or - 0.00247	0.56148 to 0.56642	0.55901 to 0.56889	0.55654 to 0.57136	29100
7	0.56375	+ or - 0.00249	0.56126 to 0.56623	0.55877 to 0.56872	0.55628 to 0.57121	28800
8	0.56445	+ or - 0.00241	0.56204 to 0.56686	0.55963 to 0.56927	0.55722 to 0.57168	28500
9	0.56441	+ or - 0.00244	0.56198 to 0.56685	0.55954 to 0.56929	0.55711 to 0.57172	28200
10	0.56483	+ or - 0.00243	0.56240 to 0.56725	0.55997 to 0.56968	0.55755 to 0.57210	27900
11	0.56532	+ or - 0.00240	0.56292 to 0.56772	0.56052 to 0.57012	0.55812 to 0.57252	27600
12	0.56503	+ or - 0.00241	0.56262 to 0.56744	0.56021 to 0.56985	0.55780 to 0.57226	27300
17	0.56602	+ or - 0.00239	0.56363 to 0.56840	0.56125 to 0.57079	0.55886 to 0.57317	25800
22	0.56548	+ or - 0.00250	0.56298 to 0.56797	0.56048 to 0.57047	0.55799 to 0.57297	24300
27	0.56517	+ or - 0.00255	0.56262 to 0.56772	0.56007 to 0.57027	0.55752 to 0.57282	22800
32	0.56503	+ or - 0.00256	0.56247 to 0.56759	0.55990 to 0.57016	0.55734 to 0.57272	21300
37	0.56519	+ or - 0.00260	0.56258 to 0.56779	0.55998 to 0.57039	0.55738 to 0.57299	19800
42	0.56582	+ or - 0.00268	0.56314 to 0.56850	0.56045 to 0.57119	0.55777 to 0.57387	18300
47	0.56530	+ or - 0.00271	0.56259 to 0.56802	0.55988 to 0.57073	0.55716 to 0.57344	16800
52	0.56409	+ or - 0.00278	0.56131 to 0.56688	0.55852 to 0.56966	0.55574 to 0.57245	15300
57	0.56398	+ or - 0.00308	0.56089 to 0.56706	0.55781 to 0.57014	0.55473 to 0.57322	13800
62	0.56414	+ or - 0.00320	0.56094 to 0.56734	0.55773 to 0.57054	0.55453 to 0.57374	12300
67	0.56411	+ or - 0.00344	0.56067 to 0.56755	0.55724 to 0.57099	0.55380 to 0.57443	10800
72	0.56315	+ or - 0.00348	0.55967 to 0.56663	0.55619 to 0.57011	0.55271 to 0.57359	9300
77	0.56458	+ or - 0.00377	0.56081 to 0.56835	0.55703 to 0.57212	0.55326 to 0.57589	7800
82	0.56336	+ or - 0.00424	0.55912 to 0.56760	0.55489 to 0.57183	0.55065 to 0.57607	6300
87	0.56553	+ or - 0.00527	0.56026 to 0.57080	0.55499 to 0.57607	0.54972 to 0.58134	4800
92	0.56622	+ or - 0.00589	0.56033 to 0.57211	0.55445 to 0.57799	0.54856 to 0.58388	3300


uf6 infinite planar arrey of cylinders on concrete h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.5638 + or - 0.0026 which occurs for 103 generations run.
0.5468
0.5928
0.6388
5
10
15
20
25
30
35
40
45
50
55
60
65
70

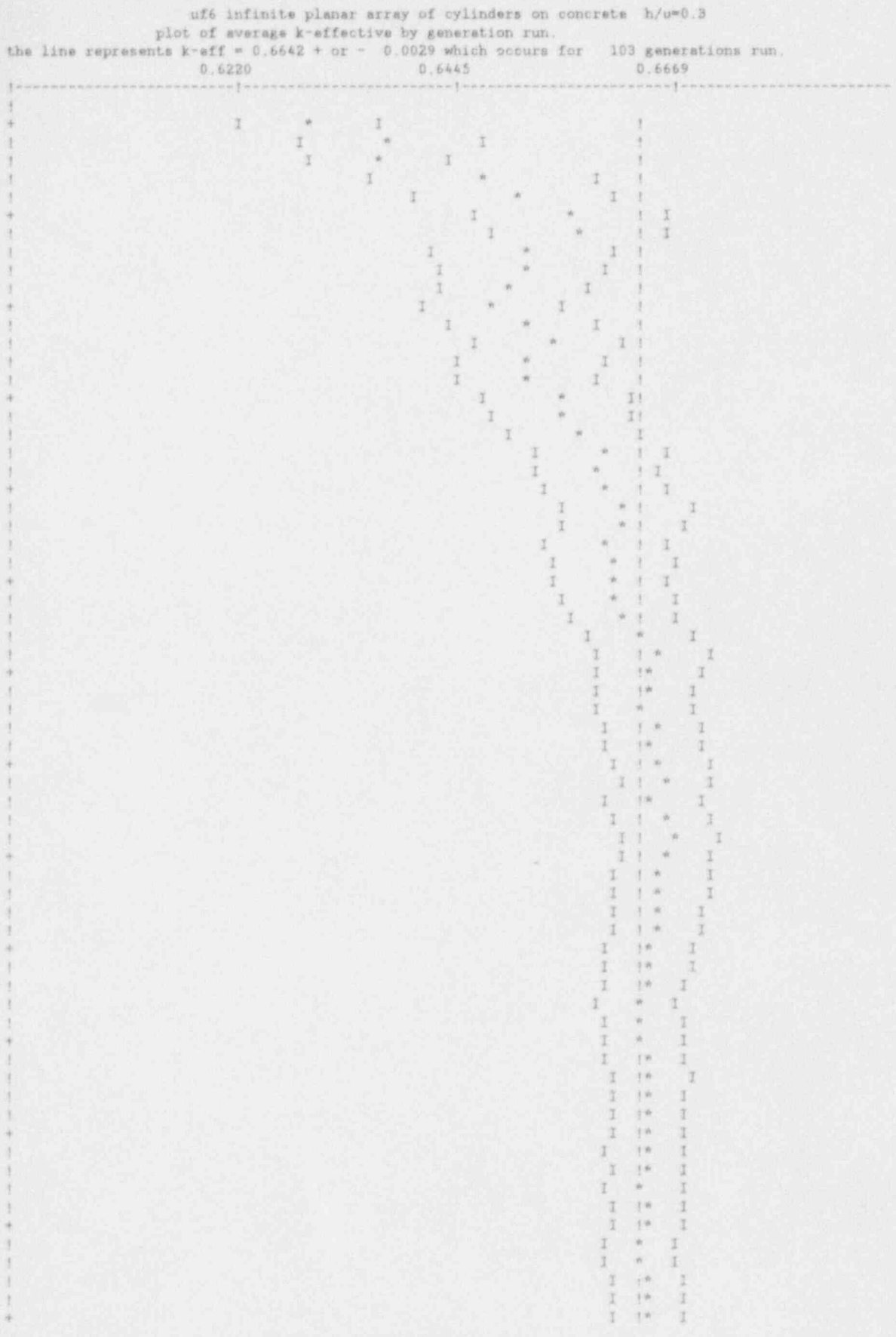

75
80
85
90
95
100

```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                          UF6IPCY5.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
H             1  0  2.49006-3  293  END
CARBONSTEEL   2  1.0  END
H2O           3  0.05  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=0.3
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=0.3

lifetime = 1.23203E-03 + or - 1.83014E-05 generation time = 2.91200E-04 + or - 8.59792E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.66415	+ or - 0.00292	0.66123 to 0.66707	0.65832 to 0.66999	0.65540 to 0.67291	30000
4	0.66458	+ or - 0.00292	0.66166 to 0.66749	0.65874 to 0.67041	0.65583 to 0.67333	29700
5	0.66486	+ or - 0.00293	0.66193 to 0.66779	0.65900 to 0.67072	0.65606 to 0.67366	29400
6	0.66496	+ or - 0.00296	0.66200 to 0.66792	0.65904 to 0.67088	0.65608 to 0.67385	29100
7	0.66529	+ or - 0.00297	0.66231 to 0.66826	0.65934 to 0.67124	0.65637 to 0.67421	28800
8	0.66504	+ or - 0.00299	0.66204 to 0.66803	0.65905 to 0.67103	0.65606 to 0.67402	28500
9	0.66499	+ or - 0.00303	0.66197 to 0.66802	0.65894 to 0.67105	0.65591 to 0.67407	28200
10	0.66472	+ or - 0.00305	0.66167 to 0.66777	0.65863 to 0.67081	0.65558 to 0.67386	27900
11	0.66474	+ or - 0.00308	0.66166 to 0.66782	0.65858 to 0.67090	0.65550 to 0.67398	27600
12	0.66537	+ or - 0.00305	0.66232 to 0.66842	0.65927 to 0.67146	0.65622 to 0.67451	27300
17	0.66569	+ or - 0.00314	0.66255 to 0.66884	0.65940 to 0.67198	0.65626 to 0.67512	25800
22	0.66579	+ or - 0.00322	0.66257 to 0.66901	0.65935 to 0.67223	0.65613 to 0.67545	24300
27	0.66494	+ or - 0.00329	0.66165 to 0.66823	0.65835 to 0.67152	0.65506 to 0.67481	22800
32	0.66513	+ or - 0.00348	0.66165 to 0.66861	0.65817 to 0.67209	0.65470 to 0.67557	21300
37	0.66422	+ or - 0.00357	0.66065 to 0.66778	0.65709 to 0.67135	0.65352 to 0.67492	19800
42	0.66356	+ or - 0.00364	0.65991 to 0.66720	0.65627 to 0.67084	0.65263 to 0.67448	18300
47	0.66267	+ or - 0.00380	0.65887 to 0.66647	0.65507 to 0.67027	0.65127 to 0.67407	16800
52	0.66394	+ or - 0.00407	0.65987 to 0.66801	0.65580 to 0.67207	0.65174 to 0.67614	15300
57	0.66331	+ or - 0.00436	0.65895 to 0.66767	0.65459 to 0.67203	0.65023 to 0.67639	13800
62	0.66374	+ or - 0.00482	0.65892 to 0.66855	0.65411 to 0.67337	0.64929 to 0.67818	12300
67	0.66503	+ or - 0.00535	0.65969 to 0.67038	0.65434 to 0.67573	0.64899 to 0.68107	10800
72	0.66239	+ or - 0.00553	0.65686 to 0.66792	0.65132 to 0.67346	0.64579 to 0.67899	9300
77	0.66052	+ or - 0.00633	0.65419 to 0.66686	0.64786 to 0.67319	0.64152 to 0.67952	7800
82	0.66707	+ or - 0.00643	0.66063 to 0.67350	0.65420 to 0.67993	0.64777 to 0.68636	6300
87	0.67194	+ or - 0.00734	0.66460 to 0.67928	0.65726 to 0.68662	0.64992 to 0.69396	4800
92	0.67337	+ or - 0.00860	0.66477 to 0.68196	0.65617 to 0.69057	0.64757 to 0.69916	3300


uf6 infinite planar array of cylinders on concrete h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.6642 + or - 0.0029 which occurs for 103 generations run.
0.6220
0.6445
0.6669
5
10
15
20
25
30
35
40
45
50
55
60
65
70

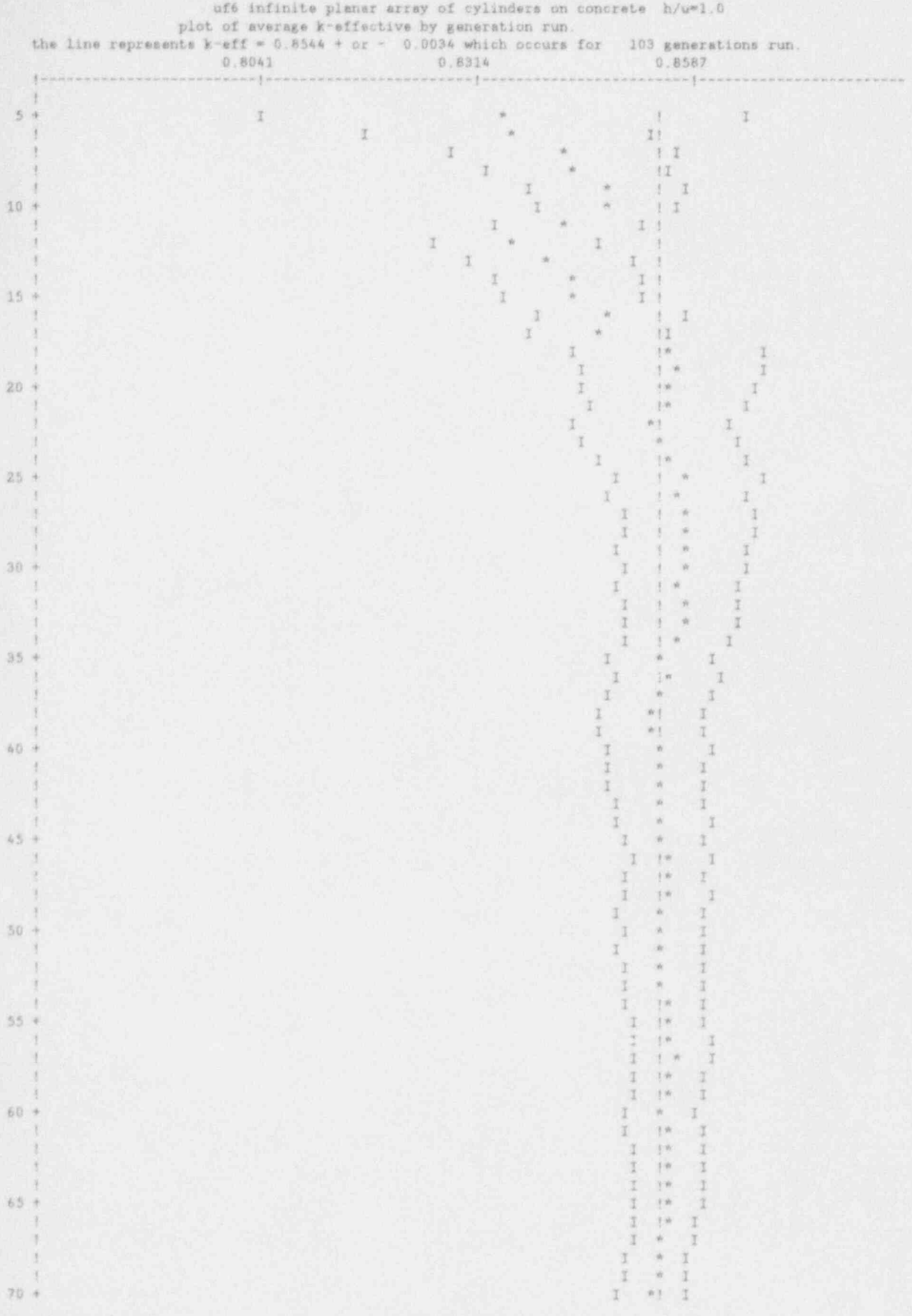

75
80
85
90
95
100

```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                          UF6IPCY6.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
H             1  0  8.3002-3  293  END
CARBONSTEEL   2  1.0  END
H2O           3  0.05  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=1.0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=1.0

lifetime = 8.19019E-04 + or - 1.72423E-05 generation time = 1.36885E-04 + or - 5.18942E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.85437	+ or - 0.00336	0.85100 to 0.85773	0.84764 to 0.86110	0.84427 to 0.86446	30000
4	0.85488	+ or - 0.00336	0.85152 to 0.85824	0.84816 to 0.86160	0.84480 to 0.86496	29700
5	0.85476	+ or - 0.00339	0.85137 to 0.85815	0.84798 to 0.86155	0.84458 to 0.86494	29400
6	0.85494	+ or - 0.00342	0.85152 to 0.85836	0.84809 to 0.86179	0.84467 to 0.86521	29100
7	0.85484	+ or - 0.00346	0.85138 to 0.85830	0.84793 to 0.86176	0.84447 to 0.86521	28800
8	0.85489	+ or - 0.00349	0.85140 to 0.85839	0.84791 to 0.86188	0.84441 to 0.86537	28500
9	0.85475	+ or - 0.00353	0.85122 to 0.85827	0.84769 to 0.86180	0.84416 to 0.86533	28200
10	0.85480	+ or - 0.00357	0.85123 to 0.85836	0.84767 to 0.86193	0.84410 to 0.86550	27900
11	0.85536	+ or - 0.00356	0.85180 to 0.85892	0.84824 to 0.86248	0.84468 to 0.86604	27600
12	0.85611	+ or - 0.00352	0.85259 to 0.85963	0.84907 to 0.86314	0.84555 to 0.86666	27300
17	0.85556	+ or - 0.00365	0.85191 to 0.85921	0.84827 to 0.86286	0.84462 to 0.86651	25800
22	0.85461	+ or - 0.00348	0.85112 to 0.85809	0.84764 to 0.86157	0.84416 to 0.86506	24300
27	0.85300	+ or - 0.00353	0.84947 to 0.85653	0.84594 to 0.86005	0.84242 to 0.86358	22800
32	0.85295	+ or - 0.00373	0.84922 to 0.85669	0.84548 to 0.86042	0.84175 to 0.86416	21300
37	0.85409	+ or - 0.00391	0.85018 to 0.85800	0.84627 to 0.86191	0.84236 to 0.86582	19800
42	0.85434	+ or - 0.00412	0.85022 to 0.85845	0.84610 to 0.86257	0.84199 to 0.86668	18300
47	0.85349	+ or - 0.00429	0.84920 to 0.85778	0.84491 to 0.86207	0.84062 to 0.86636	16800
52	0.85360	+ or - 0.00459	0.84901 to 0.85820	0.84442 to 0.86279	0.83982 to 0.86738	15300
57	0.85170	+ or - 0.00501	0.84669 to 0.85671	0.84168 to 0.86172	0.83667 to 0.86672	13800
62	0.85270	+ or - 0.00539	0.84731 to 0.85810	0.84192 to 0.86349	0.83652 to 0.86888	12300
67	0.85291	+ or - 0.00592	0.84698 to 0.85883	0.84106 to 0.86475	0.83514 to 0.87067	10800
72	0.85643	+ or - 0.00644	0.84999 to 0.86287	0.84356 to 0.86931	0.83712 to 0.87575	9300
77	0.85407	+ or - 0.00718	0.84690 to 0.86125	0.83972 to 0.86842	0.83255 to 0.87560	7800
82	0.85019	+ or - 0.00772	0.84247 to 0.85791	0.83475 to 0.86564	0.82703 to 0.87336	6300
87	0.85026	+ or - 0.00963	0.84064 to 0.85989	0.83101 to 0.86952	0.82139 to 0.87914	4800
92	0.84180	+ or - 0.01282	0.82897 to 0.85462	0.81615 to 0.86745	0.80333 to 0.88027	3300


uf6 infinite planar array of cylinders on concrete h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 0.8544 + or - 0.0034 which occurs for 103 generations run.
0.8041
0.8314
0.8587
5
10
15
20
25
30
35
40
45
50
55
60
65
70

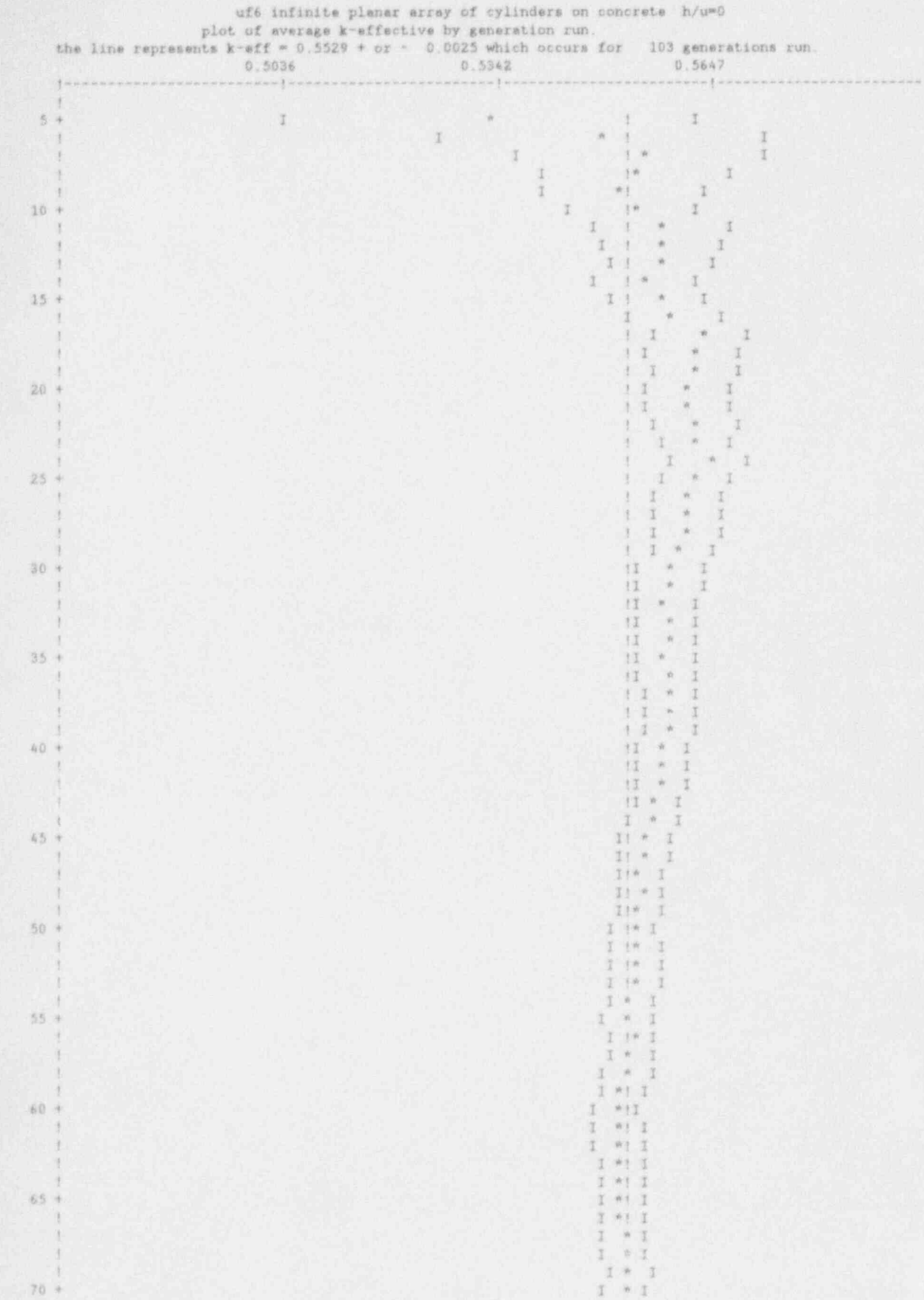

75
80
85
90
95
100

```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                              UF6IPCY7.CJW
27GROUPNDF4                INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL   2  1.0  END
H2O           3  0.1  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=0

lifetime = 9.59888E-04 + or - 1.04242E-05 generation time = 2.84823E-04 + or - 6.96641E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.55289	+ or - 0.00245	0.55044 to 0.55535	0.54799 to 0.55780	0.54553 to 0.56026	30000
4	0.55339	+ or - 0.00243	0.55096 to 0.55582	0.54854 to 0.55825	0.54611 to 0.56068	29700
5	0.55330	+ or - 0.00245	0.55085 to 0.55575	0.54840 to 0.55820	0.54595 to 0.56065	29400
6	0.55301	+ or - 0.00246	0.55055 to 0.55547	0.54809 to 0.55793	0.54564 to 0.56039	29100
7	0.55280	+ or - 0.00248	0.55032 to 0.55528	0.54785 to 0.55775	0.54537 to 0.56023	28800
8	0.55281	+ or - 0.00250	0.55031 to 0.55531	0.54781 to 0.55781	0.54530 to 0.56032	28500
9	0.55293	+ or - 0.00253	0.55040 to 0.55545	0.54787 to 0.55798	0.54535 to 0.56050	28200
10	0.55283	+ or - 0.00255	0.55028 to 0.55538	0.54773 to 0.55793	0.54517 to 0.56048	27900
11	0.55242	+ or - 0.00255	0.54988 to 0.55497	0.54733 to 0.55752	0.54478 to 0.56006	27600
12	0.55237	+ or - 0.00257	0.54979 to 0.55494	0.54722 to 0.55752	0.54465 to 0.56009	27300
17	0.55117	+ or - 0.00257	0.54860 to 0.55373	0.54603 to 0.55630	0.54347 to 0.55887	25800
22	0.55053	+ or - 0.00268	0.54785 to 0.55321	0.54517 to 0.55589	0.54249 to 0.55857	24300
27	0.55021	+ or - 0.00276	0.54746 to 0.55297	0.54470 to 0.55572	0.54195 to 0.55848	22800
32	0.55063	+ or - 0.00290	0.54773 to 0.55353	0.54483 to 0.55643	0.54193 to 0.55933	21300
37	0.54964	+ or - 0.00304	0.54660 to 0.55269	0.54356 to 0.55573	0.54051 to 0.55877	19800
42	0.54957	+ or - 0.00327	0.54631 to 0.55284	0.54304 to 0.55611	0.53978 to 0.55937	18300
47	0.55132	+ or - 0.00345	0.54787 to 0.55477	0.54443 to 0.55822	0.54098 to 0.56166	16800
52	0.55169	+ or - 0.00361	0.54808 to 0.55530	0.54447 to 0.55891	0.54086 to 0.56252	15300
57	0.55203	+ or - 0.00375	0.54827 to 0.55578	0.54452 to 0.55953	0.54077 to 0.56328	13800
62	0.55443	+ or - 0.00371	0.55072 to 0.55813	0.54701 to 0.56184	0.54331 to 0.56555	12300
67	0.55322	+ or - 0.00404	0.54918 to 0.55726	0.54515 to 0.56129	0.54111 to 0.56533	10800
72	0.55431	+ or - 0.00431	0.55000 to 0.55862	0.54568 to 0.56294	0.54137 to 0.56725	9300
77	0.55340	+ or - 0.00431	0.54910 to 0.55771	0.54479 to 0.56202	0.54049 to 0.56632	7800
82	0.55574	+ or - 0.00481	0.55092 to 0.56055	0.54611 to 0.56536	0.54130 to 0.57018	6300
87	0.55765	+ or - 0.00535	0.55230 to 0.56300	0.54696 to 0.56835	0.54161 to 0.57369	4800
92	0.55516	+ or - 0.00658	0.54857 to 0.56174	0.54199 to 0.56833	0.53540 to 0.57491	3300


uf6 infinite planar array of cylinders on concrete h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.5529 + or - 0.0025 which occurs for 103 generations run.
0.5036
0.5342
0.5647
5
10
15
20
25
30
35
40
45
50
55
60
65
70

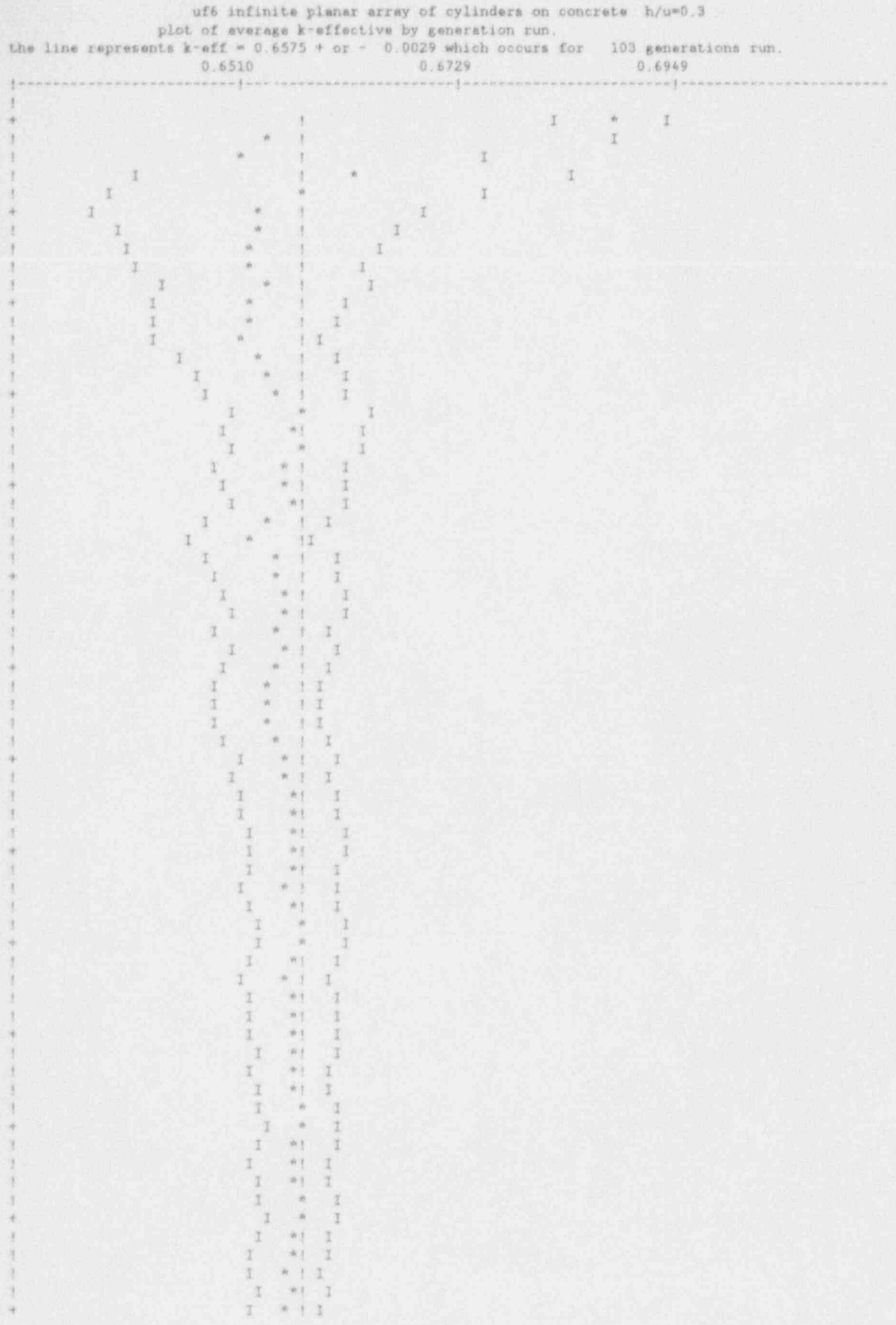

75
80
85
90
95
100

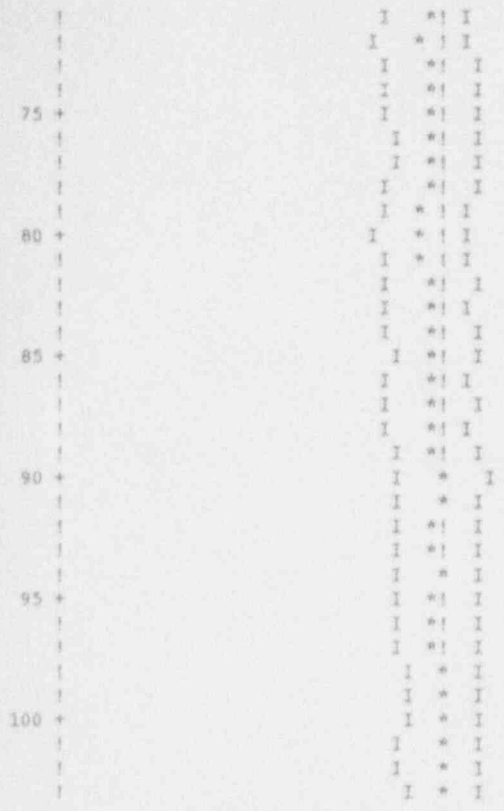
```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                          UF6IPCY8.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
F             1  0  2.49006-3  293  END
CARBONSTEEL   2  1.0  END
H2O           3  0.1  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=0.3
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2F111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2F111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=0.3

lifetime = 7.58328E-04 + or - 9.64657E-06 generation time = 2.00134E-04 + or - 4.60944E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.65750	+ or - 0.00288	0.65462 to 0.66038	0.65173 to 0.66327	0.64885 to 0.66615	30000
4	0.65712	+ or - 0.00289	0.65423 to 0.66001	0.65135 to 0.66290	0.64846 to 0.66579	29700
5	0.65686	+ or - 0.00291	0.65395 to 0.65977	0.65105 to 0.66267	0.64814 to 0.66558	29400
6	0.65760	+ or - 0.00284	0.65476 to 0.66044	0.65193 to 0.66328	0.64909 to 0.66612	29100
7	0.65775	+ or - 0.00286	0.65488 to 0.66061	0.65202 to 0.66348	0.64915 to 0.66634	28800
8	0.65722	+ or - 0.00285	0.65437 to 0.66006	0.65153 to 0.66291	0.64868 to 0.66575	28500
9	0.65752	+ or - 0.00286	0.65466 to 0.66038	0.65180 to 0.66324	0.64894 to 0.66610	28200
10	0.65783	+ or - 0.00287	0.65495 to 0.66070	0.65208 to 0.66357	0.64921 to 0.66645	27900
11	0.65787	+ or - 0.00290	0.65497 to 0.66078	0.65206 to 0.66368	0.64916 to 0.66659	27600
12	0.65801	+ or - 0.00293	0.65508 to 0.66094	0.65214 to 0.66388	0.64921 to 0.66681	27300
17	0.65856	+ or - 0.00308	0.65548 to 0.66164	0.65240 to 0.66471	0.64933 to 0.66779	25800
22	0.65766	+ or - 0.00320	0.65446 to 0.66085	0.65126 to 0.66405	0.64806 to 0.66725	24300
27	0.65848	+ or - 0.00329	0.65519 to 0.66177	0.65190 to 0.66506	0.64861 to 0.66834	22800
32	0.65816	+ or - 0.00334	0.65481 to 0.66150	0.65147 to 0.66484	0.64813 to 0.66819	21300
37	0.65916	+ or - 0.00347	0.65569 to 0.66262	0.65223 to 0.66609	0.64876 to 0.66955	19800
42	0.65817	+ or - 0.00358	0.65459 to 0.66175	0.65100 to 0.66533	0.64742 to 0.66891	18300
47	0.65848	+ or - 0.00384	0.65464 to 0.66232	0.65080 to 0.66616	0.64695 to 0.67000	16800
52	0.65876	+ or - 0.00386	0.65490 to 0.66262	0.65104 to 0.66648	0.64718 to 0.67034	15300
57	0.65852	+ or - 0.00423	0.65429 to 0.66275	0.65006 to 0.66697	0.64583 to 0.67120	13800
62	0.65892	+ or - 0.00449	0.65443 to 0.66341	0.64994 to 0.66790	0.64545 to 0.67239	12300
67	0.65962	+ or - 0.00471	0.65491 to 0.66432	0.65020 to 0.66903	0.64549 to 0.67374	10800
72	0.66072	+ or - 0.00531	0.65541 to 0.66603	0.65010 to 0.67133	0.64480 to 0.67664	9300
77	0.65862	+ or - 0.00620	0.65242 to 0.66482	0.64622 to 0.67102	0.64002 to 0.67722	7800
82	0.66013	+ or - 0.00636	0.65378 to 0.66649	0.64742 to 0.67284	0.64107 to 0.67920	6300
87	0.66203	+ or - 0.00713	0.65491 to 0.66916	0.64778 to 0.67629	0.64065 to 0.68341	4800
92	0.66149	+ or - 0.00696	0.65453 to 0.66844	0.64757 to 0.67540	0.64062 to 0.68236	3300


uf6 infinite planar array of cylinders on concrete h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.6575 + or - 0.0029 which occurs for 103 generations run.
0.6510
0.6729
0.6949
5
10
15
20
25
30
35
40
45
50
55
60
65
70

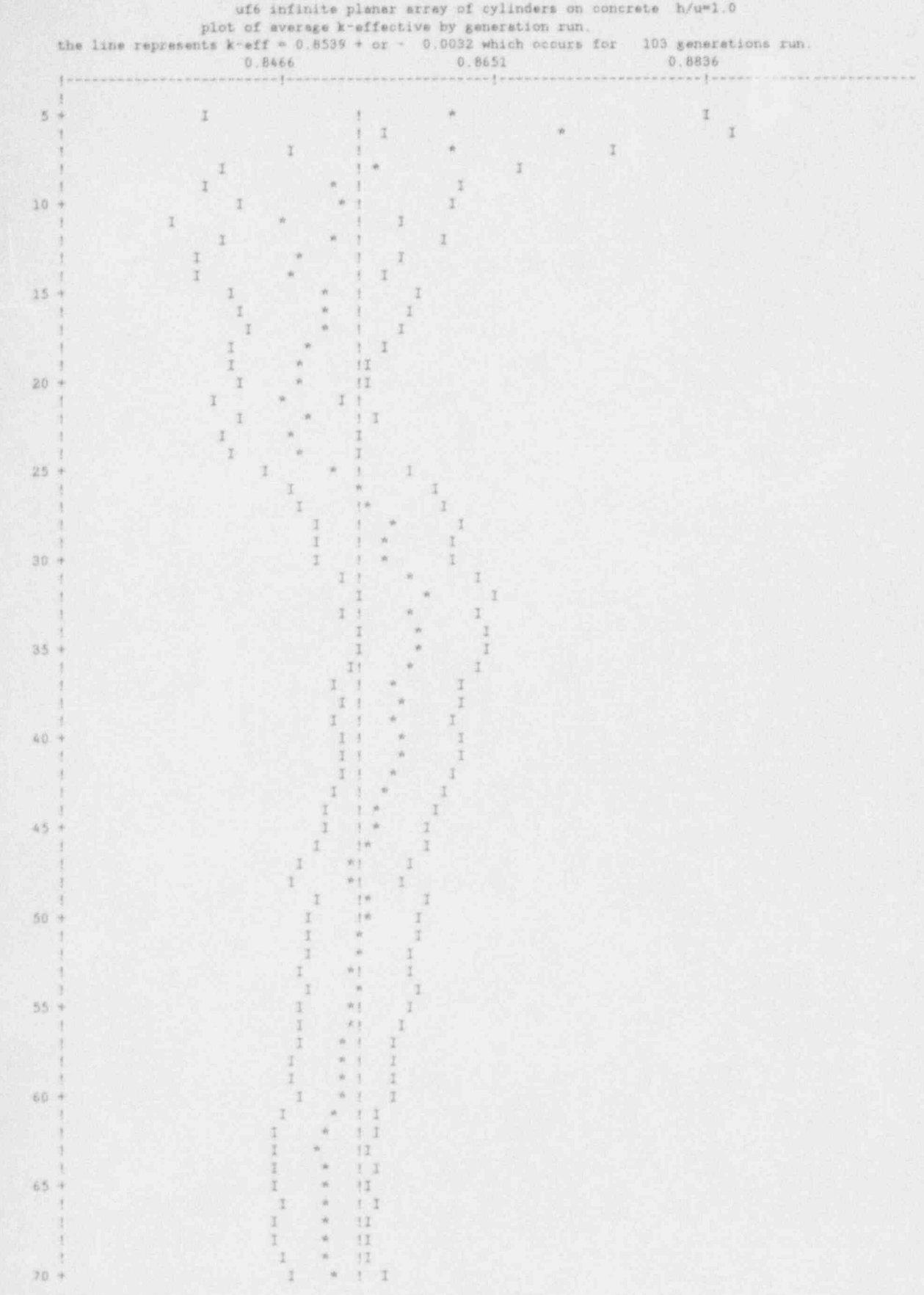

75
80
85
90
95
100

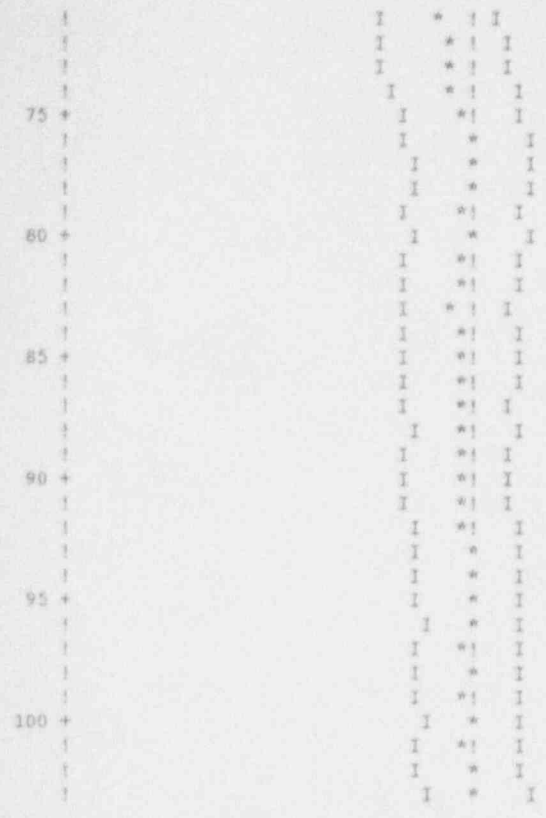
```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                          UF6IPCY9.CJW
27GROUPNDF4                INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
H             1  0  8.3002-3  293  END
CARBONSTEEL   2  1.0  END
H2O           3  0.1  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=1.0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM=!ONE UF6 CYLINDER!
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID     4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=1.0

lifetime = 4.95698E-04 + or - 8.31249E-06 generation time = 1.05619E-04 + or - 2.83710E-06

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.85389	+ or - 0.00321	0.85068 to 0.85710	0.84746 to 0.86031	0.84425 to 0.86353	30000
4	0.85359	+ or - 0.00323	0.85036 to 0.85682	0.84713 to 0.86005	0.84390 to 0.86328	29700
5	0.85372	+ or - 0.00326	0.85046 to 0.85698	0.84720 to 0.86024	0.84394 to 0.86350	29400
6	0.85336	+ or - 0.00327	0.85008 to 0.85663	0.84681 to 0.85990	0.84353 to 0.86318	29100
7	0.85355	+ or - 0.00330	0.85025 to 0.85685	0.84695 to 0.86016	0.84365 to 0.86346	28800
8	0.85384	+ or - 0.00332	0.85051 to 0.85716	0.84719 to 0.86049	0.84386 to 0.86381	28500
9	0.85405	+ or - 0.00335	0.85069 to 0.85740	0.84734 to 0.86075	0.84399 to 0.86411	28200
10	0.85399	+ or - 0.00339	0.85060 to 0.85738	0.84721 to 0.86077	0.84383 to 0.86416	27900
11	0.85447	+ or - 0.00339	0.85107 to 0.85786	0.84768 to 0.86125	0.84429 to 0.86465	27600
12	0.85415	+ or - 0.00342	0.85074 to 0.85757	0.84732 to 0.86099	0.84391 to 0.86440	27300
17	0.85443	+ or - 0.00358	0.85085 to 0.85800	0.84728 to 0.86158	0.84370 to 0.86515	25800
22	0.85499	+ or - 0.00370	0.85129 to 0.85869	0.84759 to 0.86240	0.84389 to 0.86610	24300
27	0.85369	+ or - 0.00376	0.84993 to 0.85746	0.84617 to 0.86122	0.84240 to 0.86498	22800
32	0.85166	+ or - 0.00381	0.84785 to 0.85548	0.84404 to 0.85929	0.84022 to 0.86310	21300
37	0.85234	+ or - 0.00398	0.84836 to 0.85632	0.84439 to 0.86030	0.84041 to 0.86428	19800
42	0.85206	+ or - 0.00426	0.84780 to 0.85632	0.84354 to 0.86057	0.83928 to 0.86483	18300
47	0.85456	+ or - 0.00438	0.85018 to 0.85894	0.84580 to 0.86332	0.84142 to 0.86770	16800
52	0.85397	+ or - 0.00449	0.84947 to 0.85846	0.84498 to 0.86295	0.84049 to 0.86744	15300
57	0.85546	+ or - 0.00475	0.85071 to 0.86021	0.84596 to 0.86496	0.84121 to 0.86971	13800
62	0.85837	+ or - 0.00493	0.85344 to 0.86330	0.84851 to 0.86823	0.84358 to 0.87316	12300
67	0.86004	+ or - 0.00527	0.85477 to 0.86531	0.84949 to 0.87059	0.84422 to 0.87586	10800
72	0.85833	+ or - 0.00559	0.85274 to 0.86392	0.84715 to 0.86951	0.84156 to 0.87509	9300
77	0.85421	+ or - 0.00618	0.84804 to 0.86039	0.84186 to 0.86656	0.83569 to 0.87274	7800
82	0.85728	+ or - 0.00699	0.85030 to 0.86427	0.84331 to 0.87125	0.83633 to 0.87824	6300
87	0.85975	+ or - 0.00852	0.85123 to 0.86827	0.84271 to 0.87679	0.83419 to 0.88531	4800
92	0.86003	+ or - 0.01075	0.84928 to 0.87079	0.83853 to 0.88154	0.82777 to 0.89230	3300


uf6 infinite planar array of cylinders on concrete h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 0.8539 + or - 0.0032 which occurs for 103 generations run.
0.8466
0.8651
0.8836


75
80
85
90
95
100

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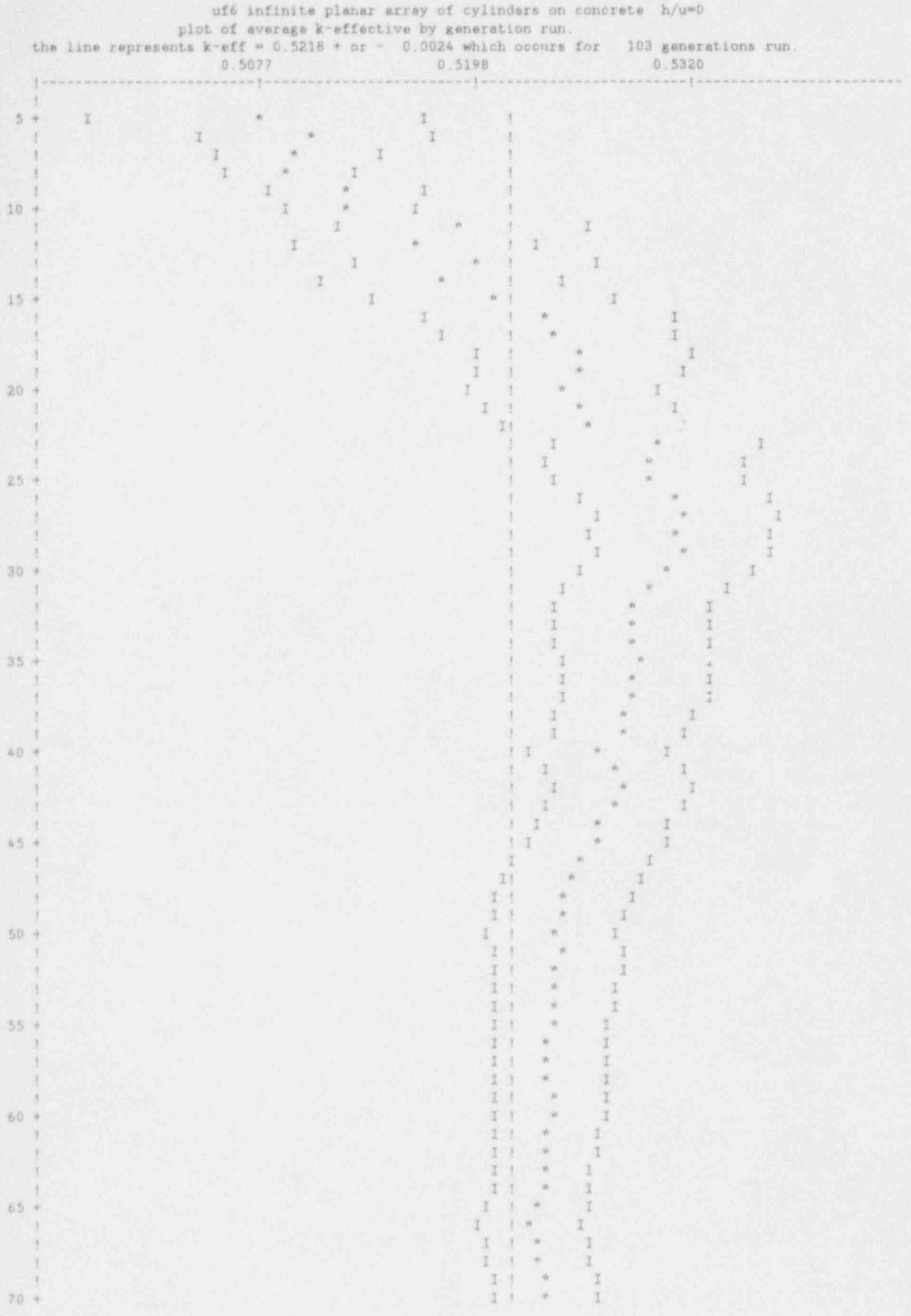
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                              UF61PCYA.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL   2  1.0  END
H2O           3  1.0  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=0

lifetime = 1.51155E-04 + or - 1.35065E-06 generation time = 3.71287E-05 + or - 8.88810E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.52182	+ or - 0.00241	0.51942 to 0.52423	0.51701 to 0.52663	0.51460 to 0.52904	30000
4	0.52187	or - 0.00243	0.51944 to 0.52430	0.51701 to 0.52673	0.51458 to 0.52916	29700
5	0.52211	+ or - 0.00244	0.51967 to 0.52455	0.51722 to 0.52699	0.51478 to 0.52944	29400
6	0.52216	+ or - 0.00247	0.51969 to 0.52462	0.51722 to 0.52709	0.51475 to 0.52956	29100
7	0.52231	+ or - 0.00249	0.51982 to 0.52480	0.51734 to 0.52729	0.51485 to 0.52978	28800
8	0.52246	+ or - 0.00251	0.51995 to 0.52497	0.51744 to 0.52748	0.51493 to 0.52999	28500
9	0.52240	+ or - 0.00254	0.51987 to 0.52494	0.51733 to 0.52747	0.51479 to 0.53001	28200
10	0.52249	+ or - 0.00256	0.51993 to 0.52506	0.51737 to 0.52762	0.51481 to 0.53018	27900
11	0.52205	+ or - 0.00255	0.51950 to 0.52460	0.51695 to 0.52715	0.51440 to 0.52970	27600
12	0.52234	+ or - 0.00256	0.51978 to 0.52490	0.51722 to 0.52746	0.51466 to 0.53002	27300
17	0.52137	+ or - 0.00261	0.51876 to 0.52398	0.51615 to 0.52658	0.51354 to 0.52919	25800
22	0.52070	+ or - 0.00273	0.51797 to 0.52343	0.51524 to 0.52615	0.51252 to 0.52888	24300
27	0.51861	+ or - 0.00262	0.51599 to 0.52124	0.51337 to 0.52386	0.51074 to 0.52649	22800
32	0.51897	+ or - 0.00278	0.51620 to 0.52175	0.51342 to 0.52452	0.51065 to 0.52730	21300
37	0.51811	+ or - 0.00295	0.51515 to 0.52106	0.51220 to 0.52401	0.50925 to 0.52697	19800
42	0.51755	+ or - 0.00293	0.51462 to 0.52048	0.51169 to 0.52340	0.50877 to 0.52633	18300
47	0.51905	+ or - 0.00310	0.51596 to 0.52215	0.51286 to 0.52524	0.50977 to 0.52834	16800
52	0.51908	+ or - 0.00331	0.51577 to 0.52240	0.51246 to 0.52571	0.50914 to 0.52903	15300
57	0.51904	+ or - 0.00365	0.51539 to 0.52269	0.51174 to 0.52634	0.50810 to 0.52999	13800
62	0.51883	+ or - 0.00409	0.51474 to 0.52292	0.51065 to 0.52701	0.50657 to 0.53109	12300
67	0.51863	+ or - 0.00441	0.51422 to 0.52304	0.50981 to 0.52745	0.50540 to 0.53187	10800
72	0.51660	+ or - 0.00484	0.51176 to 0.52144	0.50692 to 0.52629	0.50208 to 0.53113	9300
77	0.51834	+ or - 0.00535	0.51300 to 0.52369	0.50765 to 0.52903	0.50230 to 0.53438	7800
82	0.51457	+ or - 0.00577	0.50880 to 0.52033	0.50303 to 0.52610	0.49726 to 0.53187	6300
87	0.51209	+ or - 0.00722	0.50487 to 0.51931	0.49764 to 0.52654	0.49042 to 0.53376	4800
92	0.51715	+ or - 0.00890	0.50826 to 0.52605	0.49936 to 0.53495	0.49047 to 0.54384	3300


uf6 infinite planar array of cylinders on concrete h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.5218 + or - 0.0024 which occurs for 103 generations run.
0.5077
0.5198
0.5320
5
10
15
20
25
30
35
40
45
50
55
60
65
70

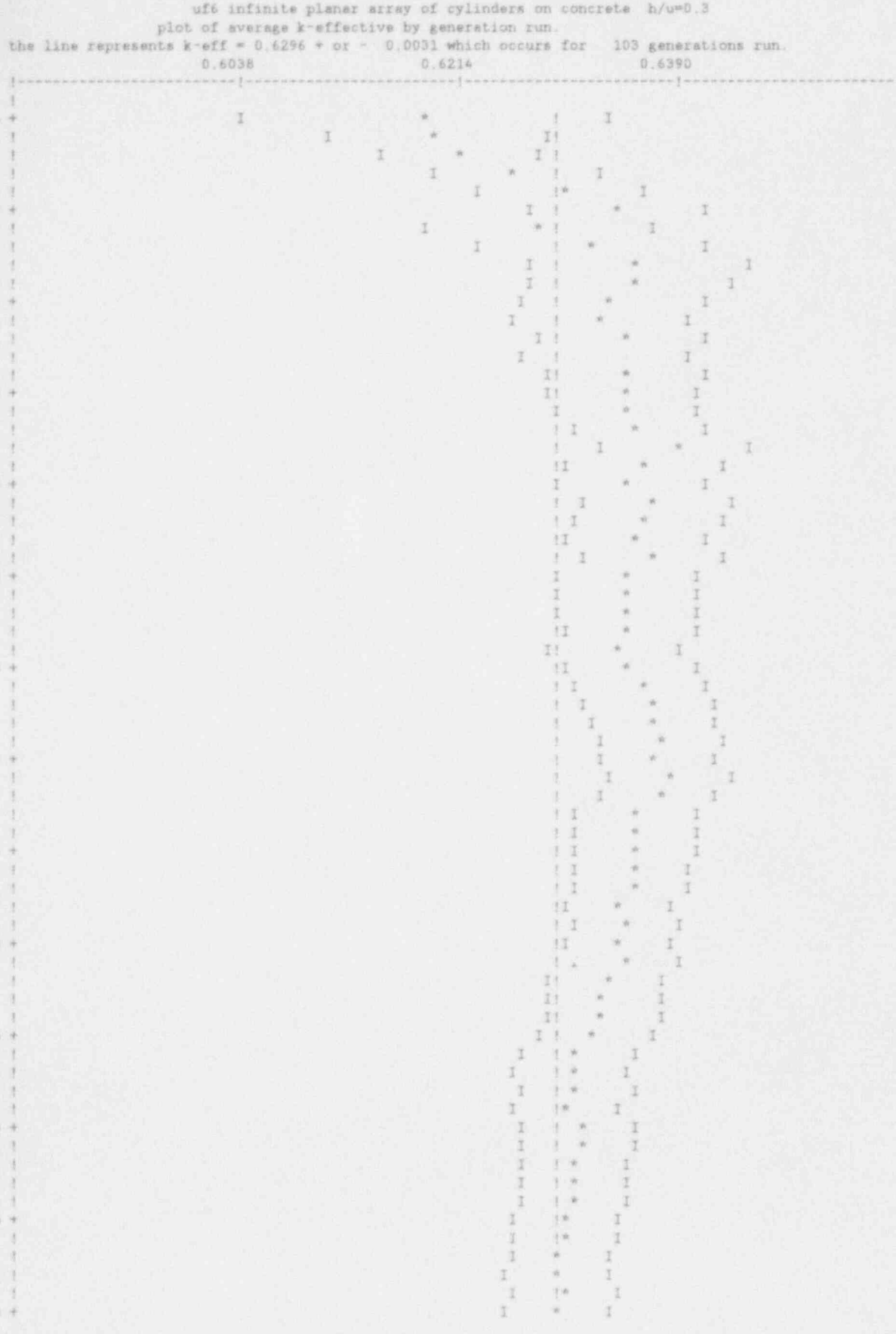

75
80
85
90
95
100

```
********************************************************************************
=CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                              UF6IPCYB.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
H             1  0  2.49006-3  293  END
CARBONSTEEL   2  1.0  END
H2O           3  1.0  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=0.3
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=0.3

lifetime = 1.20542E-04 + or - 1.43457E-06 generation time = 2.66368E-05 + or - 6.47024E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.62957	+ or - 0.00312	0.62645 to 0.63269	0.62333 to 0.63581	0.62021 to 0.63892	30000
4	0.62983	+ or - 0.00314	0.62669 to 0.63297	0.62355 to 0.63611	0.62041 to 0.63925	29700
5	0.62979	+ or - 0.00317	0.62662 to 0.63296	0.62345 to 0.63613	0.62028 to 0.63930	29400
6	0.62987	+ or - 0.00320	0.62667 to 0.63307	0.62346 to 0.63627	0.62026 to 0.63948	29100
7	0.62989	+ or - 0.00324	0.62665 to 0.63312	0.62342 to 0.63636	0.62018 to 0.63960	28800
8	0.62974	+ or - 0.00327	0.62648 to 0.63301	0.62321 to 0.63628	0.61994 to 0.63955	28500
9	0.62953	+ or - 0.00329	0.62624 to 0.63283	0.62294 to 0.63612	0.61965 to 0.63942	28200
10	0.62920	+ or - 0.00331	0.62589 to 0.63251	0.62257 to 0.63583	0.61926 to 0.63914	27900
11	0.62972	+ or - 0.00331	0.62641 to 0.63303	0.62311 to 0.63634	0.61980 to 0.63965	27600
12	0.62932	+ or - 0.00332	0.62600 to 0.63264	0.62268 to 0.63596	0.61936 to 0.63928	27300
17	0.62872	+ or - 0.00346	0.62527 to 0.63218	0.62181 to 0.63564	0.61835 to 0.63910	25800
22	0.62803	+ or - 0.00362	0.62441 to 0.63165	0.62078 to 0.63527	0.61716 to 0.63890	24300
27	0.62727	+ or - 0.00365	0.62362 to 0.63092	0.61997 to 0.63458	0.61632 to 0.63823	22800
32	0.62726	+ or - 0.00375	0.62351 to 0.63102	0.61975 to 0.63477	0.61600 to 0.63852	21300
37	0.62575	+ or - 0.00387	0.62188 to 0.62962	0.61801 to 0.63349	0.61413 to 0.63737	19800
42	0.62440	+ or - 0.00400	0.62040 to 0.62841	0.61640 to 0.63241	0.61239 to 0.63642	18300
47	0.62485	+ or - 0.00426	0.62059 to 0.62910	0.61633 to 0.63336	0.61208 to 0.63761	16800
52	0.62584	+ or - 0.00426	0.62158 to 0.63009	0.61733 to 0.63435	0.61307 to 0.63860	15300
57	0.62827	+ or - 0.00433	0.62394 to 0.63260	0.61960 to 0.63693	0.61527 to 0.64126	13800
62	0.62764	+ or - 0.00429	0.62335 to 0.63193	0.61907 to 0.63622	0.61478 to 0.64051	12300
67	0.62915	+ or - 0.00471	0.62444 to 0.63386	0.61972 to 0.63857	0.61501 to 0.64329	10800
72	0.62920	+ or - 0.00516	0.62404 to 0.63436	0.61888 to 0.63952	0.61372 to 0.64467	9300
77	0.62892	+ or - 0.00594	0.62298 to 0.63487	0.61703 to 0.64081	0.61109 to 0.64676	7800
82	0.62749	+ or - 0.00630	0.62118 to 0.63379	0.61488 to 0.64009	0.60857 to 0.64640	6300
87	0.62614	+ or - 0.00751	0.61863 to 0.63365	0.61112 to 0.64116	0.60361 to 0.64867	4800
92	0.62639	+ or - 0.01059	0.61580 to 0.63698	0.60521 to 0.64757	0.59462 to 0.65816	3300


uf6 infinite planar array of cylinders on concrete h/u=0.3
plot of average k-effective by generation run.
the line represents k-eff = 0.6296 + or - 0.0031 which occurs for 103 generations run.
0.6038
0.6214
0.6390

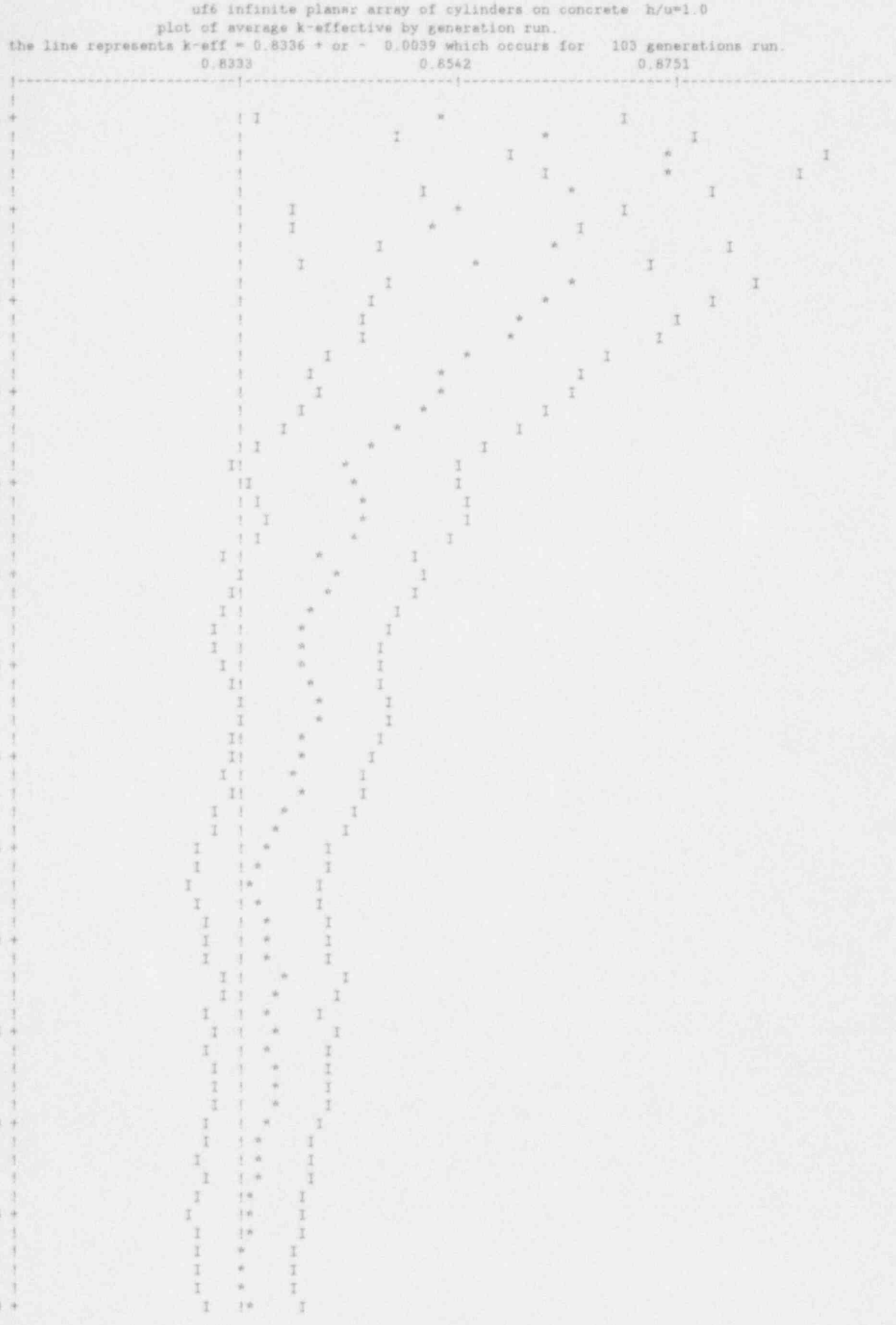

75
80
85
90
95
100

```
********************************************************************************
=CSAS25
UF6 CYLINDERS INFINITE PLANAR ARRAY                          UF6IPCYC.CJW
27GROUPNDF4                  INFHOMMEDIUM
UF6           1  1.0 293  92235 5.02  92238 94.98  END
H             1  0  8.3002-3  293  END
CARBONSTEEL   2  1.0  END
H2O           3  1.0  END
REG-CONCRETE  4  1.0  END
END COMP
UF6 INFINITE PLANAR ARRAY OF CYLINDERS ON CONCRETE  H/U=1.0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER    1  1  36.83  2P95.25
CYLINDER    2  1  38.10  2P96.52
CUBOID      3  1  2P53.34  1000.0 -53.34  2P111.76
CUBOID      4  1  2P53.34  1000.0 -100.0  2P111.76
END GEOM
READ BNDS  XFC=MIRROR  YFC=VACUUM  ZFC=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

uf6 infinite planar array of cylinders on concrete h/u=1.0

lifetime = 8.86617E-05 + or - 1.08369E-06 generation time = 2.08375E-05 + or - 3.88150E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.83360	+ or - 0.00392	0.82967 to 0.83752	0.82575 to 0.84144	0.82183 to 0.84536	30000
4	0.83357	+ or - 0.00396	0.82961 to 0.83754	0.82565 to 0.84150	0.82169 to 0.84546	29700
5	0.83320	+ or - 0.00398	0.82922 to 0.83719	0.82523 to 0.84117	0.82125 to 0.84515	29400
6	0.83269	+ or - 0.00399	0.82869 to 0.83668	0.82470 to 0.84067	0.82071 to 0.84466	29100
7	0.83190	+ or - 0.00395	0.82794 to 0.83585	0.82399 to 0.83981	0.82003 to 0.84376	28800
8	0.83141	+ or - 0.00397	0.82744 to 0.83538	0.82348 to 0.83935	0.81951 to 0.84331	28500
9	0.83158	+ or - 0.00400	0.82758 to 0.83559	0.82357 to 0.83959	0.81957 to 0.84360	28200
10	0.83202	+ or - 0.00402	0.82800 to 0.83604	0.82397 to 0.84007	0.81995 to 0.84409	27900
11	0.83196	+ or - 0.00407	0.82789 to 0.83602	0.82382 to 0.84009	0.81975 to 0.84416	27600
12	0.83062	+ or - 0.00388	0.82674 to 0.83450	0.82285 to 0.83839	0.81897 to 0.84227	27300
17	0.82935	+ or - 0.00381	0.82554 to 0.83316	0.82173 to 0.83697	0.81792 to 0.84078	25800
22	0.82995	+ or - 0.00401	0.82594 to 0.83397	0.82193 to 0.83798	0.81792 to 0.84199	24300
27	0.82975	+ or - 0.00417	0.82558 to 0.83393	0.82141 to 0.83810	0.81723 to 0.84227	22800
32	0.83080	+ or - 0.00430	0.82649 to 0.83510	0.82219 to 0.83940	0.81789 to 0.84371	21300
37	0.82985	+ or - 0.00458	0.82527 to 0.83442	0.82070 to 0.83900	0.81612 to 0.84357	19800
42	0.83002	+ or - 0.00489	0.82513 to 0.83491	0.82025 to 0.83979	0.81536 to 0.84468	18300
47	0.83267	+ or - 0.00511	0.82756 to 0.83778	0.82245 to 0.84289	0.81734 to 0.84800	16800
52	0.82977	+ or - 0.00528	0.82449 to 0.83504	0.81921 to 0.84032	0.81393 to 0.84560	15300
57	0.83001	+ or - 0.00534	0.82467 to 0.83536	0.81932 to 0.84070	0.81398 to 0.84605	13800
62	0.83132	+ or - 0.00587	0.82545 to 0.83719	0.81958 to 0.84306	0.81371 to 0.84893	12300
67	0.83271	+ or - 0.00658	0.82613 to 0.83928	0.81955 to 0.84586	0.81298 to 0.85244	10800
72	0.83177	+ or - 0.00709	0.82468 to 0.83886	0.81759 to 0.84595	0.81050 to 0.85304	9300
77	0.82929	+ or - 0.00788	0.82141 to 0.83717	0.81354 to 0.84505	0.80566 to 0.85292	7800
82	0.83355	+ or - 0.00777	0.82578 to 0.84132	0.81801 to 0.84909	0.81024 to 0.85686	6300
87	0.82992	+ or - 0.00929	0.82063 to 0.83921	0.81134 to 0.84850	0.80205 to 0.85779	4800
92	0.82393	+ or - 0.01204	0.81189 to 0.83597	0.79986 to 0.84801	0.78782 to 0.86005	3300


uf6 infinite planar array of cylinders on concrete h/u=1.0
plot of average k-effective by generation run.
the line represents k-eff = 0.8336 + or - 0.0039 which occurs for 103 generations run.
0.8333
0.8542
0.8751
5
10
15
20
25
30
35
40
45
50
55
60
65
70

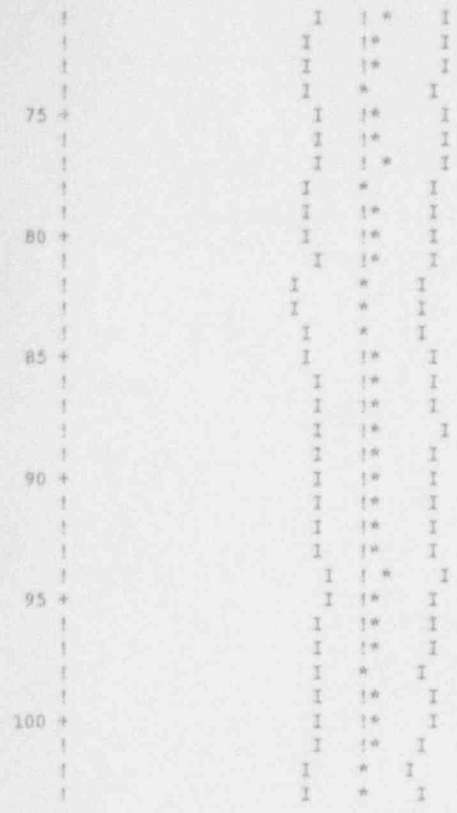


TABLE 1?
XSDRNPM Benchmark Values of K_{eff} for Critical Configurations

U0X5PCR?.CJW U0XCYCR?.CJW U0XSLCR?.CJW

$H/^{235}U$	G 235U/CM^3	SPHERE	CYLINDER	SLAB
524	0.0425	0.99851 1	1.01075 1	1.03734 1
643	0.0356	0.99024 1	1.00181 1	1.02586 1

Mixing Tables

TABLE 2
Variation of K_{eff} Values

CONCENTRATION (GRAMS U/L)	SPHERE	CYLINDER	SLAB
1000	0.99051	0.99131	0.98834
1200	1.00797	1.00989	1.00961
1400	1.01570	1.01871	1.02098
1500	1.01690	1.02043	1.02394
1600	1.01672	1.02076	1.02548
1700	1.01533	1.01988	1.02581
1800	1.01288	1.01794	1.02506
2000	1.00540	1.01142	1.02093
2200	0.99503	1.00209	1.01397

TABLE 3
K_{eff} Values for XSDRNPM Calculations on the ORNL Computer

CONCENTRATION (GRAMS U/L)	SPHERE	CYLINDER	SLAB
1600	1.01666	1.02071	1.02544

```
**********************************************************************************************************************
***                                                                                                                ***
***                          uo2f2 solution benchmark                                 uoxspcr1.cjw                 ***
***                                                                                                                ***
**********************************************************************************************************************
**********************************************************************************************************************
***                                                                                                                ***
***                            ********** data library information **********                                      ***
***                                                                                                                ***
***         unit                                            volume                                                 ***
***        number              data set name                 name        unit function                             ***
***        ------              -------------                 ----        -------------                             ***
***                                                                                                                ***
***          89                    ft89f001                              standard composition library              ***
***                                                                                                                ***
***          82                    ft82f001                              cross section library                     ***
***                                                                                                                ***
***          11                    ft11f001                              short cross section library               ***
***                                                                                                                ***
**********************************************************************************************************************
**********************************************************************************************************************
***                                                                                                                ***
***                                                                                                                ***
***                                      standard composition library data                                         ***
***                                      ---------------------------------                                         ***
***                                                                                                                ***
***           unit number  :  89                                                                                   ***
***                                                                                                                ***
***           dataset name :                   ft89f001                                                            ***
***                                                                                                                ***
***           library title:  scale-4 standard composition library                                                 ***
***                           379 standard compositions, 326 nuclides                                              ***
***                           10 elements with variable isotopic distrbutions.                                     ***
***                                                                                                                ***
***           creation date:   7/11/91                                                                             ***
***                                                                                                                ***
***                                                                                                                ***
***                                                                                                                ***
***                                          cross section library data                                            ***
***                                          ---------------------------                                           ***
***                                                                                                                ***
***           unit number  :  82                                                                                   ***
***                                                                                                                ***
***           dataset name :                   ft82f001                                                            ***
***                                                                                                                ***
***           library title:  SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY                                ***
***                             BASED ON ENDF-B VERSION 4 DATA                                                     ***
***                               COMPILED FOR NRC        1/27/89                                                  ***
***                                 LAST UPDATED         10/12/89                                                  ***
***                                   L.M.PETRIE       ORNL                                                        ***
***                                                                                                                ***
***                                                                                                                ***
***                                                                                                                ***
***                                                                                                                ***
**********************************************************************************************************************
**********************************************************************************************************************
                         ........    0 io's were used processing csas input data    ........
 control module csasi    is complete.
 ---------------------------------------------------------------
  Run with Aug 91 IBM-PC 486 (Extended) on 04/05/93 at 13:07:59
 ---------------------------------------------------------------
 The input deck follows:
*************************************************************************
=CSASI
UO2F2 SOLUTION BENCHMARK                                UOXSPCR1.CJW
27GRO[illegible]                  INFHOMMEDIUM
SOLN[illegible]       1  869.12 0 1.0 293   92235 4.89  92238 95.11  END
H2O             2  1.0  293  END
END COMP
END
=XSDRN
SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
```

```
 0$$  A3 2  E
 1$$  3 2 58 1 0   2 2 16 3 1
  10 50 0 0 0
 2$$  -2 0 0 0 0    0 -1 0 0 0
 3$$  0 0 0 1 0     0 0 0 0 0
      0 0
 5**  A4 0  0  E
   T
 13$$  1 2
 14$$  1 2
 15**  F1
    T
 34**  F1
    T
 35**  22I0 34I22.065 57.065
 36$$  23R1 35R2
 39$$  1 2
 40$$  F3
 41**  1 0
    T
 END
*************************************************************************
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	9.47409E-01	7.54348E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0732
2	223	1.24864E-02	8.76756E-01	-4.03574E+00	-7.95247E-01	-5.79802E-02	0.00000E+00	0.4357
3	432	2.54612E-03	1.07656E+00	5.73139E-02	-2.57817E-01	-1.10662E-02	0.00000E+00	0.7808
4	630	1.41790E-03	1.05936E+00	4.75411E-02	-9.24698E-02	-5.84075E-03	0.00000E+00	1.1113
5	824	8.72381E-04	1.03967E+00	3.50836E-02	-5.77567E-02	-3.53792E-03	0.00000E+00	1.4363
6	1002	5.43716E-04	1.02528E+00	2.45474E-02	-3.77806E-02	-2.19045E-03	0.00000E+00	1.7413
7	1178	3.38099E-04	1.01557E+00	1.65162E-02	-2.44465E-02	-1.35967E-03	0.00000E+00	2.0425
8	1349	2.09909E-04	1.00919E+00	1.08206E-02	-1.55965E-02	-8.45089E-04	0.00000E+00	2.3372
9	1516	1.29663E-04	1.00512E+00	6.94533E-03	-9.84774E-03	-5.23762E-04	0.00000E+00	2.6272
10	1681	7.96927E-05	1.00255E+00	4.39054E-03	-6.15830E-03	-3.23465E-04	0.00000E+00	2.9147
11	1846	4.87472E-05	1.00095E+00	2.74458E-03	-3.82153E-03	-1.99034E-04	0.00000E+00	3.2022
12	2008	2.97179E-05	9.99950E-01	1.70325E-03	-2.35743E-03	-1.22158E-04	0.00000E+00	3.4850
13	2167	1.80175E-05	9.99338E-01	1.04990E-03	-1.44730E-03	-7.46372E-05	0.00000E+00	3.7653
14	2325	1.08485E-05	9.98964E-01	6.42717E-04	-8.83255E-04	-4.53393E-05	0.00000E+00	4.0433
15	2483	6.48541E-06	9.98738E-01	3.90963E-04	-5.35524E-04	-2.73787E-05	0.00000E+00	4.3218
16	2633	3.85719E-06	9.98600E-01	2.36869E-04	-3.22812E-04	-1.64669E-05	0.00000E+00	4.5892
17	2777	2.27087E-06	9.98516E-01	1.42954E-04	-1.93725E-04	-9.85822E-06	0.00000E+00	4.8492
18	2921	1.33220E-06	9.98467E-01	8.57062E-05	-1.15544E-04	-5.85003E-06	0.00000E+00	5.1092

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	23	8.55360E-06	58	9.99998E-01	7
2	1	23	1.05718E-05	54	9.99997E-01	10
3	1	23	1.06829E-05	45	9.99998E-01	12
4	1	23	1.09410E-05	36	9.99998E-01	15
5	1	23	9.95114E-06	30	9.99997E-01	20
6	1	23	7.96340E-06	30	9.99996E-01	20
7	1	23	5.06895E-06	28	9.99996E-01	29
8	1	24	3.65900E-06	26	9.99995E-01	58
9	1	25	3.57942E-06	26	9.99995E-01	58
10	1	25	3.56325E-06	27	9.99996E-01	58
11	1	26	3.53588E-06	27	9.99996E-01	58
12	1	26	4.25747E-06	27	9.99996E-01	58
13	1	27	4.40017E-06	27	9.99997E-01	58
14	1	27	4.24948E-06	28	9.99996E-01	58
15	2	58	3.81328E-07	44	1.00000E+00	58
16	2	58	1.01244E-06	58	1.00000E+00	58
17	2	58	1.16065E-06	58	1.00000E+00	58
18	2	58	1.12846E-06	58	1.00000E+00	58
19	2	58	1.34523E-06	58	1.00000E+00	58
20	2	58	1.08181E-06	46	9.99999E-01	58
21	2	58	1.49054E-06	58	1.00000E+00	58
22	2	58	1.36378E-06	58	9.99999E-01	58
23	1	49	1.47655E-05	49	1.00002E+00	58
24	1	49	4.25222E-05	49	1.00008E+00	58
25	1	49	6.17251E-05	49	1.00008E+00	58
26	1	50	6.77084E-05	50	1.00015E+00	58
27	2	58	1.38700E-06	58	9.99999E-01	58

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
19	2957	1.56346E-11	9.98509E-01	7.13676E-06	-5.27300E-05	-8.27677E-07	0.00000E+00	5.1850

final monitor lambda 9.98510E-01 production/absorption 1.00095E+00 angular flux on 16

elapsed time 5.18 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or meterial regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       2 entries.
        7q array has       2 entries.
        8q array has       2 entries.
        9q array has       2 entries.
       10q array has       7 entries.
       11q array has       2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1       92235     1.08891E-04            92235
   2        1       92238     2.09116E-03            92238
   3        1        8016     3.30679E-02             8016
   4        2        8016     3.33757E-02           208016
   5        1        9019     4.40009E-03             9019
   6        1        1001     5.73356E-02             1001
   7        2        1001     6.67514E-02           201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1      1          1.00000E+00    2.93000E+02    0.00000E+00             0
   2      2          6.00000E+00    2.93000E+02    0.00000E+00             0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSAS1    will be called
    UO2F2 SOLUTION CRITICAL BENCHMARK   SPHERE              UOXSPCR2.CJW
    27GROUPNDF4                INFHOMMEDIUM
    SOLNUO2F2    1  728.02 0 1.0 293   92235 4.89  92238 95.11  END
    H2O          2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csas1    is finished.
-   module XSDRN    will be called
    SPHERE BENCHMARK UO2F2 SOLUTION
    0$$  A3 2  E
    15$  3 2 58 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
       T
    34**  F1
       T
    35**  22f0 34I23.302 58.302
    36$$  23R1 35R2
    39$$  1 2
    40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	9.00904E-01	7.86984E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0740
2	223	1.31364E-02	8.25534E-01	-4.64911E+00	-8.39157E-01	-5.91749E-02	0.00000E+00	0.4365
3	432	2.05783E-03	1.0713ZE+00	4.81484E-02	-2.73122E-01	-8.94742E-03	0.00000E+00	0.7817
4	630	1.14609E-03	1.05624E+00	4.10519E-02	-7.76494E-02	-4.71824E-03	0.00000E+00	1.1120
5	824	7.38650E-04	1.03661E+00	3.12448E-02	-4.83732E-02	-3.01149E-03	0.00000E+00	1.4370
6	1003	4.84187E-04	1.02174E+00	2.27599E-02	-3.30301E-02	-1.96778E-03	0.00000E+00	1.7428
7	1177	3.17339E-04	1.01124E+00	1.60574E-02	-2.24571E-02	-1.28889E-03	0.00000E+00	2.0412
8	1348	2.07201E-04	1.00405E+00	1.10483E-02	-1.50816E-02	-8.42535E-04	0.00000E+00	2.3368
9	1515	1.34739E-04	9.99226E-01	7.45880E-03	-1.00163E-02	-5.49182E-04	0.00000E+00	2.6262
10	1682	8.72495E-05	9.96029E-01	4.96331E-03	-6.59309E-03	-3.56766E-04	0.00000E+00	2.9165
11	1847	5.63194E-05	9.93927E-01	3.26946E-03	-4.30932E-03	-2.31162E-04	0.00000E+00	3.2040
12	2012	3.62169E-05	9.92558E-01	2.13604E-03	-2.80145E-03	-1.49281E-04	0.00000E+00	3.4915
13	2174	2.32374E-05	9.91668E-01	1.38815E-03	-1.81282E-03	-9.62121E-05	0.00000E+00	3.7750
14	2332	1.48600E-05	9.91094E-01	8.97937E-04	-1.16909E-03	-6.22259E-05	0.00000E+00	4.0535
15	2490	9.43899E-06	9.90727E-01	5.76879E-04	-7.50440E-04	-3.94864E-05	0.00000E+00	4.3317
16	2648	5.96850E-06	9.90493E-01	3.68790E-04	-4.78812E-04	-2.51137E-05	0.00000E+00	4.6090
17	2806	3.75655E-06	9.90344E-01	2.34756E-04	-3.04135E-04	-1.59062E-05	0.00000E+00	4.8875
18	2956	2.35712E-06	9.90249E-01	1.49033E-04	-1.92423E-04	-1.00472E-05	0.00000E+00	5.1555
19	3100	1.47624E-06	9.90189E-01	9.44678E-05	-1.21448E-04	-6.33640E-06	0.00000E+00	5.4155

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	5.12084E-05	8	9.99988E-01	7
2	1	1	4.92271E-05	5	9.99979E-01	11
3	1	1	5.48013E-05	5	9.99985E-01	12
4	1	1	5.61800E-05	4	9.99986E-01	15
5	1	1	4.81243E-05	3	9.99976E-01	20
6	1	1	4.11762E-05	3	9.99970E-01	20
7	1	1	3.28508E-05	2	9.99965E-01	29
8	1	1	2.70601E-05	1	9.99963E-01	58
9	1	1	2.68222E-05	1	9.99965E-01	58
10	1	1	2.60476E-05	1	9.99967E-01	58
11	1	1	2.50785E-05	1	9.99968E-01	58
12	1	1	2.96827E-05	1	9.99974E-01	58
13	1	1	3.04414E-05	1	9.99976E-01	58
14	1	1	2.94039E-05	1	9.99976E-01	58
15	2	58	3.27567E-07	58	1.00000E+00	58
16	2	58	8.60539E-07	58	1.00000E+00	58
17	2	58	9.85449E-07	58	1.00000E+00	58
18	2	58	9.57553E-07	58	1.00000E+00	58
19	2	58	1.14309E-06	58	1.00000E+00	58
20	2	58	9.28119E-07	46	1.00000E+00	58
21	2	58	1.26188E-06	58	1.00000E+00	58
22	2	58	1.16145E-06	58	1.00000E+00	58
23	1	1	1.43274E-05	1	9.99977E-01	58
24	1	49	3.57991E-05	49	1.00007E+00	58
25	1	50	5.19938E-05	50	1.00007E+00	58
26	1	50	5.70409E-05	50	1.00013E+00	58
27	1	50	9.11828E-05	50	1.00014E+00	58

20	3135	1.33175E-10	9.90237E-01	7.69587E-06	-5.83642E-05	-9.80359E-07	0.00000E+00	5.4898

final monitor lambda 9.90237E-01 production/absorption 9.92471E-01 angular flux on 16

elapsed time 5.49 min.

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       2
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has      7 entries.
        4q array has      7 entries.
        5q array has      7 entries.
        6q array has      2 entries.
        7q array has      2 entries.
        8q array has      2 entries.
        9q array has      2 entries.
       10q array has      7 entries.
       11q array has      2 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1       1       92235     9.12123E-05            92235
   2       1       92238     1.75166E-03            92238
   3       1        8016     3.31356E-02             8016
   4       2        8016     3.33757E-02           208016
   5       1        9019     3.68575E-03             9019
   6       1        1001     5.88994E-02             1001
   7       2        1001     6.67514E-02           201001
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1       1         1.00000E+00    2.93000E+02    0.00000E+00             0
   2       2         6.00000E+00    2.93000E+02    0.00000E+00             0
     2394 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION BENCHMARK    CYLINDER                    UOXCYCR1.CJW
     27GROUPNDF4                INPHOMMEDIUM
     SOLNUO2F2    1  869.12 0 1.0 293   92235 4.89  92238 95.11  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
     CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  2 2 51 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  15I0 34I15.9 50.9
     36$$  16R1 35R2
     39$$  1 2
     40$$  F3
     41**  1 0
       T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	9.36791E-01	7.67444E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0833
2	216	1.29514E-02	8.46029E-01	-4.23845E+00	-8.16321E-01	-5.93595E-02	0.00000E+00	1.3630
3	414	2.39750E-03	1.06177E+00	5.86076E-02	-2.72300E-01	-1.03623E-02	0.00000E+00	2.5440
4	603	1.22475E-03	1.05150E+00	4.41893E-02	-8.75353E-02	-5.02108E-03	0.00000E+00	3.6755
5	781	7.05671E-04	1.03721E+00	2.99918E-02	-4.99228E-02	-2.85907E-03	0.00000E+00	4.7457
6	956	4.13163E-04	1.02728E+00	1.93915E-02	-3.03639E-02	-1.67089E-03	0.00000E+00	5.7993
7	1124	2.43489E-04	1.02085E+00	1.21861E-02	-1.84260E-02	-9.86935E-04	0.00000E+00	6.8143
8	1290	1.43318E-04	1.01686E+00	7.50132E-03	-1.11039E-02	-5.83939E-04	0.00000E+00	7.8185
9	1455	8.43133E-05	1.01441E+00	4.55739E-03	-6.64607E-03	-3.45965E-04	0.00000E+00	8.8173
10	1618	4.95593E-05	1.01291E+00	2.74688E-03	-3.96252E-03	-2.05106E-04	0.00000E+00	9.8042
11	1776	2.90869E-05	1.01201E+00	1.64754E-03	-2.35642E-03	-1.21590E-04	0.00000E+00	10.7647
12	1934	1.69966E-05	1.01147E+00	9.83343E-04	-1.39756E-03	-7.18953E-05	0.00000E+00	11.7238
13	2081	9.92225E-06	1.01114E+00	5.86255E-04	-8.26637E-04	-4.25414E-05	0.00000E+00	12.6227
14	2225	5.77111E-06	1.01094E+00	3.49113E-04	-4.88707E-04	-2.51466E-05	0.00000E+00	13.5053
15	2369	3.32690E-06	1.01083E+00	2.07197E-04	-2.88167E-04	-1.47973E-05	0.00000E+00	14.3877
16	2513	1.89844E-06	1.01076E+00	1.22623E-04	-1.69106E-04	-8.67284E-06	0.00000E+00	15.2702
17	2657	1.07126E-06	1.01071E+00	7.25264E-05	-9.88739E-05	-5.07331E-06	0.00000E+00	16.1528

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	16	2.57327E-05	51	9.99994E-01	6
2	1	15	2.44763E-05	39	9.99989E-01	9
3	1	16	2.65161E-05	5	1.00001E+00	11
4	1	16	3.06217E-05	4	1.00001E+00	13
5	1	16	2.45148E-05	3	1.00001E+00	17
6	1	15	1.94739E-05	3	1.00001E+00	17
7	1	16	1.63154E-05	2	1.00002E+00	26
8	1	1	1.34809E-05	1	1.00002E+00	51
9	1	1	1.37716E-05	1	1.00002E+00	51
10	1	1	1.37215E-05	1	1.00002E+00	51
11	1	1	1.35170E-05	1	1.00002E+00	51
12	1	1	1.62670E-05	1	1.00001E+00	51
13	1	1	1.68848E-05	1	1.00001E+00	51
14	1	1	1.65026E-05	1	1.00001E+00	51
15	2	51	4.37140E-07	30	1.00000E+00	51
16	2	51	1.14153E-06	51	1.00000E+00	51
17	2	51	1.30576E-06	51	1.00000E+00	51
18	2	51	1.26733E-06	51	1.00000E+00	51
19	2	51	1.51887E-06	51	1.00000E+00	51
20	2	51	1.21113E-06	37	9.99999E-01	51
21	2	51	1.65531E-06	51	1.00000E+00	51
22	2	51	1.51438E-06	51	9.99999E-01	51
23	1	42	1.81878E-05	42	1.00003E+00	51
24	1	42	5.11081E-05	42	1.00010E+00	51
25	1	42	7.41171E-05	42	1.00010E+00	51
26	1	42	8.11078E-05	42	1.00018E+00	51
27	2	51	1.77745E-06	51	9.99998E-01	51

18	2693	-3.76693E-08	1.01075E+00	6.01696E-06	-4.47020E-05	-6.42569E-07	0.00000E+00	16.4198

final monitor

lambda 1.01075E+00 production/absorption 1.01260E+00 angular flux on 16

elapsed time 16.42 min.

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION BENCHMARK    CYLINDER                    UOXCYCR2.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUO2F2    1  728.02 0 1.0 293   92235 4.89  92238 95.11  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
  0$$  A3 2  E
  1$$  2 2 51 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  15I0 34I16.9 51.9
  36$$  16R1 35R2
  39$$  1 2
  40$$  F3
  41**  1 0
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	8.90888E-01	7.97279E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0833
2	215	1.35437E-02	7.97720E-01	-4.84551E+00	-8.57643E-01	-6.04009E-02	0.00000E+00	1.3585
3	413	1.95592E-03	1.05537E+00	4.95724E-02	-2.88276E-01	-8.48914E-03	0.00000E+00	2.5397
4	602	9.97302E-04	1.04604E+00	3.84724E-02	-7.43723E-02	-4.09537E-03	0.00000E+00	3.6702
5	781	5.99106E-04	1.03141E+00	2.69091E-02	-4.21636E-02	-2.44211E-03	0.00000E+00	4.7458
6	954	3.67719E-04	1.02092E+00	1.80821E-02	-2.66893E-02	-1.49964E-03	0.00000E+00	5.7885
7	1125	2.26495E-04	1.01395E+00	1.18343E-02	-1.69260E-02	-9.26459E-04	0.00000E+00	6.8202
8	1291	1.39606E-04	1.00944E+00	7.60676E-03	-1.06598E-02	-5.73584E-04	0.00000E+00	7.8243
9	1456	8.59818E-05	1.00656E+00	4.82825E-03	-6.67512E-03	-3.55212E-04	0.00000E+00	8.8232
10	1621	5.28850E-05	1.00474E+00	3.03823E-03	-4.16109E-03	-2.19870E-04	0.00000E+00	9.8218
11	1782	3.25218E-05	1.00360E+00	1.90257E-03	-2.58604E-03	-1.36157E-04	0.00000E+00	10.7975
12	1940	1.99227E-05	1.00288E+00	1.18529E-03	-1.60344E-03	-8.40854E-05	0.00000E+00	11.7578
13	2098	1.21545E-05	1.00244E+00	7.34965E-04	-9.90269E-04	-5.17750E-05	0.00000E+00	12.7172
14	2248	7.40186E-06	1.00216E+00	4.54916E-04	-6.09782E-04	-3.18615E-05	0.00000E+00	13.6327
15	2392	4.49710E-06	1.00199E+00	2.81328E-04	-3.75133E-04	-1.95983E-05	0.00000E+00	14.5150
16	2536	2.71006E-06	1.00189E+00	1.73357E-04	-2.30312E-04	-1.19997E-05	0.00000E+00	15.3975
17	2680	1.61276E-06	1.00182E+00	1.06220E-04	-1.40607E-04	-7.29633E-06	0.00000E+00	16.2802
18	2824	9.45961E-07	1.00178E+00	6.47660E-05	-8.52527E-05	-4.41015E-06	0.00000E+00	17.1625

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	16	1.26783E-05	51	9.99996E-01	6
2	1	16	1.25681E-05	38	9.99994E-01	10
3	1	16	1.39613E-05	35	9.99996E-01	11
4	1	16	1.58461E-05	28	9.99997E-01	13
5	1	16	1.29556E-05	21	9.99995E-01	17
6	1	16	1.12181E-05	2	1.00001E+00	20
7	1	16	8.74618E-06	2	1.00001E+00	26
8	1	1	6.74002E-06	1	1.00001E+00	51
9	1	1	7.12400E-06	1	1.00001E+00	51
10	1	1	7.30778E-06	1	1.00001E+00	51
11	1	1	7.38515E-06	1	1.00001E+00	51
12	1	1	9.04074E-06	1	1.00001E+00	51
13	1	1	9.50209E-06	1	1.00001E+00	51
14	1	1	9.38761E-06	1	1.00001E+00	51
15	2	51	3.61977E-07	38	1.00000E+00	51
16	2	51	9.35042E-07	51	1.00000E+00	51
17	2	51	1.06760E-06	51	1.00000E+00	51
18	2	51	1.03609E-06	51	1.00000E+00	51
19	2	51	1.24324E-06	51	1.00000E+00	51
20	2	51	1.00732E-06	38	1.00000E+00	51
21	2	51	1.35715E-06	51	1.00000E+00	51
22	2	51	1.24889E-06	51	1.00000E+00	51
23	1	42	1.44353E-05	42	1.00002E+00	51
24	1	42	4.09025E-05	43	1.00008E+00	51
25	1	43	5.93763E-05	43	1.00008E+00	51
26	1	43	6.50853E-05	43	1.00014E+00	51
27	2	51	1.14824E-06	51	9.99999E-01	51

19	2860	-3.77029E-08	1.00181E+00	5.17240E-06	-3.97663E-05	-5.73567E-07	0.00000E+00	17.4308

final monitor

lambda 1.00181E+00 production/absorption 1.00351E+00 angular flux on 16

elapsed time 17.43 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
      UO2F2 SOLUTION BENCHMARK    SLAB                    UOXSLCR1.CJW
      27GROUPNDF4                INFHOMMEDIUM
      SOLNUO2F2    1  869.12 0 1.0 293   92235 4.89  92238 95.11  END
      H2O          2  1.0  293  END
      END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
      SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
      0$$  A3 2  E
      1$$  1 2 50 1 0   2 2 16 3 1
       10 50 0 0 0
      2$$  -2 0 0 0 0    0 -1 0 0 0
      3$$  0 0 0 1 0     0 0 0 0 0
           0 0
      5**  A4 0  0  E
        T
      13$$  1 2
      14$$  1 2
      15**  F1
        T
      34**  F1
        T
      35**  9I0 39I8.95 48.95
      36$$  10R1 40R2
      39$$  1 2
      40$$  F3
      41**  1 0
        T
 WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	2.22045E-16	9.25338E-01	7.82805E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0678
2	214	1.31425E-02	8.31886E-01	-4.56798E+00	-8.24366E-01	-5.97414E-02	0.00000E+00	0.3240
3	392	2.14982E-03	1.06704E+00	5.40750E-02	-2.74789E-01	-9.32772E-03	0.00000E+00	0.5473
4	577	1.02462E-03	1.06357E+00	3.74050E-02	-7.76899E-02	-4.21238E-03	0.00000E+00	0.7773
5	753	5.61238E-04	1.05428E+00	2.36405E-02	-4.09624E-02	-2.28857E-03	0.00000E+00	0.9995
6	924	3.15203E-04	1.04784E+00	1.44154E-02	-2.35860E-02	-1.28798E-03	0.00000E+00	1.2167
7	1090	1.78938E-04	1.04376E+00	8.63036E-03	-1.36767E-02	-7.35490E-04	0.00000E+00	1.4298
8	1256	1.02432E-04	1.04124E+00	5.12435E-03	-7.94417E-03	-4.24416E-04	0.00000E+00	1.6423
9	1415	5.91921E-05	1.03968E+00	3.04082E-03	-4.63321E-03	-2.47538E-04	0.00000E+00	1.8490
10	1570	3.44186E-05	1.03873E+00	1.80739E-03	-2.71831E-03	-1.45454E-04	0.00000E+00	2.0525
11	1715	2.01645E-05	1.03815E+00	1.07901E-03	-1.60382E-03	-8.61899E-05	0.00000E+00	2.2465
12	1859	1.18751E-05	1.03779E+00	6.47146E-04	-9.52488E-04	-5.14027E-05	0.00000E+00	2.4395
13	2003	7.01858E-06	1.03757E+00	3.89845E-04	-5.68663E-04	-3.08176E-05	0.00000E+00	2.6328
14	2147	4.17251E-06	1.03743E+00	2.36382E-04	-3.41399E-04	-1.86162E-05	0.00000E+00	2.8258
15	2291	2.49936E-06	1.03734E+00	1.44605E-04	-2.06625E-04	-1.13555E-05	0.00000E+00	3.0192
16	2435	1.50840E-06	1.03729E+00	8.93673E-05	-1.26319E-04	-7.00126E-06	0.00000E+00	3.2122

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	9	1.67898E-05	50	9.99997E-01	6
2	1	10	2.20614E-05	30	9.99994E-01	9
3	1	10	2.35199E-05	26	9.99995E-01	10
4	1	10	2.21845E-05	16	9.99996E-01	13
5	1	10	1.93689E-05	15	9.99993E-01	17
6	1	9	1.53680E-05	15	9.99992E-01	17
7	1	10	1.21610E-05	14	9.99991E-01	25
8	1	10	8.86108E-06	13	9.99991E-01	45
9	1	13	6.52709E-06	14	9.99991E-01	50
10	1	14	6.47445E-06	15	9.99992E-01	50
11	1	15	6.39091E-06	16	9.99992E-01	50
12	1	16	7.74574E-06	16	9.99993E-01	50
13	1	16	8.012[illegible]E-06	17	9.99994E-01	50
14	1	17	7.71235E-06	17	9.99993E-01	50
15	2	31	3.60298E-07	31	1.00000E+00	50
16	2	50	1.09427E-06	50	1.00000E+00	50
17	2	50	1.42812E-06	50	1.00000E+00	50
18	2	50	1.39548E-06	50	1.00000E+00	50
19	2	50	1.65351E-06	50	1.00000E+00	50
20	2	50	1.21504E-06	31	9.99999E-01	50
21	2	50	1.77234E-06	50	1.00000E+00	50
22	2	50	1.60910E-06	50	9.99999E-01	50
23	1	36	2.42765E-05	36	1.00004E+00	50
24	1	36	6.72562E-05	37	1.00013E+00	50
25	1	36	9.74999E-05	37	1.00013E+00	50
26	2	50	1.61708E-06	50	9.99997E-01	50
27	2	50	1.51235E-06	50	9.99998E-01	50

17	2472	-3.73796E-08	1.03734E+00	7.59480E-06	-5.89600E-05	-9.98224E-07	0.00000E+00	3.2698

final monitor

lambda 1.03734E+00 production/absorption 1.03790E+00 angular flux on 16

elapsed time 3.27 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
   module CSASI    will be called
     UO2F2 SOLUTION BENCHMARK    SLAB                    UOXSLCR2.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLNUO2F2    1  728.02 0 1.0 293   92235 4.89  92238 95.11  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
   module XSDRN    will be called
     SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
     0$$  A3 2  E
     1$$  1 2 50 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  9I0 3919.65 49.65
     36$$  10R1 40R2
     39$$  1 2
     40$$  F3
     41**  1 0
       T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	8.79379E-01	8.09963E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0687
2	214	1.37342E-02	7.83324E-01	-5.18411E+00	-8.65725E-01	-6.08410E-02	0.00000E+00	0.3250
3	385	1.74988E-03	1.05775E+00	4.55786E-02	-2.92645E-01	-7.65318E-03	0.00000E+00	0.5427
4	565	8.26762E-04	1.05446E+00	3.24869E-02	-6.61714E-02	-3.40713E-03	0.00000E+00	0.7680
5	740	4.70021E-04	1.04464E+00	2.11294E-02	-3.44124E-02	-1.92688E-03	0.00000E+00	0.9885
6	910	2.75496E-04	1.03771E+00	1.33428E-02	-2.05143E-02	-1.13345E-03	0.00000E+00	1.2055
7	1075	1.62880E-04	1.03325E+00	8.28545E-03	-1.23862E-02	-6.74115E-04	0.00000E+00	1.4170
8	1240	9.68514E-05	1.03045E+00	5.09712E-03	-7.47890E-03	-4.03694E-04	0.00000E+00	1.6293
9	1403	5.79344E-05	1.02869E+00	3.12511E-03	-4.52113E-03	-2.43368E-04	0.00000E+00	1.8400
10	1561	3.48200E-05	1.02759E+00	1.91525E-03	-2.74112E-03	-1.47512E-04	0.00000E+00	2.0450
11	1712	2.10278E-05	1.02690E+00	1.17581E-03	-1.66754E-03	-8.98894E-05	0.00000E+00	2.2447
12	1856	1.27536E-05	1.02647E+00	7.23833E-04	-1.01858E-03	-5.50519E-05	0.00000E+00	2.4377
13	2000	7.74726E-06	1.02621E+00	4.46505E-04	-6.24417E-04	-3.38122E-05	0.00000E+00	2.6310
14	2144	4.70734E-06	1.02604E+00	2.75886E-04	-3.83580E-04	-2.08095E-05	0.00000E+00	2.8240
15	2288	2.86556E-06	1.02593E+00	1.71037E-04	-2.36195E-04	-1.28590E-05	0.00000E+00	3.0173
16	2432	1.74947E-06	1.02587E+00	1.06608E-04	-1.46101E-04	-7.99374E-06	0.00000E+00	3.2103
17	2576	1.07056E-06	1.02582E+00	6.68970E-05	-9.09438E-05	-5.00456E-06	0.00000E+00	3.4037

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	9	1.06319E-05	50	9.99998E-01	6
2	1	10	1.42082E-05	30	9.99995E-01	9
3	1	10	1.59475E-05	25	9.99997E-01	10
4	1	10	1.44546E-05	20	9.99997E-01	13
5	1	10	1.26324E-05	15	9.99995E-01	17
6	1	9	1.00224E-05	15	9.99994E-01	17
7	1	10	8.15894E-06	14	9.99994E-01	25
8	1	11	4.78027E-06	13	9.99994E-01	50
9	1	13	4.64177E-06	14	9.99994E-01	50
10	1	14	4.63850E-06	15	9.99994E-01	50
11	1	15	4.58894E-06	15	9.99994E-01	50
12	1	15	5.57466E-06	16	9.99995E-01	50
13	1	16	5.77401E-06	16	9.99995E-01	50
14	1	16	5.56395E-06	17	9.99995E-01	50
15	2	31	2.65356E-07	31	1.00000E+00	50
16	2	50	8.96492E-07	50	1.00000E+00	50
17	2	50	1.05266E-06	50	1.00000E+00	50
18	2	50	1.09014E-06	50	1.00000E+00	50
19	2	50	1.22442E-06	50	1.00000E+00	50
20	2	50	8.57906E-07	31	9.99999E-01	50
21	2	50	1.40580E-06	50	1.00000E+00	50
22	2	50	1.27989E-06	50	1.00000E+00	50
23	1	36	1.90476E-05	36	1.00003E+00	50
24	1	37	5.25981E-05	37	1.00010E+00	50
25	1	37	7.62734E-05	37	1.00010E+00	50
26	1	37	8.34733E-05	37	1.00018E+00	50
27	2	50	1.35140E-06	50	9.99998E-01	50

18	2612	-3.74044E-08	1.02586E+00	5.44625E-06	-4.33099E-05	-6.85874E-07	0.00000E+00	3.4613

final monitor lambda 1.02586E+00 production/absorption 1.02638E+00 angular flux on 16

elapsed time 3.46 min.

TABLE 8
K_{eff} Values for XSDRNPM Calculations on the ORNL Computer

ORNL output 40X???.CJW

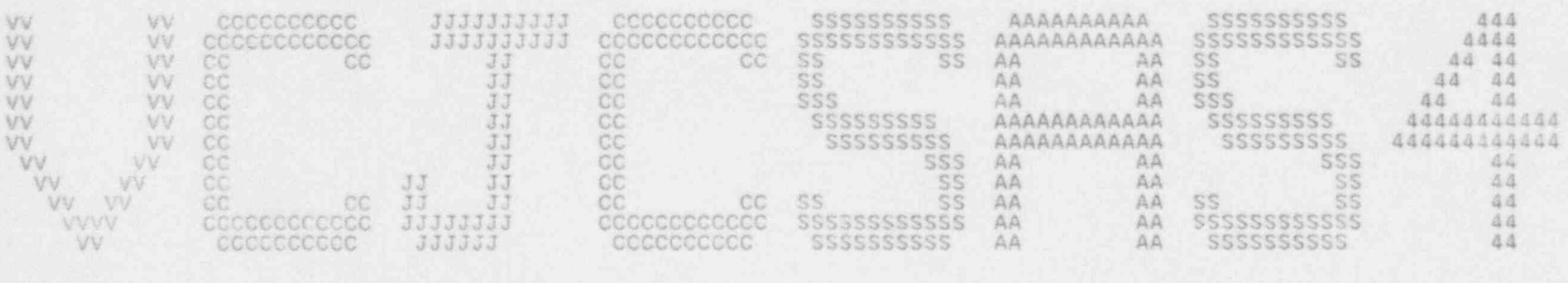
CONCENTRATION (GRAMS U/L)	SPHERE	CYLINDER	SLAB
1600	1.01666 SPO	1.02071 CYO	1.02544 SLO

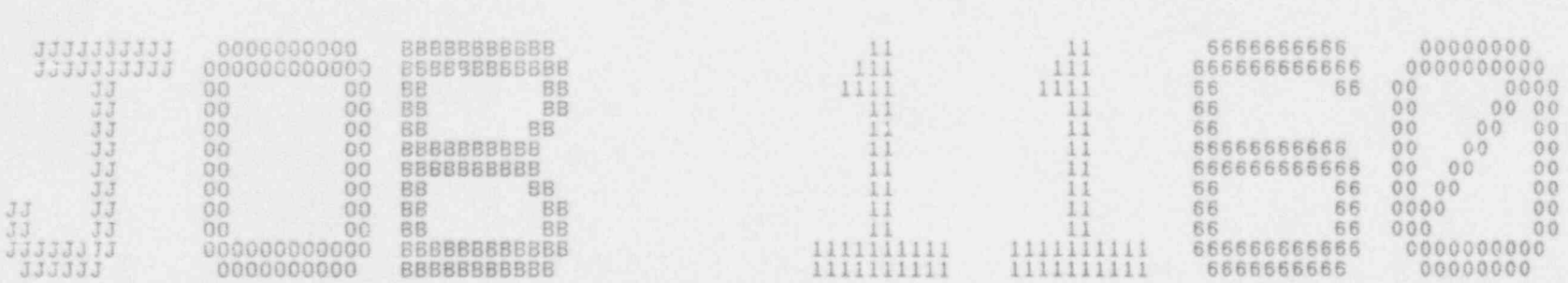
TABLE 9
KENO Benchmark Values of K_{eff} for Critical Experiments

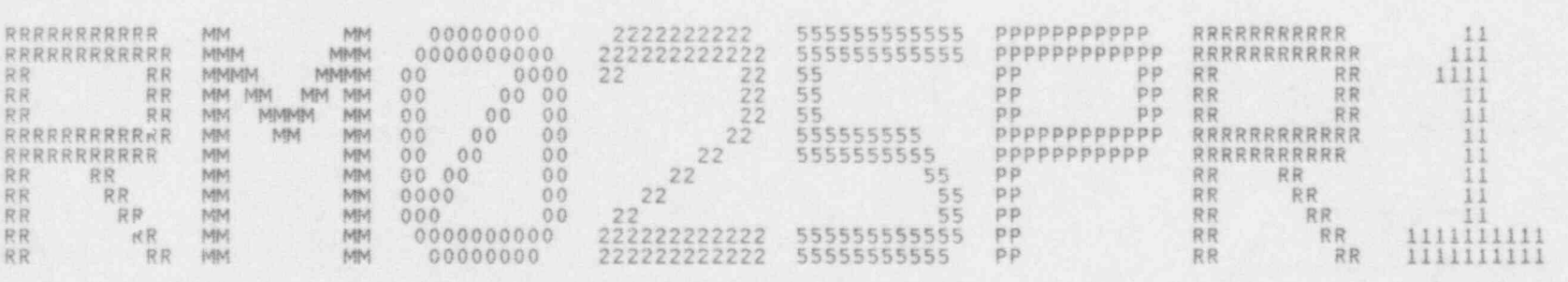
Reported H/^{235}U	SCALE's H/^{235}U	G ^{235}U per CM^3	CYLINDER DESCRIPTION	HEIGHT CM	K_{eff}
524	526.0	0.04254	15"-dia.,Al shell	44.78	0.99820±0.00392
643	645.3	0.03562	30"-dia.,Al shell*	26.49	0.99970±0.00385
735	733.7	0.03179	20"-dia.,SS shell	40.09	1.00324±0.00389
991	988.1	0.02428	30"-dia.,Al shell*	40.49	1.00522±0.00316
994	990.7	0.02422	20"-dia.,SS shell	85.72	0.99845±0.00330

* Top surface of cylinder is not reflected.

VCJCSAS4 'VCJ-CJ WITHEE NRC ' 1160







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**********************************************************************************************************************
*                                                                                                                    *
*  VCJCSAS4 KSY5 VCJ-CJ WITHEE   NRC      APR 06, 1993   22.08.29                                  KSY5 VCJCSAS4 *
*                                                                                                                    *
**********************************************************************************************************************
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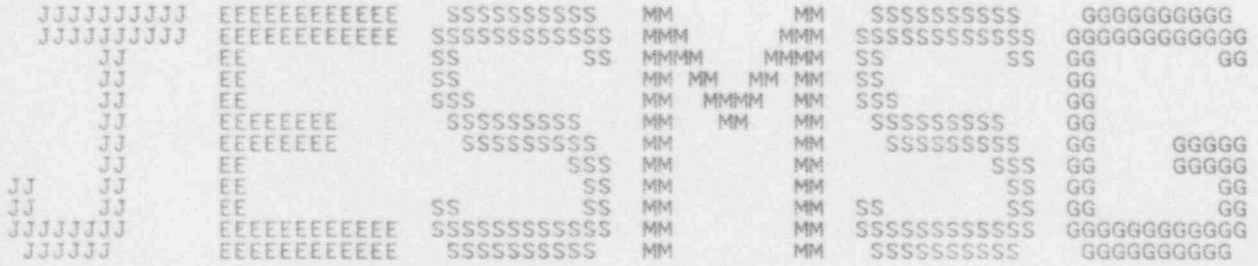
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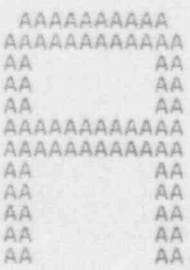
JJ EE SS SS MMMMMM MMMMM SS SS GG GG
JJ EE SS MM MM MM MM SS GG
JJ EE SSS MM MMMM MM SSS GG
JJ EEEEEEEE SSSSSSSSS MM MM MM SSSSSSSSS GG
JJ EEEEEEEE SSSSSSSSS MM MM SSSSSSSSS GG GGGGG
JJ EE SSS MM MM SSS GG GGGGG
JJ JJ EE SS MM MM SS GG GG
JJ JJ EE SS SS MM MM SS SS GG GG
JJJJJJJJ EEEEEEEEEEEE SSSSSSSSSSSS MM MM SSSSSSSSSSSS GGGGGGGGGGGG
JJJJJJ EEEEEEEEEEEE SSSSSSSSSS MM MM SSSSSSSSSS GGGGGGGGGG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```
IAT5140 JOB ORIGIN FROM G   =RM040     DSP=CR   DEVICE=RM040RD1, 0B1
$ACFG1137 VCJ LAST SYSTEM   CESS 13.32-03/19/93 FROM RM040RD1
14:37:52 IAT4401  LOCAT   STEP=LKED     DD=MARSLIB  DSN=E.TZA27286.SCALE.MARS77
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=MIPLIB   DSN=E.TZA27286.NEAD.MIPLIB77
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDS00
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=MODULES  DSN=E.TZA27286.NEAD.PGMS77
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PGDE01
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=OVLY     DSN=E.TZA27286.NEAD.OVLY77
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PSDS00
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=SYSLIB   DSN=E.TZA27286.NEAD.SUBLIB77
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDS00
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=SYSLIB   DSN=SYS2.VSFLINK
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PSDS00
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=SYSLIB   DSN=SYS2.VSFFORT
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE03
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=SYSLIB   DSN=GRAPHICS.DISV.LIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=SYSLIB   DSN=GRAPHICS.INTLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=LKED     DD=SYSLIN   DSN=E.TZA27286.NEAD.OVLY77
14:37:52 IAT4402 UNIT=338      ,VOL(S)=PSDS00
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=STEPLIB  DSN=E.TZA27286.NEAD.PGMS77
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PGDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FORTLIB  DSN=SYS2.VSFLOAD
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDS03
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT21F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT22F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT23F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT24F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT25F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT26F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT27F    DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT2      DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT27F003 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT27F004 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT27F005 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT27F006 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT28F001 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT28F002 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT28F003 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT28F004 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT28F005 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT28F006 DSN=E.TZA27286.ORIGENS.CARDLIB
14:37:52 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO       DD=FT78F001 DSN=E.TZA27286.SCALE.HEATLIB
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14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT79F001 DSN=E.TZA27286.KENO5.ALBEDOS
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT80F001 DSN=E.TZA27286.KENO4.WGTS
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT81F001 DSN=C.TZA27286.SCALE4.REV02.XN16
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE03
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT82F001 DSN=C.TZA27286.SCALE4.REV02.XN27
14:37:52 IAT4402  UNIT=3380     ,VOL(S)=PSDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT83F001 DSN=C.TZA27286.SCALE4.REV02.XN123
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PBDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT84F001 DSN=C.TZA27286.SCALE4.REV02.XN218
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PBDE04
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT85F001 DSN=C.TZA27286.SCALE4.REV02.XN22G18
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT86F001 DSN=C.TZA27286.SCALE4.REV02.XG18
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE03
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT87F001 DSN=C.TZA27286.SCALE4.REV02.XN27BURN
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PBDE04
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT88F001 DSN=C.TZA27286.SCALE4.REV03.XN27G18
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE02
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=FT89F001 DSN=C.X4S27286.SCALE4.REV02.SCLIB
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDS01
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=MESSAGE  DSN=E.TZA27286.SCALE4.MESSAGES
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE01
14:37:52 IAT4401  LOCATE FOR STEP=GO        DD=QATABLE  DSN=E.TZA27286.SCALE4.QATABLE
14:37:52 IAT4402 UNIT=3380      ,VOL(S)=PSDE03
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PSDE01
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PBDS00
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PGDE01
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PSDS00
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PBDE03
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PBDE01
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PBDE02
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PBDS03
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PSDE03
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PSDE02
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PBDE04
22:00:08 IAT5110 JOB 1160 (VCJCSAS4) USES      D PSDS01
22:00:09 IAT5200 JOB 1160 (VCJCSAS4) IN SETUP ON MAIN=X101
22:00:09 IAT5210 JOB MARSLIB  (1160) X101      USING D PSDE01 ON 140
22:00:09 IAT5210 JOB MIPLIB   (1160) X101      USING D PBDS00 ON C06
22:00:09 IAT5210 JOB MODULES  (1160) X101      USING D PGDE01 ON 142
22:00:09 IAT5210 JOB OVLY     (1160) X101      USING D PSDS00 ON E00
22:00:09 IAT5210 JOB SYSLIB   (1160) X101      USING D PBDE03 ON 154
22:00:09 IAT5210 JOB SYSLIB   (1160) X101      USING D PBDE01 ON 141
22:00:09 IAT5210 JOB SYSLIB   (1160) X101      USING D PBDE02 ON 143
22:00:09 IAT5210 JOB FORTLIB  (1160) X101      USING D PBDS03 ON E0E
22:00:09 IAT5210 JOB FT81F001 (1160) X101      USING D PSDE03 ON 155
22:00:09 IAT5210 JOB FT82F001 (1160) X101      USING D PSDE02 ON 153
22:00:09 IAT5210 JOB FT84F001 (1160) X101      USING D PBDE04 ON 156
22:00:09 IAT5210 JOB FT89F001 (1160) X101      USING D PSDS01 ON C17
22:00:09 IAT2000 JOB 1160 VCJCSAS4 SELECTED X101      GRP=JS3BATCH
22:00:11  IEF403I VCJCSAS4 - STARTED - TIME=22.00.11
22:05:23  IEF404I VCJCSAS4 - ENDED - TIME=22.05.23
22:05:24 IAT5400 JOB 1160 (VCJCSAS4) IN BREAKDOWN
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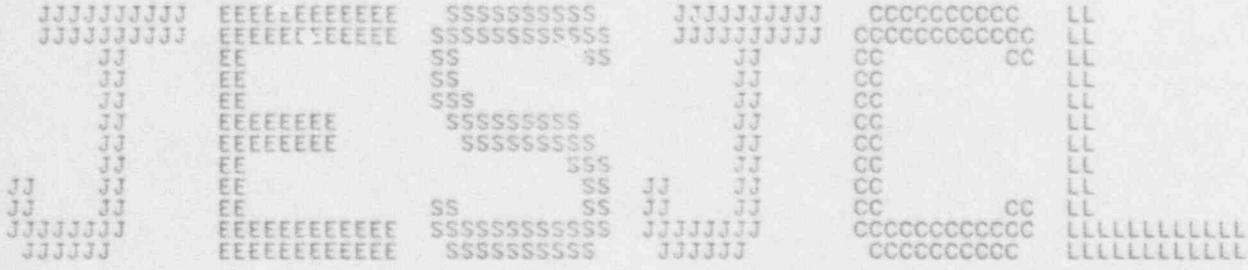
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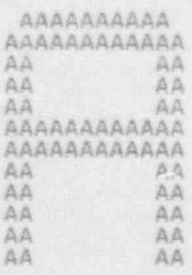
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//VCJCSAS4 JOB (17804),'VCJ-CJ WITHEE   NRC',TIME=20,                    *
// PASSWORD=
//*MAIN CLASS=STANDBY
//OUT1 OUTPUT DEFAULT=YES,JESDS=ALL,DEST=NK25B.RM025
//PROCLIB DD DISP=SHR,DSN=TZA.PROCLIB.CNTL
//A EXEC SCALE41,GOSIZE=2048K,TIME=20
//GO.FT01F001 DD SPACE=(TRK,(300,50))
//GO.FT18F001 DD SPACE=(TRK,(300,50))
//GO.SYSIN DD *
/*
//
```

```
1  //VCJCSAS4 JOB (17804),'VCJ-CJ WITHEE   NRC',TIME=20,                    *
   // PASSWORD=
2  //OUT1 OUTPUT DEFAULT=YES,JESDS=ALL,DEST=NK25B.RM025
3  //PROCLIB DD DISP=SHR,DSN=TZA.PROCLIB.CNTL
4  //A EXEC SCALE41,GOSIZE=2048K,TIME=20
5  XXSCALE41 PROC GOSIZE=2048K,BLKS=6136,SBUF=6136,
   XX             PLOT=DCS/,OUT='*',LOUT='*',
   XX             ORGLIB='E.TZA27286.ORIGENS',
   XX             MESSAGE='E.TZA27286.SCALE4.MESSAGES',
   XX             H6LIB='E.TZA27286.SCALE.HEATLIB',
   XX             LBLIN='DISP=SHR,LABEL=(,,,IN),DCB=BUFL=',
   XX             DCBV='DCB=(RECFM=VBS,LRECL=X,BLKSIZE='
   ***
   ***       JAY MANNESCHMIDT      EXT 4-8717          BLDG 6011
   ***
6  XXLKED   EXEC  PGM=IEWL,REGION=1024K,
   XX             PARM='MAP,LIST,SIZE=(1000K,100K)'
7  XXMARSLIB  DD  DISP=SHR,DSN=E.TZA27286.SCALE.MARS77
8  XXMIPLIB   DD  DISP=SHR,DSN=E.TZA27286.NEAD.MIPLIB77
9  XXMODULES  DD  DISP=SHR,DSN=E.TZA27286.NEAD.PGMS77
10 XXOVLY     DD  DISP=SHR,DSN=E.TZA27286.NEAD.OVLY77
11 XXSYSLIB   DD  DISP=SHR,DSN=E.TZA27286.NEAD.SUBLIB77
12 XX         DD  DISP=SHR,DSN=SYS2.VSFLINK
13 XX         DD  DISP=SHR,DSN=SYS2.VSFFORT
14 XX         DD  ',P=SHR,DSN=GRAPHICS.&PLOT..LIB
   IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=GRAPHICS.DISV.LIB
15 XX         DD  DISP=SHR,DSN=GRAPHICS.INTLIB
16 XXSYSLIN   DD  DSN=E.TZA27286.NEAD.OVLY77(IEFBR14),DISP=SHR
17 XX         DD  DSN=&&LOADSET,UNIT=SYSDA,DISP=(MOD,DELETE),
   XX             SPACE=(TRK,0),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
18 XX         DD  DDNAME=SYSIN
19 XXSYSLMOD  DD  DSN=&&LIBRARY,UNIT=SYSDA,DISP=(,PASS),
   XX             SPACE=(TRK,(50,20,5),RLSE)
20 XXSYSPRINT DD  SYSOUT=&LOUT
   IEF653I SUBSTITUTION JCL - SYSOUT=*
21 XXSYSUT1   DD  UNIT=SYSDA,SPACE=(TRK,(50,10))
22 XXGO     EXEC  PGM=SCALE,COND=(4,LT,LKED),REGION=&GOSIZE,
   IEF653I SUBSTITUTION JCL - PGM=SCALE,COND=(4,LT,LKED),REGION=2048K,
   XX             PARM='/NOIOINIT,NOOCSTATUS,NOINQPCOPN,',TIME=1439
23 XXSTEPLIB  DD  DSN=*.LKED.SYSLMOD,DISP=(OLD,DELETE)
24 XX         DD  DISP=SHR,DSN=E.TZA27286.NEAD.PGMS77
25 XXFORTLIB  DD  DISP=SHR,DSN=SYS2.VSFLOAD
26 //GO.FT01F001 DD SPACE=(TRK,(300,50))
   X/FT01F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
27 XXFT02F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
28 XXFT03F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
29 XXFT04F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
30 XXFT05F001 DD  UNIT=SYSDA,SPACE=(480,(20,10)),DCB=BLKSIZE=480
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31 XXFT06F001 DD  SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
   IEF653I SUBSTITUTION JCL - SYSOUT=*,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
32 XXFT08F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
33 XXFT09F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
34 XXFT10F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
35 XXFT11F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
36 XXFT12F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
37 XXFT13F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),
   XX             DCB=(RECFM=VB,LRECL=137,BLKSIZE=&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - DCB=(RECFM=VB,LRECL=137,BLKSIZE=6136,BUFL=6136)
38 XXFT14F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
39 XXFT15F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
40 XXFT16F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
41 XXFT17F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
42 //GO.FT18F001 DD SPACE=(TRK,(300,50))
   X/FT18F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
43 XXFT19F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
44 XXFT21F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(BASICLWR)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(BASICLWR)
45 XXFT22F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY1)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY1)
46 XXFT23F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY2)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY2)
47 XXFT24F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY3)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY3)
48 XXFT25F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(BASLMFBR)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(BASLMFBR)
49 XXFT26F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(MAPHU02B)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(MAPHU02B)
50 XXFT27F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(SMALLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(SMALLITE)
51 XXFT27F002 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(ACTINIDE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(ACTINIDE)
52 XXFT27F003 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(BIGFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(BIGFISP)
53 XXFT27F004 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOLITE)
54 XXFT27F005 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOACT)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOACT)
55 XXFT27F006 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOFISP)
58 XXFT28F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(BIGLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(BIGLITE)
57 XXFT28F002 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(ACTINIDE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(ACTINIDE)
58 XXFT28F003 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(BIGFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(BIGFISP)
59 XXFT28F004 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOLITE)
60 XXFT28F005 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOACT)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOACT)
61 XXFT28F006 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOFISP)
62 XXFT78F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=&H6LIB
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.SCALE.HEATLIB
63 XXFT79F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.KENO5.ALBEDOS
64 XXFT80F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.KENO4.WGTS
65 XXFT81F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN16
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66 XXFT82F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN27
67 XXFT83F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN123
68 XXFT84F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN218
69 XXFT85F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV02.XN22G18
70 XXFT86F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XG18
71 XXFT87F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV02.XN27BURN
72 XXFT88F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV03.XN27G18
73 XXFT89F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.X4S27286.SCALE4.REV02.SCLIB
74 XXFT90F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
75 XXFT91F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
76 XXFT92F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
77 XXFT93F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
78 XXFT94F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
79 XXFT95F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
80 XXFT96F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
81 XXFT97F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
82 XXFT98F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
83 XXFT99F001 DD  SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
   IEF653I SUBSTITUTION JCL - SYSOUT=*,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
84 XXMESSAGE  DD  DISP=SHR,DSN=&MESSAGE
   IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=E.TZA27286.SCALE4.MESSAGES
85 XXPRINT    DD  SYSOUT=&OUT
   IEF653I SUBSTITUTION JCL - SYSOUT=*
86 XXQATABLE  DD  DISP=SHR,DSN=E.TZA27286.SCALE4.QATABLE
87 //GO.SYSIN DD *,DCB=BLKSIZE=80
   //
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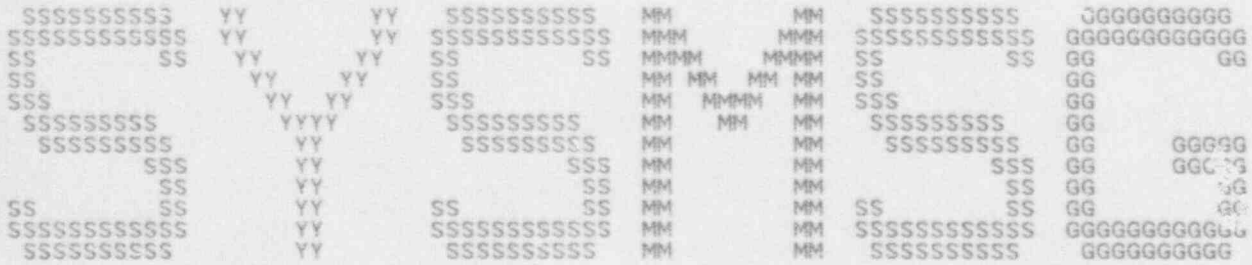
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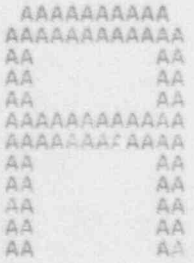

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 STMT NO. MESSAGE
-
       22 IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVED
IEF236I ALLOC. FOR VCJCSAS4 LKED A
IEF237I 140  ALLOCATED TO MARSLIB
IEF237I 141  ALLOCATED TO SYS00130
IEF237I C06  ALLOCATED TO MIPLIB
IEF237I 142  ALLOCATED TO MODULES
IEF237I E00  ALLOCATED TO OVLY
IEF237I C06  ALLOCATED TO SYSLIB
IEF237I E00  ALLOCATED TO
IEF237I 154  ALLOCATED TO
IEF237I 141  ALLOCATED TO
IEF237I 143  ALLOCATED TO
IEF237I 153  ALLOCATED TO SYS00132
IEF237I E00  ALLOCATED TO SYSLIN
IEF237I 900  ALLOCATED TO
IEF237I DMY  ALLOCATED TO
IEF237I C00  ALLOCATED TO SYSLMOD
IEF237I JES3 ALLOCATED TO SYSPRINT
IEF237I C00  ALLOCATED TO SYSUT1
IEF142I VCJCSAS4 LKED A - STEP WAS EXECUTED - COND CODE 0000
IEF285I   E.TZA27286.SCALE.MARS77                          KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   CATALOG.ICF.VPBDE01                              KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.NEAD.MIPLIB77                         KEPT
IEF285I   VOL SER NOS= PBDS00.
IEF285I   E.TZA27286.NEAD.PGMS77                           KEPT
IEF285I   VOL SER NOS= PGDE01.
IEF285I   E.TZA27286.NEAD.OVLY77                           KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   E.TZA27286.NEAD.SUBLIB77                         KEPT
IEF285I   VOL SER NOS= PBDS00.
IEF285I   SYS2.VSFLINK                                     KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   SYS2.VSFFORT                                     KEPT
IEF285I   VOL SER NOS= PBDE03.
IEF285I   GRAPHICS.DISV.LIB                                KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   GRAPHICS.INTLIB                                  KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   CATALOG.ICF.VPSDE02                              KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   E.TZA27286.NEAD.OVLY77                           KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.LOADSET          DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.LIBRARY          PASSED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   LKED.A.SYSPRINT                                  SYSOUT
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000002         DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF373I STEP /LKED    / START 93096.2200
IEF374I STEP /LKED    / STOP  93096.2200 CPU    0MIN 00.24SEC SRB    0MIN 00.01SEC VIRT  1032K SYS   204K EXT       4K SYS    3744K
*-------------------------------------------------------------------------------*
*KXY0001  DDNAME    CUU DSNAME                                  EXCP'S(IO) BLOCKSIZE*
*KXY0002  MARSLIB   140 E.TZA27286.SCALE.MARS77                              *
*KXY0002  SYS00130  141 CATALOG.ICF.VPBDE01                                  *
*KXY0002  MIPLIB    C06 E.TZA27286.NEAD.MIPLIB77                            *
*KXY0002  MODULES   142 E.TZA27286.NEAD.PGMS77                              *
*KXY0002  OVLY      E00 E.TZA27286.NEAD.OVLY77                              *
*KXY0002  SYSLIB    C06 E.TZA27286.NEAD.SUBLIB77                            *
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*KXY0002           E00 SYS2.VSFLINK                                                *
*KXY0002           154 SYS2.VSFFORT                                                *
*KXY0002           14. GRAPHICS.DISV.LIB                                           *
*KXY0002           143 GRAPHICS.INTLIB                                             *
*KXY0002  SYS00132 153 CATALOG.ICF.VPSDE02                                         *
*KXY0002  SYSLIN   E00 E.TZA27786.NEAD.OVLY77                      3        800   *
*KXY0002           900 SYS93096.T143749.RA000.VCJCSAS4.LOADSET                3200  *
*KXY0002  SYSLMOD  C00 SYS93096.T143749.RA000.VCJCSAS4.LIBRARY      9      32760   *
*KXY0002  SYSUT1   C00 SYS93096.T143749.RA000.VCJCSAS4.R0000002                   *
*KXY0003  VIRTUAL STORAGE USED  1032K     TOTAL EXCP COUNT FOR STEP        12     *
*KXY0004  06 APR 93.096  22.00.14.38         CPU TIME FOR STEP 0000 MIN 00.25 SEC *
*-------------------------------------------------------------------------------*
IEF236I ALLOC. FOR VCJCSAS4 GO A
IEF237I C00  ALLOCATED TO STEPLIB
IEF237I 142  ALLOCATED TO
IEF237I 141  ALLOCATED TO SYS00134
IEF237I E0E  ALLOCATED TO FORTLIB
IEF237I 900  ALLOCATED TO FT01F001
IEF237I C00  ALLOCATED TO FT02F001
IEF237I 900  ALLOCATED TO FT03F001
IEF237I C00  ALLOCATED TO FT04F001
IEF237I 900  ALLOCATED TO FT05F001
IEF237I JES3 ALLOCATED TO FT06F001
IEF237I C00  ALLOCATED TO FT08F001
IEF237I C00  ALLOCATED TO FT09F001
IEF237I 900  ALLOCATED TO FT10F001
IEF237I C00  ALLOCATED TO FT11F001
IEF237I 900  ALLOCATED TO FT12F001
IEF237I C00  ALLOCATED TO FT13F001
IEF237I 900  ALLOCATED TO FT14F001
IEF237I 900  ALLOCATED TO FT15F001
IEF237I 900  ALLOCATED TO FT16F001
IEF237I C00  ALLOCATED TO FT17F001
IEF237I C00  ALLOCATED TO FT18F001
IEF237I C00  ALLOCATED TO FT19F001
IEF237I 141  ALLOCATED TO FT21F001
IEF237I 141  ALLOCATED TO FT22F001
IEF237I 141  ALLOCATED TO FT23F001
IEF237I 141  ALLOCATED TO FT24F001
IEF237I 141  ALLOCATED TO FT25F001
IEF237I 141  ALLOCATED TO FT26F001
IEF237I 143  ALLOCATED TO FT27F001
IEF237I 143  ALLOCATED TO FT27F002
IEF237I 143  ALLOCATED TO FT27F003
IEF237I 143  ALLOCATED TO FT27F004
IEF237I 143  ALLOCATED TO FT27F005
IEF237I 143  ALLOCATED TO FT27F006
IEF237I 143  ALLOCATED TO FT28F001
IEF237I 143  ALLOCATED TO FT28F002
IEF237I 143  ALLOCATED TO FT28F003
IEF237I 143  ALLOCATED TO FT28F004
IEF237I 143  ALLOCATED TO FT28F005
IEF237I 143  ALLOCATED TO FT28F006
IEF237I 140  ALLOCATED TO FT78F001
IEF237I 140  ALLOCATED TO FT79F001
IEF237I 140  ALLOCATED TO FT80F001
IEF237I 155  ALLOCATED TO FT81F001
IEF237I 153  ALLOCATED TO FT82F001
IEF237I 141  ALLOCATED TO FT83F001
IEF237I 156  ALLOCATED TO FT84F001
IEF237I 140  ALLOCATED TO FT85F001
IEF237I 155  ALLOCATED TO FT86F001
IEF237I 156  ALLOCATED TO FT87F001
IEF237I 153  ALLOCATED TO FT88F001
IEF237I C17  ALLOCATED TO FT89F001
IEF237I C00  ALLOCATED TO FT90F001
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IEF237I C00  ALLOCATED TO FT01F001
IEF237I 900  ALLOCATED TO FT02F001
IEF237I C00  ALLOCATED TO FT03F001
IEF237I 900  ALLOCATED TO FT04F001
IEF237I C00  ALLOCATED TO FT05F001
IEF237I 900  ALLOCATED TO FT06F001
IEF237I 900  ALLOCATED TO FT07F001
IEF237I C00  ALLOCATED TO FT08F001
IEF237I JES3 ALLOCATED TO FT09F001
IEF237I 140  ALLOCATED TO MESSAGE
IEF237I JES3 ALLOCATED TO PRINT
IEF237I 155  ALLOCATED TO QATABLE
IEF237I JES3 ALLOCATED TO SYSIN
IEF142I VCJCSAS4 GO A - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.LIBRARY       DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   E.TZA27286.NEAD.PGMS77                        KEPT
IEF285I   VOL SER NOS= PGDE01.
IEF285I   CATALOG.ICF.VPBDE01                           KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   SYS2.VSFLOAD                                  KEPT
IEF285I   VOL SER NOS= PBDS03.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000003      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000004      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000005      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000006      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000007      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   GO.A.FT06F001                                 SYSOUT
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000009      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000010      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000011      DELETED
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IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000012      DELETED
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IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000013      DELETED
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IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000016      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000017      DELETED
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IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000018      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000019      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000020      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
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IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                    KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.SCALE.HEATLIB                      KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   E.TZA27286.KENO5.ALBEDOS                      KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   E.TZA27286.KENO4.WGTS                         KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XN16                  KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   C.TZA27286.SCALE4.REV02.XN27                  KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   C.TZA27286.SCALE4.REV02.XN123                 KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XN218                 KEPT
IEF285I   VOL SER NOS= PBDE04.
IEF285I   C.TZA27286.SCALE4.REV02.XN22G18               KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XG18                  KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   C.TZA27286.SCALE4.REV02.XN27BURN              KEPT
IEF285I   VOL SER NOS= PBDE04.
IEF285I   C.TZA27286.SCALE4.REV03.XN27G18               KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   C.X4S27286.SCALE4.REV02.SCLIB                 KEPT
IEF285I   VOL SER NOS= PSDS01.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000021      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000022      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000023      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000024      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000025      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000026      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000027      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000028      DELETED
```

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IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143749.RA000.VCJCSAS4.R0000029      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   GO.A.FT99F001                                 SYSOUT
IEF285I   E.TZA27286.SCALE4.MESSAGES                    KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   GO.A.PRINT                                    SYSOUT
IEF285I   E.TZA27286.SCALE4.QATABLE                     KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   JESI0001                                      SYSIN
IEF373I STEP /GO      / START 93096.2200
IEF374I STEP /GO      / STOP  93096.2205 CPU    1MIN 25.62SEC SRB    0MIN 01.19SEC VIRT  1612K SYS    428K EXT       8K SYS    8760K
*-------------------------------------------------------------------------------*
*KXY0001  DDNAME   CUU DSNAME                                    EXCP'S(IO) BLOCKSIZE*
*KXY0002  STEPLIB  C00 SYS93096.T143749.RA000.VCJCSAS4.LIBRARY          5      32760  *
*KXY0002           142 E.TZA27286.NEAD.PGMS77                       785             *
*KXY0002  SYS00134 141 CATALOG.ICF.VPBDE01                                          *
*KXY0002  FORTLIB  E0E SYS2.VSFLOAD                                                 *
*KXY0002  FT01F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000003           73       6136  *
*KXY0002  FT02F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000004           24       6136  *
*KXY0002  FT03F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000005                    6136  *
*KXY0002  FT04F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000006           55       6136  *
*KXY0002  FT05F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000007           14        480  *
*KXY0002  FT08F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000009          606       1776  *
*KXY0002  FT09F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000010        1,920       2816  *
*KXY0002  FT10F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000011                     *
*KXY0002  FT11F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000012           29       6136  *
*KXY0002  FT12F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000013                    6136  *
*KXY0002  FT13F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000014                    6136  *
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*KXY0002  FT16F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000017           94       6136  *
*KXY0002  FT17F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000018                    6136  *
*KXY0002  FT18F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000019           78       6136  *
*KXY0002  FT19F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000020           18       6136  *
*KXY0002  FT21F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT22F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT23F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT24F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT25F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT26F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT27F001 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT27F002 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT27F003 143 E.TZA27286.ORIGENS.CARDLIB                                   *
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*KXY0002  FT28F006 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT78F001 140 E.TZA27286.SCALE.HEATLIB                                     *
*KXY0002  FT79F001 140 E.TZA27286.KENO5.ALBEDOS                                     *
*KXY0002  FT80F001 140 E.TZA27286.KENO4.WGTS                                        *
*KXY0002  FT81F001 155 C.TZA27286.SCALE4.REV02.XN16                                 *
*KXY0002  FT82F001 153 C.TZA27286.SCALE4.REV02.XN27                     133       6136  *
*KXY0002  FT83F001 141 C.TZA27286.SCALE4.REV02.XN123                                *
*KXY0002  FT84F001 156 C.TZA27286.SCALE4.REV02.XN218                                *
*KXY0002  FT85F001 140 C.TZA27286.SCALE4.REV02.XN22G18                              *
*KXY0002  FT86F001 155 C.TZA27286.SCALE4.REV02.XG18                                 *
*KXY0002  FT87F001 156 C.TZA27286.SCALE4.REV02.XN27BURN                             *
*KXY0002  FT88F001 153 C.TZA27286.SCALE4.REV03.XN27G18                              *
*KXY0002  FT89F001 C17 C.X4S27286.SCALE4.REV02.SCLIB                    166        100  *
*KXY0002  FT90F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000021         402       1024  *
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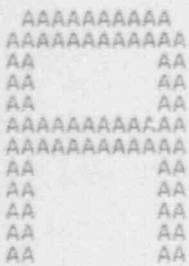
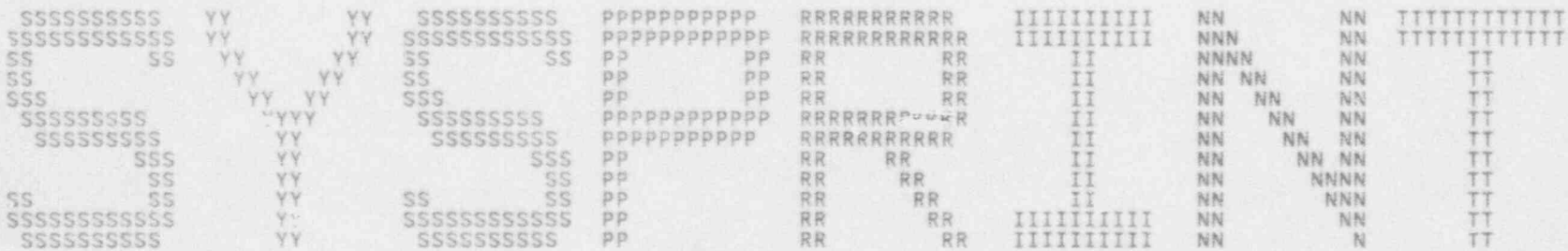
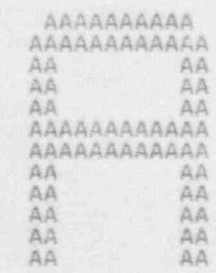
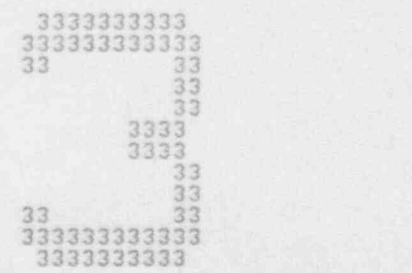
*KXY0002  FT91F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000022                    6136  *
*KXY0002  FT92F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000023          3         6136  *
*KXY0002  FT93F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000024                    6136  *
*KXY0002  FT94F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000025                    6136  *
*KXY0002  FT95F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000026                    6136  *
*KXY0002  FT96F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000027          3         6136  *
*KXY0002  FT97F001 900 SYS93096.T143749.RA000.VCJCSAS4.R0000028          3         6136  *
*KXY0002  FT98F001 C00 SYS93096.T143749.RA000.VCJCSAS4.R0000029                    6136  *
*KXY0002  MESSAGE  140 E.TZA27286.SCALE4.MESSAGES                        3         4254  *
*KXY0002  QATABLE  155 E.TZA27286.SCALE4.QATABLE                        15         4000  *
*KXY0003  VIRTUAL STORAGE USED  1612K      TOTAL EXCP COUNT FOR STEP      4,435        *
*KXY0004  06 APR 93.096  22.05.23.73          CPU TIME FOR STEP 0001 MIN 26.81 SEC     *
*-------------------------------------------------------------------------------------*
IEF375I  JOB /VCJCSAS4/ START 93096.2200
IEF376I  JOB /VCJCSAS4/ STOP  93096.2205 CPU    1MIN 25.86SEC SRB    0MIN 01.20SEC
*-------------------------------------------------------------------------------------*
*KXY0003                                 TOTAL EXCP  COUNT FOR JOB      4,447        *
*KXY0006                                 TOTAL PRINT LINES FOR JOB      1,752        *
*KXY0006                                 TOTAL PUNCH CARDS FOR JOB                   *
*KXY0004  06 APR 93.096  22.05.23.87          CPU TIME FOR JOB  0001 MIN 27.06 SEC     *
*-------------------------------------------------------------------------------------*
*KXY0005  X10 IBM 3090                   **APPROXIMATE JOB COST* $      30.23        *
*-------------------------------------------------------------------------------------*
```









```
MVS/XA DFP VER 2 LINKAGE EDITOR                 22:00:12  TUE  APR 06, 1993
JOB VCJCSAS4   STEP A           PROCEDURE LKED
INVOCATION PARAMETERS - MAP,LIST,SIZE=(1000K,100K)
ACTUAL SIZE=(892928,86016)
OUTPUT DATA SET SYS93096.T143749.RA000.VCJCSAS4 LIBRARY IS ON VOLUME SYSSA2
IEW0000          NAME     IEFBR14(R)                                          00010000

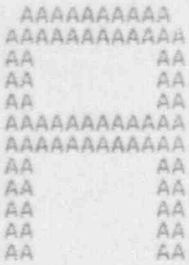
                                                MODULE MAP

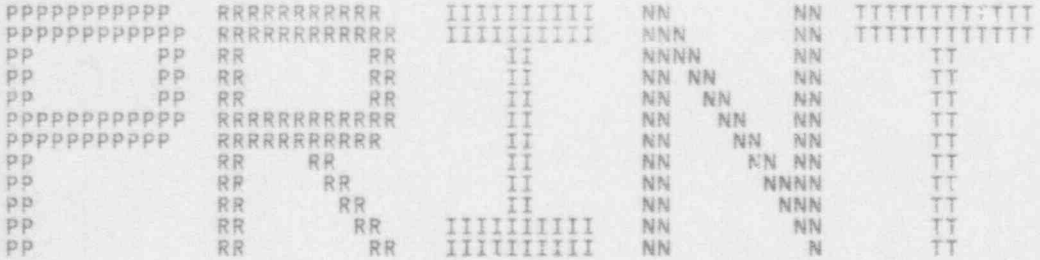
  CONTROL SECTION                       ENTRY

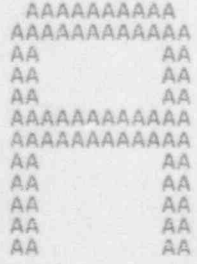
    NAME    ORIGIN  LENGTH                NAME   LOCATION     NAME   LOCATION     NAME   LOCATION     NAME   LOCATION
  IEFBR14       00       4

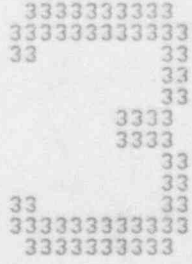
 ENTRY ADDRESS       00

 TOTAL LENGTH          8
 ** IEFBR14  DID NOT PREVIOUSLY EXIST BUT WAS ADDED AND HAS AMODE 24
 ** LOAD MODULE HAS RMODE 24
 ** AUTHORIZATION CODE IS         0.
```









PRIMARY MODULE ACCESS AND INPUT RECORD (SCALE DRIVER - 10/10/91 - 15.58)

```
*****************************************************************************
*      MESSAGES OF CURRENT INTEREST TO SCALE4 USERS WILL APPEAR HERE        *
*                                                                           *
*                    SCALE4  BULLETIN  BOARD                                *
*                    ------  --------  -----                                *
*                                                                           *
*      NOTICE TO ALL SCALE USERS:  THE SCALE CONFIGURATION MANAGEMENT       *
*      PLAN WAS UPDATED ON JUNE 10, 1992.  IF YOU HAVE ANY QUESTIONS,       *
*      CONTACT STEVE BOWMAN (4-5263).  ANY USER WHO DISCOVERS A             *
*      DISCREPANCY IN A SCALE MODULE SHOULD REPORT IT IMMEDIATELY TO        *
*      STEVE BOWMAN (4-5263) OR KAY MARTIN (4-9213) SO THAT CORRECTIVE      *
*      ACTION MAY BE TAKEN IN A TIMELY MANNER.                              *
*                                                                           *
*      1/13/92 - KENO-V.A - MODULE WAS CORRECTED TO PERFORM RESTART         *
*      CALCULATIONS FOR PROBLEMS HAVING NESTED HOLES AND/OR ARRAYS WITH     *
*      SMU AND FDN HAVING DIFFERENT VALUES. (MRR 92-001) ADDED MINOR        *
*      CHANGES FOR CONSISTENCY WITH NCSS VERSION.  (MRR 92-004)             *
*                                                                           *
*      1/14/92 - ALL CONTROL MODULES - CORRECTED THE CALCULATION OF         *
*      STORAGE NEEDED TO COLLAPSE THE BONDARENKO FACTORS WHEN USING         *
*      COLLAPSE OPTION. (MRR 92-003)                                        *
*                                                                           *
*      1/22/92 - SAS2 - CORRECTED SEVERAL MINOR ERRORS THAT WOULD HAVE      *
*      CAUSED JOB TO FAIL WHEN ENCOUNTERED. (MRR 92-002)                    *
*                                                                           *
*      1/29/92 - SAS2 - CORRECTED ERROR THAT RESET NUCLIDE NUMBER           *
*      DENSITY TO ORIGINAL INPUT VALUE IF IT DECAYED TO ZERO AFTER A        *
*      LONG COOLING TIME (E.G., XE-135).  CORRECTED ERROR THAT APPLIED      *
*      CYCLE TEMPERATURE CHANGE VARIABLE TEMKCYC ONLY TO FUEL ZONE          *
*      NUCLIDES.  (MRR 92-006)                                              *
*                                                                           *
*      2/10/92 - ALL CONTROL MODULES - CORRECTED ERROR IN LINKING OF        *
*      MODULES THAT CAUSED ERROR MESSAGES TO BE PRINTED ON WRONG OUTP       *
*      FILE AND ALLOWED CSAS TO LOOP IF THE CROSS-SECTION LIBRARY WAS       *
*      MISSPELLED. (MRR 92-007)                                             *
*                                                                           *
*      4/20/92 - KENO-V.A - MODULE WAS FIXED TO CORRECTLY CALCULATE         *
*      MATRIX K-EFF BY ARRAY NUMBER FOR A BARE ARRAY. (MRR 92-009)          *
*                                                                           *
*      5/27/92 - AIM - DELETED UNNECESSARY CONVERSIONS FROM FLOATING        *
*      POINT VALUES TO INTEGER. (MRR 92-013)                                *
*                                                                           *
*      6/22/92 - MORSE AND SAS4 - (1) FIXED THE OPTION THAT ALLOWS THE      *
*      GEOMETRY MEDIA NUMBER TO DIFFER FROM THE CROSS SECTION MEDIA         *
*      NUMBER.  IF YOU HAVE PREVIOUSLY RUN PROBLEMS WITH DIFFERENT          *
*      GEOMETRY AND CROSS SECTION MEDIA NUMBERS, RE-RUN WITH NEW            *
*      VERSION.  (MRR 92-010) (2) ERROR RECOVERY PROCEDURE WAS ADDED SO     *
*      THAT WHEN A FATAL GEOMETRY ERROR OCCURS RESULTS WILL BE              *
*      NORMALIZED AND PRINTED FOR N-1 BATCHES, WHERE N IS THE BATCH         *
*      NUMBER IN WHICH THE ERROR OCCURRED. (MRR 92-011)                     *
*                                                                           *
*      8/03/92 - ALL CONTROL MODULES- (1) CORRECTED AN ERROR IN             *
*      CALCULATING NUMBER DENSITIES FOR A CELL-WEIGHTED MIXTURE WHEN A      *
*      MIXTURE NUMBER HAS BEEN ASSIGNED TO MORE THAN ONE ZONE IN THE        *
*      UNIT CELL SPECIFICATION.  (2) MADE A CORRECTION TO ACCEPT AN         *
*      INPUT DANCOFF FACTOR OF ZERO AND USE IT.  ADDED A CHECK TO           *
*      ENSURE THAT ALL DANCOFF FACTORS INPUT ARE BETWEEN ZERO AND ONE.      *
*      (MRR 92-019)                                                         *
*                                                                           *
*      8/10/92 - KENO-V.A AND CSAS4 - THE PROGRAM VERIFICATION TABLE        *
*      WAS MODIFIED TO PRINT THE CORRECT VERSION NUMBERS FOR THESE          *
```

```
*      MODULES.  VERSION 1.10 WAS PRINTING AS 1.1 DUE TO INSUFFICIENT          *
*      SPACE IN A FORMAT STATEMENT.  (MRR 92-015)                              *
*                                                                              *
*      10/02/92 - STANDARD COMPOSITION LIBRARY - UPDATED RESONANCE DATA        *
*      FLAGS FOR NUCLIDES THAT HAVE RESONANCE DATA IN ENDF/B-V.                *
*                                                                              *
*      11/24/92 - MIPLIB - CORRECTED THE DIMENSIONAL CONSISTENCY TEST          *
*      FOR ANNULAR CELLS AND ASYMMETRIC SLAB CELLS.  THIS ALLOWS               *
*      CORRECT PROBLEMS THAT PREVIOUSLY WOULD NOT RUN TO RUN. (MRR 92-024)     *
*                                                                              *
********************************************************************************

 MODULE CSASI    WILL BE CALLED  TIME OF DAY 22.00.21  DATE 93.096

   U02F2 SOLUTION OPTIMIZE CONCENTRATION   SPHERE                UOXSPO.CJW
   27GROUPNDF4                INFHOMMEDIUM
   SOLNU02F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
   H2O          2  1.0  293  END
   END COMP
   END

 SECONDARY MODULE 000008   HAS BEEN CALLED

 MODULE 000008   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED      1.14 (SECONDS). I/O'S USED        0.

 SECONDARY MODULE 000002   HAS BEEN CALLED

 MODULE 000002   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED     14.52 (SECONDS). I/O'S USED        0.

 SECONDARY MODULE 000007   HAS BEEN CALLED

 MODULE 000007   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED      3.35 (SECONDS). I/O'S USED        0.

 MODULE CSASI    IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED     20.20 (SECONDS). I/O'S USED        0.


 MODULE XSDRN    WILL BE CALLED  TIME OF DAY 22.02.34  DATE 93.096

   SPHERE OPTIMIZATION U02F2 SOLUTION DENSITY VARIATION
   0$$  A3 2  E
   1$$  3 2 58 1 0   2 2 16 3 1
    10 50 0 0 0
   2$$  -2 0 0 0 0    0 -1 0 0 0
   3$$  0 0 0 1 0     0 0 0 0 0
        0 0
   5**  A4 0  0  E
     T
   13$$  1 2
   14$$  1 2
   15**  F1
     T
   34**  F1
     T
   35**  22I0 34I20.5025 55.5025
   36$$  23R1 35R2
   39$$  1 2
   40$$  F3
     T
   END

 MODULE XSDRN    IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED     65.37 (SECONDS). I/O'S USED        0.

  THE FOLLOWING DATA CARDS PRECEDE AN = CARD
   END
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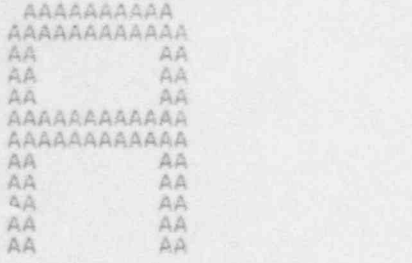
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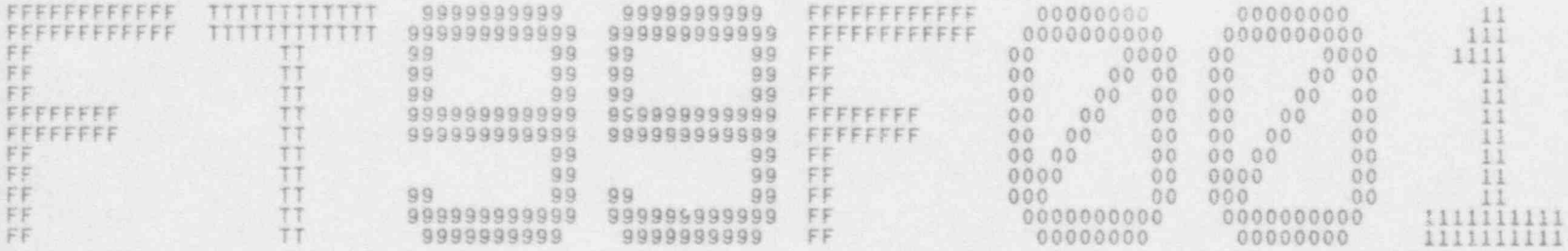
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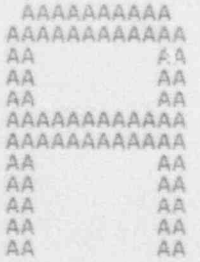
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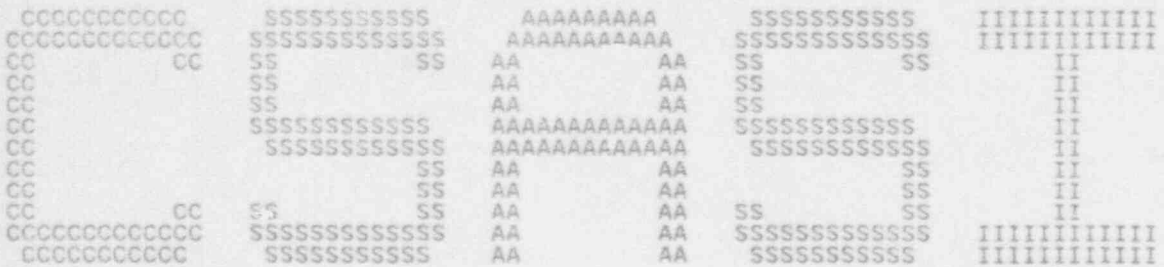
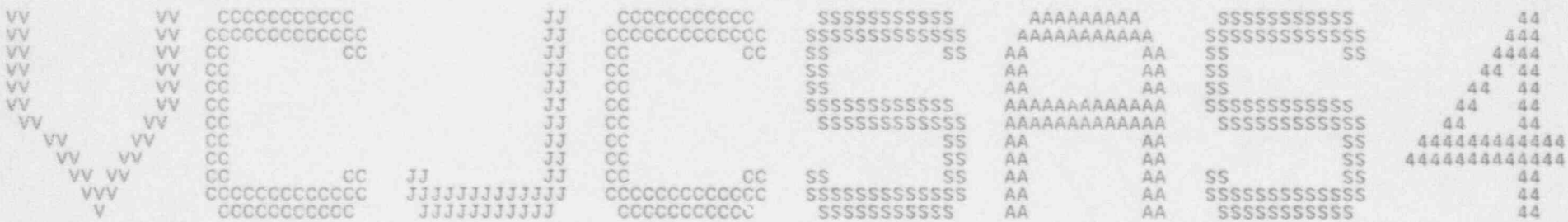
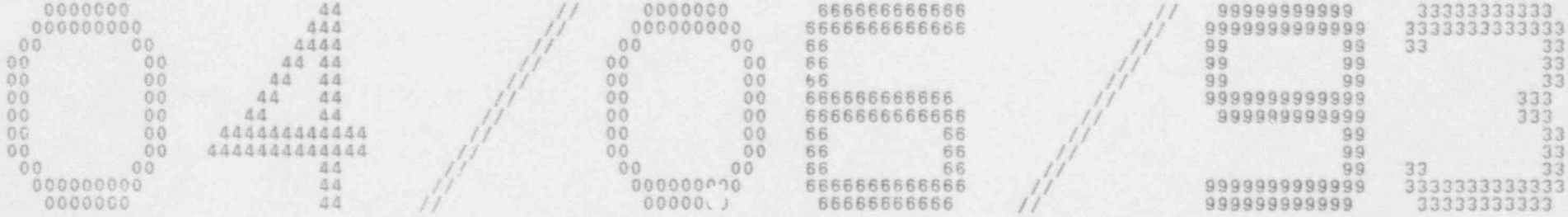
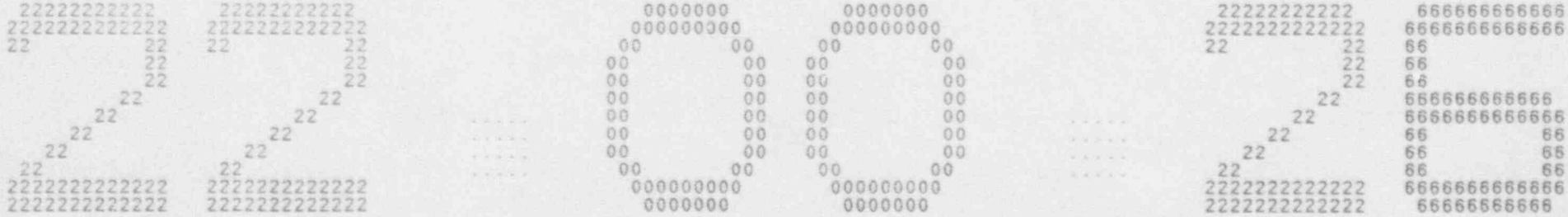
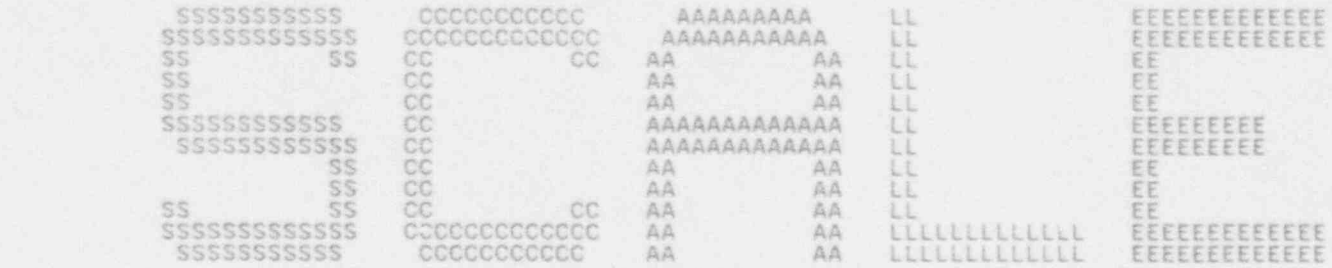










PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: CSASI

CREATION DATE: 92.329

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: CSAS25

VERSION: 1.12

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.00.27

```
UO2F2 SOLUTION OPTIMIZE CONCENTRATION   SPHERE                UOXSPO.CJW

**** PROBLEM PARAMETERS ****

LIB 27GROUPNDF4  LIBRARY
MXX             2 MIXTURES
MSC             2 COMPOSITION SPECIFICATIONS
IZM             1 MATERIAL ZONES
GE  INFHOMMEDIUM GEOMETRY
MORE            0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLN            1 FUEL SOLUTIONS

**** PROBLEM COMPOSITION DESCRIPTION ****

SC  SOLNUO2F2    STANDARD COMPOSITIGN
MX              1 MIXTURE NO.
FD     1600.0000 SOLUTION FUEL DENSITY
AML       0.0000 ACID MOLARITY
VF        1.0000 VOLUME FRACTION
TEMP       293.0 DEG KELVIN
SPG       2.8069 DEFAULT SPECIFIC GRAVITY
           92235   5.02%
           92238  94.98%
END

SC  H2O          STANDARD COMPOSITION
MX              2 MIXTURE NO.
VF        1.0000 VOLUME FRACTION
ROTH      0.9982 THEORETICAL DENSITY
TEMP       293.0 DEG KELVIN
END

**** PROBLEM GEOMETRY ****

**** INFINITE HOMOGENEOUS MEDIUM ****
MFUEL           1 MIXTURE NO. OF THE INFINITE HOMOGENEOUS MEDIUM
```

```
UO2F2 SOLUTION OPTIMIZE CONCENTRATION   SPHERE                UOXSPO.CJW

********** DATA LIBRARY INFORMATION **********

 UNIT NUMBER   DATA SET NAME                                  VOLUME NAME   UNIT FUNCTION
 -----------   -------------                                  -----------   -------------
      89       C.X4S27286.SCALE4.REV02.SCLIB                  PSDS01       STANDARD COMPOSITION LIBRARY
      82       C.TZA27286.SCALE4.REV02.XN27                   PSDE02       CROSS SECTION LIBRARY
      11       SYS93096.T143749.RA000.VCJCSAS4.R0000012       SYSSA2       SHORT CROSS SECTION LIBRARY
      90       SYS93096.T143749.RA000.VCJCSAS4.R0000021       SYSSA2       INPUT DATA DIRECT ACCESS

                          STANDARD COMPOSITION LIBRARY DATA
                          ---------------------------------

          UNIT NUMBER   :  89

          DATASET NAME  :  C.X4S27286.SCALE4.REV02.SCLIB

          LIBRARY TITLE:  SCALE-4 STANDARD COMPOSITION LIBRARY
                          380 STANDARD COMPOSITIONS, 327 NUCLIDES
                          10 ELEMENTS WITH VARIABLE ISOTOPIC DISTRBUTIONS

          CREATION DATE:  10/ 2/92

                          CROSS SECTION LIBRARY DATA
                          --------------------------

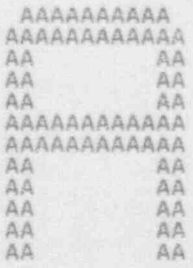
          UNIT NUMBER   :  82

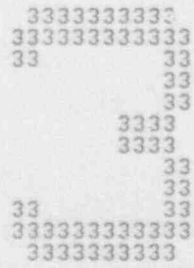
          DATASET NAME  :  C.TZA27286.SCALE4.REV02.XN27

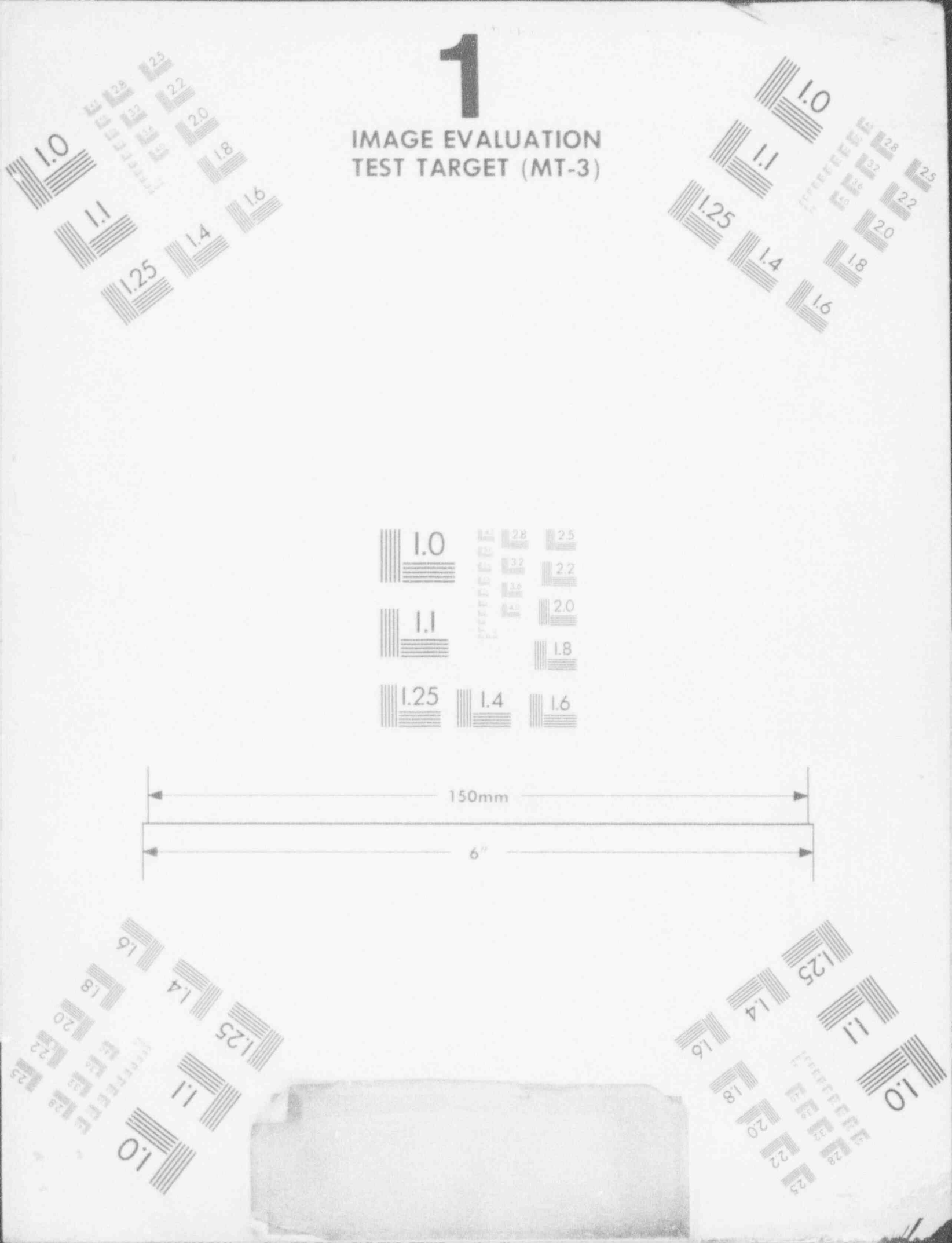
          LIBRARY TITLE:  SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
                            BASED ON ENDF-B VERSION 4 DATA
                              COMPILED FOR NRC       1/27/89
                                LAST UPDATED        10/12/89
                                  L.M.PETRIE        ORNL

                    ..... 0 IO'S WERE USED PROCESSING CSAS INPUT DATA .....

CONTROL MODULE CSASI    IS COMPLETE.
```

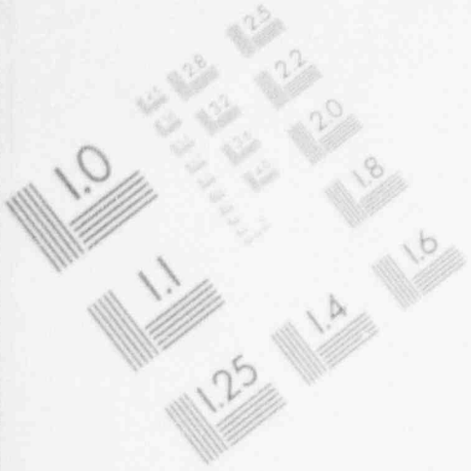


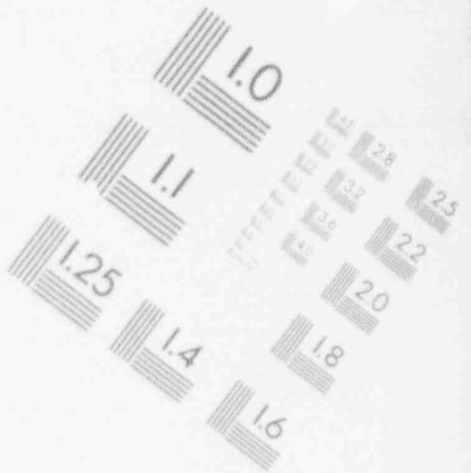


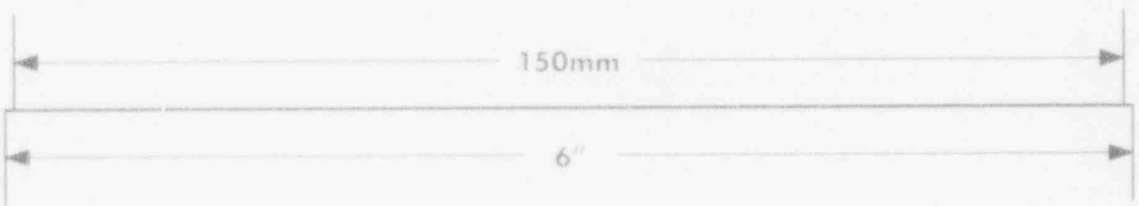

1
IMAGE EVALUATION
TEST TARGET (MT-3)
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
150mm
6"

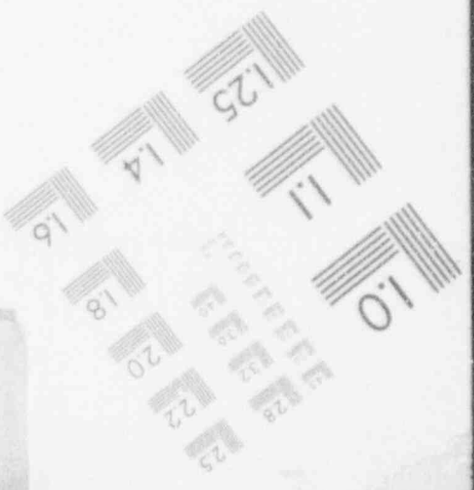
1

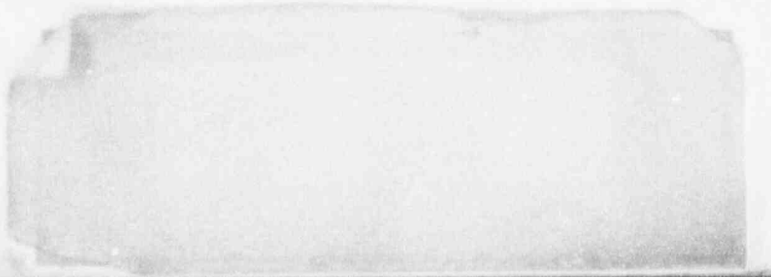
IMAGE EVALUATION TEST TARGET (MT-3)





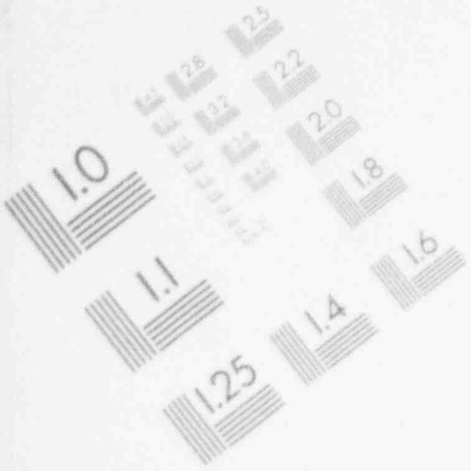


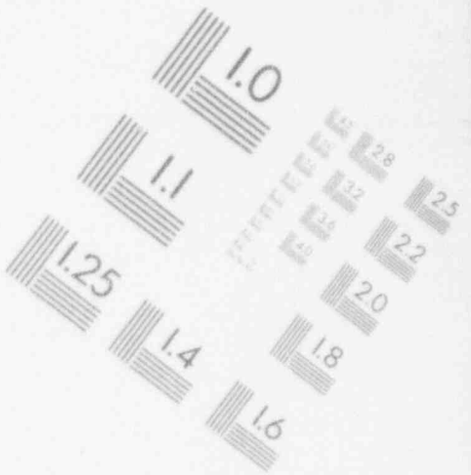


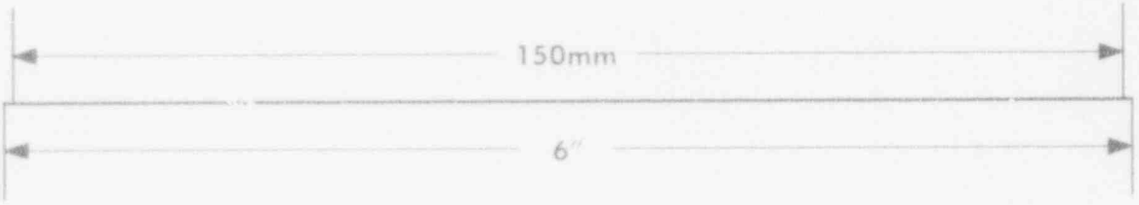


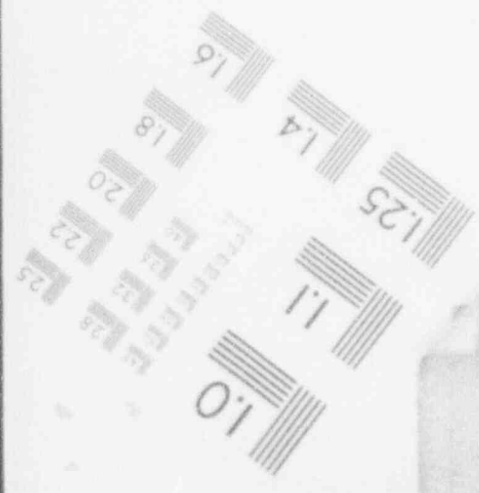
1

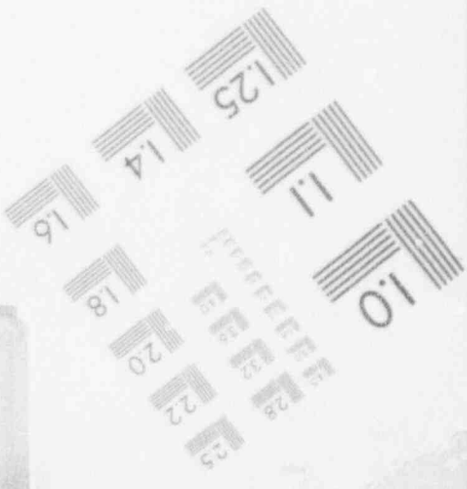
IMAGE EVALUATION TEST TARGET (MT-3)











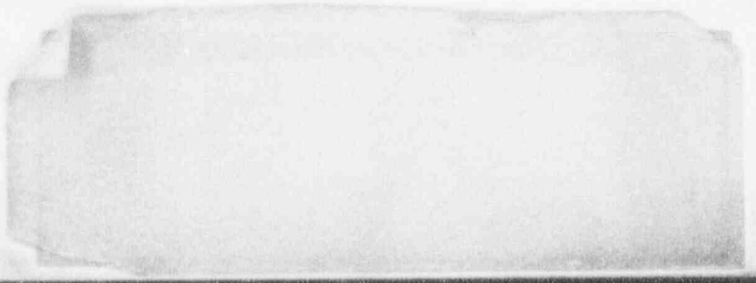


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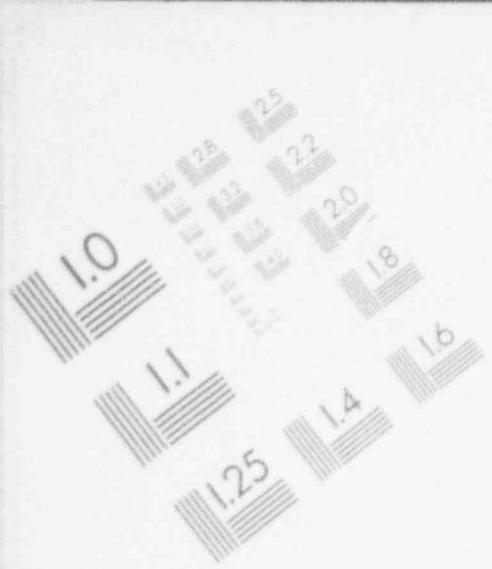
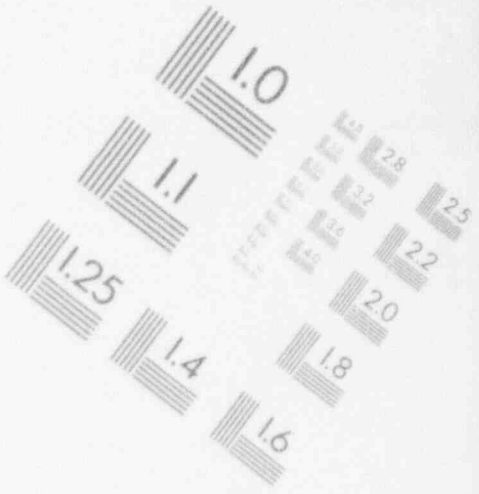
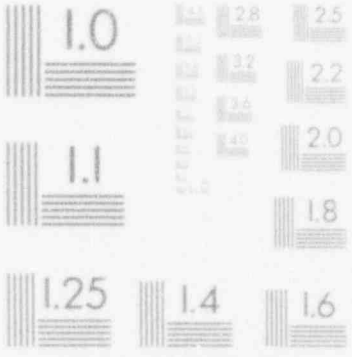
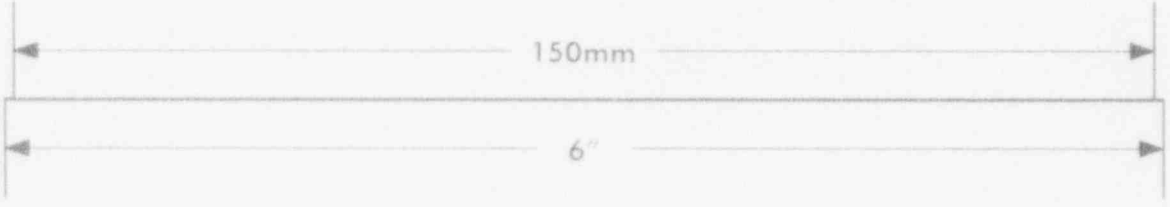
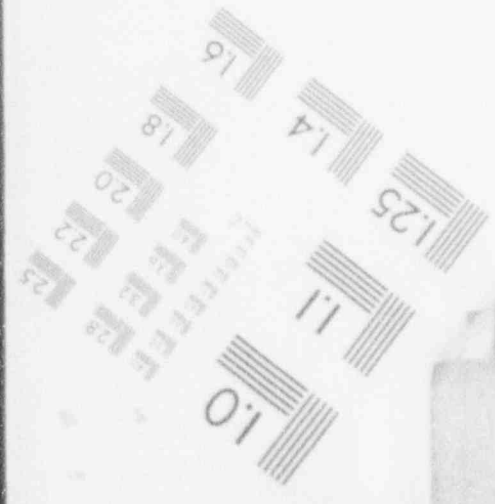
IMAGE EVALUATION
TEST TARGET (MT-3)

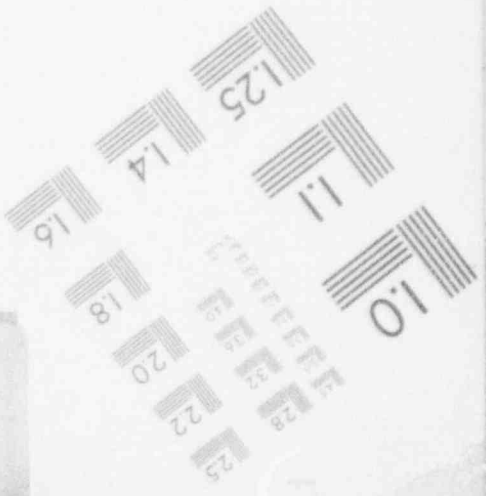


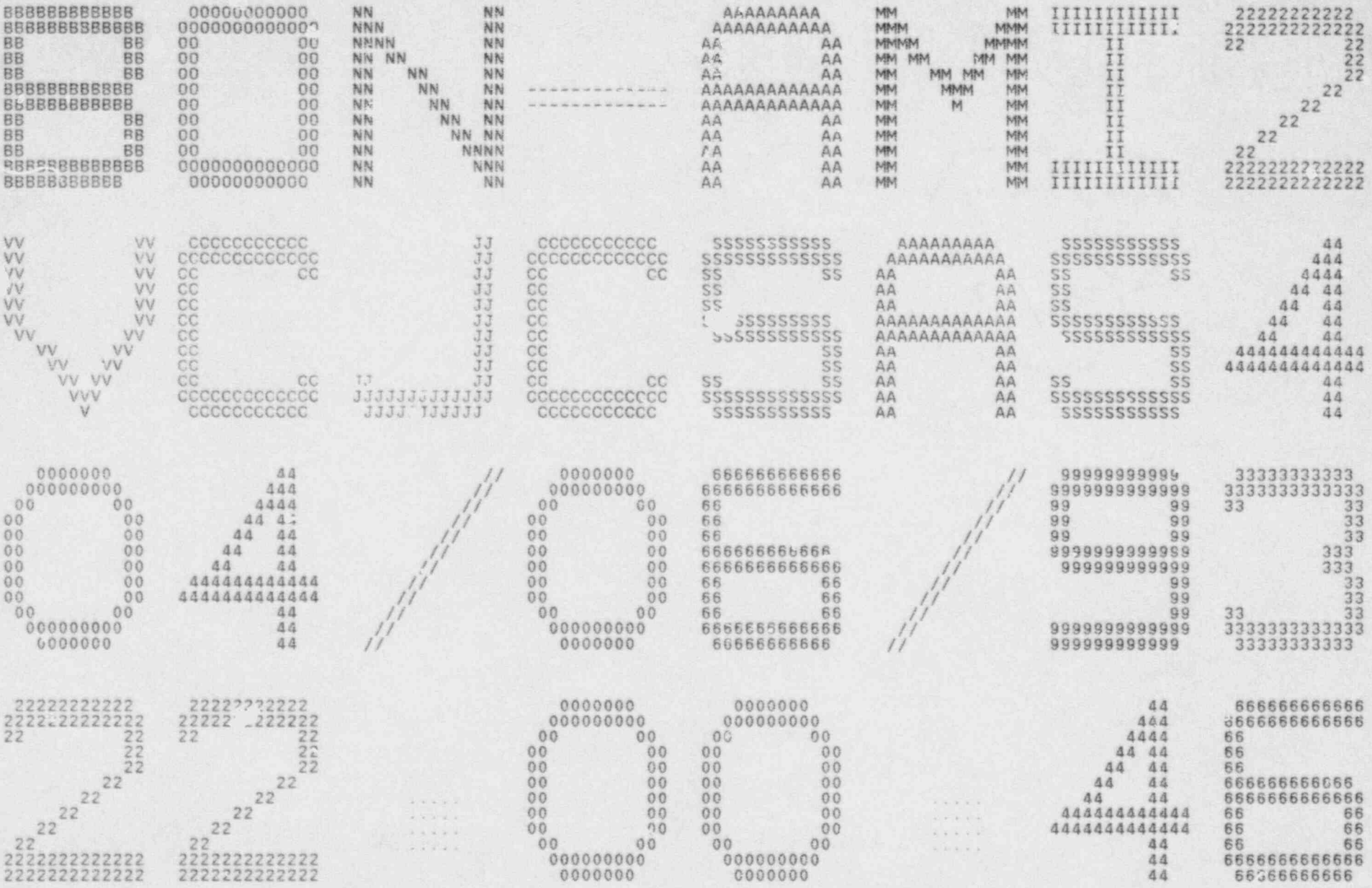


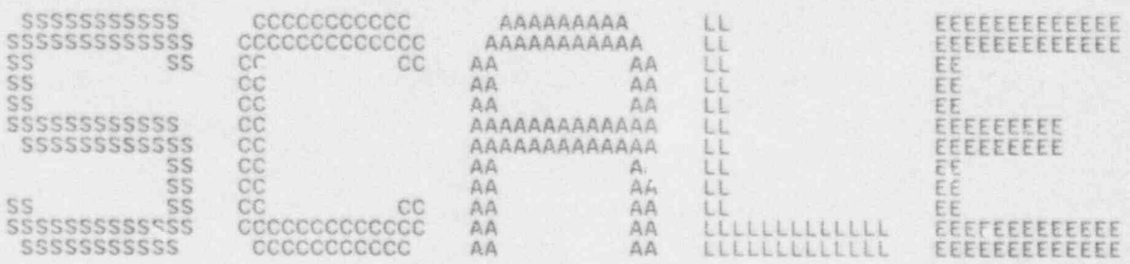












PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000008

CREATION DATE: 92.330

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: BONAMI

VERSION: 1.6

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.00.46

-1Q ARRAY HAS 1 ENTRIES.
0Q ARRAY HAS 4 ENTRIES.
1Q ARRAY HAS 6 ENTRIES.
2Q ARRAY HAS 2 ENTRIES.

LOGICAL ASSIGNMENTS

MASTER LIBRARY 11
WORKING LIBRARY 0
SCRATCH FILE 18
NEW LIBRARY 1

P R O B L E M D E S C R I P T I O N

IGR--GEOMETRY (0/1/2/3--INF MED/SLAB/CYL/SPHERE 1

IZM--NUMBER OF ZONES OR MATERIAL REGIONS 2

MS--MIXING TABLE LENGTH 7

IBL--SHIELDED CROSS SECTION EDIT OPTION (0/1--NO/YES) 0

IBR--BONDARENKO FACTOR EDIT OPTION (0/1--NO/YES) 0

ISSOPT--DANCOFF FACTOR OPTION 0

CONVERGENCE CRITERION 1.00000E-03

GEOMETRY CORRECTION FACTOR FOR WIGNER RATIONAL APPROXIMATION 1.000E+00

3Q ARRAY HAS 7 ENTRIES.

4Q ARRAY HAS 7 ENTRIES.

5Q ARRAY HAS 7 ENTRIES.

6Q ARRAY HAS 2 ENTRIES.

7Q ARRAY HAS 2 ENTRIES.

8Q ARRAY HAS 2 ENTRIES.

9Q ARRAY HAS 2 ENTRIES.

10Q ARRAY HAS 7 ENTRIES.

11Q ARRAY HAS 2 ENTRIES.

M I X I N G T A B L E

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	2.05790E-04	92235
2	1	92238	3.84443E-03	92238
3	1	8016	3.27175E-02	8016
4	2	8016	3.33757E-02	208016
5	1	9019	8.10044E-03	9019
6	1	1001	4.92340E-02	1001
7	2	1001	6.67514E-02	201001

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	1.00000E+00	2.93000E+02	0.00000E+00	0
2	2	6.00000E+00	2.93000E+02	0.00000E+00	0

2394 LOCATIONS OF 100000 AVAILABLE ARE REQUIRED TO MAKE A NEW MASTER CONTAINING THE SELF-SHIELDED VALUES

NO NUCLIDES IN YOUR PROBLEM HAVE BONDARENKO FACTOR DATA**BONAMI WILL COPY FROM LOGICAL 11 TO LOGICAL 1

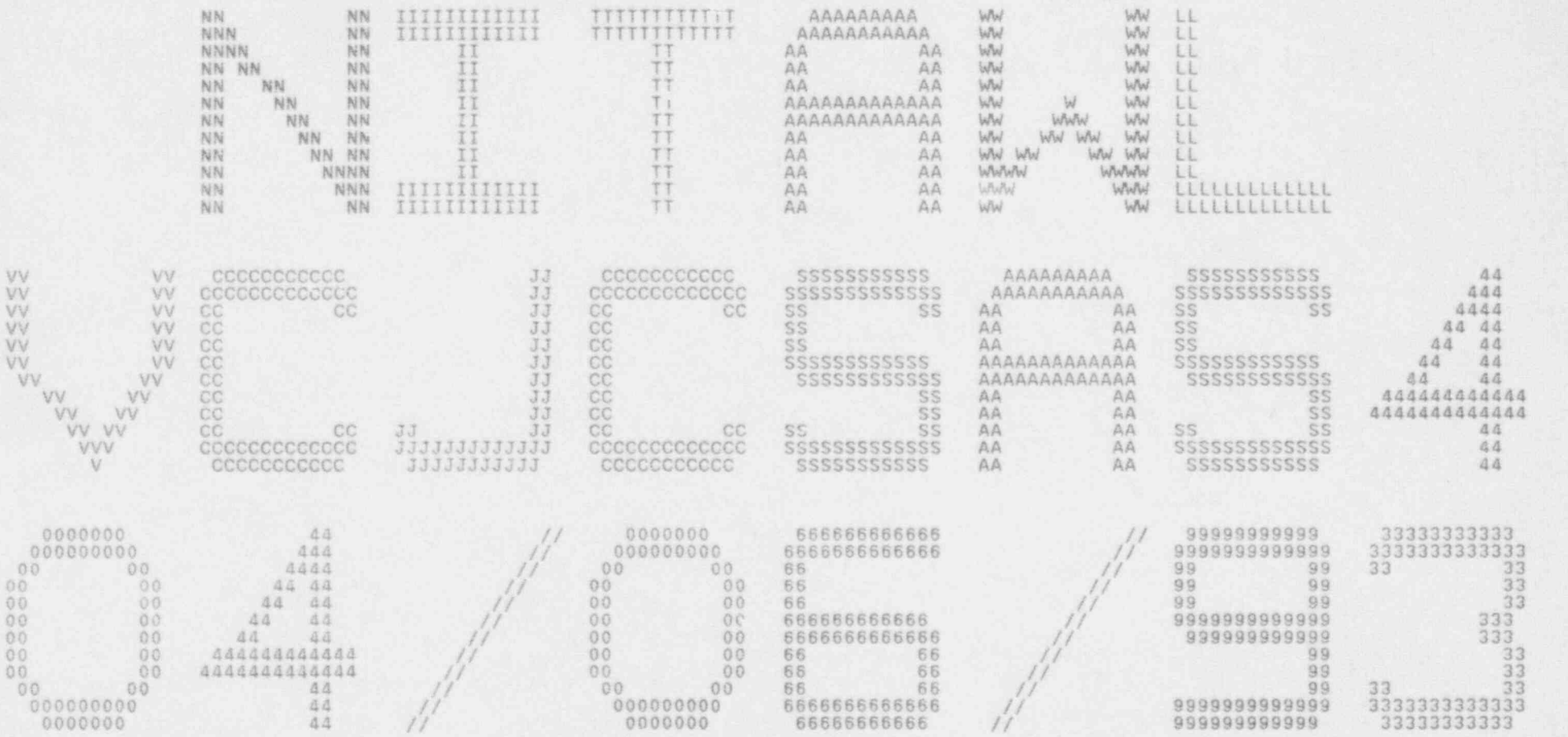
```
COPY      1001   HYDROGEN        FROM LOG 11 TO LOG 18    BONDARENKO TRIGGER 0
COPY      1001   HYDROGEN        FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      1001   HYDROGEN        FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 11 TO LOG 18    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      9019   FLUORINE        FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
COPY     92235   URANIUM-235     FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
COPY     92238   URANIUM-238     FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
```

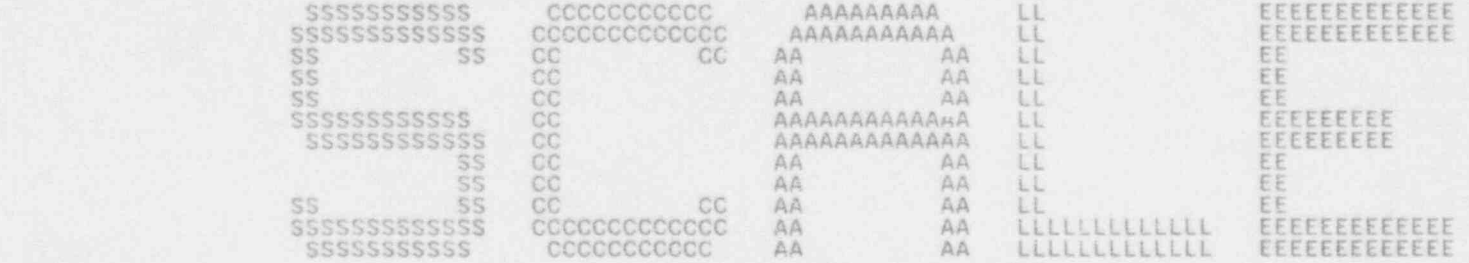
SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89
LAST UPDATED 10/12/89
L M PETRIE ORNL

TAPE ID	4027000	NUMBER OF NUCLIDES	7
NUMBER OF NEUTRON GROUPS	27	NUMBER OF GAMMA GROUPS	0
FIRST THERMAL GROUP	15	LOGICAL UNIT	1

TABLE OF CONTENTS

TAPE COPY USED 0 I/O'S, AND TOOK 0.67 SECONDS





PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000002

CREATION DATE: 91.350

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: NITAWL

REVISION: 1.6

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.00.55

```
      -1Q ARRAY HAS      1 ENTRIES.

       0Q ARRAY HAS      9 ENTRIES.

       1Q ARRAY HAS     12 ENTRIES.

SELECT  7 NUCLIDES FROM THE MASTER  LIBRARY ON LOGICAL  1
        0 NUCLIDES FROM THE WORKING LIBRARY ON LOGICAL  2
        0 NUCLIDES FROM THE WORKING LIBRARY ON LOGICAL  3
          TO CREATE THE NEW WORKING LIBRARY ON LOGICAL  4

        2 RESONANCE CALCULATIONS HAVE BEEN REQUESTED
       -1 OUTPUT OPTION FOR AMPX FORMATTED CROSS SECTION DATA

THE STORAGE ALLOCATED FOR THIS CASE IS 100000 WORDS

       2Q ARRAY HAS      7 ENTRIES.

       3Q ARRAY HAS     30 ENTRIES.

       4Q ARRAY HAS      7 ENTRIES.

 GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
   TAPE IDENTIFICATION NUMBER              4027000
   NUMBER OF NUCLIDES ON TAPE                    7
   NUMBER OF NEUTRON ENERGY GROUPS              27
   FIRST THERMAL NEUTRON ENERGY GROUP           15
   NUMBER OF GAMMA ENERGY GROUPS                 0

   DIRECT ACCESS UNIT NUMBER 3 REQUIRES 117 BLOCKS OF LENGTH  1484 WORDS


 XSDRN TAPE4027000
                      SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
                        BASED ON ENDF-B VERSION 4 DATA
                          COMPILED FOR NRC       1/27/89
                            LAST UPDATED        10/12/89
                              L.M.PETRIE         ORNL

 NUCLIDES FROM XSDRN TAPE
    1     HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              1001
    2     HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89            201001
    3     OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              8016
    4     OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89            208016
    5     FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89              9019
    6     URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89             92235
    7     URANIUM-238     ENDF/B-IV MAT 1262             UPDATED 10/12/89             92238

 HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              1001    TEMPERATURE=   293.00
                        THERMAL SCATTERING MATRIX NUMBER   1 AT A TEMPERATURE OF    293.00 WAS SELECTED.

 HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89            201001    TEMPERATURE=   293.00
                        THERMAL SCATTERING MATRIX NUMBER   1 AT A TEMPERATURE OF    293.00 WAS SELECTED.

 OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              8016    TEMPERATURE=   293.00

 OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89            208016    TEMPERATURE=   293.00

 FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89              9019    TEMPERATURE=   293.00

 URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89             92235    TEMPERATURE=   293.00
```

```
GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS  0.0000E+00
RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A)          =   233.025              TEMPERATURE(KELVIN)       =   293.000
POTENTIAL SCATTER SIGMA  =    11.500              LUMPED NUCLEAR DENSITY    = 2.0578971E-04
SPIN FACTOR (G)          = 15171.098              LUMP DIMENSION (A-BAR)    = 0.0000000E+00
INNER RADIUS             = 0.0000000E+00          DANCOFF CORRECTION (C)    = 0.0000000E+00
THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-1    =     1.008               SIGMA(PER ABSORBER ATOM)= 4.8805820E+03
MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-2    =    19.799               SIGMA(PER ABSORBER ATOM)= 8.9295386E+02
MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
THIS RESONANCE MATERIAL WILL BE TREATED AS A 0-DIMENSIONAL OBJECT.
VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000
GROUP        RES ABS         RES FISS        RES SCAT
 12      -1.273760E+00   -7.814561E-01   -3.331852E-02
 13      -4.360353E+00   -2.141225E+00   -1.007406E-01
 14      -3.107759E+00   -1.864935E+00   -2.266715E-02
EXCESS RESONANCE INTEGRALS
                 RESOLVED
ABSORPTION       2.17356E+02
FISSION          1.29257E+02

  ELAPSED TIME   0.10 MIN.
 URANIUM-238    ENDF/B-IV MAT 1262            UPDATED 10/12/89            92238     TEMPERATURE=   293.00
GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS  0.0000E+00
RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A)          =   236.006              TEMPERATURE(KELVIN)       =   293.000
POTENTIAL SCATTER SIGMA  =    10.599              LUMPED NUCLEAR DENSITY    = 3.8444269E-03
SPIN FACTOR (G)          =   656.527              LUMP DIMENSION (A-BAR)    = 0.0000000E+00
INNER RADIUS             = 0.0000000E+00          DANCOFF CORRECTION (C)    = 0.0000000E+00
THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-1    =     1.008               SIGMA(PER ABSORBER ATOM)= 2.6125439E+02
MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-2    =    16.725               SIGMA(PER ABSORBER ATOM)= 4.0061310E+01
MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
```

THIS RESONANCE MATERIAL WILL BE TREATED AS A 0-DIMENSIONAL OBJECT.

VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000

GROUP	RES ABS	RES FISS	RES SCAT
9	-1.782503E-02	0.000000E+00	-1.897987E-01
10	-6.216179E-01	-6.444589E-06	-4.087888E+00
11	-8.111181E+00	0.000000E+00	-2.312807E+01
12	-3.808702E+01	0.000000E+00	-4.588655E+01
13	-4.935625E+01	0.000000E+00	-1.625967E+01
14	-9.522398E+01	0.000000E+00	-5.548256E+00

EXCESS RESONANCE INTEGRALS

	RESOLVED
ABSORPTION	4.24719E+01
FISSION	5.22746E-04

ELAPSED TIME 0.22 MIN.

ELAPSED TIME 0.23 MIN.

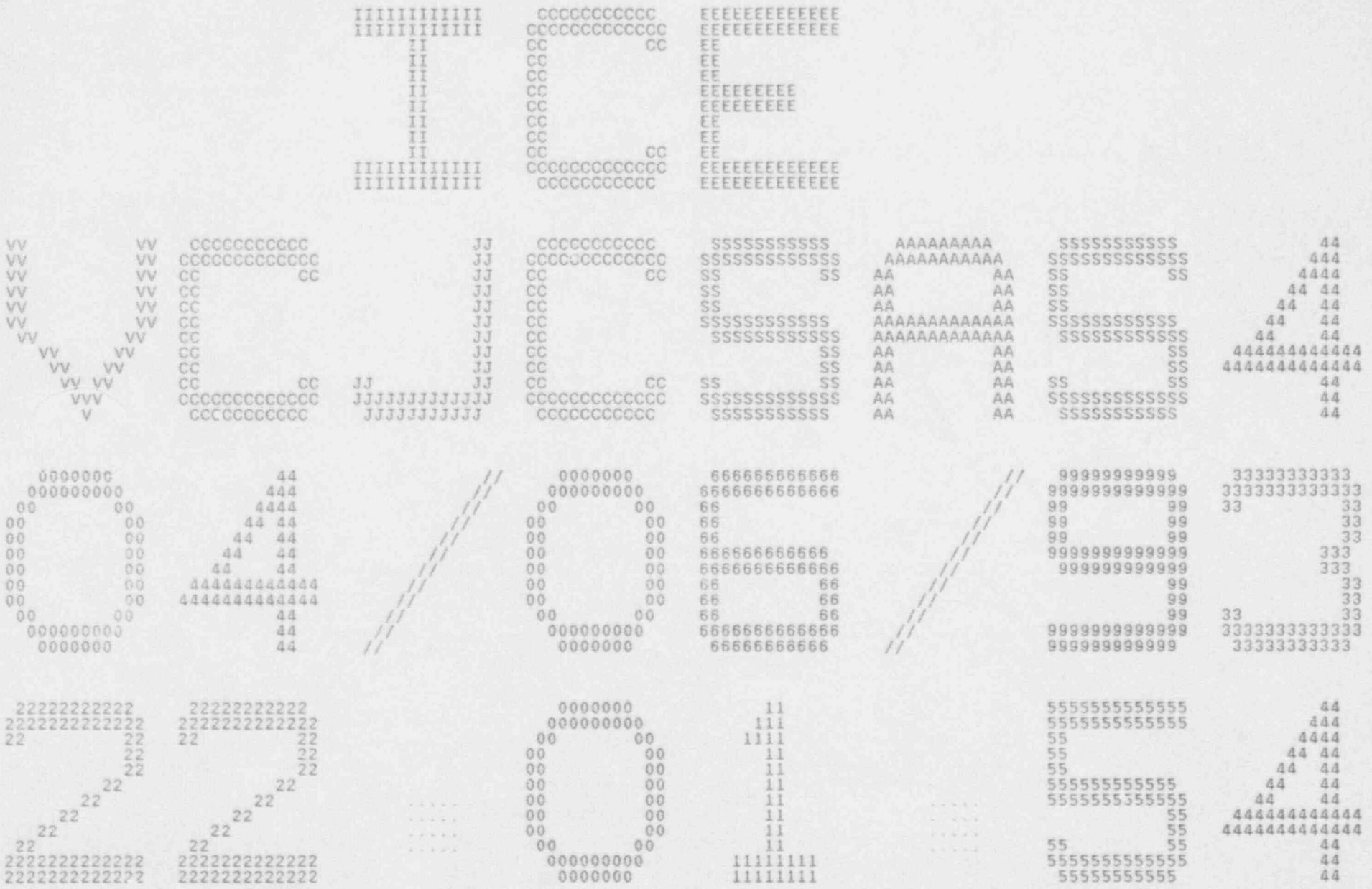
THIS XSDRN WORKING TAPE WAS CREATED 04/06/93 AT 22.01.12
THE TITLE OF THE PARENT CASE IS AS FOLLOWS
SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89

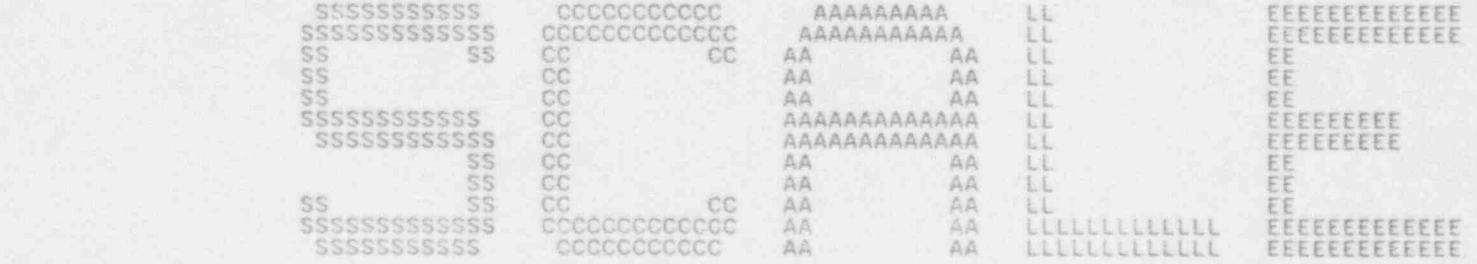
TAPE ID	4027000	NUMBER OF NUCLIDES	7
NUMBER OF NEUTRON GROUPS	27	NUMBER OF GAMMA GROUPS	0
FIRST THERMAL GROUP	15	LOGICAL UNIT	4

TABLE OF CONTENTS

HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	ID	1001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	ID	201001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	ID	8016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	ID	208016
FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89	ID	9019
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89	ID	92235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89	ID	92238

TAPE COPY USED 0 I/O'S. AND TOOK 0.42 SECONDS





PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000007

CREATION DATE: 91.287

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: ICE

REVISION: 1.4

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.01.55

```
UO2F2 SOLUTION OPTIMIZE CONCENTRATION   SPHERE              UOXSPO.CJW            04/06/93    22.01.55
        0Q ARRAY HAS      3 ENTRIES.

        1Q ARRAY HAS      7 ENTRIES.

       -1Q ARRAY HAS      4 ENTRIES.


 0$ ARRAY
INTAPE         4          IOT3          21
IOT1           2          IOT4          14
IOT2           0


 1$ ARRAY
MIX            2          IFLAG(3)       0
NMIX           7          IFLAG(4)      10
IFLAG(1)      10          KOPT           4
IFLAG(2)       0

        2Q ARRAY HAS      7 ENTRIES.

        3Q ARRAY HAS      7 ENTRIES.

        4Q ARRAY HAS      7 ENTRIES.

        5Q ARRAY HAS      2 ENTRIES.

        7Q ARRAY HAS      3 ENTRIES.
 3.000E+02   1.300E+06   5.000E+00   6.750E+04   2.530E-02   1.265E-01   9.275E+03   6.006E-08   9.500E-01   2.000E+07
 6.434E+06   3.000E+06   1.850E+06   1.400E+06   9.000E+05   4.000E+05   1.000E+05   1.700E+04   3.000E+03   5.500E+02
 1.000E+02   3.000E+01   1.000E+01   3.050E+00   1.770E+00   1.300E+00   1.130E+00   1.000E+00   8.000E-01   4.000E-01
 3.250E-01   2.250E-01   1.000E-01   5.000E-02   3.000E-02   1.000E-02


 2$,3$ AND 4* ARRAYS
MIXTURE        1     ELEMENT   92235     DENSITY    0.20578971E-03
MIXTURE        1     ELEMENT   92238     DENSITY    0.38444269E-02
MIXTURE        1     ELEMENT    8016     DENSITY    0.32717451E-01
MIXTURE        2     ELEMENT  208016     DENSITY    0.33375714E-01
MIXTURE        1     ELEMENT    9019     DENSITY    0.81004351E-02
MIXTURE        1     ELEMENT    1001     DENSITY    0.49234036E-01
MIXTURE        2     ELEMENT  201001     DENSITY    0.66751420E-01


 5$ ARRAY
MIXTURE    1     NO. OF COEFICIENTS    4
MIXTURE    2     NO. OF COEFICIENTS    4


 7$ ARRAY
IHT=       3     IHS=      16     IHM=      42     LOPT=      0
NNGA=     27     NGGA=      0     NOPT=      0     NSCT=      2
IADJM=     0     NNGTP=     0
```

```
WORDS NEEDED TO READ INPUT TAPE=    1846
 WORDS CORE NEEDED FOR MIXING=     1556
 WORDS AVAILABLE FOR MIXING=  100000

 WORDS CORE NEEDED TO MAKE MIXED AMPX WORKING TAPE=     1150
```

```
     THIS XSDRN WORKING TAPE WAS CREATED 04/06/93 AT 22.01.12
     THE TITLE OF THE PARENT CASE IS AS FOLLOWS
     SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
       BASED ON ENDF-B VERSION 4 DATA
     MIXED CROSS SECTIONS BY ICE-THE PERFECT MIXER
         TAPE ID                          4027000          NUMBER OF NUCLIDES                    2
         NUMBER OF NEUTRON GROUPS           27             NUMBER OF GAMMA GROUPS                0
         FIRST THERMAL GROUP                15             LOGICAL UNIT                          2
                                  TABLE OF CONTENTS
       MIXED CROSS SECTIONS FROM ICE                                                 ID          1
       MIXED CROSS SECTIONS FROM ICE                                                 ID          2

         TAPE COPY USED      0 I/O'S, AND TOOK    0.23 SECONDS
AN AMPX WORKING TAPE WAS MADE ON UNIT    2
 HAVE A DRINK
    1204 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE

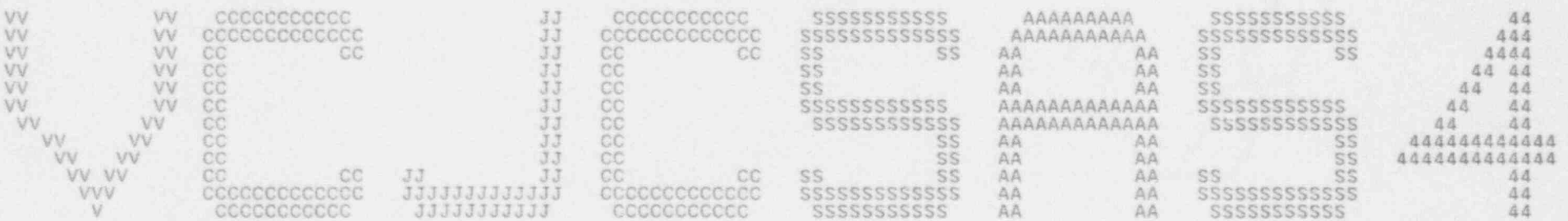

    1393 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE

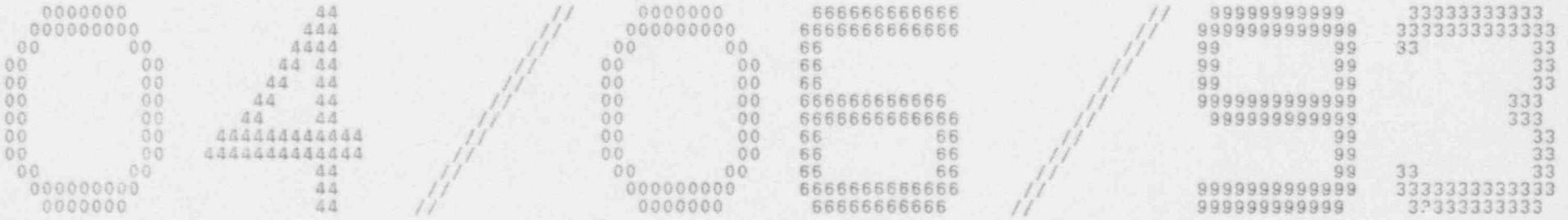

    1822 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


MSGPS=    1
    1850 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


A MORSE/KENO TAPE WAS MADE ON UNIT   14
 HAVE A DRINK
```


XX XX SSSSSSSSSS DDDDDDDDDD RRRRRRRRRR NN NN PPPPPPPPPP MM MM
XX XX SSSSSSSSSSS DDDDDDDDDDD RRRRRRRRRRR NNN NN PPPPPPPPPPP MMM MMM
XX XX SS SS DD DD RR RR NNNN NN PP PP MMMM MMMM
XX XX SS DD DD RR RR NN NN NN PP PP MM MM MM MM
XX XX SS DD DD RR RR NN NN NN PP PP MM MM MM MM
XXX SSSSSSSSSS DD DD RRRRRRRRRRR NN NN NN PPPPPPPPPPP MM MMM MM
XXX SSSSSSSSSS DD DD RRRRRRRRRRR NN NN NN PPPPPPPPPPP MM M MM
XX XX SS DD DD RR RR NN NN NN PP MM MM
XX XX SS DD DD RR RR NN NN NN PP MM MM
XX XX SS SS DD DD RR RR NN NN NN PP MM MM
XX XX SSSSSSSSSS DDDDDDDDDDD RR RR NN NNN PP MM MM
XX XX SSSSSSSSSS DDDDDDDDDD RR RR NN NN PP MM MM


VV VV CCCCCCCCCC JJ CCCCCCCCCC SSSSSSSSSS AAAAAAAA SSSSSSSSSS 44
VV VV CCCCCCCCCCCC JJ CCCCCCCCCCCC SSSSSSSSSSSS AAAAAAAAAA SSSSSSSSSSSS 444
VV VV CC CC JJ CC CC SS SS AA AA SS SS 4444
VV VV CC JJ CC SS AA AA SS 44 44
VV VV CC JJ CC SS AA AA SS 44 44
VV VV CC JJ CC SSSSSSSSSS AAAAAAAAAA SSSSSSSSSS 44 44
VV VV CC JJ CC SSSSSSSSSS AAAAAAAAAA SSSSSSSSSS 44 44
VV VV CC JJ CC SS AA AA SS 444444444444
VV VV CC JJ CC SS AA AA SS 444444444444
VV VV CC CC JJ JJ CC CC SS SS AA AA SS 44
VVV CCCCCCCCCCCC JJJJJJJJJJJJ CCCCCCCCCCCC SSSSSSSSSSSS AA AA SSSSSSSSSSSS 44
V CCCCCCCCCC JJJJJJJJJJ CCCCCCCCCC SSSSSSSSSS AA AA SSSSSSSSSS 44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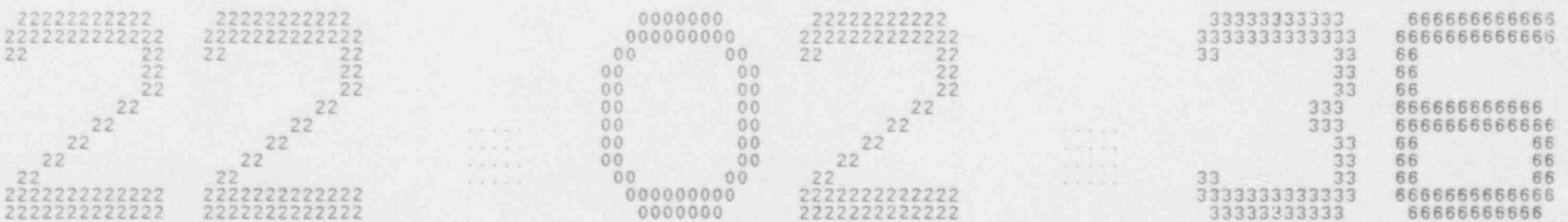
000000000 444 // 000000000 6666666666 // 9999999999 3333333333
00 00 4444 // 00 00 66 // 99 99 33 33
00 00 44 44 // 00 00 66 // 99 99 33
00 00 44 44 // 00 00 66 // 99 99 33
00 00 44 44 // 00 00 6666666666 // 9999999999 333
00 00 44 44 // 00 00 6666666666 // 9999999999 333
00 00 444444444444 // 00 00 66 66 // 99 33
00 00 444444444444 // 00 00 66 66 // 99 33
00 00 44 // 00 00 66 66 // 99 33 33
000000000 44 // 000000000 6666666666 // 9999999999 3333333333
0000000 44 // 0000000 66666666666 // 999999999 33333333


22222222222 22222222222 0000000 22222222222 33333333333 6666666666
2222222222222 2222222222222 000000000 2222222222222 3333333333333 6666666666
22 22 22 22 00 00 22 22 33 33 66
22 22 22 22 00 00 22 22 33 66
22 22 22 22 00 00 22 33 66
22 22 00 00 333 666666666
22 22 00 00 333 666666666
22 22 00 00 33 66
22 22 00 00 33 66
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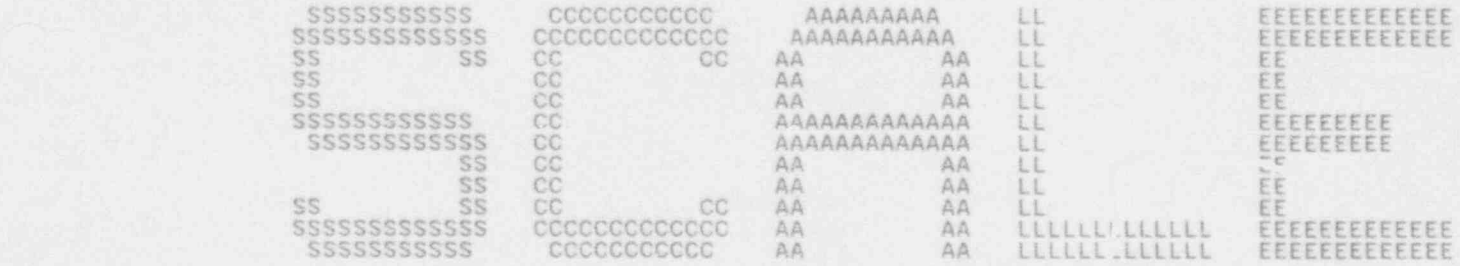

PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: XSDRN

CREATION DATE: 91.287

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: XSDRN

REVISION: 1.5

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.02.37

SPHERE OPTIMIZATION U02F2 SOLUTION DENSITY VARIATION

```
    0$ ARRAY     11 ENTRIES READ
    1$ ARRAY     15 ENTRIES READ
    2$ ARRAY     10 ENTRIES READ
    3$ ARRAY     12 ENTRIES READ
    5* ARRAY     12 ENTRIES READ
    0T
DIRECT ACCESS UNIT   9 REQUIRES     8 BLOCKS OF LENGTH  704 FOR CROSS SECTION MIXING.
```

SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

GENERAL PROBLEM DESCRIPTION DATA BLOCK

GENERAL PROBLEM DATA

IGE	1/2/3 = PLANE/CYLINDER/SPHERE	3	ISN	QUADRATURE ORDER	16
IZM	NUMBER OF ZONES	2	ISCT	ORDER OF SCATTERING	3
IM	NUMBER OF SPACIAL INTERVALS	58	IEVT	0/1/2/3/4/5/6=Q/K/ALPHA/C/Z/R/H	1
IBL	0/1/2/3 = VACUUM/REFL/PER/WHITE	1	IIM	INNER ITERATION MAXIMUM	10
IBR	RIGHT BOUNDARY CONDITION	0	ICM	OUTER ITERATION MAXIMUM	50
MXX	NUMBER OF MIXTURES	2	ICLC	-1/0/N--FLAT RES/SN/OPT	0
MS	MIXING TABLE LENGTH	2	ITH	0/1 = FORWARD/ADJOINT	0
IGM	NUMBER OF ENERGY GROUPS	27	IFLU	NOT USED(ALWAYS WGTD)	0
NNG	NUMBER OF NEUTRON GROUPS	27	IPRT	-2/-1/0/N=MIXTURE XSEC PRINT	-2
NGG	NUMBER OF GAMMA GROUPS	0	ID1	0/1/2/3=NO/PRT ND/PCH N/BOTH	0
IFTG	NUMBER OF FIRST THERMAL GROUP	15	IPBT	-1/0/1=NONE/FINE/ALL BAL. PRT	0

SPECIAL OPTIONS

IFG	0/1 = NONE/WEIGHTING CALCULATION	0	IPN	0/1/2 DIFF. COEF. PARAM	0
IQM	VOLUMETRIC SOURCES (0/N=NO/YES)	0	IDFM	0/1 = NONE/DENSITY FACTORS 38*	0
IPM	BOUNDARY SOURCES (0/N=NO/YES)	0	IAZ	0/N = NONE/N ACTIVITIES BY ZONE	0
IFN	0/1/2 = INPUT 33*/34*/USE LAST	1	IAI	0/1=NONE/ACTIVITIES BY INTERVAL	0
ITMX	MAXIMUM TIME (MINUTES)	0	IFCT	0/1=NO/YES UPSCATTER SCALING	0
IDT1	0/1/2/3=NO/XSECT/SRCE/FLUX--OUT	0	IPVT	0/1/2=NO/K/ALPHA PARAMETRIC SRCH	0
ISX	BROAD GROUP FLUXES	0	ISEN	OUTER ITERATION ACCELERATION	0
IBLN	ACTIVITY DATA UNIT	0	NBND	BAND REBALN PARAMETER	-1
JBKL	0/1/2 BUCKLING GEOMETRY	0			

FLOATING POINT PARAMETERS

EPS	OVERALL CONVERGENCE	1.00000E-04	DY	CYL/PLA HT FOR BUCKLING	0.00000E+00
PTC	POINT CONVERGENCE	1.00000E-04	DZ	PLANE DEPTH FOR BUCKLING	0.00000E+00
XNF	NORMALIZATION FACTOR	1.00000E+00	VSC	VOID STREAMING CORRECTION	0.00000E+00
EV	EIGENVALUE GUESS	0.00000E+00	PV	IPVT=1/2--K/ALPHA	0.00000E+00
EVM	EIGENVALUE MODIFIER	0.00000E+00	EQL	EV CHANGE EPS FOR SEARCH	1.00000E-03
BF	BUCKLING FACTOR=1.420892	1.42089E+00	XNPM	NEW PARAM MOD FOR SEARCH	7.50000E-01

THIS CASE WILL REQUIRE 1515 LOCATIONS FOR MIXING
THIS CASE HAS BEEN ALLOCATED 200000 LOCATIONS

SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

13$ ARRAY 2 ENTRIES READ

14$ ARRAY 2 ENTRIES READ

15* ARRAY 2 ENTRIES READ

0T

DATA BLOCK 2 (MIXING TABLE, ETC.)

NUCLIDES ON TAPE	CCCC IDENTIFICATION	MIXING TABLE MIXTURE	MIXING TABLE COMPONENT	ATOM DENSITY	EXTRA XSECT ID'S
1 1		1	1	1.00000E+00	
2 2		2	2	1.00000E+00	

ELAPSED TIME 0.01 MIN.

30919 LOCATIONS WILL BE USED

34* ARRAY 116 ENTRIES READ

0T

35* ARRAY 59 ENTRIES READ

36$ ARRAY 58 ENTRIES READ

39$ ARRAY 2 ENTRIES READ

40$ ARRAY 2 ENTRIES READ

0T

SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
NEUTRON GROUP PARAMETERS

GP	ENERGY BOUNDARIES	LETHARGY BOUNDARIES	MID PT VELOCITIES	BROAD GP NUMBERS	CALC TYPE	GROUP BAND	RIGHT ALBEDO	LEFT ALBEDO
1	2.00000E+07	-6.93147E-01	4.60581E+09	0	0	1		
2	6.43400E+06	4.40988E-01	2.88737E+09	0	0	2		
3	3.00000E+06	1.20397E+00	2.12201E+09	0	0	3		
4	1.85000E+06	1.68740E+00	1.75673E+09	0	0	4		
5	1.40000E+06	1.96611E+00	1.46535E+09	0	0	5		
6	9.00000E+05	2.40795E+00	1.06619E+09	0	0	6		
7	4.00000E+05	3.21888E+00	6.07557E+08	0	0	7		
8	1.00000E+05	4.60517E+00	2.72415E+08	0	0	8		
9	1.70000E+04	6.37713E+00	1.13526E+08	0	0	9		
10	3.00000E+03	8.11173E+00	4.82126E+07	0	0	10		
11	5.50000E+02	9.80818E+00	2.05946E+07	0	0	11		
12	1.00000E+02	1.15129E+01	1.01036E+07	0	0	12		
13	3.00000E+01	1.27169E+01	5.69594E+06	0	0	13		
14	1.00000E+01	1.38155E+01	3.20957E+06	0	0	14		
15	3.04999E+00	1.50030E+01	2.10601E+06	0	0	15		
16	1.77000E+00	1.55471E+01	1.70521E+06	0	0	15		
17	1.29999E+00	1.58557E+01	1.52544E+06	0	0	15		
18	1.12999E+00	1.59959E+01	1.42867E+06	0	0	15		
19	1.00000E+00	1.61181E+01	1.31002E+06	0	0	15		
20	8.00000E-01	1.63412E+01	9.05898E+05	0	0	15		
21	4.00000E-01	1.70344E+01	8.13318E+05	0	0	15		
22	3.25000E-01	1.72420E+01	6.90069E+05	0	0	15		
23	2.25000E-01	1.76098E+01	4.86933E+05	0	0	15		
24	9.99998E-02	1.84207E+01	3.57766E+05	0	0	15		
25	5.00000E-02	1.91138E+01	2.71895E+05	0	0	15		
26	3.00000E-02	1.96246E+01	1.87283E+05	0	0	15		
27	1.00000E-02	2.07233E+01	8.88202E+04	0	0	15		
28	1.00000E-05	2.76310E+01						

SPHERE OPTIMIZATION U02F2 SOLUTION DENSITY VARIATION

	MIXTURE BY ZONE	ORDER P(L) BY ZONE	ACTIVITY TABLE MATL NO.	ACTIVITY TABLE REACTION	QUADRATURE CONSTANTS WEIGHTS	DIRECTIONS	REFL DIREC	WT X COS
1	1	3			0	-1.00000E+00	17	0
2	2	3			1.35762E-02	-9.89401E-01	17	-1.34323E-02
3					3.11268E-02	-9.44575E-01	16	-2.94016E-02
4					4.75793E-02	-8.65631E-01	15	-4.11861E-02
5					6.23145E-02	-7.55404E-01	14	-4.70726E-02
6					7.47980E-02	-6.17876E-01	13	-4.62159E-02
7					8.45782E-02	-4.58017E-01	12	-3.87382E-02
8					9.13017E-02	-2.81604E-01	11	-2.57109E-02
9					9.47253E-02	-9.50125E-02	10	-9.00008E-03
10					9.47253E-02	9.50125E-02	9	9.00008E-03
11					9.13017E-02	2.81604E-01	8	2.57109E-02
12					8.45782E-02	4.58017E-01	7	3.87382E-02
13					7.47980E-02	6.17876E-01	6	4.62159E-02
14					6.23145E-02	7.55404E-01	5	4.70726E-02
15					4.75793E-02	8.65631E-01	4	4.11861E-02
16					3.11268E-02	9.44575E-01	3	2.94016E-02
17					1.35762E-02	9.89401E-01	2	1.34323E-02

CONSTANTS FOR P(3) SCATTERING

ANGL	SET 1	SET 2	SET 3
1	-1.00000E+00	1.00000E+00	-9.99999E-01
2	-9.89401E-01	9.68370E-01	-9.37242E-01
3	-9.44575E-01	8.38332E-01	-6.90061E-01
4	-8.65631E-01	6.23976E-01	-3.23133E-01
5	-7.55404E-01	3.55953E-01	5.54553E-02
6	-6.17876E-01	7.26565E-02	3.37096E-01
7	-4.58017E-01	-1.85331E-01	4.46819E-01
8	-2.81604E-01	-3.81049E-01	3.66577E-01
9	-9.50125E-02	-4.86459E-01	1.40374E-01
10	9.50125E-02	-4.86459E-01	-1.40374E-01
11	2.81604E-01	-3.81049E-01	-3.66577E-01
12	4.58017E-01	-1.85331E-01	-4.46819E-01
13	6.17876E-01	7.26565E-02	-3.37096E-01
14	7.55404E-01	3.55953E-01	-5.54553E-02
15	8.65631E-01	6.23976E-01	3.23133E-01
16	9.44575E-01	8.38332E-01	6.90061E-01
17	9.89401E-01	9.68370E-01	9.37242E-01

INT	RADII	MID PTS	ZONE NO.	AREAS	VOLUMES	DENS FACT	RADIUS MOD	SPEC(INT)
1	0	4.45706E-01	1	0	2.96705E+00		0	
2	8.91413E-01	1.33712E+00	1	9.98545E+00	2.07693E+01		0	
3	1.78283E+00	2.22853E+00	1	3.99418E+01	5.63740E+01			
4	2.67424E+00	3.11994E+00	1	8.98690E+01	1.09781E+02			
5	3.56565E+00	4.01136E+00	1	1.59767E+02	1.80990E+02			
6	4.45706E+00	4.90277E+00	1	2.49636E+02	2.70001E+02			
7	5.34848E+00	5.79418E+00	1	3.59476E+02	3.76816E+02			
8	6.23989E+00	6.68560E+00	1	4.89287E+02	5.01431E+02			
9	7.13130E+00	7.57701E+00	1	6.39069E+02	6.43850E+02			
10	8.02272E+00	8.46842E+00	1	8.08821E+02	8.04073E+02			
11	8.91413E+00	9.35983E+00	1	9.98545E+02	9.82095E+02			
12	9.80554E+00	1.02512E+01	1	1.20824E+03	1.17792E+03			
13	1.06970E+01	1.11427E+01	1	1.43791E+03	1.39155E+03			
14	1.15884E+01	1.20341E+01	1	1.68754E+03	1.62298E+03			
15	1.24798E+01	1.29255E+01	1	1.95715E+03	1.87221E+03			
16	1.33712E+01	1.38169E+01	1	2.24673E+03	2.13925E+03			
17	1.42626E+01	1.47083E+01	1	2.55628E+03	2.42408E+03			
18	1.51540E+01	1.55997E+01	1	2.88580E+03	2.72669E+03			
19	1.60454E+01	1.64911E+01	1	3.23528E+03	3.04717E+03			
20	1.69368E+01	1.73825E+01	1	3.60474E+03	3.38536E+03			
21	1.78282E+01	1.82740E+01	1	3.99417E+03	3.74148E+03			
22	1.87197E+01	1.91654E+01	1	4.40358E+03	4.11531E+03			
23	1.96111E+01	2.00568E+01	1	4.83295E+03	4.50689E+03			
24	2.05025E+01	2.10025E+01	2	5.28229E+03	5.54416E+03			
25	2.15025E+01	2.20025E+01	2	5.81015E+03	6.08452E+03			
26	2.25025E+01	2.30025E+01	2	6.36313E+03	6.65008E+03			
27	2.35025E+01	2.40025E+01	2	6.94124E+03	7.24079E+03			
28	2.45025E+01	2.50025E+01	2	7.54449E+03	7.85655E+03			
29	2.55025E+01	2.60025E+01	2	8.17287E+03	8.49756E+03			
30	2.65025E+01	2.70025E+01	2	8.82639E+03	9.16362E+03			
31	2.75025E+01	2.80025E+01	2	9.50504E+03	9.85481E+03			
32	2.85025E+01	2.90025E+01	2	1.02088E+04	1.05712E+04			
33	2.95025E+01	3.00025E+01	2	1.09377E+04	1.13126E+04			
34	3.05025E+01	3.10025E+01	2	1.16918E+04	1.20792E+04			
35	3.15025E+01	3.20025E+01	2	1.24709E+04	1.28710E+04			
36	3.25025E+01	3.30025E+01	2	1.32753E+04	1.36879E+04			
37	3.35025E+01	3.40025E+01	2	1.41047E+04	1.45299E+04			
38	3.45025E+01	3.50025E+01	2	1.49593E+04	1.53971E+04			
39	3.55025E+01	3.60025E+01	2	1.58390E+04	1.62893E+04			
40	3.65025E+01	3.70025E+01	2	1.67438E+04	1.72067E+04			
41	3.75025E+01	3.80025E+01	2	1.76738E+04	1.81492E+04			
42	3.85025E+01	3.90025E+01	2	1.86289E+04	1.91169E+04			
43	3.95025E+01	4.00025E+01	2	1.96091E+04	2.01098E+04			
44	4.05025E+01	4.10025E+01	2	2.06145E+04	2.11276E+04			
45	4.15025E+01	4.20025E+01	2	2.16450E+04	2.21707E+04			
46	4.25025E+01	4.30025E+01	2	2.27007E+04	2.32390E+04			
47	4.35025E+01	4.40025E+01	2	2.37814E+04	2.43322E+04			
48	4.45025E+01	4.50025E+01	2	2.48873E+04	2.54507E+04			
49	4.55025E+01	4.60025E+01	2	2.60184E+04	2.65943E+04			
50	4.65025E+01	4.70025E+01	2	2.71745E+04	2.77630E+04			
51	4.75025E+01	4.80025E+01	2	2.83558E+04	2.89570E+04			
52	4.85025E+01	4.90025E+01	2	2.95623E+04	3.01760E+04			
53	4.95025E+01	5.00025E+01	2	3.07938E+04	3.14200E+04			
54	5.05025E+01	5.10025E+01	2	3.20505E+04	3.26897E+04			
55	5.15025E+01	5.20025E+01	2	3.33324E+04	3.39837E+04			
56	5.25025E+01	5.30025E+01	2	3.46393E+04	3.53033E+04			
57	5.35025E+01	5.40025E+01	2	3.59714E+04	3.66480E+04			
58	5.45025E+01	5.50025E+01	2	3.73287E+04	3.80177E+04			
59	5.55025E+01			3.87110E+04				

ELAPSED TIME 0 01 MIN.

OUTER ITER	INNER ITERS	1 - BALANCE	EIGENVALUE	1 - SOURCE RATIO	1 - SCATTER RATIO	1 - UPSCAT RATIO	SEARCH PARAMETER	TIME (MIN)
1	0	6.52256E-16	1.10262E+00	5.86606E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0157
2	224	1.08052E-02	1.01779E+00	-2.18879E+00	-6.35907E-01	-5.80859E-02	0.00000E+00	0.0998
3	436	4.36915E-03	1.07035E+00	8.20726E-02	-2.46000E-01	-1.94265E-02	0.00000E+00	0.1815
4	637	2.31144E-03	1.05423E+00	6.42141E-02	-1.43940E-01	-9.45349E-03	0.00000E+00	0.2597
5	832	1.24016E-03	1.04018E+00	4.32975E-02	-8.59291E-02	-4.89548E-03	0.00000E+00	0.3362
6	1012	6.69449E-04	1.03054E+00	2.68857E-02	-4.94629E-02	-2.60697E-03	0.00000E+00	0.4082
7	1185	3.61984E-04	1.02455E+00	1.58795E-02	-2.78602E-02	-1.40776E-03	0.00000E+00	0.4783
8	1353	1.94663E-04	1.02106E+00	9.07636E-03	-1.54674E-02	-7.62352E-04	0.00000E+00	0.5470
9	1519	1.03776E-04	1.01908E+00	5.07369E-03	-8.48156E-03	-4.12021E-04	0.00000E+00	0.6155
10	1683	5.47999E-05	1.01797E+00	2.79687E-03	-4.60554E-03	-2.22125E-04	0.00000E+00	0.6828
11	1841	2.85302E-05	1.01736E+00	1.52756E-03	-2.48208E-03	-1.19246E-04	0.00000E+00	0.7485
12	1999	1.44670E-05	1.01702E+00	8.26019E-04	-1.32612E-03	-6.34307E-05	0.00000E+00	0.8142
13	2146	7.05979E-06	1.01684E+00	4.43672E-04	-7.01044E-04	-3.34953E-05	0.00000E+00	0.8768
14	2295	3.17975E-06	1.01674E+00	2.36423E-04	-3.66630E-04	-1.74683E-05	0.00000E+00	0.9402
15	2442	1.18550E-06	1.01668E+00	1.25082E-04	-1.88929E-04	-8.98745E-06	0.00000E+00	1.0028
16	2586	1.84629E-07	1.01665E+00	6.58367E-05	-9.58268E-05	-4.56153E-06	0.00000E+00	1.0650

GRP TO GRP		INNER ITERS	MFD INT.	MAX. FLUX DIFFERENCE	MSF INT.	MAX. SCALE FACTOR	COARSE MESH
1	1	1	1	7.16349E-05	9	1.00002E+00	7
2	2	1	1	6.59556E-05	6	1.00004E+00	10
3	3	1	1	7.35713E-05	6	1.00003E+00	11
4	4	1	1	7.52640E-05	4	1.00003E+00	15
5	5	1	1	6.25197E-05	3	1.00004E+00	20
6	6	1	1	5.19499E-05	3	1.00005E+00	20
7	7	1	1	4.29276E-05	2	1.00005E+00	29
8	8	1	1	3.96246E-05	2	1.00006E+00	46
9	9	1	1	3.93846E-05	1	1.00006E+00	58
10	10	1	1	3.93065E-05	1	1.00005E+00	58
11	11	1	1	3.87336E-05	1	1.00005E+00	58
12	12	1	1	4.69576E-05	1	1.00004E+00	58
13	13	1	1	4.89547E-05	1	1.00004E+00	58
14	14	1	1	4.82367E-05	1	1.00004E+00	58
15	15	2	58	5.14041E-07	44	1.00000E+00	58
16	16	2	58	1.42010E-06	58	1.00000E+00	58
17	17	2	58	1.63592E-06	58	1.00000E+00	58
18	18	2	58	1.59630E-06	58	1.00000E+00	58
19	19	2	58	1.90037E-06	58	1.00000E+00	58
20	20	2	58	1.53291E-06	44	9.99999E-01	58
21	21	2	58	2.18654E-06	58	9.99999E-01	58
22	22	2	58	1.98868E-06	58	9.99999E-01	58
23	23	1	49	2.33971E-05	49	1.00004E+00	58
24	24	1	49	6.41587E-05	49	1.00012E+00	58
25	25	1	49	9.28523E-05	49	1.00013E+00	58
26	26	2	58	2.62853E-06	58	9.99996E-01	58
27	27	2	58	2.19667E-06	58	9.99998E-01	58

17	2623	-6.87087E-07	1.01668E+00	8.12067E-06	-3.80491E-05	-3.34055E-07	0.00000E+00	1.0795

FINAL MONITOR LAMBDA 1.01666E+00 PRODUCTION/ABSORPTION 1.01951E+00 ANGULAR FLUX ON 16

ELAPSED TIME 1.08 MIN

SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

INT.	ZONE NUMBER	RADIUS	INT. MIDPOINT	AREA	VOLUME	PROD DENSITY
1	1	0.00000E+00	4.45706E-01	0.00000E+00	2.96705E+00	1.38853E-04
2	1	8.91413E-01	1.33712E+00	9.98545E+00	2.07693E+01	9.69277E-04
3	1	1.78283E+00	2.22853E+00	3.99418E+01	5.63740E+01	2.61319E-03
4	1	2.67424E+00	3.11994E+00	8.98690E+01	1.09781E+02	5.03572E-03
5	1	3.56565E+00	4.01136E+00	1.59767E+02	1.80990E+02	8.18510E-03
6	1	4.45706E+00	4.90277E+00	2.49636E+02	2.70001E+02	1.19927E-02
7	1	5.34848E+00	5.79418E+00	3.59476E+02	3.76816E+02	1.63763E-02
8	1	6.23989E+00	6.68560E+00	4.89287E+02	5.01431E+02	2.12365E-02
9	1	7.13130E+00	7.57701E+00	6.39069E+02	6.43850E+02	2.64670E-02
10	1	8.02272E+00	8.46842E+00	8.08821E+02	8.04073E+02	3.19414E-02
11	1	8.91413E+00	9.35983E+00	9.98545E+02	9.82095E+02	3.75379E-02
12	1	9.80554E+00	1.02512E+01	1.20824E+03	1.17792E+03	4.31063E-02
13	1	1.06970E+01	1.11427E+01	1.43791E+03	1.39155E+03	4.85238E-02
14	1	1.15884E+01	1.20341E+01	1.68754E+03	1.62298E+03	5.36210E-02
15	1	1.24798E+01	1.29255E+01	1.95715E+03	1.87221E+03	5.83024E-02
16	1	1.33712E+01	1.38169E+01	2.24673E+03	2.13925E+03	6.23997E-02
17	1	1.42626E+01	1.47083E+01	2.55628E+03	2.42408E+03	6.59364E-02
18	1	1.51540E+01	1.55997E+01	2.88580E+03	2.72669E+03	6.88475E-02
19	1	1.60454E+01	1.64911E+01	3.23528E+03	3.04717E+03	7.16351E-02
20	1	1.69368E+01	1.73825E+01	3.60474E+03	3.38536E+03	7.48435E-02
21	1	1.78282E+01	1.82740E+01	3.99417E+03	3.74148E+03	8.10985E-02
22	1	1.87197E+01	1.91654E+01	4.40358E+03	4.11531E+03	9.41470E-02
23	1	1.96111E+01	2.00568E+01	4.83295E+03	4.50689E+03	1.31702E-01
24	2	2.05025E+01	2.10025E+01	5.28229E+03	5.54416E+03	0.00000E+00
25	2	2.15025E+01	2.20025E+01	5.81015E+03	6.08452E+03	0.00000E+00
26	2	2.25025E+01	2.30025E+01	6.36313E+03	6.65008E+03	0.00000E+00
27	2	2.35025E+01	2.40025E+01	6.94124E+03	7.24079E+03	0.00000E+00
28	2	2.45025E+01	2.50025E+01	7.54449E+03	7.85656E+03	0.00000E+00
29	2	2.55025E+01	2.60025E+01	8.17287E+03	8.49756E+03	0.00000E+00
30	2	2.65025E+01	2.70025E+01	8.82639E+03	9.16362E+03	0.00000E+00
31	2	2.75025E+01	2.80025E+01	9.50504E+03	9.85481E+03	0.00000E+00
32	2	2.85025E+01	2.90025E+01	1.02088E+04	1.05712E+04	0.00000E+00
33	2	2.95025E+01	3.00025E+01	1.09377E+04	1.13126E+04	0.00000E+00
34	2	3.05025E+01	3.10025E+01	1.16918E+04	1.20792E+04	0.00000E+00
35	2	3.15025E+01	3.20025E+01	1.24709E+04	1.28710E+04	0.00000E+00
36	2	3.25025E+01	3.30025E+01	1.32753E+04	1.36879E+04	0.00000E+00
37	2	3.35025E+01	3.40025E+01	1.41047E+04	1.45299E+04	0.00000E+00
38	2	3.45025E+01	3.50025E+01	1.49593E+04	1.53971E+04	0.00000E+00
39	2	3.55025E+01	3.60025E+01	1.58390E+04	1.62893E+04	0.00000E+00
40	2	3.65025E+01	3.70025E+01	1.67438E+04	1.72067E+04	0.00000E+00
41	2	3.75025E+01	3.80025E+01	1.76738E+04	1.81492E+04	0.00000E+00
42	2	3.85025E+01	3.90025E+01	1.86289E+04	1.91169E+04	0.00000E+00
43	2	3.95025E+01	4.00025E+01	1.96091E+04	2.01098E+04	0.00000E+00
44	2	4.05025E+01	4.10025E+01	2.06145E+04	2.11276E+04	0.00000E+00
45	2	4.15025E+01	4.20025E+01	2.16450E+04	2.21707E+04	0.00000E+00
46	2	4.25025E+01	4.30025E+01	2.27007E+04	2.32390E+04	0.00000E+00
47	2	4.35025E+01	4.40025E+01	2.37814E+04	2.43322E+04	0.00000E+00
48	2	4.45025E+01	4.50025E+01	2.48873E+04	2.54507E+04	0.00000E+00
49	2	4.55025E+01	4.60025E+01	2.60184E+04	2.65943E+04	0.00000E+00
50	2	4.65025E+01	4.70025E+01	2.71745E+04	2.77630E+04	0.00000E+00
51	2	4.75025E+01	4.80025E+01	2.83558E+04	2.89570E+04	0.00000E+00
52	2	4.85025E+01	4.90025E+01	2.95623E+04	3.01760E+04	0.00000E+00
53	2	4.95025E+01	5.00025E+01	3.07938E+04	3.14200E+04	0.00000E+00
54	2	5.05025E+01	5.10025E+01	3.20505E+04	3.26897E+04	0.00000E+00
55	2	5.15025E+01	5.20025E+01	3.33324E+04	3.39837E+04	0.00000E+00
56	2	5.25025E+01	5.30025E+01	3.46393E+04	3.53033E+04	0.00000E+00
57	2	5.35025E+01	5.40025E+01	3.59714E+04	3.66480E+04	0.00000E+00
58	2	5.45025E+01	5.50025E+01	3.73287E+04	3.80177E+04	0.00000E+00
59		5.55025E+01		3.87110E+04		

SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

TOTAL FLUX

INT	GRP 1	GRP 2	GRP 3	GRP 4	GRP 5	GRP 6	GRP 7	GRP 8
1	8.76320E-06	6.77633E-05	8.01849E-05	4.78280E-05	6.80944E-05	1.05017E-04	1.02060E-04	7.69075E-05
2	8.76973E-06	6.77452E-05	8.01456E-05	4.77893E-05	6.80144E-05	1.04875E-04	1.01889E-04	7.67558E-05
3	8.71523E-06	6.73091E-05	7.96268E-05	4.74783E-05	6.75696E-05	1.04187E-04	1.01219E-04	7.62483E-05
4	8.62984E-06	6.66308E-05	7.88204E-05	4.69954E-05	6.68790E-05	1.03120E-04	1.00179E-04	7.54628E-05
5	8.51213E-06	6.57031E-05	7.77196E-05	4.63374E-05	6.59411E-05	1.01673E-04	9.87719E-05	7.44021E-05
6	8.36577E-06	6.45495E-05	7.63507E-05	4.55192E-05	6.47745E-05	9.98721E-05	9.70218E-05	7.30831E-05
7	8.19077E-06	6.31717E-05	7.47162E-05	4.45429E-05	6.33728E-05	9.77246E-05	9.49053E-05	7.15114E-05
8	7.98908E-06	6.15847E-05	7.28332E-05	4.34180E-05	6.17797E-05	9.52511E-05	9.25320E-05	6.97007E-05
9	7.76157E-06	5.97955E-05	7.07106E-05	4.21497E-05	5.99726E-05	9.24629E-05	8.98231E-05	6.76606E-05
10	7.51014E-06	5.78192E-05	6.83657E-05	4.07489E-05	5.79763E-05	8.93823E-05	8.68309E-05	6.54064E-05
11	7.23629E-06	5.56660E-05	6.58106E-05	3.92224E-05	5.58007E-05	8.60251E-05	8.35695E-05	6.29505E-05
12	6.94221E-06	5.33543E-05	6.30672E-05	3.75834E-05	5.34653E-05	8.24200E-05	8.00663E-05	6.03107E-05
13	6.62959E-06	5.08950E-05	6.01481E-05	3.58391E-05	5.09787E-05	7.85806E-05	7.63361E-05	5.75012E-05
14	6.30142E-06	4.83157E-05	5.70855E-05	3.40090E-05	4.83706E-05	7.45491E-05	7.24138E-05	5.45419E-05
15	5.95949E-06	4.56263E-05	5.38907E-05	3.20988E-05	4.56463E-05	7.03353E-05	6.83115E-05	5.14468E-05
16	5.60845E-06	4.28693E-05	5.06138E-05	3.01396E-05	4.28522E-05	6.59993E-05	6.40748E-05	4.82363E-05
17	5.24950E-06	4.00469E-05	4.72565E-05	2.81298E-05	3.99837E-05	6.15385E-05	5.97048E-05	4.49190E-05
18	4.89128E-06	3.72412E-05	4.39143E-05	2.61288E-05	3.71255E-05	5.70541E-05	5.52622E-05	4.15095E-05
19	4.53109E-06	3.44144E-05	4.05413E-05	2.41058E-05	3.42299E-05	5.24880E-05	5.07107E-05	3.79965E-05
20	4.18803E-06	3.17447E-05	3.73410E-05	2.21801E-05	3.14609E-05	4.80178E-05	4.61256E-05	3.43729E-05
21	3.83835E-06	2.90037E-05	3.40430E-05	2.01889E-05	2.85875E-05	4.33633E-05	4.13257E-05	3.05685E-05
22	3.52217E-06	2.65468E-05	3.10417E-05	1.83521E-05	2.58782E-05	3.87680E-05	3.63540E-05	2.65202E-05
23	3.01249E-06	2.23310E-05	2.59487E-05	1.52643E-05	2.13861E-05	3.19637E-05	2.99060E-05	2.19256E-05
24	2.17158E-06	1.50613E-05	1.73316E-05	1.01216E-05	1.409.9E-05	2.19342E-05	2.16304E-05	1.37824E-05
25	1.62393E-06	1.03500E-05	1.17470E-05	6.73651E-06	9.20381E-06	1.47611E-05	1.52484E-05	1.23551E-05
26	1.28595E-06	7.68534E-06	8.33448E-06	4.90852E-06	6.64291E-06	1.08048E-05	1.12673E-05	9.17026E-06
27	1.03968E-06	5.82907E-06	6.47759E-06	3.63431E-06	4.84775E-06	7.91270E-06	8.31509E-06	6.81541E-06
28	8.55202E-07	4.51828E-06	4.97181E-06	2.76313E-06	3.64987E-06	5.96567E-06	6.25442E-06	5.10700E-06
29	7.09494E-07	3.53283E-06	3.84773E-06	2.11394E-06	2.75818E-06	4.49135E-06	4.70583E-06	3.84682E-06
30	5.93964E-07	2.79435E-06	3.01437E-06	1.64133E-06	2.12334E-06	3.44651E-06	3.59414E-06	2.92310E-06
31	5.00211E-07	2.22336E-06	2.37482E-06	1.28001E-06	1.63875E-06	2.64279E-06	2.74765E-06	2.23404E-06
32	4.23661E-07	1.78185E-06	1.88523E-06	1.00764E-06	1.28062E-06	2.05517E-06	2.12758E-06	1.72164E-06
33	3.60429E-07	1.43476E-06	1.50337E-06	7.96375E-07	1.00349E-06	1.59910E-06	1.64957E-06	1.33393E-06
34	3.07891E-07	1.16110E-06	1.20513E-06	6.33453E-07	7.93235E-07	1.25746E-06	1.29290E-06	1.04131E-06
35	2.63928E-07	9.43308E-07	9.69721E-07	5.05711E-07	6.28948E-07	9.90469E-07	1.01495E-06	8.16769E-07
36	2.26958E-07	7.69312E-07	7.83355E-07	4.05633E-07	5.01872E-07	7.86442E-07	8.03984E-07	6.44903E-07
37	1.95714E-07	6.29471E-07	6.34847E-07	3.26452E-07	4.01748E-07	6.25953E-07	6.38022E-07	5.11322E-07
38	1.69201E-07	5.16662E-07	5.18106E-07	2.63699E-07	3.23158E-07	5.01294E-07	5.10091E-07	4.07761E-07
39	1.46618E-07	4.25267E-07	4.26738E-07	2.13653E-07	2.60753E-07	4.02573E-07	4.08622E-07	3.26347E-07
40	1.27317E-07	3.50972E-07	3.43897E-07	1.73637E-07	2.11215E-07	3.24866E-07	3.29328E-07	2.62504E-07
41	1.10770E-07	2.90374E-07	2.81772E-07	1.41499E-07	1.71590E-07	2.62904E-07	2.65975E-07	2.11813E-07
42	9.65447E-08	2.40801E-07	2.31400E-07	1.15616E-07	1.39848E-07	2.13596E-07	2.15875E-07	1.71658E-07
43	8.42836E-08	2.00132E-07	1.90443E-07	9.46981E-08	1.14285E-07	1.74014E-07	1.75583E-07	1.39494E-07
44	7.36904E-08	1.66681E-07	1.57056E-07	7.77470E-08	9.36518E-08	1.42228E-07	1.43381E-07	1.13784E-07
45	6.45179E-08	1.39099E-07	1.29773E-07	6.39708E-08	7.69314E-08	1.16545E-07	1.17344E-07	9.30376E-08
46	5.65591E-08	1.16301E-07	1.07426E-07	5.27460E-08	6.33473E-08	9.57605E-08	9.63465E-08	7.63175E-08
47	4.96400E-08	9.74148E-08	8.90817E-08	4.35763E-08	5.22748E-08	7.88626E-08	7.92600E-08	6.27343E-08
48	4.36136E-08	8.17344E-08	7.39899E-08	3.60668E-08	4.32256E-08	6.50928E-08	6.53757E-08	5.17028E-08
49	3.83552E-08	6.86866E-08	6.15470E-08	2.99016E-08	3.58081E-08	5.38299E-08	5.40141E-08	4.26861E-08
50	3.37587E-08	5.78050E-08	5.12656E-08	2.48273E-08	2.97103E-08	4.45892E-08	4.47075E-08	3.53025E-08
51	2.97338E-08	4.87086E-08	4.27504E-08	2.06397E-08	2.46828E-08	3.69827E-08	3.70471E-08	2.92310E-08
52	2.62026E-08	4.10852E-08	3.56799E-08	1.71733E-08	2.05212E-08	3.06905E-08	3.07079E-08	2.42022E-08
53	2.30985E-08	3.46782E-08	2.97926E-08	1.42952E-08	1.70665E-08	2.54723E-08	2.54533E-08	2.00361E-08
54	2.03636E-08	2.92728E-08	2.48709E-08	1.18924E-08	1.41741E-08	2.10927E-08	2.10214E-08	1.65065E-08
55	1.79479E-08	2.46954E-08	2.07412E-08	9.88077E-09	1.17510E-08	1.74247E-08	1.73085E-08	1.35408E-08
56	1.58069E-08	2.07769E-08	1.72359E-08	8.16501E-09	9.65870E-09	1.42305E-08	1.40080E-08	1.08625E-08
57	1.39025E-08	1.74193E-08	1.42586E-08	6.71096E-09	7.88117E-09	1.14921E-08	1.11767E-08	8.52973E-09
58	1.21745E-08	1.43140E-08	1.15208E-08	5.31318E-09	6.06228E-09	8.53748E-09	7.87505E-09	5.68739E-09

INT	GRP 9	GRP 10	GRP 11	GRP 12	GRP 13	GRP 14	GRP 15	GRP 16
1	5.96691E-05	5.49058E-05	5.22616E-05	3.41693E-05	2.96298E-05	2.87259E-05	1.40529E-05	8.12130E-06
2	5.95395E-05	5.47808E-05	5.21391E-05	3.40886E-05	2.95598E-05	2.86578E-05	1.40197E-05	8.10221E-06
3	5.91437E-05	5.44149E-05	5.17897E-05	3.38588E-05	2.93611E-05	2.84650E-05	1.39253E-05	8.04763E-06
4	5.85329E-05	5.38520E-05	5.12531E-05	3.35087E-05	2.90564E-05	2.81694E-05	1.37807E-05	7.96405E-06
5	5.77098E-05	5.30942E-05	5.05315E-05	3.30367E-05	2.86469E-05	2.77723E-05	1.35863E-05	7.85169E-06
6	5.66861E-05	5.21519E-05	4.96343E-05	3.24498E-05	2.81379E-05	2.72786E-05	1.33448E-05	7.71205E-06
7	5.54670E-05	5.10300E-05	4.85662E-05	3.17514E-05	2.75321E-05	2.66911E-05	1.30572E-05	7.54580E-06
8	5.40621E-05	4.97372E-05	4.73353E-05	3.09463E-05	2.68336E-05	2.60136E-05	1.27257E-05	7.35416E-06
9	5.24798E-05	4.82811E-05	4.59490E-05	3.00396E-05	2.60470E-05	2.52505E-05	1.23521E-05	7.13817E-06
10	5.07308E-05	4.66714E-05	4.44158E-05	2.90364E-05	2.51765E-05	2.44058E-05	1.19386E-05	6.89913E-06
11	4.88258E-05	4.49177E-05	4.27453E-05	2.79434E-05	2.42277E-05	2.34852E-05	1.14876E-05	6.63833E-06
12	4.67768E-05	4.30306E-05	4.09465E-05	2.67655E-05	2.32049E-05	2.24920E-05	1.10014E-05	6.35710E-06
13	4.45980E-05	4.10209E-05	3.90297E-05	2.55101E-05	2.21143E-05	2.14330E-05	1.04822E-05	6.05681E-06
14	4.22956E-05	3.88987E-05	3.70031E-05	2.41813E-05	2.09592E-05	2.03103E-05	9.93231E-06	5.73872E-06
15	3.98878E-05	3.66742E-05	3.48763E-05	2.27861E-05	1.97459E-05	1.91315E-05	9.35409E-06	5.40427E-06
16	3.73823E-05	3.43542E-05	3.26541E-05	2.13264E-05	1.84759E-05	1.78966E-05	8.74963E-06	5.05473E-06
17	3.47868E-05	3.19449E-05	3.03434E-05	1.98088E-05	1.71560E-05	1.66156E-05	8.12183E-06	4.69199E-06
18	3.21025E-05	2.94455E-05	2.79434E-05	1.82318E-05	1.57860E-05	1.52870E-05	7.47399E-06	4.31817E-06
19	2.93250E-05	2.68550E-05	2.54598E-05	1.66058E-05	1.43783E-05	1.39302E-05	6.81245E-06	3.93734E-06
20	2.64371E-05	2.41636E-05	2.28903E-05	1.49302E-05	1.29363E-05	1.25472E-05	6.14599E-06	3.55483E-06
21	2.34168E-05	2.13740E-05	2.02602E-05	1.32382E-05	1.14966E-05	1.11903E-05	5.49193E-06	3.18090E-06
22	2.02334E-05	1.84925E-05	1.75920E-05	1.15443E-05	1.00784E-05	9.87345E-06	4.87262E-06	2.82730E-06
23	1.69044E-05	1.56157E-05	1.50275E-05	1.00048E-05	8.83626E-06	8.82019E-06	4.33440E-06	2.51771E-06
24	1.34388E-05	1.27100E-05	1.25261E-05	8.59947E-06	7.72983E-06	8.00204E-06	3.82067E-06	2.21884E-06
25	1.02093E-05	9.88038E-06	9.96752E-06	7.01381E-06	6.40931E-06	6.81209E-06	3.22922E-06	1.87677E-06
26	7.65475E-06	7.50761E-06	7.68416E-06	5.47330E-06	5.06299E-06	5.44932E-06	2.61450E-06	1.52491E-06
27	5.72620E-06	5.66018E-06	5.85206E-06	4.20877E-06	3.92628E-06	4.27065E-06	2.05843E-06	1.20518E-06
28	4.29229E-06	4.25665E-06	4.42398E-06	3.19729E-06	2.99936E-06	3.28194E-06	1.59201E-06	9.34687E-07
29	3.23448E-06	3.21101E-06	3.34636E-06	2.42676E-06	2.28394E-06	2.51075E-06	1.22004E-06	7.17740E-07
30	2.45193E-06	2.43240E-06	2.53572E-06	1.84012E-06	1.73464E-06	1.91033E-06	9.31173E-07	5.48428E-07
31	1.87178E-06	1.85460E-06	1.93253E-06	1.40303E-06	1.32316E-06	1.45924E-06	7.10995E-07	4.19032E-07
32	1.43823E-06	1.42237E-06	1.47988E-06	1.07314E-06	1.01178E-06	1.11536E-06	5.44239E-07	3.20797E-07
33	1.11281E-06	1.09862E-06	1.14142E-06	8.27199E-07	7.79310E-07	8.59052E-07	4.18515E-07	2.46685E-07
34	8.66247E-07	8.53486E-07	8.84990E-07	6.40242E-07	6.02613E-07	6.63379E-07	3.23457E-07	1.90592E-07
35	6.78622E-07	6.67498E-07	6.91083E-07	4.99553E-07	4.69680E-07	5.16782E-07	2.51461E-07	1.48128E-07
36	5.34473E-07	5.24753E-07	5.42256E-07	3.91267E-07	3.67487E-07	4.03696E-07	1.96578E-07	1.15742E-07
37	4.23340E-07	4.15032E-07	4.28297E-07	3.08819E-07	2.89737E-07	3.18117E-07	1.54585E-07	9.09769E-08
38	3.36859E-07	3.29723E-07	3.39682E-07	2.44513E-07	2.29188E-07	2.51244E-07	1.22173E-07	7.18744E-08
39	2.69385E-07	2.63357E-07	2.71008E-07	1.94974E-07	1.82578E-07	2.00069E-07	9.70740E-08	5.70935E-08
40	2.16274E-07	2.11151E-07	2.16964E-07	1.55857E-07	1.45831E-07	1.59571E-07	7.74979E-08	4.55577E-08
41	1.74402E-07	1.70097E-07	1.74621E-07	1.25393E-07	1.17229E-07	1.28241E-07	6.21492E-08	3.65280E-08
42	1.41107E-07	1.37468E-07	1.40944E-07	1.01074E-07	9.44308E-08	1.03167E-07	5.00503E-08	2.94034E-08
43	1.14612E-07	1.11562E-07	1.14300E-07	8.19467E-08	7.65965E-08	8.35727E-08	4.04615E-08	2.37674E-08
44	9.33572E-08	9.07850E-08	9.29109E-08	6.65319E-08	6.20815E-08	6.77360E-08	3.28310E-08	1.92770E-08
45	7.63046E-08	7.41491E-08	7.58403E-08	5.43002E-08	5.06367E-08	5.52461E-08	2.67253E-08	1.56911E-08
46	6.25151E-08	6.06989E-08	6.20238E-08	4.43600E-08	4.13487E-08	4.50649E-08	2.18250E-08	1.28088E-08
47	5.13710E-08	4.98473E-08	5.09097E-08	3.64078E-08	3.39177E-08	3.69660E-08	1.78699E-08	1.04874E-08
48	4.22916E-08	4.10070E-08	4.18447E-08	2.98956E-08	2.78399E-08	3.03124E-08	1.46697E-08	8.60590E-09
49	3.49043E-08	3.38241E-08	3.44984E-08	2.46446E-08	2.29378E-08	2.49745E-08	1.20653E-08	7.07804E-09
50	2.88368E-08	2.79239E-08	2.84559E-08	2.03083E-08	1.88939E-08	2.05513E-08	9.93838E-09	5.82781E-09
51	2.38662E-08	2.30940E-08	2.35187E-08	1.67803E-08	1.56012E-08	1.69666E-08	8.19032E-09	4.80252E-09
52	1.97358E-08	1.90784E-08	1.94063E-08	1.38289E-08	1.28482E-08	1.39551E-08	6.74132E-09	3.95067E-09
53	1.63207E-08	1.57544E-08	1.60016E-08	1.13917E-08	1.05705E-08	1.14717E-08	5.52998E-09	3.23986E-09
54	1.34128E-08	1.29169E-08	1.30842E-08	9.29185E-09	8.60701E-09	9.31972E-09	4.49237E-09	2.62949E-09
55	1.09588E-08	1.05052E-08	1.05919E-08	7.49683E-09	6.92307E-09	7.47765E-09	3.59332E-09	2.10149E-09
56	8.71637E-09	8.28636E-09	8.28707E-09	5.82972E-09	5.36035E-09	5.76450E-09	2.76626E-09	1.61529E-09
57	6.71998E-09	6.27686E-09	6.18811E-09	4.31528E-09	3.94294E-09	4.22002E-09	2.01600E-09	1.17532E-09
58	4.29917E-09	3.90470E-09	3.78333E-09	2.61315E-09	2.37239E-09	2.52793E-09	1.20348E-09	7.01155E-10

INT	GRP 17	GRP 18	GRP 19	GRP 20	GRP 21	GRP 22	GRP 23	GRP 24
1	3.69696E-06	3.22895E-06	6.00687E-06	1.98414E-05	6.08602E-06	1.16118E-05	4.12786E-05	5.95708E-05
2	3.68824E-06	3.22130E-06	5.99261E-06	1.97932E-05	6.07079E-06	1.15819E-05	4.11651E-05	5.93998E-05
3	3.66340E-06	3.19961E-06	5.95225E-06	1.96599E-05	6.02893E-06	1.15039E-05	4.08872E-05	5.89985E-05
4	3.62534E-06	3.16627E-06	5.89040E-06	1.94555E-05	5.96719E-06	1.12841E-05	4.04607E-05	5.83820E-05

5	3.57419E-06	3.12169E-06	5.80728E-06	1.91809E-05	5.88297E-06	1.12234E-05	3.98894E-05	5.75579E-05
6	3.51062E-06	3.06616E-06	5.70396E-06	1.88396E-05	5.77824E-06	1.10236E-05	3.91784E-05	5.65308E-05
7	3.43493E-06	3.00005E-06	5.58097E-06	1.84332E-05	5.65360E-06	1.07857E-05	3.83326E-05	5.53107E-05
8	3.34768E-06	2.92384E-06	5.43916E-06	1.79646E-05	5.50983E-06	1.05114E-05	3.73565E-05	5.39006E-05
9	3.24934E-06	2.83794E-06	5.27934E-06	1.74365E-05	5.34783E-06	1.02022E-05	3.62570E-05	5.23143E-05
10	3.14050E-06	2.74286E-06	5.10243E-06	1.68519E-05	5.16843E-06	9.85984E-06	3.50386E-05	5.05541E-05
11	3.02175E-06	2.63914E-06	4.90941E-06	1.62139E-05	4.97270E-06	9.48633E-06	3.37105E-05	4.86382E-05
12	2.89368E-06	2.52725E-06	4.70121E-06	1.55257E-05	4.76149E-06	9.08324E-06	3.22768E-05	4.65674E-05
13	2.75693E-06	2.40780E-06	4.47890E-06	1.47908E-05	4.53802E-06	8.65311E-06	3.07495E-05	4.43669E-05
14	2.61206E-06	2.28123E-06	4.24338E-06	1.40122E-05	4.29709E-06	8.19737E-06	2.91335E-05	4.20367E-05
15	2.45978E-06	2.14820E-06	3.99582E-06	1.31941E-05	4.04618E-06	7.71932E-06	2.74469E-05	3.96175E-05
16	2.30060E-06	2.00916E-06	3.73715E-06	1.23397E-05	3.78414E-06	7.22076E-06	2.57001E-05	3.71175E-05
17	2.13554E-06	1.86503E-06	3.46908E-06	1.14552E-05	3.51328E-06	6.70722E-06	2.39308E-05	3.46215E-05
18	1.96548E-06	1.71656E-06	3.19317E-06	1.05464E-05	3.23520E-06	6.18282E-06	2.21751E-05	3.21856E-05
19	1.79251E-06	1.56570E-06	2.91300E-06	9.62586E-06	2.95456E-06	5.65974E-06	2.05363E-05	3.00421E-05
20	1.61890E-06	1.41434E-06	2.63241E-06	8.70698E-06	2.67514E-06	5.14933E-06	1.91480E-05	2.84573E-05
21	1.44972E-06	1.26715E-06	2.35964E-06	7.81716E-06	2.40704E-06	4.68081E-06	1.83341E-05	2.82328E-05
22	1.28960E-06	1.12781E-06	2.10209E-06	6.97981E-06	2.15645E-06	4.27755E-06	1.85298E-05	3.05628E-05
23	1.15113E-06	1.00856E-06	1.87942E-06	6.25879E-06	1.95057E-06	4.01462E-06	2.06400E-05	3.86160E-05
24	1.02058E-06	8.98010E-07	1.66814E-06	5.56663E-06	1.76613E-06	3.84621E-06	2.46785E-05	5.32422E-05
25	8.66152E-07	7.63996E-07	1.41802E-06	4.74512E-06	1.52424E-06	3.52252E-06	2.73265E-05	6.38514E-05
26	7.04638E-07	6.22027E-07	1.15657E-06	3.[illegible]9E-06	1.25686E-06	3.05529E-06	2.69612E-05	6.51295E-05
27	5.58120E-07	4.93321E-07	9.18368E-07	3.[illegible]E-06	1.00981E-06	2.56445E-06	2.48190E-05	6.11632E-05
28	4.33371E-07	3.83333E-07	7.14593E-07	2.41[illegible]6E-06	7.93307E-07	2.09443E-06	2.18023E-05	5.44826E-05
29	3.33194E-07	2.94942E-07	5.50211E-07	1.86653E-06	6.16103E-07	1.68373E-06	1.85808E-05	4.69262E-05
30	2.54706E-07	2.25528E-07	4.21015E-07	1.43070E-06	4.74469E-07	1.33708E-06	1.54834E-05	3.94177E-05
31	1.94715E-07	1.72466E-07	3.22018E-07	1.09543E-06	3.64902E-07	1.05568E-06	1.27107E-05	3.25639E-05
32	1.49056E-07	1.32020E-07	2.46564E-07	8.39184E-07	2.80429E-07	8.30182E-07	1.03142E-05	2.65505E-05
33	1.14641E-07	1.01550E-07	1.89630E-07	6.45506E-07	2.16359E-07	6.52549E-07	8.30903E-06	2.14699E-05
34	8.85437E-08	7.84177E-08	1.46443E-07	4.98429E-07	1.67367E-07	5.12513E-07	6.65485E-06	1.72429E-05
35	6.88196E-08	6.09509E-08	1.13792E-07	3.87197E-07	1.30261E-07	4.03511E-07	5.31481E-06	1.38005E-05
36	5.37498E-08	4.75922E-08	8.88515E-08	3.02216E-07	1.01747E-07	3.17971E-07	4.23407E-06	1.10098E-05
37	4.22507E-08	3.74111E-08	6.9[illegible]08	2.37395E-07	8.00064E-08	2.51500E-07	3.37247E-06	8.77915E-06
38	3.33641E-08	2.95345E-08	5[illegible]8	1.87328E-07	6.31301E-08	1.99237E-07	2.68488E-06	6.99296E-06
39	2.65046E-08	2.34632E-08	4[illegible]E-0	1.48714E-07	5.01403E-08	1.58524E-07	2.14068E-06	5.57804E-06
40	2.11398E-08	1.87091E-08	3.[illegible]	1.18532E-07	3.99407E-08	1.26356E-07	1.70797E-06	4.45028E-06
41	1.69516E-08	1.50033E-08	2.7[illegible]	9.49920E-08	3.20128E-08	1.01183E-07	1.36621E-06	3.55997E-06
42	1.36393E-08	1.20687E-08	2.2511[illegible]E-0	7.63844E-08	2.57183E-08	8.11669E-08	1.09432E-06	2.85024E-06
43	1.10266E-08	9.75750E-09	1.81949E-08	6.17215E-08	2.07803E-08	6.54179E-08	8.79320E-07	2.28988E-06
44	8.93954E-09	7.90880E-09	1.47485E-08	5.00123E-08	1.68193E-08	5.28054E-08	7.07704E-07	1.84168E-06
45	7.27781E-09	6.43923E-09	1.20048E-08	4.06992E-08	1.36857E-08	4.28216E-08	5.71539E-07	1.48695E-06
46	5.93860E-09	5.25314E-09	9.79426E-09	3.31938E-08	1.11483E-08	3.47651E-08	4.62259E-07	1.20158E-06
47	4.86320E-09	4.30228E-09	8.01940E-09	2.71736E-08	9.12504E-09	2.83454E-08	3.75095E-07	9.74732E-07
48	3.98919E-09	3.52831E-09	6.57723E-09	2.22796E-08	7.47163E-09	2.31211E-08	3.04612E-07	7.90738E-07
49	3.28153E-09	2.90267E-09	5.40965E-09	1.83213E-08	6.14320E-09	1.89256E-08	2.47959E-07	6.43471E-07
50	2.70086E-09	2.38853E-09	4.45171E-09	1.50716E-08	5.04630E-09	1.54745E-08	2.01638E-07	5.22585E-07
51	2.22599E-09	1.96871E-09	3.66830E-09	1.24163E-08	4.15558E-09	1.26718E-08	1.63947E-07	4.24713E-07
52	1.83035E-09	1.61838E-09	3.01554E-09	1.02015E-08	3.40820E-09	1.03258E-08	1.32551E-07	3.42781E-07
53	1.50104E-09	1.32721E-09	2.47212E-09	8.35901E-09	2.79004E-09	8.38129E-09	1.06410E-07	2.74926E-07
54	1.21750E-09	1.07611E-09	2.00410E-09	6.76997E-09	2.25364E-09	6.69742E-09	8.38738E-08	2.16093E-07
55	9.72779E-10	8.59679E-10	1.60014E-09	5.39968E-09	1.79361E-09	5.24756E-09	6.43394E-08	1.65380E-07
56	7.46986E-10	6.59747E-10	1.22748E-09	4.13377E-09	1.36636E-09	3.90987E-09	4.64791E-08	1.18752E-07
57	5.43234E-10	4.79624E-10	8.91494E-10	2.99359E-09	9.83140E-10	2.70314E-09	3.01657E-08	7.62146E-08
58	3.23362E-10	2.84931E-10	5.28507E-10	1.75317E-09	5.62449E-10	1.44554E-09	1.41489E-08	3.37610E-08

INT	GRP 25	GRP 26	GRP 27
1	3.90399E-05	3.51988E-05	7.48021E-06
2	3.89259E-05	3.50949E-05	7.45798E-06
3	3.86632E-05	3.48586E-05	7.40794E-06
4	3.82588E-05	3.44935E-05	7.33016E-06
5	3.77191E-05	3.40074E-05	7.22711E-06
6	3.70456E-05	3.33996E-05	7.09763E-06
7	3.62464E-05	3.26797E-05	6.94505E-06
8	3.53217E-05	3.18452E-05	6.76723E-06
9	3.42827E-05	3.09095E-05	6.56897E-06
10	3.31283E-05	2.98675E-05	6.34686E-06

11	3.18737E-05	2.87378E-05	6.10761E-06
12	3.05155E-05	2.75115E-05	5.84604E-06
13	2.90749E-05	2.62148E-05	5.57167E-06
14	2.75468E-05	2.48346E-05	5.27684E-06
15	2.59646E-05	2.34113E-05	4.97515E-06
16	2.43267E-05	2.19306E-05	4.65889E-06
17	2.27000E-05	2.04691E-05	4.35108E-06
18	2.11114E-05	1.90299E-05	4.03987E-06
19	1.97366E-05	1.78001E-05	3.78361E-06
20	1.87388E-05	1.68855E-05	3.57371E-06
21	1.87139E-05	1.68912E-05	3.59287E-06
22	2.05395E-05	1.84545E-05	3.84118E-06
23	2.73261E-05	2.57302E-05	5.52815E-06
24	4.02148E-05	4.07252E-05	9.45149E-06
25	4.94629E-05	5.10869E-05	1.19843E-05
26	5.06365E-05	5.21816E-05	1.21722E-05
27	4.76791E-05	4.91938E-05	1.14969E-05
28	4.25434E-05	4.38931E-05	1.02416E-05
29	3.66941E-05	3.78745E-05	8.84280E-06
30	3.08509E-05	3.18431E-05	7.42863E-06
31	2.55082E-05	2.63362E-05	6.14640E-06
32	2.08084E-05	2.14826E-05	5.01075E-06
33	1.68354E-05	1.73849E-05	4.05657E-06
34	1.35243E-05	1.39643E-05	3.25671E-06
35	1.08280E-05	1.11826E-05	2.60913E-06
36	8.63903E-06	8.92061E-06	2.08024E-06
37	6.89025E-06	7.11640E-06	1.66041E-06
38	5.48809E-06	5.66703E-06	1.32142E-06
39	4.37841E-06	4.52233E-06	1.05522E-06
40	3.49265E-06	3.60645E-06	8.40875E-07
41	2.79438E-06	2.88635E-06	6.73556E-07
42	2.23672E-06	2.30947E-06	5.38422E-07
43	1.79733E-06	1.85657E-06	4.33314E-07
44	1.44505E-06	1.49192E-06	3.47775E-07
45	1.16701E-06	1.20555E-06	2.81428E-07
46	9.42629E-07	9.73098E-07	2.26790E-07
47	7.64932E-07	7.90253E-07	1.84535E-07
48	6.20187E-07	6.40134E-07	1.49144E-07
49	5.04918E-07	5.21691E-07	1.21864E-07
50	4.09759E-07	4.22846E-07	9.84898E-08
51	3.33220E-07	3.44335E-07	8.04322E-08
52	2.68685E-07	2.77217E-07	6.46093E-08
53	2.15656E-07	2.22888E-07	5.20357E-08
54	1.69286E-07	1.74592E-07	4.07221E-08
55	1.29671E-07	1.34074E-07	3.12795E-08
56	9.28875E-08	9.56654E-08	2.23362E-08
57	5.96734E-08	6.17264E-08	1.44130E-08
58	2.56298E-08	2.59100E-08	5.99489E-09

ELAPSED TIME 1.08 MIN.

FINE GROUP SUMMARY FOR ZONE 1 BY GROUP INCLUDING SUM FOR ALL GROUPS IN LINE 28

GRP	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	2.12611E-02	0.00000E+00	1.06941E-02	1.24651E-02	1.53306E-03	7.85772E-03	9.99879E-01
2	0.00000E+00	1.88838E-01	6.22575E-03	1.43323E-01	1.37159E-01	5.69319E-03	5.22069E-02	1.00003E+00
3	0.00000E+00	2.14979E-01	6.57330E-02	1.34742E-01	2.18162E-01	4.01694E-03	5.85063E-02	1.00005E+00
4	0.00000E+00	1.24462E-01	9.28167E-02	8.32800E-02	1.83314E-01	1.86073E-03	3.20863E-02	1.00004E+00
5	0.00000E+00	1.65962E-01	1.61415E-01	2.22261E-01	2.85907E-01	1.14447E-03	4.03006E-02	1.00004E+00
6	0.00000E+00	1.80150E-01	3.14165E-01	5.09675E-01	4.38346E-01	1.48977E-03	5.44108E-02	1.00007E+00
7	0.00000E+00	8.94499E-02	4.91452E-01	7.92349E-01	5.37872E-01	1.65761E-03	4.13088E-02	1.00005E+00
8	0.00000E+00	1.38125E-02	5.71883E-01	9.02483E-01	5.59861E-01	2.97457E-03	2.28979E-02	9.99968E-01
9	0.00000E+00	1.00304E-03	5.54495E-01	8.01025E-01	5.36818E-01	4.91994E-03	1.38161E-02	9.99950E-01
10	0.00000E+00	7.45080E-05	5.35255E-01	7.58014E-01	5.15189E-01	9.50065E-03	1.06870E-02	9.99956E-01
11	0.00000E+00	5.86189E-06	5.18710E-01	7.36369E-01	4.89788E-01	2.00672E-02	8.88934E-03	9.99973E-01
12	0.00000E+00	4.11789E-07	4.24235E-01	4.09553E-01	3.92449E-01	2.67166E-02	5.07157E-03	9.99998E-01
13	0.00000E+00	6.53883E-08	3.83871E-01	3.31355E-01	3.53318E-01	2.65621E-02	3.99572E-03	9.99993E-01
14	0.00000E+00	1.29582E-08	3.77557E-01	3.29199E-01	3.33700E-01	4.06788E-02	3.17574E-03	1.00000E+00
15	0.00000E+00	1.46442E-09	2.13339E-01	1.20232E-01	2.09383E-01	2.21381E-03	1.73803E-03	1.00001E+00
16	0.00000E+00	4.30005E-10	1.37848E-01	5.35699E-02	1.35519E-01	1.30372E-03	1.02353E-03	1.00001E+00
17	0.00000E+00	1.38483E-10	7.20451E-02	1.65476E-02	7.01597E-02	1.43700E-03	4.47695E-04	1.00001E+00
18	0.00000E+00	9.91496E-11	6.43846E-02	1.41541E-02	6.23353E-02	1.67268E-03	3.77633E-04	9.99993E-01
19	0.00000E+00	1.40176E-10	1.08797E-01	3.76066E-02	1.05984E-01	2.10625E-03	7.05332E-04	1.00001E+00
20	0.00000E+00	2.27941E-10	2.62306E-01	2.44758E-01	2.51200E-01	8.99845E-03	2.11147E-03	9.99992E-01
21	0.00000E+00	3.33632E-11	1.16921E-01	5.33440E-02	1.11464E-01	4.95991E-03	4.99447E-04	9.99991E-01
22	0.00000E+00	3.87089E-11	2.03909E-01	1.46206E-01	1.90700E-01	1.27879E-02	4.24173E-04	9.99992E-01
23	0.00000E+00	3.70100E-11	5.73931E-01	9.38745E-01	5.26989E-01	5.36002E-02	-6.65087E-03	9.99994E-01
24	0.00000E+00	1.00737E-11	9.98021E-01	1.81355E+00	8.93491E-01	1.23725E-01	-1.91871E-02	9.99996E-01
25	0.00000E+00	2.94890E-12	9.91686E-01	1.26361E+00	8.91285E-01	1.14315E-01	-1.39061E-02	9.99996E-01
26	0.00000E+00	2.06779E-12	8.85986E-01	1.70702E+00	7.45117E-01	1.53916E-01	-1.30411E-02	9.99997E-01
27	0.00000E+00	4.92765E-13	3.29198E-01	4.22110E-01	2.68103E-01	6.38719E-02	-2.77613E-03	9.99999E-01
28	0.00000E+00	9.99998E-01	9.45618E+00	1.29958E+01	9.45607E+00	6.93723E-01	3.06976E-01	1.00000E+00

GRP	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	2.62789E-06	7.85772E-03	8.73299E-06	0.00000E+00	5.89462E-04	7.05881E-04	0.00000E+00	1.77946E-01
2	1.90378E-05	5.22069E-02	6.75990E-05	0.00000E+00	5.73354E-03	3.26559E-03	0.00000E+00	1.35496E+00
3	2.20118E-05	5.85063E-02	8.00104E-05	0.00000E+00	6.00000E+00	3.74871E-03	0.00000E+00	1.59564E+00
4	1.28955E-05	3.20863E-02	4.77412E-05	0.00000E+00	0.00000E+00	1.58288E-03	0.00000E+00	9.48367E-01
5	1.79859E-05	4.03006E-02	6.79983E-05	0.00000E+00	0.00000E+00	5.54806E-04	0.00000E+00	1.34544E+00
6	2.71978E-05	5.44108E-02	1.04887E-04	0.00000E+00	0.00000E+00	5.05738E-04	0.00000E+00	2.05890E+00
7	2.58712E-05	4.13088E-02	1.01970E-04	0.00000E+00	0.00000E+00	5.40057E-04	0.00000E+00	1.98322E+00
8	1.94088E-05	2.28979E-02	7.68637E-05	0.00000E+00	0.00000E+00	5.96975E-04	0.00000E+00	1.48311E+00
9	1.52151E-05	1.38161E-02	5.96464E-05	0.00000E+00	0.00000E+00	8.34407E-04	0.00000E+00	1.14570E+00
10	1.42067E-05	1.06870E-02	5.48898E-05	0.00000E+00	0.00000E+00	1.79054E-03	0.00000E+00	1.05173E+00
11	1.38134E-05	8.88934E-03	5.22480E-05	0.00000E+00	0.00000E+00	3.84980E-03	0.00000E+00	1.00014E+00
12	9.32525E-06	5.07157E-03	3.41614E-05	0.00000E+00	0.00000E+00	5.30947E-03	0.00000E+00	6.54309E-01
13	8.30916E-06	3.99572E-03	2.96230E-05	0.00000E+00	0.00000E+00	5.17409E-03	0.00000E+00	5.68135E-01
14	8.43737E-06	3.17574E-03	2.87190E-05	0.00000E+00	0.00000E+00	4.16356E-03	0.00000E+00	5.52340E-01
15	4.09511E-06	1.73803E-03	1.40503E-05	0.00000E+00	0.00000E+00	7.83142E-04	0.00000E+00	2.70491E-01
16	2.37911E-06	1.02353E-03	8.11969E-06	0.00000E+00	0.00000E+00	5.37003E-04	0.00000E+00	1.56442E-01
17	1.09067E-06	4.47695E-04	3.69625E-06	0.00000E+00	0.00000E+00	8.48066E-04	0.00000E+00	7.12535E-02
18	9.57466E-07	3.77633E-04	3.22835E-06	0.00000E+00	0.00000E+00	1.16098E-03	0.00000E+00	6.22565E-02
19	1.78203E-06	7.05332E-04	6.00582E-06	0.00000E+00	0.00000E+00	1.40050E-03	0.00000E+00	1.15856E-01
20	5.94074E-06	2.11147E-03	1.98391E-05	0.00000E+00	0.00000E+00	6.03420E-03	0.00000E+00	3.83141E-01
21	1.86745E-06	4.99447E-04	6.08583E-06	0.00000E+00	0.00000E+00	3.44272E-03	0.00000E+00	1.17774E-01
22	3.94032E-06	4.24173E-04	1.16124E-05	0.00000E+00	0.00000E+00	8.77768E-03	0.00000E+00	2.27279E-01
23	2.23742E-05	-6.65087E-03	4.12860E-05	0.00000E+00	0.00000E+00	3.66934E-02	0.00000E+00	8.61529E-01
24	4.48041E-05	-1.91871E-02	5.95808E-05	0.00000E+00	0.00000E+00	8.74828E-02	0.00000E+00	1.31020E+00
25	3.27224E-05	-1.39061E-02	3.90413E-05	0.00000E+00	0.00000E+00	8.18866E-02	0.00000E+00	8.71148E-01
26	3.19353E-05	-1.30411E-02	3.51866E-05	0.00000E+00	0.00000E+00	1.10931E-01	0.00000E+00	7.90136E-01
27	7.14029E-06	-2.77613E-03	7.46770E-06	0.00000E+00	0.00000E+00	4.61495E-02	0.00000E+00	1.67807E-01
28	3.77362E-04	3.06965E-01	1.07025E-03	0.00000E+00	5.95195E-04	4.18750E-01	0.00000E+00	2.13251E+01

FINE GROUP SUMMARY FOR ZONE 2 BY GROUP INCLUDING SUM FOR ALL GROUPS IN LINE 28

GRP	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	0.00000E+00	0.00000E+00	5.36302E-03	7.09878E-03	3.78284E-04	-7.47730E-03	0.00000E+00
2	0.00000E+00	0.00000E+00	4.07293E-03	4.20705E-02	5.53060E-02	5.91583E-04	-5.18231E-02	9.99805E-01
3	0.00000E+00	0.00000E+00	2.66499E-02	3.26010E-02	8.48502E-02	1.24374E-06	-5.82070E-02	1.00010E+00
4	0.00000E+00	0.00000E+00	3.44666E-02	1.93287E-02	6.64233E-02	6.77055E-07	-3.19624E-02	1.00007E+00
5	0.00000E+00	0.00000E+00	5.92020E-02	5.48396E-02	9.93694E-02	8.98050E-07	-4.01751E-02	1.00006E+00
6	0.00000E+00	0.00000E+00	1.11604E-01	1.39506E-01	1.65847E-01	1.53018E-06	-5.42528E-02	1.00004E+00
7	0.00000E+00	0.00000E+00	1.84245E-01	2.53822E-01	2.25414E-01	2.72847E-06	-4.11800E-02	1.00002E+00
8	0.00000E+00	0.00000E+00	2.37061E-01	3.46553E-01	2.59879E-01	7.01945E-06	-2.28137E-02	9.99976E-01
9	0.00000E+00	0.00000E+00	2.53655E-01	3.37656E-01	2.67411E-01	1.75975E-05	-1.37557E-02	9.99964E-01
10	0.00000E+00	0.00000E+00	2.52873E-01	3.40273E-01	2.73479E-01	4.20323E-05	-1.06334E-02	9.99973E-01
11	0.00000E+00	0.00000E+00	2.71640E-01	3.51174E-01	2.80382E-01	1.00476E-04	-8.83775E-03	9.99990E-01
12	0.00000E+00	0.00000E+00	2.38893E-01	2.07163E-01	2.43774E-01	1.46256E-04	-5.03600E-03	1.00002E+00
13	0.00000E+00	0.00000E+00	2.31212E-01	1.83174E-01	2.34930E-01	2.40564E-04	-3.96354E-03	1.00001E+00
14	0.00000E+00	0.00000E+00	2.43138E-01	2.05752E-01	2.45810E-01	4.61134E-04	-3.14138E-03	1.00002E+00
15	0.00000E+00	0.00000E+00	1.49706E-01	7.08960E-02	1.51083E-01	3.38672E-04	-1.72184E-03	1.00002E+00
16	0.00000E+00	0.00000E+00	9.71286E-02	3.08091E-02	9.78934E-02	2.44493E-04	-1.01406E-03	1.00002E+00
17	0.00000E+00	0.00000E+00	5.03251E-02	9.35510E-03	5.06422E-02	1.26512E-04	-4.43344E-04	9.99997E-01
18	0.00000E+00	0.00000E+00	4.51089E-02	8.20018E-03	4.53634E-02	1.19361E-04	-3.73817E-04	9.99999E-01
19	0.00000E+00	0.00000E+00	7.74031E-02	2.28277E-02	7.78571E-02	2.42413E-04	-6.98293E-04	1.00001E+00
20	0.00000E+00	0.00000E+00	1.91162E-01	1.63808E-01	1.92223E-01	1.03308E-03	-2.08884E-03	9.99987E-01
21	0.00000E+00	0.00000E+00	8.89746E-02	3.77156E-02	8.90483E-02	4.21719E-04	-4.92536E-04	9.99984E-01
22	0.00000E+00	0.00000E+00	2.11129E-01	1.45510E-01	2.10255E-01	1.28591E-03	-4.07775E-04	9.99990E-01
23	0.00000E+00	0.00000E+00	1.62938E+00	2.67983E+00	1.60426E+00	1.83508E-02	6.78056E-03	9.99996E-01
24	0.00000E+00	0.00000E+00	4.50898E+00	8.69560E+00	4.42306E+00	6.64788E-02	1.94469E-02	1.00000E+00
25	0.00000E+00	0.00000E+00	5.25528E+00	7.18086E+00	5.17271E+00	6.84990E-02	1.40794E-02	9.99999E-01
26	0.00000E+00	0.00000E+00	5.06235E+00	1.11620E+01	4.94848E+00	1.00679E-01	1.31870E-02	1.00000E+00
27	0.00000E+00	0.00000E+00	2.01525E+00	3.04821E+00	1.96791E+00	4.45348E-02	2.80363E-03	1.00000E+00
28	0.00000E+00	0.00000E+00	2.15409E+01	3.57748E+01	2.15407E+01	3.04347E-01	-3.04201E-01	1.00000E+00

GRP	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	1.13440E-08	3.80417E-04	2.62789E-06	7.85772E-03	0.00000E+00	0.00000E+00	0.00000E+00	1.09238E-01
2	1.27484E-08	3.83792E-04	1.90378E-05	5.22069E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.93199E-01
3	1.01401E-08	2.99280E-04	2.20118E-05	5.85063E-02	0.00000E+00	0.00000E+00	0.00000E+00	5.34815E-01
4	4.56902E-09	1.23824E-04	1.28955E-05	3.20863E-02	0.00000E+00	0.00000E+00	0.00000E+00	2.95491E-01
5	5.02585E-09	1.25446E-04	1.79859E-05	4.03006E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.90236E-01
6	6.75605E-09	1.57982E-04	2.71978E-05	5.44108E-02	0.00000E+00	0.00000E+00	0.00000E+00	6.22448E-01
7	5.74034E-09	1.28861E-04	2.58712E-05	4.13088E-02	0.00000E+00	0.00000E+00	0.00000E+00	6.39164E-01
8	3.77442E-09	8.42017E-05	1.94088E-05	2.28979E-02	0.00000E+00	0.00000E+00	0.00000E+00	5.14160E-01
9	2.69968E-09	6.04037E-05	1.52151E-05	1.38161E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.25535E-01
10	2.38641E-09	5.36043E-05	1.42067E-05	1.06870E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.15418E-01
11	2.28907E-09	5.15814E-05	1.38134E-05	8.88934E-03	0.00000E+00	0.00000E+00	0.00000E+00	4.24685E-01
12	1.57835E-09	3.55715E-05	9.32525E-06	5.07157E-03	0.00000E+00	0.00000E+00	0.00000E+00	3.02630E-01
13	1.42529E-09	3.21825E-05	8.30916E-06	3.99572E-03	0.00000E+00	0.00000E+00	0.00000E+00	2.80594E-01
14	1.52349E-09	3.43556E-05	8.43737E-06	3.17574E-03	0.00000E+00	0.00000E+00	0.00000E+00	3.03049E-01
15	7.11145E-10	1.61877E-05	4.09511E-06	1.73803E-03	0.00000E+00	0.00000E+00	0.00000E+00	1.46097E-01
16	4.17118E-10	9.47561E-06	2.37911E-06	1.02353E-03	0.00000E+00	0.00000E+00	0.00000E+00	8.55264E-02
17	1.92144E-10	4.35156E-06	1.09067E-06	4.47695E-04	0.00000E+00	0.00000E+00	0.00000E+00	3.95900E-02
18	1.68841E-10	3.81586E-06	9.57466E-07	3.77633E-04	0.00000E+00	0.00000E+00	0.00000E+00	3.49828E-02
19	3.11319E-10	7.03908E-06	1.78203E-06	7.05332E-04	0.00000E+00	0.00000E+00	0.00000E+00	6.51467E-02
20	1.00686E-09	2.26370E-05	5.94074E-06	2.11147E-03	0.00000E+00	0.00000E+00	0.00000E+00	2.19818E-01
21	3.11662E-10	6.91011E-06	1.86745E-06	4.99447E-04	0.00000E+00	0.00000E+00	0.00000E+00	7.19638E-02
22	7.38078E-10	1.63979E-05	3.94032E-06	4.24173E-04	0.00000E+00	0.00000E+00	0.00000E+00	1.89856E-01
23	5.79788E-09	1.29693E-04	2.23742E-05	-6.65087E-03	0.00000E+00	0.00000E+00	0.00000E+00	1.97393E+00
24	1.23374E-08	2.59850E-04	4.48041E-05	-1.91871E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.92405E+00
25	9.38716E-09	1.73314E-04	3.27224E-05	-1.39061E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.84149E+00
26	8.85825E-09	1.45893E-04	3.19353E-05	-1.30411E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.96080E+00
27	1.83116E-09	2.74925E-05	7.14029E-06	-2.77613E-03	0.00000E+00	0.00000E+00	0.00000E+00	9.24349E-01
28	1.14065E-07	2.77454E-03	3.77362E-04	3.06965E-01	0.00000E+00	0.00000E+00	0.00000E+00	2.22282E+01

FINE GROUP SUMMARY FOR SYSTEM

GRP.	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	2.12611E-02	0.00000E+00	1.60571E-02	1.95639E-02	1.91134E-03	3.80417E-04	9.99884E-01
2	0.00000E+00	1.88838E-01	1.02987E-02	1.85393E-01	1.92465E-01	6.28477E-03	3.83792E-04	1.00002E+00
3	0.00000E+00	2.14979E-01	9.23828E-02	1.67343E-01	3.03012E-01	4.01818E-03	2.99280E-04	1.00005E+00
4	0.00000E+00	1.24462E-01	1.27283E-01	1.02609E-01	2.49738E-01	1.86140E-03	1.23824E-04	1.00004E+00
5	0.00000E+00	1.65962E-01	2.20617E-01	2.77101E-01	3.85277E-01	1.14536E-03	1.25446E-04	1.00004E+00
6	0.00000E+00	1.80150E-01	4.25769E-01	6.49182E-01	6.04193E-01	1.49130E-03	1.57982E-04	1.00006E+00
7	0.00000E+00	8.94499E-02	6.75697E-01	1.04617E+00	7.63287E-01	1.66034E-03	1.28861E-04	1.00005E+00
8	0.00000E+00	1.38125E-02	8.08945E-01	1.24904E+00	8.19740E-01	2.98159E-03	8.42017E-05	9.99971E-01
9	0.00000E+00	1.00304E-03	8.08149E-01	1.13868E+00	8.04229E-01	4.93753E-03	6.04037E-05	9.99954E-01
10	0.00000E+00	7.45080E-05	7.98128E-01	1.09829E+00	7.88668E-01	9.54267E-03	5.36043E-05	9.99962E-01
11	0.00000E+00	5.86189E-06	7.90350E-01	1.08754E+00	7.70170E-01	2.01677E-02	5.15814E-05	9.99979E-01
12	0.00000E+00	4.11789E-07	6.63128E-01	6.16715E-01	6.36223E-01	2.68628E-02	3.55715E-05	1.00000E+00
13	0.00000E+00	6.53883E-08	6.15083E-01	5.14529E-01	5.88248E-01	2.68027E-02	3.21825E-05	1.00000E+00
14	0.00000E+00	1.29582E-08	6.20694E-01	5.34951E-01	5.79510E-01	4.11399E-02	3.43556E-05	1.00001E+00
15	0.00000E+00	1.46442E-09	3.63045E-01	1.91128E-01	3.60466E-01	2.55249E-03	1.61877E-05	1.00001E+00
16	0.00000E+00	4.30005E-10	2.34977E-01	8.43790E-02	2.33413E-01	1.54821E-03	9.47561E-06	1.00001E+00
17	0.00000E+00	1.38483E-10	1.22370E-01	2.59027E-02	1.20802E-01	1.56351E-03	4.35156E-06	1.00000E+00
18	0.00000E+00	9.91496E-11	1.09493E-01	2.23543E-02	1.07699E-01	1.79205E-03	3.81586E-06	9.99995E-01
19	0.00000E+00	1.40176E-10	1.86200E-01	6.04343E-02	1.83841E-01	2.34866E-03	7.03908E-06	1.00001E+00
20	0.00000E+00	2.27941E-10	4.53468E-01	4.08566E-01	4.43423E-01	1.00315E-02	2.26370E-05	9.99990E-01
21	0.00000E+00	3.33632E-11	2.05895E-01	9.10595E-02	2.00512E-01	5.38163E-03	6.91011E-06	9.99988E-01
22	0.00000E+00	3.87089E-11	4.15038E-01	2.91716E-01	4.00956E-01	1.40738E-02	1.63979E-05	9.99991E-01
23	0.00000E+00	3.70100E-11	2.20331E+00	3.61857E+00	2.13125E+00	7.19510E-02	1.29693E-04	9.99995E-01
24	0.00000E+00	1.00737E-11	5.50700E+00	1.05091E+01	5.31655E+00	1.90204E-01	2.59850E-04	9.99999E-01
25	0.00000E+00	2.94890E-12	6.24696E+00	8.44446E+00	6.06399E+00	1.82814E-01	1.73314E-04	9.99999E-01
26	0.00000E+00	2.06779E-12	5.94833E+00	1.28690E+01	5.69360E+00	2.54595E-01	1.45893E-04	1.00000E+00
27	0.00000E+00	4.92765E-13	2.34444E+00	3.47031E+00	2.23601E+00	1.08407E-01	2.74925E-05	1.00000E+00
28	0.00000E+00	9.99998E-01	3.09970E+01	4.87706E+01	3.09968E+01	9.98069E-01	2.77456E-03	1.00000E+00

GRP.	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	1.13440E-08	3.80417E-04	8.73299E-06	0.00000E+00	5.89462E-04	7.05881E-04	0.00000E+00	2.87184E-01
2	1.27484E-08	3.83792E-04	6.75990E-05	0.00000E+00	5.73354E-06	3.26559E-03	0.00000E+00	1.84816E+00
3	1.01401E-08	2.99280E-04	8.00104E-05	0.00000E+00	0.00000E+00	3.74871E-03	0.00000E+00	2.13046E+00
4	4.56902E-09	1.23824E-04	4.77412E-05	0.00000E+00	0.00000E+00	1.58288E-03	0.00000E+00	1.24386E+00
5	5.02585E-09	1.25446E-04	6.79983E-05	0.00000E+00	0.00000E+00	5.54806E-04	0.00000E+00	1.73567E+00
6	6.75605E-09	1.57982E-04	1.04887E-04	0.00000E+00	0.00000E+00	5.05738E-04	0.00000E+00	2.68135E+00
7	5.74034E-09	1.28861E-04	1.01970E-04	0.00000E+00	0.00000E+00	5.40057E-04	0.00000E+00	2.62238E+00
8	3.77442E-09	8.42017E-05	7.68637E-05	0.00000E+00	0.00000E+00	5.96975E-04	0.00000E+00	1.99727E+00
9	2.69968E-09	6.04037E-05	5.96464E-05	0.00000E+00	0.00000E+00	8.34407E-04	0.00000E+00	1.57123E+00
10	2.38641E-09	5.36043E-05	5.48898E-05	0.00000E+00	0.00000E+00	1.79054E-03	0.00000E+00	1.46715E+00
11	2.28907E-09	5.15814E-05	5.22480E-05	0.00000E+00	0.00000E+00	3.84980E-03	0.00000E+00	1.42483E+00
12	1.57835E-09	3.55715E-05	3.41614E-05	0.00000E+00	0.00000E+00	5.30947E-03	0.00000E+00	9.56940E-01
13	1.42529E-09	3.21825E-05	2.96230E-05	0.00000E+00	0.00000E+00	5.17409E-03	0.00000E+00	8.48729E-01
14	1.52349E-09	3.43556E-05	2.87190E-05	0.00000E+00	0.00000E+00	4.16356E-03	0.00000E+00	8.55389E-01
15	7.11145E-10	1.61877E-05	1.40503E-05	0.00000E+00	0.00000E+00	7.83142E-04	0.00000E+00	4.16588E-01
16	4.17118E-10	9.47561E-06	8.11969E-06	0.00000E+00	0.00000E+00	5.37003E-04	0.00000E+00	2.41969E-01
17	1.92144E-10	4.35156E-06	3.69625E-06	0.00000E+00	0.00000E+00	8.48066E-04	0.00000E+00	1.10843E-01
18	1.68841E-10	3.81586E-06	3.22835E-06	0.00000E+00	0.00000E+00	1.16098E-03	0.00000E+00	9.72393E-02
19	3.11319E-10	7.03908E-06	6.00582E-06	0.00000E+00	0.00000E+00	1.40050E-03	0.00000E+00	1.81002E-01
20	1.00686E-09	2.26370E-05	1.98391E-05	0.00000E+00	0.00000E+00	6.03420E-03	0.00000E+00	6.02959E-01
21	3.11662E-10	6.91011E-06	6.08583E-06	0.00000E+00	0.00000E+00	3.44272E-03	0.00000E+00	1.89737E-01
22	7.38078E-10	1.63979E-05	1.16124E-05	0.00000E+00	0.00000E+00	8.77768E-03	0.00000E+00	4.17135E-01
23	5.79788E-09	1.29693E-04	4.12860E-05	0.00000E+00	0.00000E+00	3.66934E-02	0.00000E+00	2.83545E+00
24	1.23374E-08	2.59850E-04	5.95808E-05	0.00000E+00	0.00000E+00	8.74828E-02	0.00000E+00	6.23425E+00
25	9.38716E-09	1.73314E-04	3.90413E-05	0.00000E+00	0.00000E+00	8.18866E-02	0.00000E+00	4.71264E+00
26	8.85825E-09	1.45893E-04	3.51866E-05	0.00000E+00	0.00000E+00	1.10931E-01	0.00000E+00	4.75094E+00
27	1.83116E-09	2.74925E-05	7.46770E-06	0.00000E+00	0.00000E+00	4.61495E-02	0.00000E+00	1.09216E+00
28	1.14065E-07	2.77454E-03	1.07025E-03	0.00000E+00	5.95195E-04	4.18750E-01	0.00000E+00	4.35532E+01

ELAPSED TIME 1.09 MIN.

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*   RJP NEWS   *                                                                                   *
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*                                                                                                  *
*          REVISED  04/02/93 14:56:12     BY MKD                                                   *
*          00/00/00 THIS COMPUTER AND ITS ASSOCIATED SUBSYSTEMS, INCLUDING                         *
*                   ELECTRONIC MAIL, ARE FOR OFFICAL USE ONLY BY AUTHORIZED                        *
*                   EMPLOYEES OF MARTIN MARIETTA ENERGY SYSTEMS, INC.                              *
*                   (ENERGY SYSTEMS), OR BY OTHER PERSONS AUTHORIZED BY                            *
*                   ENERGY SYSTEMS, UNDER TERMS OF ENERGY SYSTEMS' CONTRACT                        *
*                   WITH THE U.S. DEPARTMENT OF ENERGY. ENERGY SYSTEMS                             *
*                   THEREFORE RETAINS THE RIGHT TO MONITOR THE CONTENT OF                          *
*                   ALL MESSAGES AND TO ACCESS ANY COMPUTER FILES WITHOUT                          *
*                   PRIOR KNOWLEDGE OR CONSENT OF USER, SENDER, OR ADDRESSEE.                      *
*                                                                                                  *
*          04/02/93 THE FOLLOWING CHANGES TO THE WAY JOB OUTPUT IS                                 *
*                   PROCESSED WILL BE EFFECTIVE ON APRIL 12.  OUTPUT                               *
*                   HELD IN CLASS T WILL BE HELD FIVE DAYS, INSTEAD OF                             *
*                   SEVEN DAYS, BEFORE IT IS PRINTED.  THE NEW OUTPUT                              *
*                   CLASS C WILL ALSO BE AVAILABLE.  OUTPUT IN CLASS C                             *
*                   WILL BE HELD 4 DAYS AND THEN WILL BE DELETED.  FOR                             *
*                   MORE INFORMATION, REFER TO "CHANGES TO JOB OUTPUT                              *
*                   PROCESSING" IN THE JAN-FEB C&T NEWS.                                           *
*                                                                                                  *
*          03/26/93 ATTENTION SYSTEM SELECT 9 AND 47 USERS:  ON APRIL 12,                          *
*                   SSN 9 AND 47 WILL NO LONGER PROMPT YOU FOR YOUR                                *
*                   TERMINAL TYPE; THE DEFAULT WILL BE VT100.  THE REST OF                         *
*                   THE LOG ON PROCEDURE WILL REMAIN THE SAME.  IF YOU ARE                         *
*                   NOT USING OR EMULATING A VT100, YOU WILL NEED TO USE                           *
*                   SSN 90, WHICH WILL PROMPT YOU FOR YOUR TERMINAL TYPE.                          *
*                   THEN YOU SHOULD ENTER THE SPECIFIC APPLICATION ID (E.G.,                       *
*                   TSOK, TSOX, TSOY, IDMSK).  IF YOU HAVE ANY QUESTIONS,                          *
*                   PLEASE CALL USER SERVICES AT 4-4000.                                           *
*                                                                                                  *
*          03/09/93 THE OUTCODE FOR THE Y-12 UNCLASSIFIED TAPE LIBRARY                             *
*                   WAS PUBLISHED INCORRECTLY IN THE C&T NEWS.  THE                                *
*                   CORRECT OUTCODE IS IUCP.                                                       *
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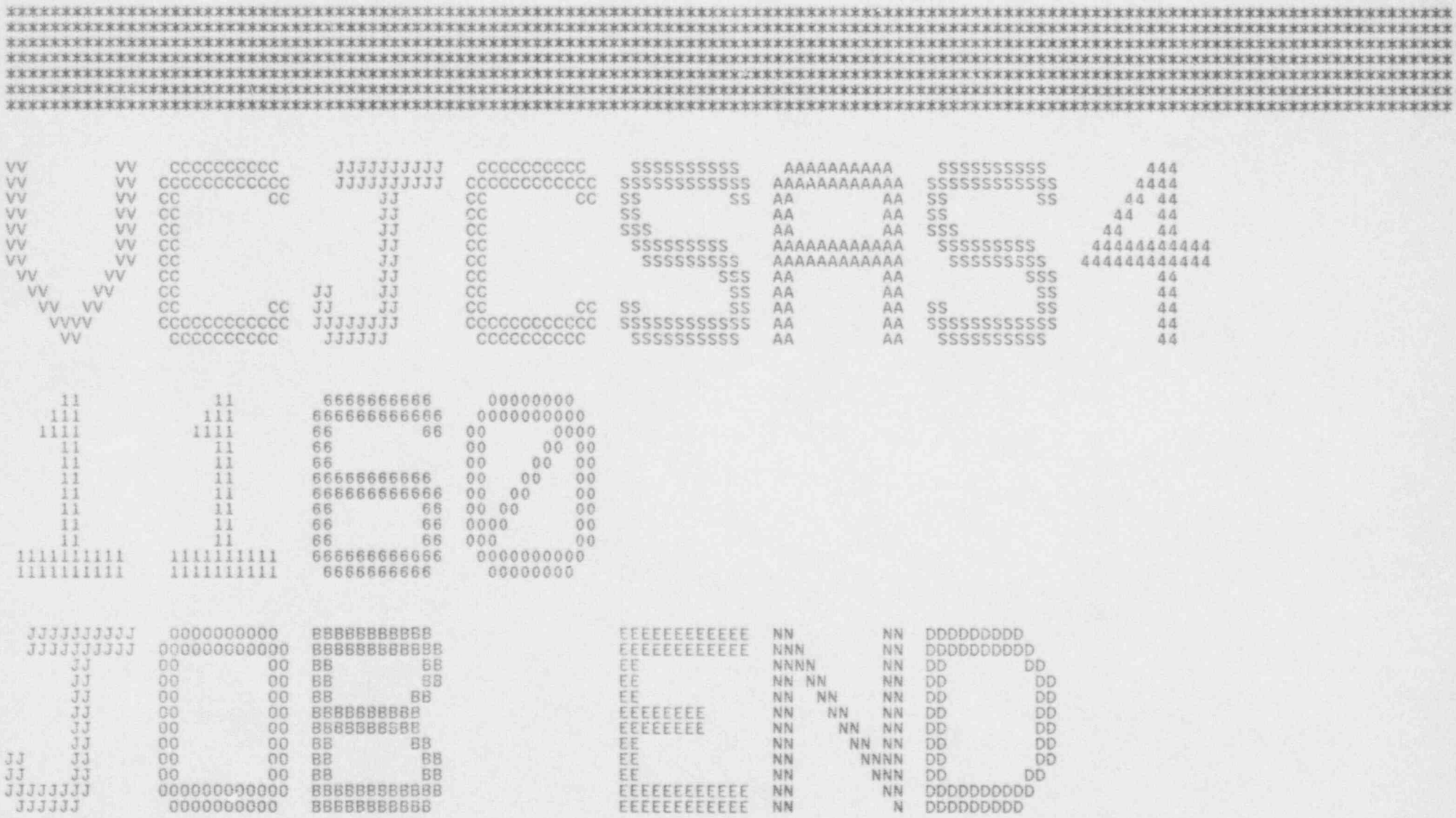
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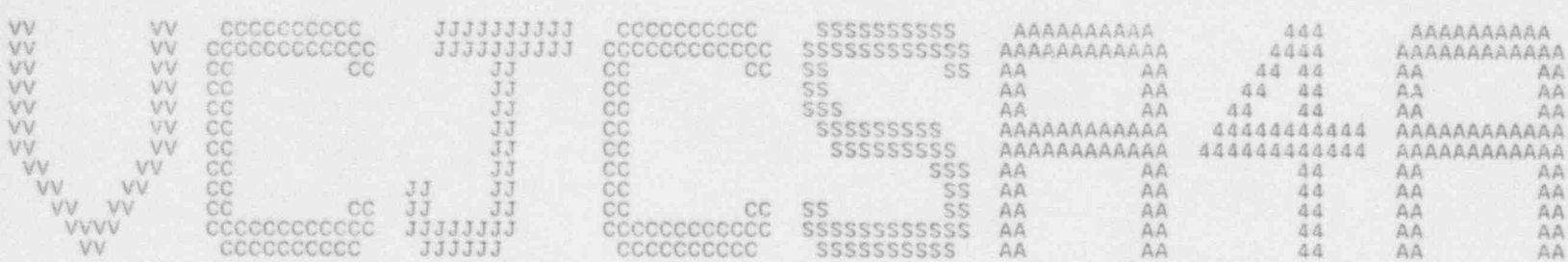
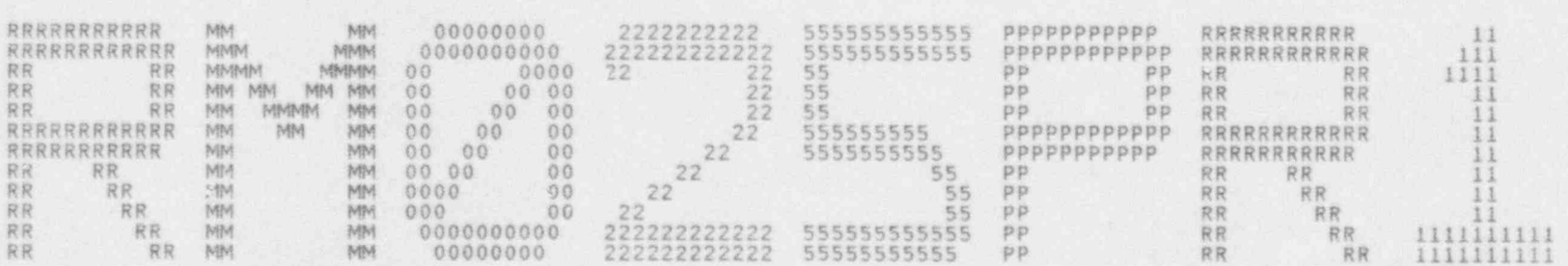
VCJCSA4A 'VCJ-CJ WITHEE NRC 1165





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*                                                                                                           *
*  VCJCSA4A KSY5 VCJ-CJ WITHEE   NRC      APR 06, 1993   22.12.11                                KSY5 VCJCSA4A *
*                                                                                                           *
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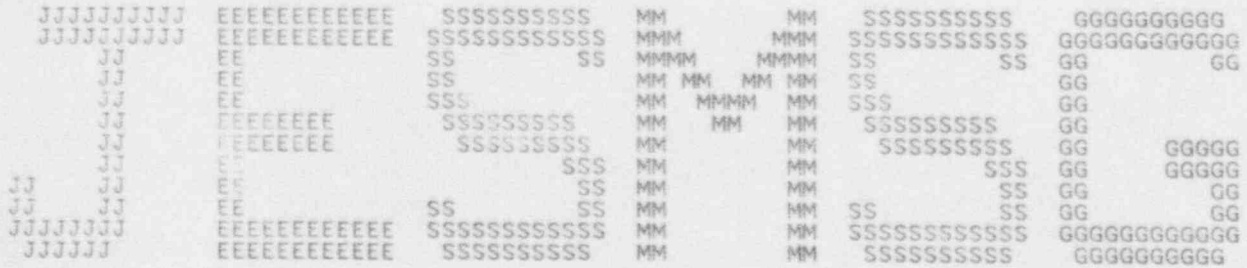
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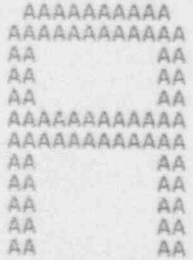
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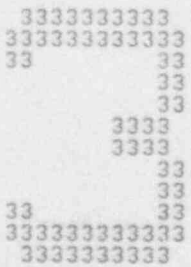
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14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT79F001 DSN=E.TZA27286.KENO5.ALBEDOS
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT80F001 DSN=E.TZA27286.KENO4.WGTS
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT81F001 DSN=C.TZA27286.SCALE4.REV02.XN16
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE03
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT82F001 DSN=C.TZA27286.SCALE4.REV02.XN27
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE02
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT83F001 DSN=C.TZA27286.SCALE4.REV02.XN123
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT84F001 DSN=C.TZA27286.SCALE4.REV02.XN218
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PBDE04
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT85F001 DSN=C.TZA27286.SCALE4.REV02.XN22G18
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT86F001 DSN=C.TZA27286.SCALE4.REV02.XG18
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE03
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT87F001 DSN=C.TZA27286.SCALE4.REV02.XN27BURN
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PBDE04
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT88F001 DSN=C.TZA27286.SCALE4.REV03.XN27G18
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE02
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=FT89F001 DSN=C.X4S27286.SCALE4.REV02.SCLIB
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDS01
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=MESSAGE  DSN=E.TZA27286.SCALE4.MESSAGES
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:38:12 IAT4401  LOCATE FOR STEP=GO       DD=QATABLE  DSN=E.TZA27286.SCALE4.QATABLE
14:38:12 IAT4402 UNIT=3380     ,VOL(S)=PSDE03
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PSDE01
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PBDS00
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PGDE01
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PSDS00
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PBDE03
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PBDE01
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PBDE02
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PBDS03
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PSDE03
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PSDE02
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PBDE04
22:00:09 IAT5110 JOB 1165 (VCJCSA4A) USES     D PSDS01
22:00:09 IAT5200 JOB 1165 (VCJCSA4A) IN SETUP ON MAIN=X101
22:00:09 IAT5210 JOB MARSLIB  (1165) X101     USING D PSDE01 ON 140
22:00:09 IAT5210 JOB MIPLIB   (1165) X101     USING D PBDS00 ON C06
22:00:09 IAT5210 JOB MODULES  (1165) X101     USING D PGDE01 ON 142
22:00:09 IAT5210 JOB OVLY     (1165) X101     USING D PSDS00 ON E00
22:00:09 IAT5210 JOB SYSLIB   (1165) X101     USING D PBDE03 ON 154
22:00:09 IAT5210 JOB SYSLIB   (1165) X101     USING D PBDE01 ON 141
22:00:09 IAT5210 JOB SYSLIB   (1165) X101     USING D PBDE02 ON 143
22:00:09 IAT5210 JOB FORTLIB  (1165) X101     USING D PBDS03 ON E0E
22:00:09 IAT5210 JOB FT81F001 (1165) X101     USING D PSDE03 ON 155
22:00:09 IAT5210 JOB FT82F001 (1165) X101     USING D PSDE02 ON 153
22:00:09 IAT5210 JOB FT84F001 (1165) X101     USING D PBDE04 ON 156
22:00:09 IAT5210 JOB FT89F001 (1165) X101     USING D PSDS01 ON C17
22:00:09 IAT2000 JOB 1165 VCJCSA4A SELECTED X101      GRP=JS3BATCH
22:00:19  IEF403I VCJCSA4A - STARTED - TIME=22.00.19
22:09:03  IEF404I VCJCSA4A - ENDED - TIME=22.09.03
22:09:04 IAT5400 JOB 1165 (VCJCSA4A) IN BREAKDOWN
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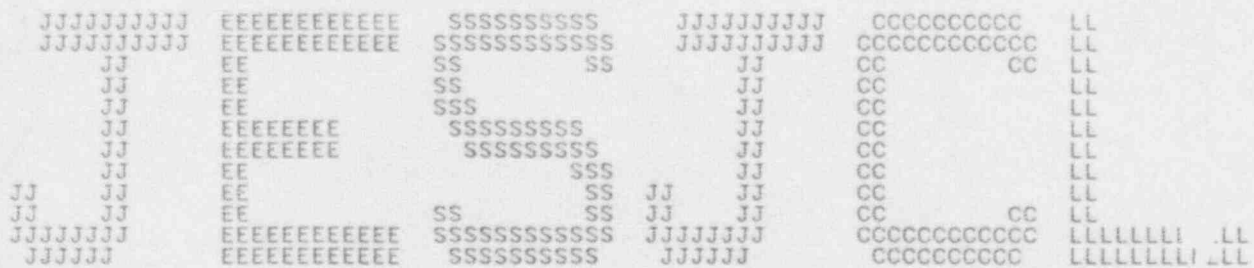
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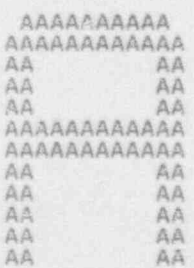
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//VCJCSA4A JOB (17804),'VCJ-CJ WITHEE   NRC',TIME=20,                  *
// PASSWORD=
//*MAIN CLASS=STANDBY
//OUT1 OUTPUT DEFAULT=YES,JESDS=ALL,DEST=NK25B.RM025
//PROCLIB DD DISP=SHR,DSN=TZA.PROCLIB.CNTL
//A EXEC SCALE41,GOSIZE=2048K,TIME=20
//GO.FT01F001 DD SPACE=(TRK,(300,50))
//GO.FT18F001 DD SPACE=(TRK,(300,50))
//GO.SYSIN DD *
/*
//
```

```
1  //VCJCSA4A JOB (17804),'VCJ-CJ WITHEE   NRC',TIME=20,                  *
   // PASSWORD=
2  //OUT1 OUTPUT DEFAULT=YES,JESDS=ALL,DEST=NK25B.RM025
3  //PROCLIB DD DISP=SHR,DSN=TZA.PROCLIB.CNTL
4  //A EXEC SCALE41,GOSIZE=2048K,TIME=20
5  XXSCALE41 PROC GOSIZE=2048K,BLKS=6136,SBUF=6136,
   XX             PLOT=DISV,OUT='*',LOUT='*'
   XX             ORG'"B='E.TZA27286.ORIGENS',
   XX             MESSAGE='E.TZA27286.SCALE4.MESSAGES',
   XX             H6LIB='E.TZA27286.SCALE.HEATLIB',
   XX             LBLIN='DISP=SHR,LABEL=(,,,IN),DCB=BUFL=',
   XX             DCBV='DCB=(RECFM=VBS,LRECL=X,BLKSIZE='
   ***
   ***      JAY MANNESCHMIDT     EXT 4-8717         BLDG 6011
   ***
6  XXLKED   EXEC  PGM=IEWL,REGION=1024K,
   XX             PARM='MAP,LIST,SIZE=(1000K,100K)'
7  XXMARSLIB  DD  DISP=SHR,DSN=E.TZA27286.SCALE.MARS77
8  XXMIPLIB   DD  DISP=SHR,DSN=E.TZA27286.NEAD.MIPLIB77
9  XXMODULES  DD  DISP=SHR,DSN=E.TZA27286.NEAD.PGMS77
10 XXOVLY     DD  DISP=SHR,DSN=E.TZA27286.NEAD.OVLY77
11 XXSYSLIB   DD  DISP=SHR,DSN=E.TZA27286.NEAD.SUBLIB77
12 XX         DD  DISP=SHR,DSN=SYS2.V_"'TN'
13 XX         DD  DISP=SHR,DSN=SYS2.VSFONT
14 XX         DD  DISP=SHR,DSN=GRAPHICS.&PLOT..LIB
   IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=GRAPHICS.DISV.LIB
15 XX         DD  DISP=SHR,DSN=GRAPHICS.INTLIB
16 XXSYSLIN   DD  DSN=E.TZA27286.NEAD.OVLY77(IEFBR14),DISP=SHR
17 XX         DD  DSN=&&LOADSET,UNIT=SYSDA,DISP=(MOD,DELETE),
   XX             SPACE=(TRK,0),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
18 XX         DD  DDNAME=SYSIN
19 XXSYSLMOD  DD  DSN=&&LIBRARY,UNIT=SYSDA,DISP=(,PASS),
   XX             SPACE=(TRK,(50,20,5),RLSE)
20 XXSYSPRINT DD  SYSOUT=&LOUT
   IEF653I SUBSTITUTION JCL - SYSOUT=*
21 XXSYSUT1   DD  UNIT=SYSDA,SPACE=(TRK,(50,10))
22 XXGO     EXEC  PGM=SCALE,COND=(4,LT,LKED),REGION=&GOSIZE,
   IEF653I SUBSTITUTION JCL - PGM=SCALE,COND=(4,LT,LKED),REGION=2048K,
   XX             PARM='/NOIOINIT,NOOCSTATUS,NOINQPCOPN,',TIME=1439
23 XXSTEPLIB  DD  DSN=*.LKED.SYSLMOD,DISP=(OLD,DELETE)
24 XX         DD  DISP=SHR,DSN=E.TZA27286.NEAD.PGMS77
25 XXFORTLIB  DD  DISP=SHR,DSN=SYS2.VSFLOAD
26 //GO.FT01F001 DD SPACE=(TRK,(300,50))
   X/FT01F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
27 XXFT02F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
28 XXFT03F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
29 XXFT04F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
30 XXFT05F001 DD  UNIT=SYSDA,SPACE=(480,(20,10)),DCB=BLKSIZE=480
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31 XXFT06F001 DD  SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
   IEF653I SUBSTITUTION JCL - SYSOUT=*,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
32 XXFT08F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
33 XXFT09F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
34 XXFT10F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
35 XXFT11F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
36 XXFT12F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
37 XXFT13F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),
   XX                DCB=(RECFM=VB,LRECL=137,BLKSIZE=&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - DCB=(RECFM=VB,LRECL=137,BLKSIZE=6136,BUFL=6136)
38 XXFT14F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
39 XXFT15F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
40 XXFT16F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
41 XXFT17F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
42 //GO.FT18F001 DD SPACE=(TRK,(300,50))
   X/FT18F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
43 XXFT19F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
44 XXFT21F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(BASICLWR)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(BASICLWR)
45 XXFT22F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY1)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY1)
46 XXFT23F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY2)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY2)
47 XXFT24F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY3)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY3)
48 XXFT25F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(BASLMFBR)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(BASLMFBR)
49 XXFT26F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(MAPHU02B)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(MAPHU02B)
50 XXFT27F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(SMALLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(SMALLITE)
51 XXFT27F002 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(ACTINIDE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(ACTINIDE)
52 XXFT27F003 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(BIGFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(BIGFISP)
53 XXFT27F004 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOLITE)
54 XXFT27F005 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOACT)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOACT)
55 XXFT27F006 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOFISP)
56 XXFT28F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(BIGLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(BIGLITE)
57 XXFT28F002 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(ACTINIDE)
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59 XXFT28F004 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOLITE)
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60 XXFT28F005 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOACT)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOACT)
61 XXFT28F006 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOFISP)
62 XXFT78F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=&H6LIB
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.SCALE.HEATLIB
63 XXFT79F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.KENO5.ALBEDOS
64 XXFT80F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.KENO4.WGTS
65 XXFT81F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN16
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66 XXFT82F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN27
67 XXFT83F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN123
68 XXFT84F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN218
69 XXFT85F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV02.XN22G18
70 XXFT86F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XG18
71 XXFT87F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV02.XN27BURN
72 XXFT88F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV03.XN27G18
73 XXFT89F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.X4S27286.SCALE4.REV02.SCLIB
74 XXFT90F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
75 XXFT91F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
76 XXFT92F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
77 XXFT93F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
78 XXFT94F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
79 XXFT95F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
80 XXFT96F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
81 XXFT97F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
82 XXFT98F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
83 XXFT99F001 DD  SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
   IEF653I SUBSTITUTION JCL - SYSOUT=*,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
84 XXMESSAGE  DD  DISP=SHR,DSN=&MESSAGE
   IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=E.TZA27286.SCALE4.MESSAGES
85 XXPRINT    DD  SYSOUT=&OUT
   IEF653I SUBSTITUTION JCL - SYSOUT=*
86 XXQATABLE  DD  DISP=SHR,DSN=E.TZA27286.SCALE4.QATABLE
87 //GO.SYSIN DD *,DCB=BLKSIZE=80
   //
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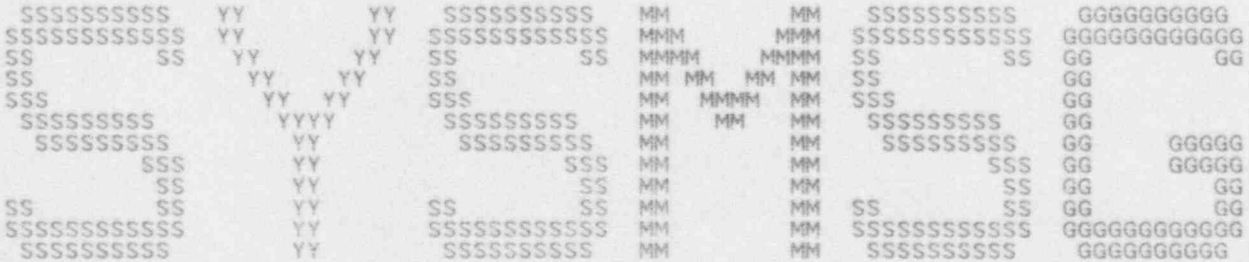
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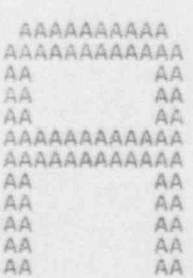
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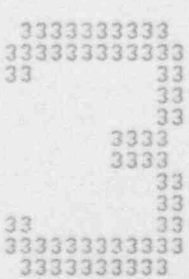
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 STMT NO  MESSAGE
-
       22 IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVED
IEF236I ALLOC. FOR VCJCSA4A LKED A
IEF237I 140  ALLOCATED TO MARSLIB
IEF237I 141  ALLOCATED TO SYS00154
IEF237I C06  ALLOCATED TO MIPLIB
IEF237I 142  ALLOCATED TO MODULES
IEF237I E00  ALLOCATED TO OVLY
IEF237I C06  ALLOCATED TO SYSLIB
IEF237I E00  ALLOCATED TO
IEF237I 154  ALLOCATED TO
IEF237I 141  ALLOCATED TO
IEF237I 143  ALLOCATED TO
IEF237I 153  ALLOCATED TO SYS00156
IEF237I E00  ALLOCATED TO SYSLIN
IEF237I C00  ALLOCATED TO
IEF237I DMY  ALLOCATED TO
IEF237I 900  ALLOCATED TO SYSLMOD
IEF237I JES3 ALLOCATED TO SYSPRINT
IEF237I 900  ALLOCATED TO SYSUT1
IEF142I VCJCSA4A LKED A - STEP WAS EXECUTED - COND CODE 0000
IEF285I   E.TZA27286.SCALE.MARS77                          KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   CATALOG.ICF.VPBDE01                              KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.NEAD.MIPLIB77                         KEPT
IEF285I   VOL SER NOS= PBDS00.
IEF285I   E.TZA27286.NEAD.PGMS77                           KEPT
IEF285I   VOL SER NOS= PGDE01.
IEF285I   E.TZA27286.NEAD.OVLY77                           KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   E.TZA27286.NEAD.SUBLIB77                         KEPT
IEF285I   VOL SER NOS= PBDS00.
IEF285I   SYS2.VSFLINK                                     KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   SYS2.VSFFORT                                     KEPT
IEF285I   VOL SER NOS= PBDE03.
IEF285I   GRAPHICS.DISV.LIB                                KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   GRAPHICS.INTLIB                                  KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   CATALOG.ICF.VPSDE02                              KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   E.TZA27286.NEAD.OVLY77                           KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.LOADSET          DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.LIBRARY          PASSED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   LKED.A.SYSPRINT                                  SYSOUT
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000002         DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF373I STEP /LKED    / START 93096.2200
IEF374I STEP /LKED    / STOP  93096.2200 CPU    0MIN 00.24SEC SRB    0MIN 00.01SEC VIRT  1032K SYS   204K EXT       4K SYS    8744K
*-------------------------------------------------------------------------------*
*KXY0001  DDNAME   CUU DSNAME                                  EXCP'S(IO) BLOCKSIZE*
*KXY0002  MARSLIB  140 E.TZA27286.SCALE.MARS77                                    *
*KXY0002  SYS00154 141 CATALOG.ICF.VPBDE01                                        *
*KXY0002  MIPLIB   C06 E.TZA27286.NEAD.MIPLIB77                                   *
*KXY0002  MODULES  142 E.TZA27286.NEAD.PGMS77                                     *
*KXY0002  OVLY     E00 E.TZA27286.NEAD.OVLY77                                     *
*KXY0002  SYSLIB   C06 E.TZA27286.NEAD.SUBLIB77                                   *
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*KXY0002           E00 SYS2.VSFLINK                                                *
*KXY0002           154 SYS2.VSFFORT                                                *
*KXY0002           141 GRAPHICS.DISV.LIB                                           *
*KXY0002           143 GRAPHICS.INTLIB                                             *
*KXY0002  SYS00156 153 CATALOG.ICF.VPSDE02                                         *
*KXY0002  SYSLIN   E00 E.TZA27286.NEAD.OVLY77                        3       800  *
*KXY0002           C00 SYS93096.T143809.RA000.VCJCSA4A.LOADSET                3200  *
*KXY0002  SYSLMOD  900 SYS93096.T143809.RA000.VCJCSA4A.LIBRARY       9     32760  *
*KXY0002  SYSUT1   900 SYS93096.T143809.RA000.VCJCSA4A.R0000002                   *
*KXY0003  VIRTUAL STORAGE USED  1032K     TOTAL EXCP COUNT FOR STEP        12     *
*KXY0004  06 APR 93.096  22.00.22.34        CPU TIME FOR STEP 0000 MIN 00.25 SEC *
*-------------------------------------------------------------------------------*
IEF236I ALLOC. FOR VCJCSA4A GO A
IEF237I 900  ALLOCATED TO STEPLIB
IEF237I 142  ALLOCATED TO
IEF237I 141  ALLOCATED TO SYS00158
IEF237I E0E  ALLOCATED TO FORTLIB
IEF237I C00  ALLOCATED TO FT01F001
IEF237I 900  ALLOCATED TO FT02F001
IEF237I C00  ALLOCATED TO FT03F001
IEF237I 900  ALLOCATED TO FT04F001
IEF237I C00  ALLOCATED TO FT05F001
IEF237I JES3 ALLOCATED TO FT06F001
IEF237I 900  ALLOCATED TO FT08F001
IEF237I 900  ALLOCATED TO FT09F001
IEF237I 900  ALLOCATED TO FT10F001
IEF237I 900  ALLOCATED TO FT11F001
IEF237I 900  ALLOCATED TO FT12F001
IEF237I 900  ALLOCATED TO FT13F001
IEF237I C00  ALLOCATED TO FT14F001
IEF237I C00  ALLOCATED TO FT15F001
IEF237I C00  ALLOCATED TO FT16F001
IEF237I C00  ALLOCATED TO FT17F001
IEF237I 900  ALLOCATED TO FT18F001
IEF237I C00  ALLOCATED TO FT19F001
IEF237I 141  ALLOCATED TO FT21F001
IEF237I 141  ALLOCATED TO FT22F001
IEF237I 141  ALLOCATED TO FT23F001
IEF237I 141  ALLOCATED TO FT24F001
IEF237I 141  ALLOCATED TO FT25F001
IEF237I 141  ALLOCATED TO FT26F001
IEF237I 143  ALLOCATED TO FT27F001
IEF237I 143  ALLOCATED TO FT27F002
IEF237I 143  ALLOCATED TO FT27F003
IEF237I 143  ALLOCATED TO FT27F004
IEF237I 143  ALLOCATED TO FT27F005
IEF237I 143  ALLOCATED TO FT27F006
IEF237I 143  ALLOCATED TO FT28F001
IEF237I 143  ALLOCATED TO FT28F002
IEF237I 143  ALLOCATED TO FT28F003
IEF237I 143  ALLOCATED TO FT28F004
IEF237I 143  ALLOCATED TO FT28F005
IEF237I 143  ALLOCATED TO FT28F006
IEF237I 140  ALLOCATED TO FT78F001
IEF237I 140  ALLOCATED TO FT79F001
IEF237I 140  ALLOCATED TO FT80F001
IEF237I 155  ALLOCATED TO FT81F001
IEF237I 153  ALLOCATED TO FT82F001
IEF237I 141  ALLOCATED TO FT83F001
IEF237I 156  ALLOCATED TO FT84F001
IEF237I 140  ALLOCATED TO FT85F001
IEF237I 155  ALLOCATED TO FT86F001
IEF237I 156  ALLOCATED TO FT87F001
IEF237I 153  ALLOCATED TO FT88F001
IEF237I C17  ALLOCATED TO FT89F001
IEF237I 900  ALLOCATED TO FT90F001
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IEF237I C00  ALLOCATED TO FT01F001
IEF237I C00  ALLOCATED TO FT02F001
IEF237I 900  ALLOCATED TO FT03F001
IEF237I C00  ALLOCATED TO FT04F001
IEF237I 900  ALLOCATED TO FT05F001
IEF237I 900  ALLOCATED TO FT06F001
IEF237I C00  ALLOCATED TO FT07F001
IEF237I 900  ALLOCATED TO FT08F001
IEF237I JES3 ALLOCATED TO FT09F001
IEF237I 140  ALLOCATED TO MESSAGE
IEF237I JES3 ALLOCATED TO PRINT
IEF237I 155  ALLOCATED TO QATABLE
IEF237I JES3 ALLOCATED TO SYSIN
IEF142I VCJCSA4A GO A - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.LIBRARY      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   E.TZA27286.NEAD.PGMS77                       KEPT
IEF285I   VOL SER NOS= PGDE01.
IEF285I   CATALOG.ICF.VPBDE01                          KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   SYS2.VSFLOAD                                 KEPT
IEF285I   VOL SER NOS= PBDS03.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000003     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000004     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000005     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000006     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000007     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   GO.A.FT06F001                                SYSOUT
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000009     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000010     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000011     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000012     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000013     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000014     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000015     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000016     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000017     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000018     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000019     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000020     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                  KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                  KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                  KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                  KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                  KEPT
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IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                        KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                         KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.SCALE.HEATLIB                           KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   E.TZA27286.KENO5.ALBEDOS                           KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   E.TZA27286.KENO4.WGTS                              KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XN16                       KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   C.TZA27286.SCALE4.REV02.XN27                       KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   C.TZA27286.SCALE4.REV02.XN123                      KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XN218                      KEPT
IEF285I   VOL SER NOS= PBDE04.
IEF285I   C.TZA27286.SCALE4.REV02.XN22G18                    KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XG18                       KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   C.TZA27286.SCALE4.REV02.XN27BURN                   KEPT
IEF285I   VOL SER NOS= PBDE04.
IEF285I   C.TZA27286.SCALE4.REV03.XN27G18                    KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   C.X4S27286.SCALE4.REV02.SCLIB                      KEPT
IEF285I   VOL SER NOS= PSDS01.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000021           DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000022           DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000023           DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000024           DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000025           DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000026           DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000027           DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000028           DELETED
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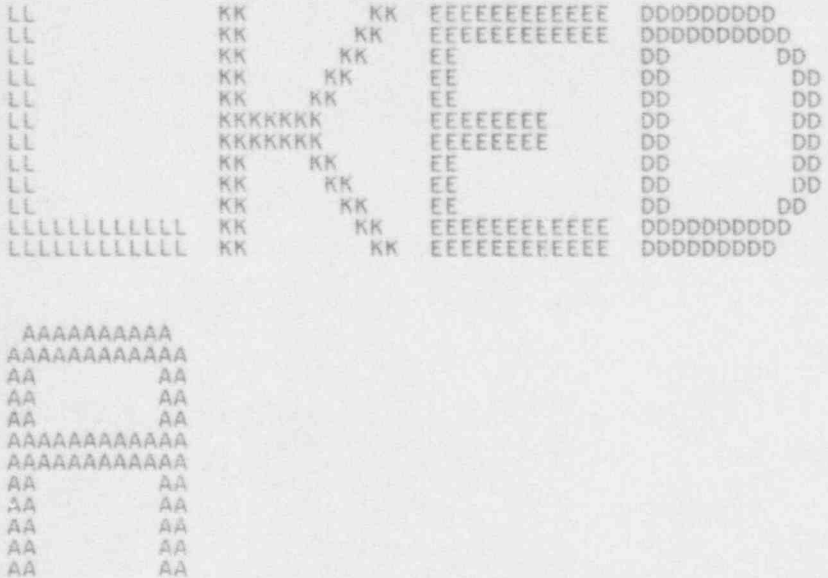
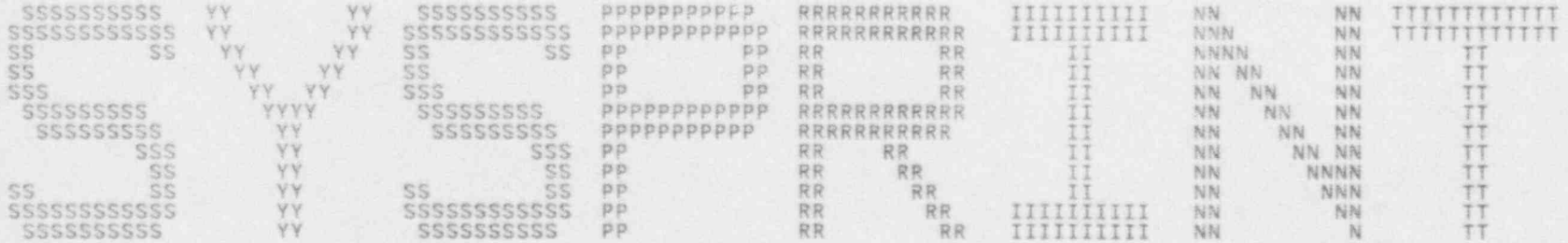
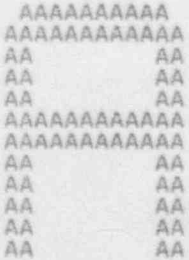
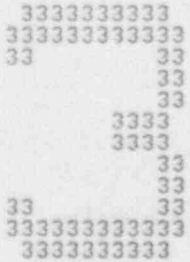
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T143809.RA000.VCJCSA4A.R0000029     DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   GO.A.FT99F001                                SYSOUT
IEF285I   E.TZA27286.SCALE4.MESSAGES                   KEPT
IEF285I   VOL SER NOS= PSDE 1.
IEF285I   GO.A.PRINT                                   SYSOUT
IEF285I   E.TZA27286.SCALE4.CATABLE                    KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   JESI0001                                     SYSIN
IEF373I STEP /GO      / START 93096.2200
IEF374I STEP /GO      / STOP  93096.2209 CPU    3MIN 23.66SEC SRB    0MIN 01.30SEC VIRT  1612K SYS   228K EXT       8K SYS    8760K
*-------------------------------------------------------------------------------*
*KXY0001  DDNAME   CUU DSNAME                                    EXCP'S(IO) BLOCKSIZE*
*KXY0002  STEPLIB  900 SYS93096.T143809.RA000.VCJCSA4A.LIBRARY          5      32760  *
*KXY0002           142 E.TZA27286.NEAD.PGMS77                       785             *
*KXY0002  SYS00158 141 CATALOG.ICF.VPBDE01                                          *
*KXY0002  FORTLIB  E0E SYS2.VSFLOAD                                                 *
*KXY0002  FT01F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000003         73       6136  *
*KXY0002  FT02F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000004         24       6136  *
*KXY0002  FT03F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000005                  6136  *
*KXY0002  FT04F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000006         55       6136  *
*KXY0002  FT05F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000007         14        480  *
*KXY0002  FT08F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000009        606       1776  *
*KXY0002  FT09F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000010      1,920       2816  *
*KXY0002  FT10F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000011                     *
*KXY0002  FT11F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000012         29       6136  *
*KXY0002  FT12F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000013                  6136  *
*KXY0002  FT13F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000014                  6136  *
*KXY0002  FT14F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000015          6       6136  *
*KXY0002  FT15F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000016                  6136  *
*KXY0002  FT16F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000017        322       6136  *
*KXY0002  FT17F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000018                  6136  *
*KXY0002  FT18F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000019         78       6136  *
*KXY0002  FT19F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000020         18       6136  *
*KXY0002  FT21F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT22F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT23F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT24F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT25F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT26F001 141 E.TZA27286.ORIGENS.BINRYLIB                                  *
*KXY0002  FT27F001 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT27F002 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT27F003 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT27F004 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT27F005 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT27F006 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT28F001 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT28F002 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT28F003 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT28F004 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT28F005 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT28F008 143 E.TZA27286.ORIGENS.CARDLIB                                   *
*KXY0002  FT78F001 140 E.TZA27286.SCALE.HEATLIB                                     *
*KXY0002  FT79F001 140 E.TZA27286.KENO5.ALBEDOS                                     *
*KXY0002  FT80F001 140 E.TZA27286.KENO4.WGTS                                        *
*KXY0002  FT81F001 155 C.TZA27286.SCALE4.REV02.XN16                                 *
*KXY0002  FT82F001 153 C.TZA27286.SCALE4.REV02.XN27                     133       6136  *
*KXY0002  FT83F001 141 C.TZA27286.SCALE4.REV02.XN123                                *
*KXY0002  FT84F001 156 C.TZA27286.SCALE4.REV02.XN218                                *
*KXY0002  FT85F001 140 C.TZA27286.SCALE4.REV02.XN22G18                              *
*KXY0002  FT86F001 155 C.TZA27286.SCALE4.REV02.XG18                                 *
*KXY0002  FT87F001 156 C.TZA27286.SCALE4.REV02.XN27BURN                             *
*KXY0002  FT88F001 153 C.TZA27286.SCALE4.REV03.XN27G18                              *
*KXY0002  FT89F001 C17 C.X4S27286.SCALE4.REV02.SCLIB                    166        100  *
*KXY0002  FT90F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000021         402       1024  *
```

```
*KXY0002  FT91F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000022                    6136  *
*KXY0002  FT92F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000023          3         6136  *
*KXY0002  FT93F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000024                    6136  *
*KXY0002  FT94F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000025                    6136  *
*KXY0002  FT95F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000026                    6136  *
*KXY0002  FT96F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000027          3         6136  *
*KXY0002  FT97F001 C00 SYS93096.T143809.RA000.VCJCSA4A.R0000028          3         6136  *
*KXY0002  FT98F001 900 SYS93096.T143809.RA000.VCJCSA4A.R0000029                    6136  *
*KXY0002  MESSAGE  140 E.TZA27286.SCALE4.MESSAGES                        3         4254  *
*KXY0002  QATABLE  155 E.TZA27286.SCALE4.QATABLE                        15         4000  *
*KXY0003  VIRTUAL STORAGE USED  1612K      TOTAL EXCP COUNT FOR STEP      4,663        *
*KXY0004  06 APR 93.096  22.09.03.76         CPU TIME FOR STEP 0003 MIN 24.96 SEC      *
*-------------------------------------------------------------------------------------*
IEF375I  JOB /VCJCSA4A/ START 93096.2200
IEF376I  JOB /VCJCSA4A/ STOP  93096.2209 CPU    3MIN 23.90SEC SRB    0MIN 01.31SEC
*-------------------------------------------------------------------------------------*
*KXY0003                                  TOTAL EXCP  COUNT FOR JOB      4,675        *
*KXY0006                                  TOTAL PRINT LINES FOR JOB      1,835        *
*KXY0006                                  TOTAL PUNCH CARDS FOR JOB                   *
*KXY0004  06 APR 93.096  22.09.03.91         CPU TIME FOR JOB  0003 MIN 25.21 SEC      *
*-------------------------------------------------------------------------------------*
*KXY0005  X10 IBM 3090                    **APPROXIMATE JOB COST* $      59.12        *
*-------------------------------------------------------------------------------------*
```


LL KK KK EEEEEEEEEEEE DDDDDDDDD
LL KK KK EEEEEEEEEEEE DDDDDDDDDD
LL KK KK EE DD DD
LL KK KK EE DD DD
LL KK KK EE DD DD
LL KKKKKKK EEEEEEEE DD DD
LL KKKKKKK EEEEEEEE DD DD
LL KK KK EE DD DD
LL KK KK EE DD DD
LL KK KK EE DD DD
LLLLLLLLLLL KK KK EEEEEEEEEEEE DDDDDDDDD
LLLLLLLLLLL KK KK EEEEEEEEEEEE DDDDDDDDD


SSSSSSSSS YY YY SSSSSSSSS PPPPPPPPPP RRRRRRRRR IIIIIIIII NN NN TTTTTTTTTTT
SSSSSSSSSSS YY YY SSSSSSSSSSS PPPPPPPPPPP RRRRRRRRRR IIIIIIIII NNN NN TTTTTTTTTTT
SS SS YY YY SS SS PP PP RR RR II NNNN NN TT
SS YY YY SS PP PP RR RR II NN NN NN TT
SSS YY YY SSS PP PP RR RR II NN NN NN TT
SSSSSSSSS YYYY SSSSSSSSS PPPPPPPPPPP RRRRRRRRR II NN NN NN TT
SSSSSSSSS YY SSSSSSSSS PPPPPPPPPP RRRRRRRRR II NN NN NN TT
SSS YY SSS PP RR RR II NN NN NN TT
SS YY SS PP RR RR II NN NNNN TT
SS SS YY SS PP RR RR II NN NN TT
SSSSSSSSSSS YY SSSSSSSSSSS PP RR RR IIIIIIIIII NN NN TT
SSSSSSSSS YY SSSSSSSSS PP RR RR IIIIIIIIII NN N TT





```
MVS/XA DFP VER 2 LINKAGE EDITOR                22:00:20  TUE  APR 06, 1993
JOB VCJCSA4A   STEP A          PROCEDURE LKED
INVOCATION PARAMETERS - MAP,LIST,SIZE=(1000K,100K)
ACTUAL SIZE=(892928,86016)
OUTPUT DATA SET SYS93096.T143809.RA000.VCJCSA4A.LIBRARY IS ON VOLUME SYSSA1
IEW0000          NAME    IEFBR14(R)                                          00010000

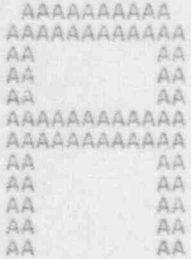

                                        MODULE MAP

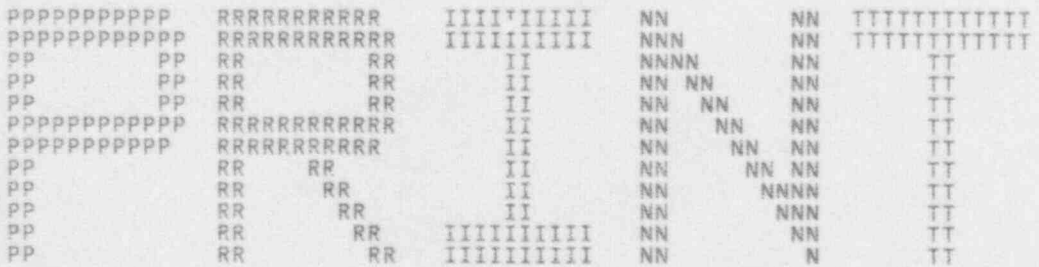
 CONTROL SECTION                        ENTRY

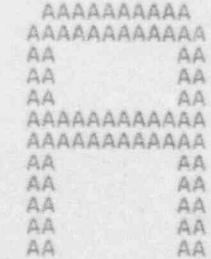
   NAME     ORIGIN  LENGTH               NAME   LOCATION     NAME   LOCATION     NAME   LOCATION     NAME   LOCATION
 IEFBR14       00       4

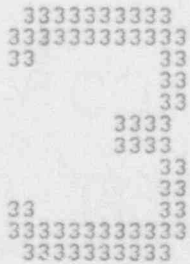

ENTRY ADDRESS       00

TOTAL LENGTH          8
** IEFBR14  DID NOT PREVIOUSLY EXIST BUT WAS ADDED AND HAS AMODE 24
** LOAD MODULE HAS RMODE 24
** AUTHORIZATION CODE IS         0.
```









PRIMARY MODULE ACCESS AND INPUT RECORD (SCALE DRIVER - 10/10/91 - 15.58)

```
*******************************************************************************
*      MESSAGES OF CURRENT INTEREST TO SCALE4 USERS WILL APPEAR HERE          *
*                                                                             *
*                    SCALE4  BULLETIN  BOARD                                  *
*                    ------  --------  -----                                  *
*                                                                             *
*      NOTICE TO ALL SCALE USERS:  THE SCALE CONFIGURATION MANAGEMENT         *
*      PLAN WAS UPDATED ON JUNE 10, 1992.  IF YOU HAVE ANY QUESTIONS,         *
*      CONTACT STEVE BOWMAN (4-5263).  ANY USER WHO DISCOVERS A               *
*      DISCREPANCY IN A SCALE MODULE SHOULD REPORT IT IMMEDIATELY TO          *
*      STEVE BOWMAN (4-5263) OR KAY MARTIN (4-9213) SO THAT CORRECTIVE        *
*      ACTION MAY BE TAKEN IN A TIMELY MANNER.                                *
*                                                                             *
*      1/13/92 - KENO-V.A - MODULE WAS CORRECTED TO PERFORM RESTART           *
*      CALCULATIONS FOR PROBLEMS HAVING NESTED HOLES AND/OR ARRAYS WITH       *
*      SMU AND FDN HAVING DIFFERENT VALUES. (MRR 92-001) ADDED MINOR          *
*      CHANGES FOR CONSISTENCY WITH NCSS VERSION.  (MRR 92-004)               *
*                                                                             *
*      1/14/92 - ALL CONTROL MODULES - CORRECTED THE CALCULATION OF           *
*      STORAGE NEEDED TO COLLAPSE THE BONDARENKO FACTORS WHEN USING           *
*      COLLAPSE OPTION. (MRR 92-003)                                          *
*                                                                             *
*      1/22/92 - SAS2 - CORRECTED SEVERAL MINOR ERRORS THAT WOULD HAVE        *
*      CAUSED JOB TO FAIL WHEN ENCOUNTERED. (MRR 92-002)                      *
*                                                                             *
*      1/29/92 - SAS2 - CORRECTED ERROR THAT RESET NUCLIDE NUMBER             *
*      DENSITY TO ORIGINAL INPUT VALUE IF IT DECAYED TO ZERO AFTER A          *
*      LONG COOLING TIME (E.G., XE-135).  CORRECTED ERROR THAT APPLIED        *
*      CYCLE TEMPERATURE CHANGE VARIABLE TEMKCYC ONLY TO FUEL ZONE            *
*      NUCLIDES.  (MRR 92-006)                                                *
*                                                                             *
*      2/10/92 - ALL CONTROL MODULES - CORRECTED ERROR IN LINKING OF          *
*      MODULES THAT CAUSED ERROR MESSAGES TO BE PRINTED ON WRONG OUTPUT       *
*      FILE AND ALLOWED CSAS TO LOOP IF THE CROSS-SECTION LIBRARY WAS         *
*      MISSPELLED. (MRR 92-007)                                               *
*                                                                             *
*      4/20/92 - KENO-V.A - MODULE WAS FIXED TO CORRECTLY CALCULATE           *
*      MATRIX K-EFF BY ARRAY NUMBER FOR A BARE ARRAY. (MRR 92-009)            *
*                                                                             *
*      5/27/92 - AIM - DELETED UNNECESSARY CONVERSIONS FROM FLOATING          *
*      POINT VALUES TO INTEGER. (MRR 92-013)                                  *
*                                                                             *
*      6/22/92 - MORSE AND SAS4 - (1) FIXED THE OPTION THAT ALLOWS THE        *
*      GEOMETRY MEDIA NUMBER TO DIFFER FROM THE CROSS SECTION MEDIA           *
*      NUMBER.  IF YOU HAVE PREVIOUSLY RUN PROBLEMS WITH DIFFERENT            *
*      GEOMETRY AND CROSS SECTION MEDIA NUMBERS, RE-RUN WITH NEW              *
*      VERSION.  (MRR 92-010) (2) ERROR RECOVERY PROCEDURE WAS ADDED SO       *
*      THAT WHEN A FATAL GEOMETRY ERROR OCCURS RESULTS WILL BE                *
*      NORMALIZED AND PRINTED FOR N-1 BATCHES, WHERE N IS THE BATCH           *
*      NUMBER IN WHICH THE ERROR OCCURRED. (MRR 92-011)                       *
*                                                                             *
*      8/03/92 - ALL CONTROL MODULES- (1) CORRECTED AN ERROR IN               *
*      CALCULATING NUMBER DENSITIES FOR A CELL-WEIGHTED MIXTURE WHEN A        *
*      MIXTURE NUMBER HAS BEEN ASSIGNED TO MORE THAN ONE ZONE IN THE          *
*      UNIT CELL SPECIFICATION.  (2) MADE A CORRECTION TO ACCEPT AN           *
*      INPUT DANCOFF FACTOR OF ZERO AND USE IT.  ADDED A CHECK TO             *
*      ENSURE THAT ALL DANCOFF FACTORS INPUT ARE BETWEEN ZERO AND ONE.        *
*      (MRR 92-019)                                                           *
*                                                                             *
*      8/10/92 - KENO-V.A AND CSAS4 - THE PROGRAM VERIFICATION TABLE          *
*      WAS MODIFIED TO PRINT THE CORRECT VERSION NUMBERS FOR THESE            *
```

```
*      MODULES.  VERSION 1.10 WAS PRINTING AS 1.1 DUE TO INSUFFICIENT          *
*      SPACE IN A FORMAT STATEMENT.  (MRR 92-015)                              *
*                                                                              *
*      10/02/92 - STANDARD COMPOSITION LIBRARY - UPDATED RESONANCE DATA        *
*      FLAGS FOR NUCLIDES THAT HAVE RESONANCE DATA IN ENDF/B-V.                *
*                                                                              *
*      11/24/92 - MIPLIB - CORRECTED THE DIMENSIONAL CONSISTENCY TEST          *
*      FOR ANNULAR CELLS AND ASYMMETRIC SLAB CELLS.  THIS ALLOWS               *
*      CORRECT PROBLEMS THAT PREVIOUSLY WOULD NOT RUN TO RUN. (MRR 92-024)     *
*                                                                              *
********************************************************************************


 MODULE CSASI    WILL BE CALLED  TIME OF DAY 22.00.30  DATE 93.096

   U02F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                  U0XCY0.CJW
   27GROUPNDF4                INFHOMMEDIUM
   SOLNU02F2     1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
   H2O           2  1.0  293  END
   END COMP
   END

 SECONDARY MODULE 000008   HAS BEEN CALLED

 MODULE 000008   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000.  CPU TIME USED      1.14 (SECONDS).  I/O'S USED        0.

 SECONDARY MODULE 000002   HAS BEEN CALLED

 MODULE 000002   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000.  CPU TIME USED     14.54 (SECONDS).  I/O'S USED        0.

 SECONDARY MODULE 000007   HAS BEEN CALLED

 MODULE 000007   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000.  CPU TIME USED      3.36 (SECONDS).  I/O'S USED        0.

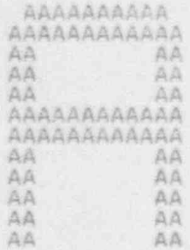
 MODULE CSASI    IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000.  CPU TIME USED     20.22 (SECONDS).  I/O'S USED        0.

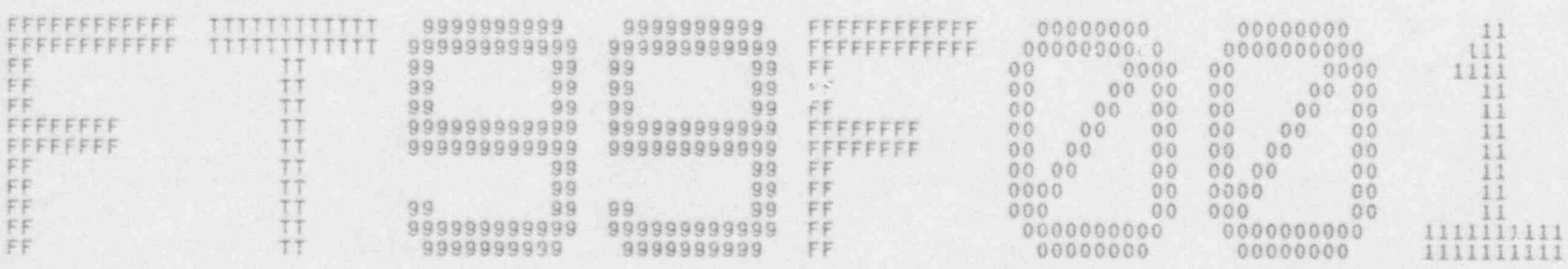

 MODULE XSDRN    WILL BE CALLED  TIME OF DAY 22.02.38  DATE 93.096

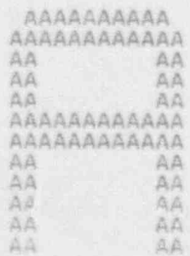
   CYLINDER OPTIMIZATION U02F2 SOLUTION DENSITY VARIATION
   0$$  A3 2  E
   1$$  2 2 51 1 0   2 2 16 3 1
    10 50 0 0 0
   2$$  -2 0 0 0 0    0 -1 0 0 0
   3$$  0 0 0 1 0     0 0 0 0 0
        0 0
   5**  A4 0  0  E
     T
   13$$  1 2
   14$$  1 2
   15**  F1
     T
   34**  F1
     T
   35**  15I0 34I14.25 49.25
   36$$  I6R1 35R2
   39$$  1 2
   40$$  F3
     T
   END

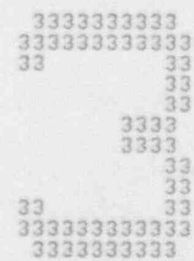
 MODULE XSDRN    IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000.  CPU TIME USED    183.39 (SECONDS).  I/O'S USED        0.

  THE FOLLOWING DATA CARDS PRECEDE AN = CARD
   END
```







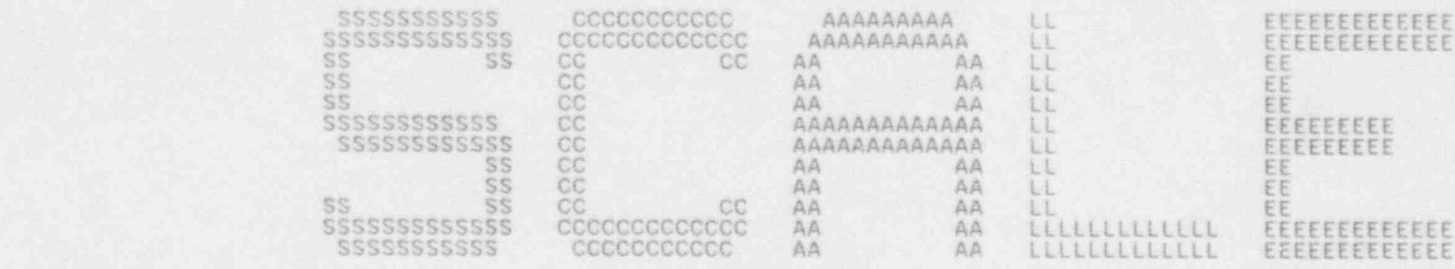


CSASI

VCJCSA4A

04/06/93

22:00:34



PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM:	CSASI
CREATION DATE:	92.329
LIBRARY:	E.TZA27286.MEAD.PGMS77
PRODUCTION CODE:	CSAS25
VERSION:	1.12
JOBNAME:	VCJCSA4A
DATE OF EXECUTION:	04/06/93
TIME OF EXECUTION:	22.00.35

```
U02F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                    UOXCY0.CJW

**** PROBLEM PARAMETERS ****

LIB 27GROUPNDF4  LIBRARY
MXX              2 MIXTURES
MSC              2 COMPOSITION SPECIFICATIONS
IZM              1 MATERIAL ZONES
GE  INFHOMMEDIUM GEOMETRY
MORE             0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLN             1 FUEL SOLUTIONS

**** PROBLEM COMPOSITION DESCRIPTION ****

SC  SOLNU02F2    STANDARD COMPOSITION
MX               1 MIXTURE NO.
FD      1600.0000 SOLUTION FUEL DENSITY
AML        0.0000 ACID MOLARITY
VF         1.0000 VOLUME FRACTION
TEMP        293.0 DEG KELVIN
SPG        2.8069 DEFAULT SPECIFIC GRAVITY
            92235   5.02%
            92238  94.98%
END

SC  H2O          STANDARD COMPOSITION
MX               2 MIXTURE NO.
VF         1.0000 VOLUME FRACTION
ROTH       0.9982 THEORETICAL DENSITY
TEMP        293.0 DEG KELVIN
END

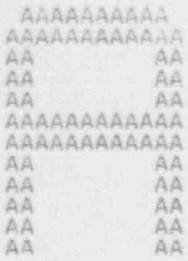
**** PROBLEM GEOMETRY ****

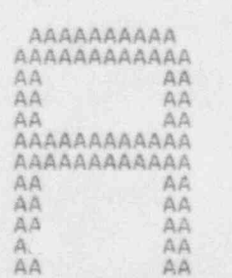
**** INFINITE HOMOGENEOUS MEDIUM ****
MFUEL            1 MIXTURE NO. OF THE INFINITE HOMOGENEOUS MEDIUM
```

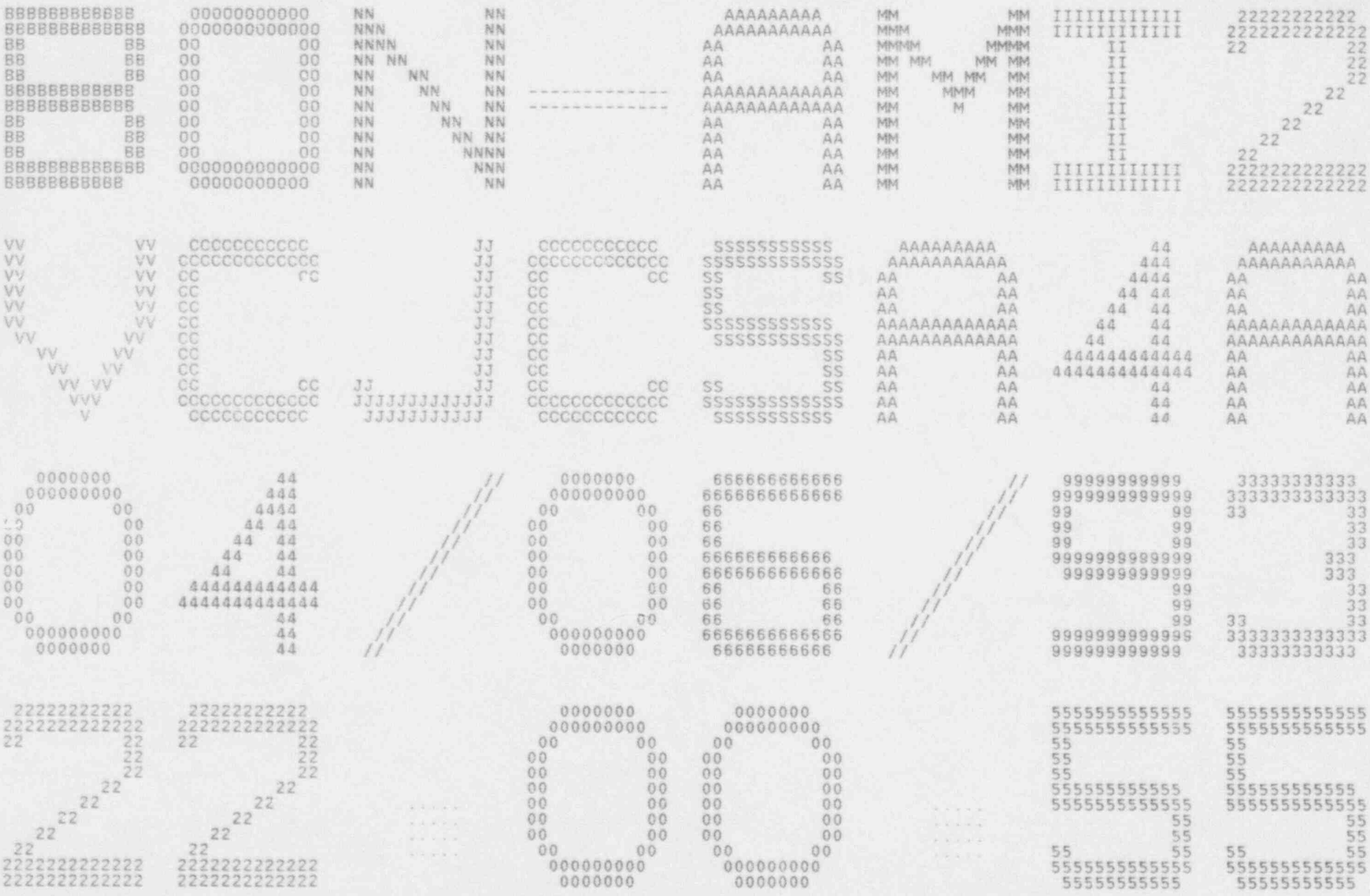
```
***************************************************************************************************
***                                                                                             ***
***                      UO2F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER            UOXCYO.CJW  ***
***                                                                                             ***
***************************************************************************************************
***************************************************************************************************
***                                                                                             ***
***                    *********** DATA LIBRARY INFORMATION ***********                         ***
***                                                                                             ***
***         UNIT                                             VOLUME                             ***
***        NUMBER              DATA SET NAME                  NAME        UNIT FUNCTION         ***
***        ------              -------------                  ----        -------------         ***
***                                                                                             ***
***          89     C.X4S27286.SCALE4.REV02.SCLIB            PSDS01      STANDARD COMPOSITION LIBRARY ***
***                                                                                             ***
***          82     C.TZA27286.SCALE4.REV02.XN27             PSDE02      CROSS SECTION LIBRARY  ***
***                                                                                             ***
***          11     SYS93096.T143809.RA000.VCJCSA4A.R0000012 SYSSA1      SHORT CROSS SECTION LIBRARY ***
***                                                                                             ***
***          90     SYS93096.T143809.RA000.VCJCSA4A.R0000021 SYSSA1      INPUT DATA DIRECT ACCESS ***
***                                                                                             ***
***************************************************************************************************
***************************************************************************************************
***                                                                                             ***
***                                                                                             ***
***                              STANDARD COMPOSITION LIBRARY DATA                              ***
***                              ---------------------------------                              ***
***                                                                                             ***
***            UNIT NUMBER   :  89                                                              ***
***                                                                                             ***
***            DATASET NAME  :  C.X4S27286.SCALE4.REV02.SCLIB                                   ***
***                                                                                             ***
***            LIBRARY TITLE:   SCALE-4 STANDARD COMPOSITION LIBRARY                            ***
***                             380 STANDARD COMPOSITIONS, 327 NUCLIDES                         ***
***                             10 ELEMENTS WITH VARIABLE ISOTOPIC DISTRBUTIONS.                ***
***                                                                                             ***
***            CREATION DATE:   10/ 2/92                                                        ***
***                                                                                             ***
***                                                                                             ***
***                                                                                             ***
***                                 CROSS SECTION LIBRARY DATA                                  ***
***                                 --------------------------                                  ***
***                                                                                             ***
***            UNIT NUMBER   :  82                                                              ***
***                                                                                             ***
***            DATASET NAME  :  C.TZA27286.SCALE4.REV02.XN27                                    ***
***                                                                                             ***
***            LIBRARY TITLE:   SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY           ***
***                               BASED ON ENDF-B VERSION 4 DATA                                ***
***                                 COMPILED FOR NRC         1/27/89                            ***
***                                   LAST UPDATED          10/12/89                            ***
***                                     L.M.PETRIE         ORNL                                 ***
***                                                                                             ***
***                                                                                             ***
***                                                                                             ***
***************************************************************************************************
***************************************************************************************************

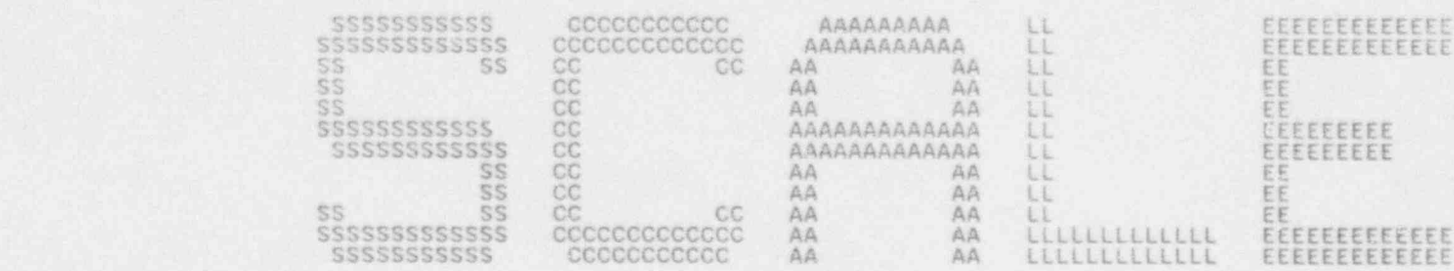
                    ........  0 IO'S WERE USED PROCESSING CSAS INPUT DATA     ........

CONTROL MODULE CSASI     IS COMPLETE.
```









PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000008

CREATION DATE: 92.330

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: BONAMI

VERSION: 1.6

JOBNAME: VCJCSA4A

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.00.55

-1Q ARRAY HAS 1 ENTRIES.
0Q ARRAY HAS 4 ENTRIES.
1Q ARRAY HAS 6 ENTRIES.
2Q ARRAY HAS 2 ENTRIES.

LOGICAL ASSIGNMENTS

MASTER LIBRARY 11
WORKING LIBRARY 0
SCRATCH FILE 18
NEW LIBRARY 1

P R O B L E M D E S C R I P T I O N

IGR--GEOMETRY (0/1/2/3--INF MED/SLAB/CYL/SPHERE 1

IZM--NUMBER OF ZONES OR MATERIAL REGIONS 2

MS--MIXING TABLE LENGTH 7

IBL--SHIELDED CROSS SECTION EDIT OPTION (0/1--NO/YES) 0

IBR--BONDARENKO FACTOR EDIT OPTION (0/1--NO/YES) 0

ISSOPT--DANCOFF FACTOR OPTION 0

CONVERGENCE CRITERION 1.00000E-03

GEOMETRY CORRECTION FACTOR FOR WIGNER RATIONAL APPROXIMATION 1.000E+00

3Q ARRAY HAS 7 ENTRIES.

4Q ARRAY HAS 7 ENTRIES.

5Q ARRAY HAS 7 ENTRIES.

6Q ARRAY HAS 2 ENTRIES.

7Q ARRAY HAS 2 ENTRIES.

8Q ARRAY HAS 2 ENTRIES.

9Q ARRAY HAS 2 ENTRIES.

10Q ARRAY HAS 7 ENTRIES.

11Q ARRAY HAS 2 ENTRIES.

M I X I N G T A B L E

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	2.05790E-04	92235
2	1	92238	3.84443E-03	92238
3	1	8016	3.27175E-02	8016
4	2	8016	3.33757E-02	208016
5	1	9019	8.10044E-03	9019
6	1	1001	4.92340E-02	1001
7	2	1001	6.57514E-02	201001

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	1.00000E+00	2.93000E+02	0.00000E+00	0
2	2	6.00000E+00	2.93000E+02	0.00000E+00	0

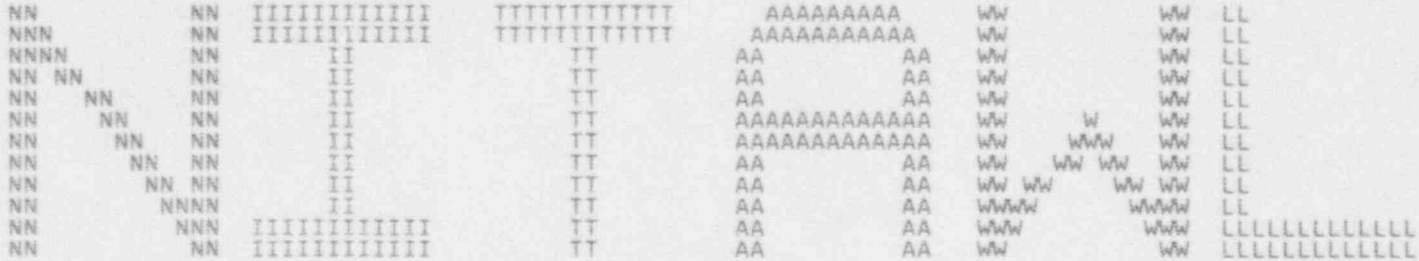
2394 LOCATIONS OF 100000 AVAILABLE ARE REQUIRED TO MAKE A NEW MASTER CONTAINING THE SELF-SHIELDED VALUES

NO NUCLIDES IN YOUR PROBLEM HAVE BONDARENKO FACTOR DATA**BONAMI WILL COPY FROM LOGICAL 11 TO LOGICAL 1

```
COPY      1001   HYDROGEN        FROM LOG 11 TO LOG 18    BONDARENKO TRIGGER 0
COPY      1001   HYDROGEN        FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      1001   HYDROGEN        FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 11 TO LOG 18    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      9019   FLUORINE        FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
COPY     92235   URANIUM-235     FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
COPY     92238   URANIUM-238     FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
```

```
SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
  BASED ON ENDF-B VERSION 4 DATA
    COMPILED FOR NRC        1/27/89
      LAST UPDATED         10/12/89
        L M PETRIE         ORNL
    TAPE ID                        4027000          NUMBER OF NUCLIDES                    7
    NUMBER OF NEUTRON GROUPS            27          NUMBER OF GAMMA GROUPS                0
    FIRST THERMAL GROUP                 15          LOGICAL UNIT                          1
                                TABLE OF CONTENTS
   HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              ID      1001
   HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              ID    201001
   OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              ID      8016
   OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              ID    208016
   FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89              ID      9019
   URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89              ID     92235
   URANIUM-238     ENDF/B-IV MAT 1262             UPDATED 10/12/89              ID     92238

    TAPE COPY USED      0 I/O'S, AND TOOK     0.67 SECONDS
```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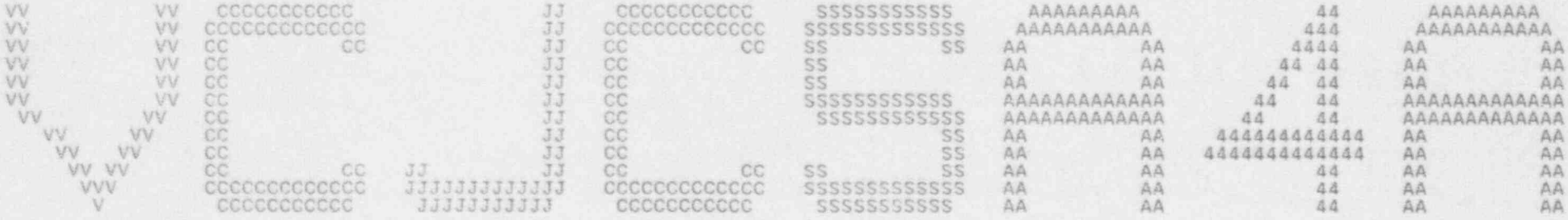
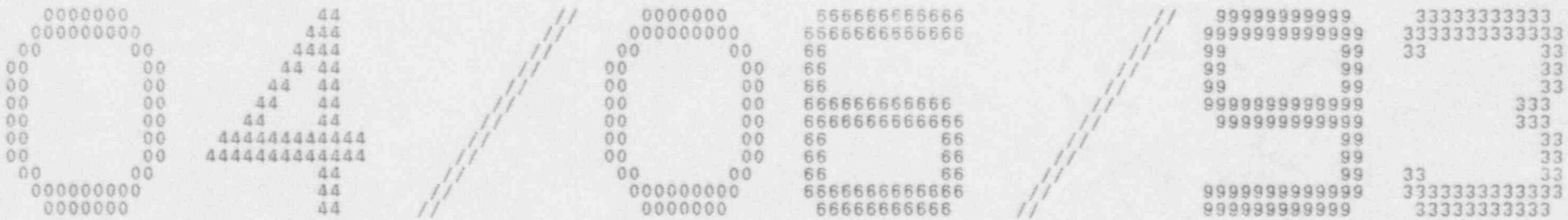
NNN NN IIIIIIIIIIII TTTTTTTTTTTT AAAAAAAAAAA WW WW LL
NNNN NN II TT AA AA WW WW LL
NN NN NN II TT AA AA WW WW LL
NN NN NN II TT AA AA WW WW LL
NN NN NN II TT AAAAAAAAAAAAA WW W WW LL
NN NN NN II TT AAAAAAAAAAAAA WW WWW WW LL
NN NN NN II TT AA AA WW WW WW WW LL
NN NN NN II TT AA AA WW WW WW LL
NN NNNN II TT AA AA WWWW WWWW LL
NN NNN IIIIIIIIIIII TT AA AA WWW WWW LLLLLLLLLLLLL
NN NN IIIIIIIIIIII TT AA AA WW WW LLLLLLLLLLLLL


VV VV CCCCCCCCCC JJ CCCCCCCCCC SSSSSSSSSS AAAAAAAA 44 AAAAAAAA
VV VV CCCCCCCCCCCC JJ CCCCCCCCCCCC SSSSSSSSSSSS AAAAAAAAAA 444 AAAAAAAAAA
VV VV CC CC JJ CC CC SS SS AA AA 4444 AA AA
VV VV CC JJ CC SS AA AA 44 44 AA AA
VV VV CC JJ CC SS AA AA 44 44 AA AA
VV VV CC JJ CC SSSSSSSSSS AAAAAAAAAA 44 44 AAAAAAAAAA
VV VV CC JJ CC SSSSSSSSSS AAAAAAAAAA 44 44 AAAAAAAAAA
VV VV CC JJ CC SS AA AA 444444444444 AA AA
VV VV CC JJ CC SS AA AA 444444444444 AA AA
VV VV CC JJ JJ CC CC SS SS AA AA 44 AA AA
VVV CCCCCCCCCCCC JJJJJJJJJJJJ CCCCCCCCCCCC SSSSSSSSSSSS AA AA 44 AA AA
V CCCCCCCCCC JJJJJJJJJJ CCCCCCCCCC SSSSSSSSSS AA AA 44 AA AA


0000000 44 0000000 6666666666 99999999999 33333333333
000000000 444 000000000 6666666666666 9999999999999 3333333333333
00 00 4444 00 00 66 99 99 33 33
00 00 44 44 00 00 66 99 99 33
00 00 44 44 00 00 66 99 99 33
00 00 44 44 00 00 666666666666 99999999999 333
00 00 44 44 00 00 6666666666666 9999999999999 333
00 00 444444444444 00 00 66 66 99 33
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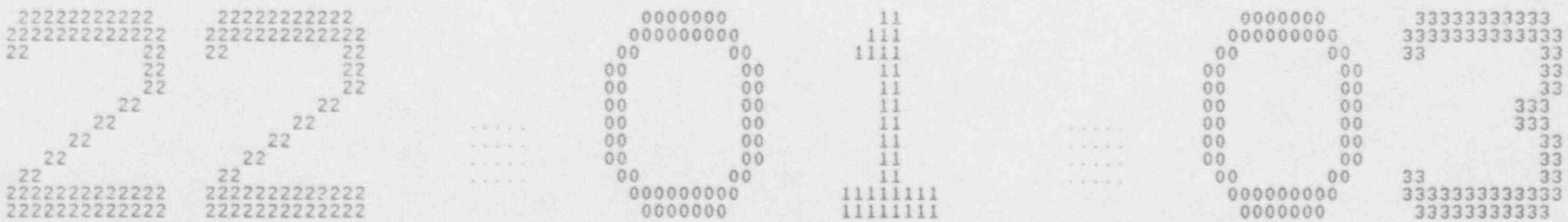
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2222222222222 2222222222222 000000000 111 000000000 3333333333333
22 22 22 22 00 00 1111 00 00 33 33
22 22 22 00 00 11 00 00 33
22 22 00 00 11 00 00 33
22 22 00 00 11 00 00 333
22 22 00 00 11 00 00 333
22 22 00 00 11 00 00 33
22 22 00 00 11 00 00 33
22 22 00 00 11 00 00 33 33
2222222222222 2222222222222 000000000 11111111 000000000 3333333333333
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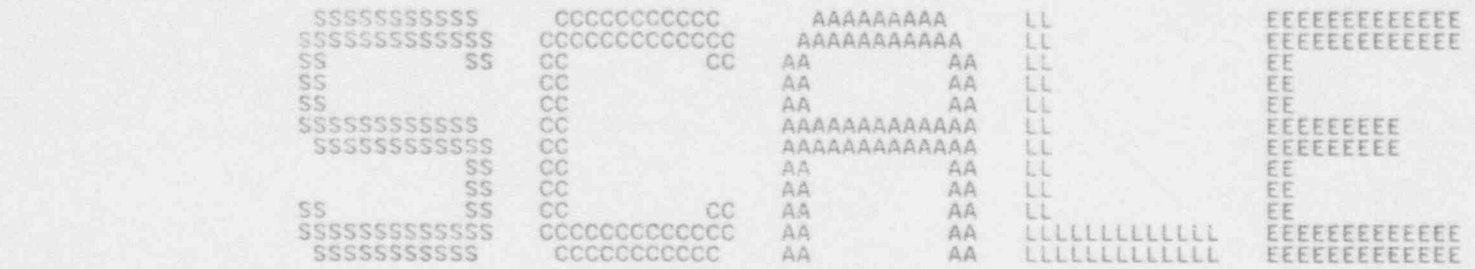


PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000002

CREATION DATE: 91.350

LIBRARY: E.TZA27286.L`D.PGMS77

PRODUCTION CODE: NITAWL

REVISION: 1.6

JOBNAME: VCJCSA4A

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.01.03

```
       -1Q ARRAY HAS      1 ENTRIES.

        0Q ARRAY HAS      9 ENTRIES.

        1Q ARRAY HAS     12 ENTRIES.

SELECT  7 NUCLIDES FROM THE MASTER  LIBRARY ON LOGICAL  1
        0 NUCLIDES FROM THE WORKING LIBRARY ON LOGICAL  2
        0 NUCLIDES FROM THE WORKING LIBRARY ON LOGICAL  3
          TO CREATE THE NEW WORKING LIBRARY ON LOGICAL  4

        2 RESONANCE CALCULATIONS HAVE BEEN REQUESTED
       -1 OUTPUT OPTION FOR AMPX FORMATTED CROSS SECTION DATA

THE STORAGE ALLOCATED FOR THIS CASE IS 100000 WORDS

        2Q ARRAY HAS      7 ENTRIES.

        3Q ARRAY HAS     30 ENTRIES.

        4Q ARRAY HAS      7 ENTRIES.

 GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
   TAPE IDENTIFICATION NUMBER              4027000
   NUMBER OF NUCLIDES ON TAPE                    7
   NUMBER OF NEUTRON ENERGY GROUPS              27
   FIRST THERMAL NEUTRON ENERGY GROUP           15
   NUMBER OF GAMMA ENERGY GROUPS                 0

   DIRECT ACCESS UNIT NUMBER  9 REQUIRES 117 BLOCKS OF LENGTH  1484 WORDS


 XSDRN TAPE4027000
                      SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
                        BASED ON ENDF-B VERSION 4 DATA
                          COMPILED FOR NRC       1/27/89
                            LAST UPDATED        10/12/89
                              L.M.PETRIE         ORNL

 NUCLIDES FROM XSDRN TAPE
     1     HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              1001
     2     HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89            201001
     3     OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              8016
     4     OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89            208016
     5     FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89              9019
     6     URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89             92235
     7     URANIUM-238     ENDF/B-IV MAT 1262             UPDATED 10/12/89             92238

 HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              1001     TEMPERATURE=   293.00
                           THERMAL SCATTERING MATRIX NUMBER    1 AT A TEMPERATURE OF    293.00 WAS SELECTED.

 HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89            201001     TEMPERATURE=   293.00
                           THERMAL SCATTERING MATRIX NUMBER    1 AT A TEMPERATURE OF    293.00 WAS SELECTED.

 OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              8016     TEMPERATURE=   293.00

 OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89            208016     TEMPERATURE=   293.00

 FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89              9019     TEMPERATURE=   293.00

 URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89             92235     TEMPERATURE=   293.00
```

```
GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS  0.0000E+00
RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A)          =   233.025              TEMPERATURE(KELVIN)       =   293.000
POTENTIAL SCATTER SIGMA  =    11.500              LUMPED NUCLEAR DENSITY    = 2.0578971E-04
SPIN FACTOR (G)          = 15171.098              LUMP DIMENSION (A-BAR)    = 0.0000000E+00
INNER RADIUS             = 0.0000000E+00          DANCOFF CORRECTION (C)    = 0.0000000E+00
THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-1    =     1.008               SIGMA(PER ABSORBER ATOM)= 4.8805820E+03
MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-2    =    19.799               SIGMA(PER ABSORBER ATOM)= 8.9295386E+02
MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
THIS RESONANCE MATERIAL WILL BE TREATED AS A 0-DIMENSIONAL OBJECT.
VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000

GROUP        RES ABS         RES FISS        RES SCAT
 12      -1.273760E+00   -7.814561E-01   -3.331852E-02
 13      -4.360353E+00   -2.141225E+00   -1.[illegible]7406E-01
 14      -3.107759E+00   -1.864935E+00   -2.266715E-02

EXCESS RESONANCE INTEGRALS
                 RESOLVED

ABSORPTION       2.17356E+02
FISSION          1.29257E+02

  ELAPSED TIME   0.10 MIN.
 URANIUM-238    ENDF/B-IV MAT 1262            UPDATED 10/12/89            92238     TEMPERATURE=   293.00
GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS  0.0000E+00
RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A)          =   236.006              TEMPERATURE(KELVIN)       =   293.000
POTENTIAL SCATTER SIGMA  =    10.599              LUMPED NUCLEAR DENSITY    = 3.8444269E-03
SPIN FACTOR (G)          =   656.527              LUMP DIMENSION (A-BAR)    = 0.0000000E+00
INNER RADIUS             = 0.0000000E+00          DANCOFF CORRECTION (C)    = 0.0000000E+00
THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-1    =     1.008               SIGMA(PER ABSORBER ATOM)= 2.6125439E+02
MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-2    =    16.725               SIGMA(PER ABSORBER ATOM)= 4.0061310E+01
MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
```

THIS RESONANCE MATERIAL WILL BE TREATED AS A 0-DIMENSIONAL OBJECT.

VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000

GROUP	RES ABS	RES FISS	RES SCAT
9	-1.782503E-02	0.000000E+00	-1.897987E-01
10	-6.216179E-01	-6.444589E-06	-4.087888E+00
11	-8.111181E+00	0.000000E+00	-2.312807E+01
12	-3.908702E+01	0.000000E+00	-4.588655E+01
13	-4.935625E+01	0.000000E+00	-1.625967E+01
14	-9.522398E+01	0.000000E+00	-5.548256E+00

EXCESS RESONANCE INTEGRALS

	RESOLVED
ABSORPTION	4.24719E+01
FISSION	5.22746E-04

ELAPSED TIME 0.22 MIN.

ELAPSED TIME 0.23 MIN.

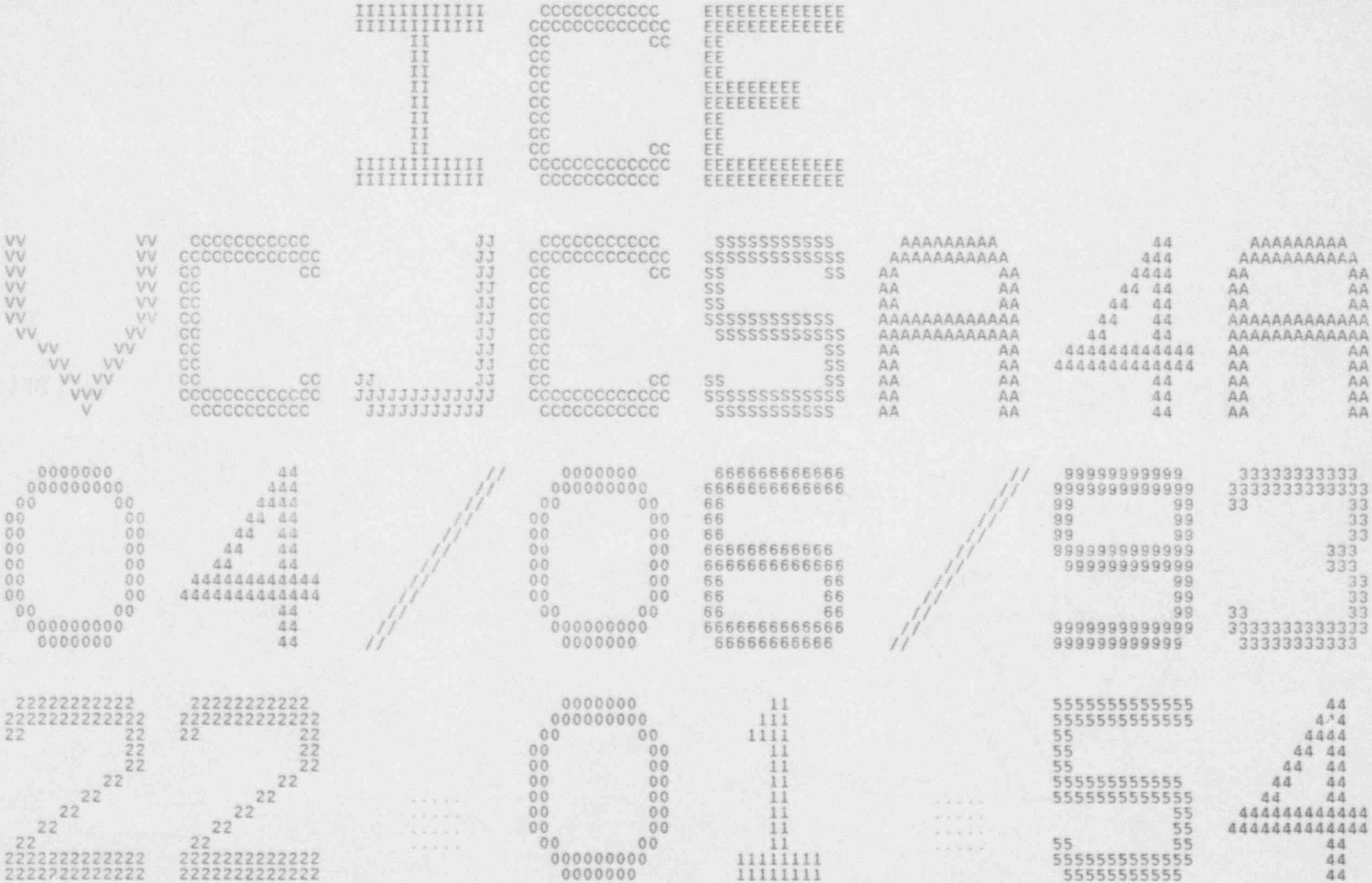
THIS XSDRN WORKING TAPE WAS CREATED 04/06/93 AT 22.01.11
THE TITLE OF THE PARENT CASE IS AS FOLLOWS
SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89

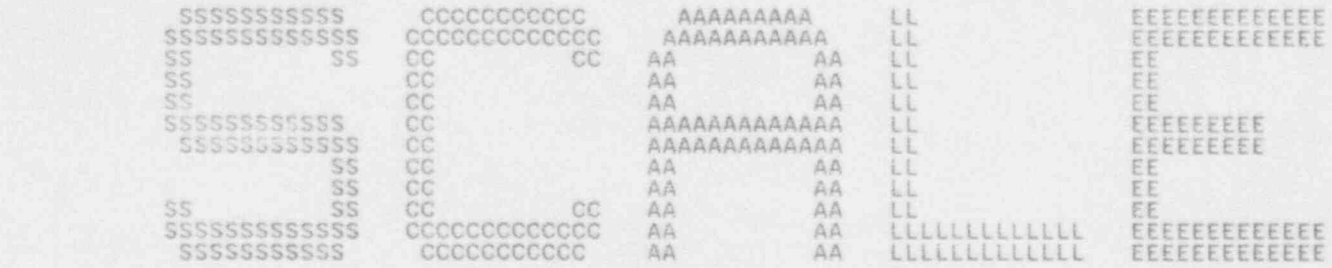
TAPE ID	4027000	NUMBER OF NUCLIDES	7
NUMBER OF NEUTRON GROUPS	27	NUMBER OF GAMMA GROUPS	0
FIRST THERMAL GROUP	15	LOGICAL UNIT	4

TABLE OF CONTENTS

HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	ID	1001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	ID	201001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	ID	8016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	ID	208016
FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89	ID	9019
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89	ID	92235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89	ID	92238

TAPE COPY USED 0 I/O'S. AND TOOK 0.42 SECONDS





PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000007

CREATION DATE: 91.287

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: ICE

REVISION: 1.4

JOBNAME: VCJCSA4A

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.01.55

```
U02F2 SOLUTION OPTIMIZE CONCENTRATION  CYLINDER                UOXCYO.CJW        04/06/93    22.01.55

        0Q ARRAY HAS      3 ENTRIES.

        1Q ARRAY HAS      7 ENTRIES.

       -1Q ARRAY HAS      4 ENTRIES.


 0$ ARRAY
INTAPE        4          IOT3         21
IOT1          2          IOT4         14
IOT2          0


 1$ ARRAY
MIX           2          IFLAG(3)      0
NMIX          7          IFLAG(4)     10
IFLAG(1)     10          KOPT          4
IFLAG(2)      0

        2Q ARRAY HAS      7 ENTRIES.

        3Q ARRAY HAS      7 ENTRIES.

        4Q ARRAY HAS      7 ENTRIES.

        5Q ARRAY HAS      2 ENTRIES.

        7Q ARRAY HAS      3 ENTRIES.
 3.000E+02   1.300E+06   5.000E+00   6.750E+04   2.530E-02   1.265E-01   9.275E+03   6.006E-08   9.500E-01   2.000E+07
 6.434E+06   3.000E+06   1.850E+06   1.400E+06   9.000E+05   4.000E+05   1.000E+05   1.700E+04   3.000E+03   5.500E+02
 1.000E+02   3.000E+01   1.000E+01   3.050E+00   1.770E+00   1.300E+00   1.130E+00   1.000E+00   8.000E-01   4.000E-01
 3.250E-01   2.250E-01   1.000E-01   5.000E-02   3.000E-02   1.000E-02


 2$,3$,AND 4* ARRAYS
MIXTURE       1     ELEMENT   92235     DENSITY    0.20578971E-03
MIXTURE       1     ELEMENT   92238     DENSITY    0.38444269E-02
MIXTURE       1     ELEMENT    8016     DENSITY    0.32717451E-01
MIXTURE       2     ELEMENT  208016     DENSITY    0.33375714E-01
MIXTURE       1     ELEMENT    9019     DENSITY    0.81004351E-02
MIXTURE       1     ELEMENT    1001     DENSITY    0.49234036E-01
MIXTURE       2     ELEMENT  201001     DENSITY    0.66751420E-01


 5$ ARRAY
MIXTURE    1     NO. OF COEFICIENTS    4
MIXTURE    2     NO. OF COEFICIENTS    4


 7$ ARRAY
IHT=       3     IHS=       16     IHM=       42     LOPT=       0
NNGA=     27     NGGA=       0     NOPT=       0     NSCT=       2
IADJM=     0     NNGTP=      0
```

```
WORDS NEEDED TO READ INPUT TAPE=    1846
 WORDS CORE NEEDED FOR MIXING=     1556
 WORDS AVAILABLE FOR MIXING=  100000


 WORDS CORE NEEDED TO MAKE MIXED AMPX WORKING TAPE=    1150
```

```
     THIS XSDRN WORKING TAPE WAS CREATED 04/06/93 AT 22.01.11
     THE TITLE OF THE PARENT CASE IS AS FOLLOWS
     SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
       BASED ON ENDF-B VERSION 4 DATA
     MIXED CROSS SECTIONS BY ICE-THE PERFECT MIXER
         TAPE ID                      4027000          NUMBER OF NUCLIDES                    2
         NUMBER OF NEUTRON GROUPS          27          NUMBER OF GAMMA GROUPS                0
         FIRST THERMAL GROUP               15          LOGICAL UNIT                          2
                              TABLE OF CONTENTS
       MIXED CROSS SECTIONS FROM ICE                                              ID          1
       MIXED CROSS SECTIONS FROM ICE                                              ID          2

         TAPE COPY USED      0 I/O'S, AND TOOK    0.24 SECONDS
AN AMPX WORKING TAPE WAS MADE ON UNIT    2
 HAVE A DRINK
    1204 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


    1393 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


    1822 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


MSGPS=    1
    1850 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


A MORSE/KENO TAPE WAS MADE ON UNIT   14
 HAVE A DRINK
```


XX XX SSSSSSSSSS DDDDDDDDDD RRRRRRRRRR NN NN PPPPPPPPPP MM MM
XX XX SSSSSSSSSS DDDDDDDDDD RRRRRRRRRR NNN NN PPPPPPPPPP MMM MMM
XX XX SS SS DD DD RR RR NNNN NN PP PP MMMM MMMM
XX XX SS DD DD RR RR NN NN NN PP PP MM MM MM MM
XX XX SS DD DD RR RR NN NN NN PP PP MM MM MM MM
XXX SSSSSSSSSS DD DD RRRRRRRRRR NN NN NN PPPPPPPPPP MM MMM MM
XXX SSSSSSSSSS DD DD RRRRRRRRRR NN NN NN PPPPPPPPPP MM M MM
XX XX SS DD DD RR RR NN NN NN PP MM MM
XX XX SS DD DD RR RR NN NN NN PP MM MM
XX XX SS SS DD DD RR RR NN NN NNNN PP MM MM
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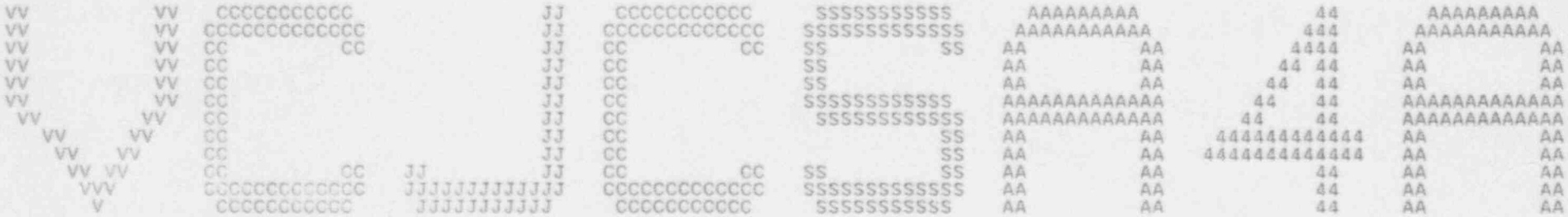
XX XX SSSSSSSSSS DDDDDDDDDD RR RR NN NN NN PP MM MM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VV VV CC CC JJ JJ CC CC SS SS AA AA 44 AA AA
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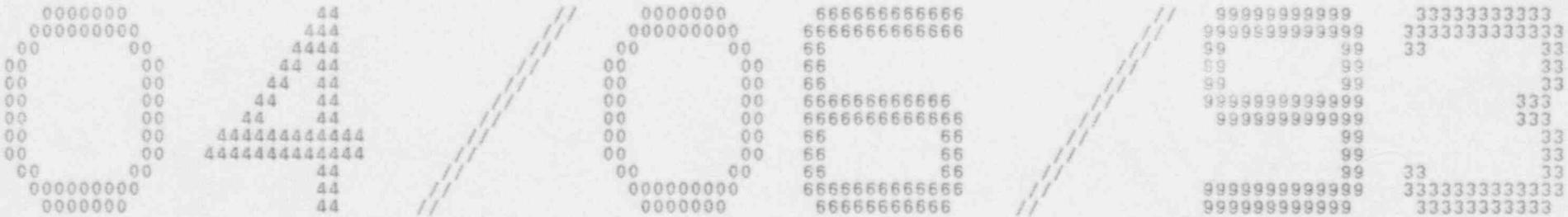
V CCCCCCCCCC JJJJJJJJJJ CCCCCCCCCC SSSSSSSSSS AA AA 44 AA AA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00 00 44 44 00 00 666666666666 99999999999 333
00 00 44 44 00 00 6666666666666 999999999999 333
00 00 444444444444 00 00 66 66 99 33
00 00 444444444444 00 00 66 66 99 33
00 00 44 00 00 66 66 99 33 33
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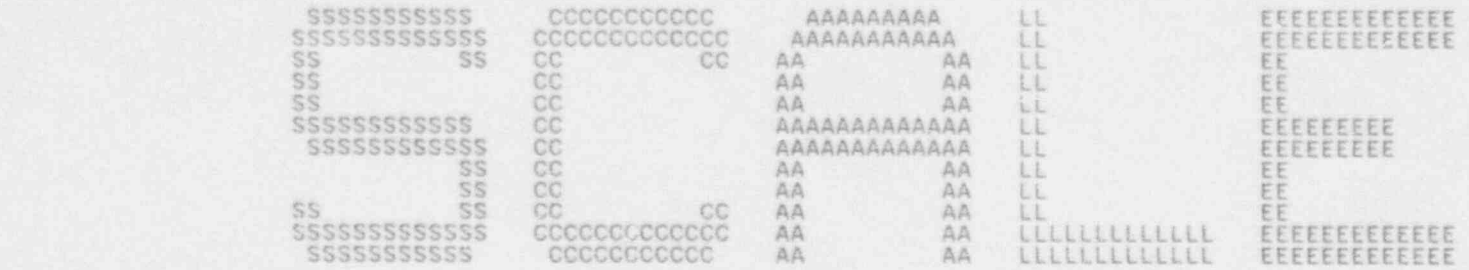

PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: XSDRN

CREATION DATE: 91.287

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: XSDRN

REVISION: 1.5

JOBNAME: VCJCSA4A

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.02.40

CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

```
    0$ ARRAY     11 ENTRIES READ
    1$ ARRAY     15 ENTRIES READ
    2$ ARRAY     10 ENTRIES READ
    3$ ARRAY     12 ENTRIES READ
    5* ARRAY     12 ENTRIES READ
    0T
DIRECT ACCESS UNIT   9 REQUIRES     8 BLOCKS OF LENGTH  704 FOR CROSS SECTION MIXING.
```

CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

GENERAL PROBLEM DESCRIPTION DATA BLOCK

GENERAL PROBLEM DATA

IGE	1/2/3 = PLANE/CYLINDER/SPHERE	2	ISN	QUADRATURE ORDER	16
IZM	NUMBER OF ZONES	2	ISCT	ORDER OF SCATTERING	3
IM	NUMBER OF SPACIAL INTERVALS	51	IEVT	0/1/2/3/4/5/6=Q/K/ALPHA/C/Z/R/H	1
IBL	0/1/2/3 = VACUUM/REFL/PER/WHITE	1	IIM	INNER ITERATION MAXIMUM	10
IBR	RIGHT BOUNDARY CONDITION	0	ICM	OUTER ITERATION MAXIMUM	50
MXX	NUMBER OF MIXTURES	2	ICLC	-1/0/N--FLAT RES/SN/OPT	0
MS	MIXING TABLE LENGTH	2	ITH	0/1 = FORWARD/ADJOINT	0
IGM	NUMBER OF ENERGY GROUPS	27	IFLU	NOT USED(ALWAYS WGTD)	0
NNG	NUMBER OF NEUTRON GROUPS	27	IPRT	-2/-1/0/N=MIXTURE XSEC PRINT	-2
NGG	NUMBER OF GAMMA GROUPS	0	ID1	0/1/2/3=NO/PRT ND/PCH N/BOTH	0
IFTG	NUMBER OF FIRST THERMAL GROUP	15	IPBT	-1/0/1=NONE/FINE/ALL BAL. PRT	0

SPECIAL OPTIONS

IFG	0/1 = NONE/WEIGHTING CALCULATION	0	IPN	0/1/2 DIFF. COEF. PARAM	0
IQM	VOLUMETRIC SOURCES (0/N=NO/YES)	0	IDFM	0/1 = NONE/DENSITY FACTORS 38*	0
IPM	BOUNDARY SOURCES (0/N=NO/YES)	0	IAZ	0/N = NONE/N ACTIVITIES BY ZONE	0
IFN	0/1/2 = INPUT 33*/34*/USE LAST	1	IAI	0/1=NONE/ACTIVITIES BY INTERVAL	0
ITMX	MAXIMUM TIME (MINUTES)	0	IFCT	0/1=NO/YES UPSCATTER SCALING	0
IDT1	0/1/2/3=NO/XSECT/SRCE/FLUX--OUT	0	IPVT	0/1/2=NO/K/ALPHA PARAMETRIC SRCH	0
ISX	BROAD GROUP FLUXES	0	ISEN	OUTER ITERATION ACCELERATION	0
IBLN	ACTIVITY DATA UNIT	0	NBND	BAND REBALN PARAMETER	-1
JBKL	0/1/2 BUCKLING GEOMETRY	0			

FLOATING POINT PARAMETERS

EPS	OVERALL CONVERGENCE	1.00000E-04	DY	CYL/PLA HT FOR BUCKLING	0.00000E+00
PTC	POINT CONVERGENCE	1.00000E-04	DZ	PLANE DEPTH FOR BUCKLING	0.00000E+00
XNF	NORMALIZATION FACTOR	1.00000E+00	VSC	VOID STREAMING CORRECTION	0.00000E+00
EV	EIGENVALUE GUESS	0.00000E+00	PV	IPVT=1/2--K/ALPHA	0.00000E+00
EVM	EIGENVALUE MODIFIER	0.00000E+00	EQL	EV CHANGE EPS FOR SEARCH	1.00000E-03
BF	BUCKLING FACTOR=1.420892	1.42089E+00	XNPM	NEW PARAM MOD FOR SEARCH	7.50000E-01

THIS CASE WILL REQUIRE 1515 LOCATIONS FOR MIXING
THIS CASE HAS BEEN ALLOCATED 200000 LOCATIONS

CYLINDER OPTIMIZATION U02F2 SOLUTION DENSITY VARIATION

13$ ARRAY 2 ENTRIES READ

14$ ARRAY 2 ENTRIES READ

15* ARRAY 2 ENTRIES READ

0T

DATA BLOCK 2 (MIXING TABLE, ETC.)

NUCLIDES ON TAPE		CCCC IDENTIFICATION	MIXTURE	MIXING TABLE COMPONENT	ATOM DENSITY	EXTRA XSECT ID'S
1	1		1	1	1.00000E+00	
2	2		2	2	1.00000E+00	

ELAPSED TIME 0.01 MIN.

54389 LOCATIONS WILL BE USED

34* ARRAY 102 ENTRIES READ

0T

35* ARRAY 52 ENTRIES READ

36$ ARRAY 51 ENTRIES READ

39$ ARRAY 2 ENTRIES READ

40$ ARRAY 2 ENTRIES READ

0T

CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
NEUTRON GROUP PARAMETERS

GP	ENERGY BOUNDARIES	LETHARGY BOUNDARIES	MID PT VELOCITIES	BROAD GP NUMBERS	CALC TYPE	GROUP BAND	RIGHT ALBEDO	LEFT ALBEDO
1	2.00000E+07	-6.93147E-01	4.60581E+09	0	0	1		
2	6.43400E+06	4.40988E-01	2.88737E+09	0	0	2		
3	3.00000E+06	1.20397E+00	2.12291E+09	0	0	3		
4	1.85000E+06	1.68740E+00	1.75673E+09	0	0	4		
5	1.40000E+06	1.96611E+00	1.46535E+09	0	0	5		
6	9.00000E+05	2.40795E+00	1.06619E+09	0	0	6		
7	4.00000E+05	3.21888E+00	6.07557E+08	0	0	7		
8	1.00000E+05	4.60517E+00	2.72425E+08	0	0	8		
9	1.70000E+04	6.37713E+00	1.13526E+08	0	0	9		
10	3.00000E+03	8.11173E+00	4.82126E+07	0	0	10		
11	5.50000E+02	9.80818E+00	2.05946E+07	0	0	11		
12	1.00000E+02	1.15129E+01	1.01036E+07	0	0	12		
13	3.00000E+01	1.27169E+01	5.69594E+06	0	0	13		
14	1.00000E+01	1.38155E+01	3.20957E+06	0	0	14		
15	3.04999E+00	1.50030E+01	2.10601E+06	0	0	15		
16	1.77000E+00	1.55471E+01	1.70521E+06	0	0	15		
17	1.29999E+00	1.58557E+01	1.52544E+06	0	0	15		
18	1.12999E+00	1.59959E+01	1.42867E+06	0	0	15		
19	1.00000E+00	1.61181E+01	1.31002E+06	0	0	15		
20	8.00000E-01	1.63412E+01	9.05898E+05	0	0	15		
21	4.00000E-01	1.70314E+01	8.13318E+05	0	0	15		
22	3.25000E-01	1.72420E+01	6.90069E+05	0	0	15		
23	2.25000E-01	1.76098E+01	4.86933E+05	0	0	15		
24	9.99998E-02	1.84207E+01	3.57760E+05	0	0	15		
25	5.00000E-02	1.91138E+01	2.71895E+05	0	0	15		
26	3.00000E-02	1.96246E+01	1.87283E+05	0	0	15		
27	1.00000E-02	2.07233E+01	8.88202E+04	0	0	15		
28	1.00000E-05	2.76310E+01						

CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

	MIXTURE BY ZONE	ORDER P(L) BY ZONE	ACTIVITY TABLE MATL NO.	ACTIVITY TABLE REACTION	QUADRATURE CONSTANTS WEIGHTS	QUADRATURE CONSTANTS DIRECTIONS	REFL DIREC	WT X COS
1	1	3			0	-1.45209E-01	3	0
2	2	3			1.35762E-02	-1.02679E-01	3	-1.39399E-03
3					1.35762E-02	1.02679E-01	2	1.39399E-03
4					0	-3.28296E-01	8	0
5					1.55634E-02	-3.03306E-01	8	-4.72046E-03
6					1.55634E-02	-1.25633E-01	7	-1.95528E-03
7					1.55634E-02	1.25633E-01	6	1.95528E-03
8					1.55634E-02	3.03306E-01	5	4.72046E-03
9					0	-5.00682E-01	15	0
10					1.58597E-02	-4.83622E-01	15	-7.67012E-03
11					1.58597E-02	-3.54036E-01	14	-5.61492E-03
12					1.58597E-02	-1.29586E-01	13	-2.05520E-03
13					1.58597E-02	1.29586E-01	12	2.05520E-03
14					1.58597E-02	3.54036E-01	11	5.61492E-03
15					1.58597E-02	4.83622E-01	10	7.67012E-03
16					0	-6.55259E-01	24	0
17					1.55786E-02	-6.42668E-01	24	-1.00119E-02
18					1.55786E-02	-5.44828E-01	23	-8.48766E-03
19					1.55786E-02	-3.64042E-01	22	-5.67127E-03
20					1.55786E-02	-1.27835E-01	21	-1.99149E-03
21					1.55786E-02	1.27835E-01	20	1.99149E-03
22					1.55786E-02	3.64042E-01	19	5.67127E-03
23					1.55786E-02	5.44828E-01	18	8.48766E-03
24					1.55786E-02	6.42668E-01	17	1.00118E-02
25					0	-7.86275E-01	35	0
26					1.49596E-02	-7.76595E-01	35	-1.16175E-02
27					1.49596E-02	-7.00576E-01	34	-1.04803E-02
28					1.49596E-02	-5.55981E-01	33	-8.31724E-03
29					1.49596E-02	-3.56961E-01	32	-5.34000E-03
30					1.49596E-02	-1.23001E-01	31	-1.84004E-03
31					1.49596E-02	1.23001E-01	30	1.84004E-03
32					1.49596E-02	3.56961E-01	29	5.34000E-03
33					1.49596E-02	5.55981E-01	28	8.31724E-03
34					1.49596E-02	7.00576E-01	27	1.04803E-02
35					1.49596E-02	7.76595E-01	26	1.16175E-02
36					0	-8.88943E-01	48	0
37					1.40964E-02	-8.81338E-01	48	-1.24237E-02
38					1.40964E-02	-8.21277E-01	47	-1.15770E-02
39					1.40964E-02	-7.05246E-01	46	-9.94141E-03
40					1.40964E-02	-5.41155E-01	45	-7.62831E-03
41					1.40964E-02	-3.40184E-01	44	-4.79536E-03
42					1.40964E-02	-1.16030E-01	43	-1.63561E-03
43					1.40964E-02	1.16030E-01	42	1.63561E-03
44					1.40964E-02	3.40184E-01	41	4.79536E-03
45					1.40964E-02	5.41155E-01	40	7.62831E-03
46					1.40964E-02	7.05246E-01	39	9.94141E-03
47					1.40964E-02	8.21277E-01	38	1.15770E-02
48					1.40964E-02	8.81338E-01	37	1.24237E-02
49					0	-9.59531E-01	63	0
50					1.30431E-02	-9.53497E-01	63	-1.24368E-02
51					1.30431E-02	-9.05685E-01	62	-1.18129E-02
52					1.30431E-02	-8.12458E-01	61	-1.05970E-02
53					1.30431E-02	-6.78491E-01	60	-8.84962E-03
54					1.30431E-02	-5.10501E-01	59	-6.65851E-03
55					1.30431E-02	-3.16913E-01	58	-4.13352E-03
56					1.30431E-02	-1.07433E-01	57	-1.40126E-03
57					1.30431E-02	1.07433E-01	56	1.40126E-03
58					1.30431E-02	3.16913E-01	55	4.13352E-03
59					1.30431E-02	5.10501E-01	54	6.65851E-03

60			1.30431E-02	6.78491E-01	53	8.84962E-03
61			1.30431E-02	8.12458E-01	52	1.05970E-02
62			1.30431E-02	9.05685E-01	51	1.18129E-02
63			1.30431E-02	9.53497E-01	50	1.24366E-02
64			0	-9.95476E-01	80	0
65			1.18407E-02	-9.90683E-01	80	-1.17303E-02
66			1.18407E-02	-9.52611E-01	79	-1.12795E-02
67			1.18407E-02	-8.77931E-01	78	-1.03953E-02
68			1.18407E-02	-7.69513E-01	77	-9.11155E-03
69			1.18407E-02	-6.31523E-01	76	-7.47765E-03
70			1.18407E-02	-4.69264E-01	75	-5.55640E-03
71			1.18407E-02	-2.88971E-01	74	-3.42161E-03
72			1.18407E-02	-9.75737E-02	73	-1.15534E-03
73			1.18407E-02	9.75737E-02	72	1.15534E-03
74			1.18407E-02	2.88971E-01	71	3.42161E-03
75			1.18407E-02	4.69264E-01	70	5.55640E-03
76			1.18407E-02	6.31523E-01	69	7.47765E-03
77			1.18407E-02	7.69513E-01	68	9.11155E-03
78			1.18407E-02	8.77931E-01	67	1.03953E-02
79			1.18407E-02	9.52611E-01		1.12795E-02
80			1.18407E-02	9.90683E-01	60	1.17303E-02

CONSTANTS FOR P(3) SCATTERING

ANGL	SET 1	SET 2	SET 3	SET 4	SET 5
1	-1.45209E-01	9.68370E-01	1.82608E-02	-3.46314E-01	-2.42061E-03
2	-1.02679E-01	9.68370E-01	0.00000E+00	-2.44881E-01	1.71162E-03
3	1.02679E-01	9.68370E-01	0.00000E+00	2.44881E-01	-1.71162E-03
4	-3.28296E-01	8.38332E-01	9.33384E-02	-6.95818E-01	-2.79727E-02
5	-3.03306E-01	8.38332E-01	6.60002E-02	-6.42852E-01	-1.07047E-02
6	-1.25633E-01	8.38332E-01	-6.60001E-02	-2.66279E-01	2.58435E-02
7	1.25633E-01	8.38332E-01	-6.60002E-02	2.66278E-01	-2.58435E-02
8	3.03306E-01	8.38332E-01	6.60002E-02	6.42852E-01	1.07047E-02
9	-5.00682E-01	6.23976E-01	2.17097E-01	-8.42114E-01	-9.92261E-02
10	-4.83622E-01	6.23976E-01	1.88012E-01	-8.13419E-01	-7.01634E-02
11	-3.54036E-01	6.23976E-01	0.00000E+00	-5.95464E-01	7.01634E-02
12	-1.29586E-01	6.23976E-01	-1.88012E-01	-2.17955E-01	7.01634E-02
13	1.29586E-01	6.23976E-01	-1.88012E-01	2.17955E-01	-7.01634E-02
14	3.54036E-01	6.23976E-01	0.00000E+00	5.95464E-01	-7.01633E-02
15	4.83622E-01	6.23976E-01	1.88012E-01	8.13419E-01	7.01634E-02
16	-6.55259E-01	3.55954E-01	3.71840E-01	-7.43610E-01	-2.22422E-01
17	-6.42668E-01	3.55954E-01	3.43536E-01	-7.29322E-01	-1.84938E-01
18	-5.44828E-01	3.55954E-01	1.42297E-01	-6.18289E-01	4.33927E-02
19	-3.64042E-01	3.55954E-01	-1.42297E-01	-4.13127E-01	2.18149E-01
20	-1.27835E-01	3.55954E-01	-3.43535E-01	-1.45071E-01	1.23571E-01
21	1.27835E-01	3.55954E-01	-3.43535E-01	1.45071E-01	-1.23571E-01
22	3.64042E-01	3.55954E-01	-1.42297E-01	4.13128E-01	-2.18148E-01
23	5.44828E-01	3.55954E-01	1.42297E-01	6.18289E-01	-4.33923E-02
24	6.42668E-01	3.55954E-01	3.43535E-01	7.29322E-01	1.84937E-01
25	-7.86275E-01	7.26566E-02	5.35402E-01	-4.37607E-01	-3.84294E-01
26	-7.76595E-01	7.26566E-02	5.09197E-01	-4.32219E-01	-3.42408E-01
27	-7.00576E-01	7.26566E-02	3.14701E-01	-3.89911E-01	-6.01170E-02
28	-5.55981E-01	7.26566E-02	0.00000E+00	-3.09435E-01	2.71737E-01
29	-3.56962E-01	7.26566E-02	-3.14700E-01	-1.98670E-01	3.79563E-01
30	-1.23001E-01	7.26566E-02	-5.09197E-01	-6.84571E-02	1.74466E-01
31	1.23001E-01	7.26566E-02	-5.09197E-01	6.84569E-02	-1.74466E-01
32	3.56962E-01	7.26566E-02	-3.14701E-01	1.98670E-01	-3.79563E-01
33	5.55981E-01	7.26566E-02	0.00000E+00	3.09435E-01	-2.71737E-01
34	7.00576E-01	7.26566E-02	3.14701E-01	3.89911E-01	6.01166E-02
35	7.76595E-01	7.26566E-02	5.09197E-01	4.32219E-01	3.42408E-01
36	-8.88943E-01	-1.85331E-01	6.84351E-01	-2.66175E-02	-5.55344E-01
37	-8.81338E-01	-1.85331E-01	6.61032E-01	-2.63898E-02	-5.13071E-01
38	-8.21277E-01	-1.85331E-01	4.83909E-01	-2.45914E-02	-2.12521E-01
39	-7.05246E-01	-1.85331E-01	1.77123E-01	-2.11171E-02	2.12521E-01
40	-5.41155E-01	-1.85331E-01	-1.77123E-01	-1.62037E-02	5.13071E-01
41	-3.40185E-01	-1.85331E-01	-4.83908E-01	-1.01861E-02	5.13071E-01

42	-1.16031E-01	-1.85331E-01	-6.61032E-01	-3.47429E-03	2.12521E-01
43	1.16030E-01	-1.85331E-01	-6.61032E-01	3.47429E-03	-2.12521E-01
44	3.40184E-01	-1.85331E-01	-4.83909E-01	1.01861E-02	-5.13071E-01
45	5.41155E-01	-1.85331E-01	-1.77122E-01	1.62037E-02	-5.13071E-01
46	7.05246E-01	-1.85331E-01	1.77123E-01	2.11171E-02	-2.12520E-01
47	8.21277E-01	-1.85331E-01	4.83909E-01	2.45914E-02	2.12521E-01
48	8.81338E-01	-1.85331E-01	6.61032E-01	2.63898E-02	5.13071E-01
49	-9.59531E-01	-3.81049E-01	7.97349E-01	3.54609E-01	-6.98420E-01
50	-9.53497E-01	-3.81049E-01	7.77357E-01	3.52379E-01	-6.59226E-01
51	-9.05685E-01	-3.81049E-01	6.23393E-01	3.34709E-01	-3.71582E-01
52	-8.12458E-01	-3.81049E-01	3.45957E-01	3.00256E-01	7.81980E-02
53	-6.78491E-01	-3.81049E-01	0.00000E+00	2.50746E-01	4.93857E-01
54	-5.10501E-01	-3.81049E-01	-3.45957E-01	1.88663E-01	6.940 -01
55	-3.16914E-01	-3.81049E-01	-6.23392E-01	1.17120E-01	5.9137 -01
56	-1.07434E-01	-3.81049E-01	-7.77357E-01	3.97038E-02	2.30675E-01
57	1.07434E-01	-3.81049E-01	-7.77357E-01	-3.97037E-02	-2.30674E-01
58	3.16913E-01	-3.81049E-01	-6.23392E-01	-1.17120E-01	-5.91369E-01
59	5.10501E-01	-3.81049E-01	-3.45957E-01	-1.88663E-01	-6.94028E-01
60	6.78491E-01	-3.81049E-01	0.00000E+00	-2.50746E-01	-4.93857E-01
61	8.12458E-01	-3.81049E-01	3.45957E-01	-3.00256E-01	-7.81980E-02
62	9.05685E-01	-3.81049E-01	6.23392E-01	-3.34709E-01	3.71581E-01
63	9.53497E-01	-3.81049E-01	7.77357E-01	-3.52378E-01	6.59227E-01
64	-9.95476E-01	-4.86459E-01	8.58207E-01	5.82086E-01	-7.79888E-01
65	-9.90682E-01	-4.86459E-01	8.41717E-01	5.79283E-01	-7.46306E-01
66	-9.52611E-01	-4.86459E-01	7.13573E-01	5.57021E-01	-4.94755E-01
67	-8.77931E-01	-4.86459E-01	4.76794E-01	5.13354E-01	-7.64421E-02
68	-7.69513E-01	-4.86459E-01	1.67427E-01	4.49958E-01	3.67638E-01
69	-6.31523E-01	-4.86459E-01	-1.67428E-01	3.69271E-01	6.87800E-01
70	-4.69264E-01	-4.86459E-01	-4.76794E-01	2.74393E-01	7.76133E-01
71	-2.88972E-01	-4.86459E-01	-7.13573E-01	1.68971E-01	6.02862E-01
72	-9.75736E-02	-4.86459E-01	-8.41717E-01	5.70544E-02	2.26389E-01
73	9.75733E-02	-4.86459E-01	-8.41717E-01	-5.70542E-02	-2.26389E-01
74	2.88972E-01	-4.86459E-01	-7.13573E-01	-1.68971E-01	-6.02862E-01
75	4.69264E-01	-4.86459E-01	-4.76795E-01	-2.74393E-01	-7.76133E-01
76	6.31523E-01	-4.86459E-01	-1.67427E-01	-3.69271E-01	-6.87800E-01
77	7.69510E-01	-4.86459E-01	1.67428E-01	-4.49958E-01	-3.67637E-01
78	8.77931E-01	-4.86459E-01	4.76794E-01	-5.13354E-01	7.64421E-02
79	9.52611E-01	-4.86459E-01	7.13573E-01	-5.57021E-01	4.94756E-01
80	9.90682E-01	-4.86459E-01	8.41717E-01	-5.79283E-01	7.46306E-01

INT	RADII	MID PTS	ZONE NO.	AREAS	VOLUMES	DENS FACT	RADIUS MOD	SPEC(INT)
1	0	4.45313E-01	1	0	2.49195E+00		0	
2	8.90625E-01	1.33594E+00	1	5.59596E+00	7.47585E+00		0	
3	1.78125E+00	2.22656E+00	1	1.11919E+01	1.24597E+01			
4	2.67188E+00	3.11719E+00	1	1.67879E+01	1.74436E+01			
5	3.56250E+00	4.00781E+00	1	2.23838E+01	2.24276E+01			
6	4.45313E+00	4.89844E+00	1	2.79798E+01	2.74115E+01			
7	5.34375E+00	5.78906E+00	1	3.35758E+01	3.23954E+01			
8	6.23438E+00	6.67969E+00	1	3.91717E+01	3.73793E+01			
9	7.12500E+00	7.57031E+00	1	4.47677E+01	4.23632E+01			
10	8.01563E+00	8.40094E+00	1	5.03636E+01	4.73470E+01			
11	8.90625E+00	9.35156E+00	1	5.59596E+01	5.23311E+01			
12	9.79688E+00	1.02422E+01	1	6.15556E+01	5.73148E+01			
13	1.06875E+01	1.11328E+01	1	6.71515E+01	6.22988E+01			
14	1.15781E+01	1.20234E+01	1	7.27475E+01	6.72827E+01			
15	1.24688E+01	1.29141E+01	1	7.83435E+01	7.22666E+01			
16	1.33594E+01	1.38047E+01	1	8.39394E+01	7.72505E+01			
17	1.42500E+01	1.47500E+01	2	8.95354E+01	9.26769E+01			
18	1.52500E+01	1.57500E+01	2	9.56186E+01	9.89602E+01			
19	1.62500E+01	1.67500E+01	2	1.02102E+02	1.05243E+02			
20	1.72500E+01	1.77500E+01	2	1.08385E+02	1.11527E+02			
21	1.82500E+01	1.87500E+01	2	1.14668E+02	1.17810E+02			
22	1.92500E+01	1.97500E+01	2	1.20951E+02	1.24093E+02			
23	2.02500E+01	2.07500E+01	2	1.27234E+02	1.30376E+02			
24	2.12500E+01	2.17500E+01	2	1.33518E+02	1.36659E+02			
25	2.22500E+01	2.27500E+01	2	1.39801E+02	1.42943E+02			
26	2.32500E+01	2.37500E+01	2	1.46084E+02	1.49226E+02			
27	2.42500E+01	2.47500E+01	2	1.52367E+02	1.55509E+02			
28	2.52500E+01	2.57500E+01	2	1.58650E+02	1.61790E+02			
29	2.62500E+01	2.67500E+01	2	1.64934E+02	1.68076E+02			
30	2.72500E+01	2.77500E+01	2	1.71217E+02	1.74357E+02			
31	2.82500E+01	2.87500E+01	2	1.77500E+02	1.80643E+02			
32	2.92500E+01	2.97500E+01	2	1.83783E+02	1.86924E+02			
33	3.02500E+01	3.07500E+01	2	1.90066E+02	1.93209E+02			
34	3.12500E+01	3.17500E+01	2	1.96350E+02	1.99490E+02			
35	3.22500E+01	3.27500E+01	2	2.02633E+02	2.05775E+02			
36	3.32500E+01	3.37500E+01	2	2.08916E+02	2.12057E+02			
37	3.42500E+01	3.47500E+01	2	2.15199E+02	2.18340E+02			
38	3.52500E+01	3.57500E+01	2	2.21482E+02	2.24625E+02			
39	3.62500E+01	3.67500E+01	2	2.27765E+02	2.30906E+02			
40	3.72500E+01	3.77500E+01	2	2.34049E+02	2.37191E+02			
41	3.82500E+01	3.87500E+01	2	2.40332E+02	2.43473E+02			
42	3.92500E+01	3.97500E+01	2	2.46615E+02	2.49756E+02			
43	4.02500E+01	4.07500E+01	2	2.52898E+02	2.56035E+02			
44	4.12500E+01	4.17500E+01	2	2.59181E+02	2.62324E+02			
45	4.22500E+01	4.27500E+01	2	2.65464E+02	2.68605E+02			
46	4.32500E+01	4.37500E+01	2	2.71748E+02	2.74891E+02			
47	4.42500E+01	4.47500E+01	2	2.78031E+02	2.81172E+02			
48	4.52500E+01	4.57500E+01	2	2.84314E+02	2.87457E+02			
49	4.62500E+01	4.67500E+01	2	2.90597E+02	2.93738E+02			
50	4.72500E+01	4.77500E+01	2	2.96880E+02	3.00023E+02			
51	4.82500E+01	4.87500E+01	2	3.03164E+02	3.06305E+02			
52	4.92500E+01			3.09447E+02				

ELAPSED TIME 0.01 MIN.

OUTER ITER	INNER ITERS	1 - BALANCE	EIGENVALUE	1 - SOURCE RATIO	1 - SCATTER RATIO	1 - UPSCAT RATIO	SEARCH PARAMETER	TIME (MIN)
1	0	8.52256E-16	1.09006E+00	6.18371E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0172
2	215	1.16257E-02	9.69730E-01	-2.39212E+00	-6.74798E-01	-6.01810E-02	0.00000E+00	0.2815
3	416	4.07766E-03	1.04958E+00	8.67638E-02	-2.61934E-01	-1.76701E-02	0.00000E+00	0.5303
4	609	1.95727E-03	1.04353E+00	6.05931E-02	-1.35347E-01	-7.87634E-03	0.00000E+00	0.7697
5	794	9.77101E-04	1.03513E+00	3.70344E-02	-7.32395E-02	-3.83155E-03	0.00000E+00	1.0003
6	989	4.96529E-04	1.02913E+00	2.11858E-02	-3.90259E-02	-1.93640E-03	0.00000E+00	1.2203
7	1136	2.53626E-04	1.02549E+00	1.16758E-02	-2.06019E-02	-9.95078E-04	0.00000E+00	1.4320
8	1302	1.29377E-04	1.02340E+00	6.29677E-03	-1.07989E-02	-5.14757E-04	0.00000E+00	1.6423
9	1463	6.60475E-05	1.02221E+00	3.36663E-03	-5.63882E-03	-2.68256E-04	0.00000E+00	1.8470
10	1613	3.36432E-05	1.02153E+00	1.79729E-03	-2.94729E-03	-1.40582E-04	0.00000E+00	2.0382
11	1763	1.70069E-05	1.02115E+00	9.60422E-04	-1.54301E-03	-7.39537E-05	0.00000E+00	2.2307
12	1917	8.48794E-06	1.02093E+00	5.15756E-04	-8.09445E-04	-3.91047E-05	0.00000E+00	2.4272
13	2070	4.14742E-06	1.02080E+00	2.79626E-04	-4.26746E-04	-2.08662E-05	0.00000E+00	2.6232
14	2219	1.92906E-06	1.02073E+00	1.53420E-04	-2.26860E-04	-1.12433E-05	0.00000E+00	2.8128
15	2364	7.94970E-07	1.02068E+00	8.54837E-05	-1.21759E-04	-6.12875E-06	0.00000E+00	2.9992

GRP TO GRP	INNER ITERS	MFD INT	MAX. FLUX DIFFERENCE	MSF INT.	MAX. SCALE FACTOR	COARSE MESH
1	1	1	6.56421E-05	51	9.99984E-01	6
2	1	16	6.68653E-05	6	1.00003E+00	9
3	1	16	7.05273E-05	6	1.00002E+00	10
4	1	16	6.81328E-05	4	1.00002E+00	13
5	1	16	5.67761E-05	3	1.00003E+00	17
6	1	1	4.68023E-05	3	1.00004E+00	17
7	1	1	3.71492E-05	2	1.00005E+00	26
8	1	1	3.35391E-05	2	1.00005E+00	43
9	1	1	3.15431E-05	1	1.00004E+00	51
10	1	1	3.05337E-05	1	1.00004E+00	51
11	1	1	2.92246E-05	1	1.00004E+00	51
12	1	1	3.46801E-05	1	1.00003E+00	51
13	1	1	3.56002E-05	1	1.00003E+00	51
14	1	1	3.45999E-05	1	1.00003E+00	51
15	2	51	6.25385E-07	38	1.00000E+00	51
16	2	51	1.70292E-06	51	1.00000E+00	51
17	2	51	1.96029E-06	51	1.00000E+00	51
18	2	51	1.90423E-06	51	1.00000E+00	51
19	2	51	2.27658E-06	51	1.00000E+00	51
20	2	51	1.76073E-06	37	9.99989E-01	51
21	2	51	2.49107E-06	51	9.99999E-01	51
22	2	51	2.25526E-06	51	9.99999E-01	51
23	1	41	2.95358E-05	41	1.00005E+00	51
24	1	42	8.06803E-05	42	1.00016E+00	51
25	2	50	8.87684E-07	36	1.00000E+00	51
26	2	50	1.85559E-06	35	1.00000E+00	51
27	2	51	3.28574E-06	51	9.99997E-01	51

16	2402	-4.05256E-07	1.02072E+00	8.46005E-06	-5.11791E-05	-6.68643E-07	0.00000E+00	3.0468

FINAL MONITOR LAMBDA 1.02071E+00 PRODUCTION/ABSORPTION 1.02289E+00 ANGULAR FLUX ON 16

ELAPSED TIME 3.05 MIN.

CYLINDER OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

INT.	ZONE NUMBER	RADIUS	INT. MIDPOINT	AREA	VOLUME	PROD DENSITY
1	1	0.00000E+00	4.45313E-01	0.00000E+00	2.49195E+00	5.05669E-03
2	1	8.90625E-01	1.33594E+00	5.59596E+00	7.47585E+00	1.50891E-02
3	1	1.78125E+00	2.22656E+00	1.11919E+01	1.24597E+01	2.48772E-02
4	1	2.67188E+00	3.11719E+00	1.67879E+01	1.74436E+01	3.42663E-02
5	1	3.56250E+00	4.00781E+00	2.23838E+01	2.24276E+01	4.30920E-02
6	1	4.45313E+00	4.89844E+00	2.79798E+01	2.74115E+01	5.12238E-02
7	1	5.34375E+00	5.78906E+00	3.35758E+01	3.23954E+01	5.84966E-02
8	1	6.23438E+00	6.67969E+00	3.91717E+01	3.73793E+01	6.48380E-02
9	1	7.12500E+00	7.57031E+00	4.47677E+01	4.23632E+01	7.00980E-02
10	1	8.01563E+00	8.46094E+00	5.03636E+01	4.73470E+01	7.43674E-02
11	1	8.90625E+00	9.35156E+00	5.59596E+01	5.23311E+01	7.76172E-02
12	1	9.79688E+00	1.02422E+01	6.15556E+01	5.73148E+01	8.04978E-02
13	1	1.06875E+01	1.11328E+01	6.71515E+01	6.22988E+01	8.36368E-02
14	1	1.15781E+01	1.20234E+01	7.27475E+01	6.72827E+01	9.00333E-02
15	1	1.24688E+01	1.29141E+01	7.83435E+01	7.22666E+01	1.03674E-01
16	1	1.33594E+01	1.38047E+01	8.39394E+01	7.72505E+01	1.43843E-01
17	2	1.42500E+01	1.47500E+01	8.95354E+01	9.26769E+01	0.00000E+00
18	2	1.52500E+01	1.57500E+01	9.58186E+01	9.89602E+01	0.00000E+00
19	2	1.62500E+01	1.67500E+01	1.02102E+02	1.05243E+02	0.00000E+00
20	2	1.72500E+01	1.77500E+01	1.08385E+02	1.11527E+02	0.00000E+00
21	2	1.82500E+01	1.87500E+01	1.14668E+02	1.17810E+02	0.00000E+00
22	2	1.92500E+01	1.97500E+01	1.20951E+02	1.24093E+02	0.00000E+00
23	2	2.02500E+01	2.07500E+01	1.27234E+02	1.30376E+02	0.00000E+00
24	2	2.12500E+01	2.17500E+01	1.33518E+02	1.36659E+02	0.00000E+00
25	2	2.22500E+01	2.27500E+01	1.39801E+02	1.42943E+02	0.00000E+00
26	2	2.32500E+01	2.37500E+01	1.46084E+02	1.49226E+02	0.00000E+00
27	2	2.42500E+01	2.47500E+01	1.52367E+02	1.55509E+02	0.00000E+00
28	2	2.52500E+01	2.57500E+01	1.58650E+02	1.61790E+02	0.00000E+00
29	2	2.62500E+01	2.67500E+01	1.64934E+02	1.68076E+02	0.00000E+00
30	2	2.72500E+01	2.77500E+01	1.71217E+02	1.74357E+02	0.00000E+00
31	2	2.82500E+01	2.87500E+01	1.77500E+02	1.80643E+02	0.00000E+00
32	2	2.92500E+01	2.97500E+01	1.83783E+02	1.86924E+02	0.00000E+00
33	2	3.02500E+01	3.07500E+01	1.90066E+02	1.93209E+02	0.00000E+00
34	2	3.12500E+01	3.17500E+01	1.96350E+02	1.99490E+02	0.00000E+00
35	2	3.22500E+01	3.27500E+01	2.02633E+02	2.05775E+02	0.00000E+00
36	2	3.32500E+01	3.37500E+01	2.08916E+02	2.12057E+02	0.00000E+00
37	2	3.42500E+01	3.47500E+01	2.15199E+02	2.18340E+02	0.00000E+00
38	2	3.52500E+01	3.57500E+01	2.21482E+02	2.24625E+02	0.00000E+00
39	2	3.62500E+01	3.67500E+01	2.27765E+02	2.30906E+02	0.00000E+00
40	2	3.72500E+01	3.77500E+01	2.34049E+02	2.37191E+02	0.00000E+00
41	2	3.82500E+01	3.87500E+01	2.40332E+02	2.43473E+02	0.00000E+00
42	2	3.92500E+01	3.97500E+01	2.46615E+02	2.49756E+02	0.00000E+00
43	2	4.02500E+01	4.07500E+01	2.52898E+02	2.56035E+02	0.00000E+00
44	2	4.12500E+01	4.17500E+01	2.59181E+02	2.62324E+02	0.00000E+00
45	2	4.22500E+01	4.27500E+01	2.65464E+02	2.68605E+02	0.00000E+00
46	2	4.32500E+01	4.37500E+01	2.71748E+02	2.74891E+02	0.00000E+00
47	2	4.42500E+01	4.47500E+01	2.78031E+02	2.81172E+02	0.00000E+00
48	2	4.52500E+01	4.57500E+01	2.84314E+02	2.87457E+02	0.00000E+00
49	2	4.62500E+01	4.67500E+01	2.90597E+02	2.93738E+02	0.00000E+00
50	2	4.72500E+01	4.77500E+01	2.96880E+02	3.00023E+02	0.00000E+00
51	2	4.82500E+01	4.87500E+01	3.03164E+02	3.06305E+02	0.00000E+00
52		4.92500E+01		3.09447E+02		

CYLINDER OPTIMIZATION U02F2 SOLUTION DENSITY VARIATION

TOTAL FLUX

INT	GRP 1	GRP 2	GRP 3	GRP 4	GRP 5	GRP 6	GRP 7	GRP 8
1	3.85992E-04	2.95306E-03	3.48941E-03	2.07897E-03	2.95698E-03	4.55919E-03	4.42979E-03	3.33746E-03
2	3.84052E-04	2.93760E-03	3.47105E-03	2.06798E-03	2.94132E-03	4.53503E-03	4.40638E-03	3.31987E-03
3	3.80082E-04	2.90661E-03	3.43428E-03	2.04607E-03	2.91019E-03	4.48706E-03	4.35986E-03	3.28487E-03
4	3.74276E-04	2.86098E-03	3.38009E-03	2.01370E-03	2.86405E-03	4.41583E-03	4.29071E-03	3.23280E-03
5	3.66661E-04	2.80100E-03	3.30880E-03	1.97107E-03	2.80329E-03	4.32194E-03	4.19944E-03	3.16401E-03
6	3.57297E-04	2.72710E-03	3.22093E-03	1.91851E-03	2.72831E-03	4.20603E-03	4.08674E-03	3.07908E-03
7	3.46287E-04	2.64016E-03	3.11754E-03	1.85668E-03	2.64009E-03	4.06942E-03	3.95373E-03	2.97865E-03
8	3.33726E-04	2.54096E-03	2.99950E-03	1.78602E-03	2.53925E-03	3.91310E-03	3.80129E-03	2.86343E-03
9	3.19814E-04	2.43124E-03	2.86884E-03	1.70779E-03	2.42763E-03	3.73941E-03	3.63114E-03	2.73421E-03
10	3.04683E-04	2.31192E-03	2.72663E-03	1.62259E-03	2.30585E-03	3.54918E-03	3.44401E-03	2.59155E-03
11	2.88723E-04	2.18637E-03	2.57674E-03	1.53273E-03	2.17740E-03	3.34667E-03	3.24238E-03	2.43601E-03
12	2.72060E-04	2.05512E-03	2.41967E-03	1.43834E-03	2.04202E-03	3.13117E-03	3.02532E-03	2.26706E-03
13	2.55414E-04	1.92466E-03	2.26278E-03	1.34382E-03	1.90613E-03	2.90991E-03	2.79610E-03	2.08398E-03
14	2.38242E-04	1.78913E-03	2.09866E-03	1.24386E-03	1.76041E-03	2.66992E-03	2.54470E-03	1.88247E-03
15	2.21450E-04	1.66095E-03	1.94150E-03	1.14789E-03	1.61858E-03	2.42454E-03	2.27351E-03	1.65832E-03
16	1.91392E-04	1.41105E-03	1.63975E-03	9.65511E-04	1.35398E-03	2.02550E-03	1.89719E-03	1.39128E-03
17	1.42819E-04	9.79016E-04	1.12543E-03	6.56056E-04	9.11453E-04	1.41525E-03	1.39379E-03	1.08074E-03
18	1.07632E-04	6.74731E-04	7.64908E-04	4.38227E-04	5.98943E-04	9.63467E-04	9.97158E-04	8.07989E-04
19	8.68931E-05	5.11544E-04	5.74364E-04	3.26596E-04	4.42176E-04	7.18358E-04	7.48884E-04	6.09301E-04
20	7.16113E-05	3.94970E-04	4.38454E-04	2.45766E-04	3.27505E-04	5.34545E-04	5.61499E-04	4.60019E-04
21	5.99217E-05	3.10798E-04	3.41500E-04	1.89550E-04	2.50230E-04	4.08702E-04	4.28592E-04	3.50053E-04
22	5.06003E-05	2.47030E-04	2.68655E-04	1.47483E-04	1.92367E-04	3.13144E-04	3.27823E-04	2.67770E-04
23	4.30561E-05	1.98259E-04	2.13492E-04	1.16094E-04	1.50052E-04	2.43339E-04	2.53805E-04	2.06505E-04
24	3.68491E-05	1.60182E-04	1.70788E-04	9.19789E-05	1.17734E-04	1.89808E-04	1.97214E-04	1.60206E-04
25	3.16948E-05	1.30223E-04	1.37499E-04	7.34035E-05	9.32085E-05	1.49439E-04	1.54687E-04	1.25224E-04
26	2.73746E-05	1.06384E-04	1.11237E-04	5.88736E-05	7.41692E-05	1.18153E-04	1.21835E-04	9.84385E-05
27	2.37289E-05	8.72976E-05	9.03999E-05	4.74643E-05	5.93945E-05	9.40672E-05	9.66869E-05	7.78956E-05
28	2.06336E-05	7.19072E-05	7.37432E-05	3.84216E-05	4.77732E-05	7.52049E-05	7.70479E-05	6.19576E-05
29	1.79921E-05	5.94357E-05	6.03653E-05	3.12258E-05	3.86132E-05	6.04572E-05	6.17778E-05	4.95626E-05
30	1.57276E-05	4.92786E-05	4.95655E-05	2.54638E-05	3.13290E-05	4.87924E-05	4.97270E-05	3.98280E-05
31	1.37787E-05	4.09734E-05	4.08128E-05	2.08326E-05	2.55193E-05	3.95573E-05	4.02317E-05	3.21622E-05
32	1.20[illegible]4E-05	3.41566E-05	3.36920E-05	1.70932E-05	2.08565E-05	3.21851E-05	3.28653E-05	2.60755E-05
33	1.063[illegible]E-05	2.85428E-05	2.78799E-05	1.40638E-05	1.71020E-05	2.62869E-05	2.66352E-05	2.12294E-05
34	9.36996E-06	2.39055E-05	2.31216E-05	1.16006E-05	1.40646E-05	2.15388E-05	2.17878E-05	1.73441E-05
35	8.26609E-06	2.00641E-05	1.92151E-05	9.59189E-06	1.15995E-05	1.77058E-05	1.78868E-05	1.42209E-05
36	7.30235E-06	1.68737E-05	1.59998E-05	7.94887E-06	9.59126E-06	1.45967E-05	1.47262E-05	1.16955E-05
37	6.45902E-06	1.42176E-05	1.33471E-05	6.60137E-06	7.95040E-06	1.20674E-05	1.21612E-05	9.64830E-06
38	5.71965E-06	1.20011E-05	1.11537E-05	5.49333E-06	6.60537E-06	1.00016E-05	1.00683E-05	7.98049E-06
39	5.07020E-06	1.01[illegible]	9.33602E-06	4.57997E-06	5.49978E-06	8.30944E-06	8.35718E-06	6.61830E-06
40	4.49875E-06	8.59[illegible]	[illegible]2672E-06	3.82529E-06	4.58842E-06	6.91868E-06	6.95203E-06	5.50106E-06
41	3.99509E-06	7.28953[illegible]	6.57092E-06	3.20026E-06	3.83514E-06	5.77227E-06	5.79535E-06	4.58209E-06
42	3.55048E-06	6.1[illegible]	5.52393E-06	2.68138E-06	3.21082E-06	4.82430E-06	4.83957E-06	3.82360E-06
43	3.15738E-06	5.[illegible]	4.64923E-06	2.24960E-06	2.69192E-06	4.03791E-06	4.04727E-06	3.19492E-06
44	2.80927E-06	4.48335E-06	3.91682E-06	1.88935E-06	2.25935E-06	3.38335E-06	3.38818E-06	2.67264E-06
45	2.50051E-06	3.82029E-06	3.30203E-06	1.58790E-06	1.89743E-06	2.83610E-06	2.83668E-06	2.23489E-06
46	2.22615E-06	3.25684E-06	2.78447E-06	1.33479E-06	1.59344E-06	2.37665E-06	2.37386E-06	1.86819E-06
47	1.98189E-06	2.77625E-06	2.34710E-06	1.12122E-06	1.33635E-06	1.98724E-06	1.97943E-06	1.55347E-06
48	1.76377E-06	2.36436E-06	1.97566E-06	9.40019E-07	1.11773E-06	1.65585E-06	1.64403E-06	1.28575E-06
49	1.56825E-06	2.00828E-06	1.65730E-06	7.84060E-07	9.27148E-07	1.36333E-06	1.34156E-06	1.03953E-06
50	1.39179E-06	1.69729E-06	1.38183E-06	6.49250E-07	7.62008E-07	1.10949E-06	1.07814E-06	8.22299E-07
51	1.22835E-06	1.40276E-06	1.12249E-06	5.15848E-07	5.87124E-07	8.25145E-07	7.60925E-07	5.49813E-07

INT	GRP 9	GRP 10	GRP 11	GRP 12	GRP 13	GRP 14	GRP 15	GRP 16
1	2.58905E-03	2.38224E-03	2.26745E-03	1.48249E-03	1.28554E-03	1.24630E-03	6.09697E-04	3.52347E-04
2	2.57541E-03	2.36969E-03	2.25549E-03	1.47466E-03	1.27873E-03	1.23969E-03	6.06454E-04	3.50470E-04
3	2.54827E-03	2.34469E-03	2.23165E-03	1.45904E-03	1.26516E-03	1.22649E-03	5.99987E-04	3.46728E-04
4	2.50785E-03	2.30745E-03	2.19611E-03	1.43575E-03	1.24492E-03	1.20682E-03	5.90333E-04	3.41141E-04
5	2.45443E-03	2.25819E-03	2.14907E-03	1.40490E-03	1.21808E-03	1.18071E-03	5.77535E-04	3.33733E-04

6	2.38843E-03	2.19726E-03	2.09083E-03	1.36669E-03	1.18482E-03	1.14837E-03	5.61655E-04	3.24541E-04
7	2.31026E-03	2.12499E-03	2.02165E-03	1.32123E-03	1.14524E-03	1.10983E-03	5.42755E-04	3.13599E-04
8	2.22041E-03	2.04177E-03	1.94186E-03	1.26877E-03	1.09954E-03	1.06536E-03	5.20912E-04	3.00959E-04
9	2.11930E-03	1.94784E-03	1.85160E-03	1.20934E-03	1.04774E-03	1.01493E-03	4.96210E-04	2.86669E-04
10	2.00723E-03	1.84342E-03	1.75112E-03	1.14321E-03	9.90144E-04	9.58989E-04	4.68775E-04	2.70817E-04
11	1.88419E-03	1.72837E-03	1.64027E-03	1.07024E-03	9.26691E-04	8.97430E-04	4.38781E-04	2.53515E-04
12	1.74981E-03	1.60250E-03	1.51929E-03	9.90966E-04	8.58065E-04	8.31361E-04	4.06585E-04	2.34998E-04
13	1.60293E-03	1.46511E-03	1.38793E-03	9.05288E-04	7.84422E-04	7.60864E-04	3.72726E-04	2.15592E-04
14	1.44207E-03	1.31625E-03	1.24767E-03	8.15277E-04	7.08066E-04	6.89281E-04	3.38299E-04	1.95949E-04
15	1.26510E-03	1.15616E-03	1.09984E-03	7.21778E-04	6.30182E-04	6.17442E-04	3.04761E-04	1.76839E-04
16	1.07259E-03	9.90715E-04	9.53466E-04	6.34916E-04	5.60833E-04	5.60010E-04	2.75138E-04	1.59810E-04
17	8.65211E-04	8.18207E-04	8.06469E-04	5.53803E-04	4.97866E-04	5.15579E-04	2.46130E-04	1.42932E-04
18	6.67614E-04	6.46070E-04	6.51783E-04	4.58677E-04	4.19195E-04	4.45607E-04	2.11269E-04	1.22789E-04
19	5.08561E-04	4.98740E-04	5.10441E-04	3.63576E-04	3.36329E-04	3.62016E-04	1.73699E-04	1.01314E-04
20	3.86426E-04	3.81920E-04	3.94826E-04	2.83940E-04	2.64875E-04	2.88104E-04	1.38868E-04	8.13060E-05
21	2.94182E-04	2.91696E-04	3.03120E-04	2.19050E-04	2.05475E-04	2.24823E-04	1.09053E-04	6.40253E-05
22	2.25083E-04	2.23409E-04	2.32786E-04	1.68792E-04	1.58842E-04	1.74599E-04	8.48406E-05	4.99098E-05
23	1.73205E-04	1.71797E-04	1.79065E-04	1.29929E-04	1.22468E-04	1.34861E-04	6.57276E-05	3.87096E-05
24	1.34181E-04	1.32921E-04	1.38479E-04	1.00518E-04	9.47838E-05	1.04515E-04	5.09243E-05	3.00115E-05
25	1.04605E-04	1.03434E-04	1.07598E-04	7.80177E-05	7.35476E-05	8.10708E-05	3.95496E-05	2.33109E-05
26	8.20889E-05	8.10234E-05	8.41608E-05	6.09785E-05	5.74407E-05	6.33052E-05	3.08440E-05	1.81794E-05
27	6.47982E-05	6.38327E-05	6.61784E-05	4.78732E-05	4.50537E-05	4.95945E-05	2.41743E-05	1.42435E-05
28	5.14568E-05	5.06014E-05	5.23764E-05	3.78508E-05	3.55825E-05	3.91415E-05	1.90492E-05	1.12207E-05
29	4.10751E-05	4.03213E-05	4.16601E-05	3.00589E-05	2.82282E-05	3.10091E-05	1.50937E-05	8.88644E-06
30	3.29609E-05	3.23062E-05	3.33301E-05	2.40254E-05	2.25379E-05	2.47389E-05	1.20231E-05	7.07637E-06
31	2.65892E-05	2.60024E-05	2.67840E-05	1.92797E-05	1.80689E-05	1.98080E-05	9.62749E-06	5.66359E-06
32	2.15150E-05	2.10285E-05	2.16336E-05	1.55593E-05	1.45682E-05	1.59591E-05	7.74599E-06	4.55544E-06
33	1.74903E-05	1.70732E-05	1.75410E-05	1.26007E-05	1.17885E-05	1.28996E-05	6.26150E-06	3.68074E-06
34	1.42748E-05	1.39191E-05	1.42854E-05	1.02548E-05	9.58603E-06	1.04832E-05	5.08243E-06	2.98694E-06
35	1.16897E-05	1.13863E-05	1.16729E-05	8.37096E-06	7.81970E-06	8.54349E-06	4.14237E-06	2.43349E-06
36	9.60548E-06	9.34759E-06	9.57436E-06	6.86203E-06	6.40573E-06	6.99513E-06	3.38811E-06	1.99002E-06
37	7.91581E-06	7.69641E-06	7.87567E-06	5.63976E-06	5.26174E-06	5.74129E-06	2.78105E-06	1.63289E-06
38	6.54263E-06	6.35630E-06	6.49947E-06	4.65194E-06	4.33760E-06	4.73091E-06	2.28959E-06	1.34414E-06
39	5.42099E-06	5.26257E-06	5.37676E-06	3.84559E-06	3.58399E-06	3.90630E-06	1.89065E-06	1.10959E-06
40	4.50294E-06	4.36834E-06	4.46020E-06	3.18863E-06	2.97021E-06	3.23611E-06	1.56507E-06	9.18403E-07
41	3.74768E-06	3.63318E-06	3.70691E-06	2.64839E-06	2.46589E-06	2.68501E-06	1.29860E-06	7.61823E-07
42	3.12541E-06	3.02795E-06	3.08744E-06	2.20485E-06	2.05191E-06	2.23338E-06	1.07942E-06	6.33160E-07
43	2.60943E-06	2.52631E-06	2.57405E-06	1.83702E-06	1.70879E-06	1.85874E-06	8.98312E-07	5.26773E-07
44	2.18134E-06	2.11022E-06	2.14840E-06	1.53234E-06	1.42449E-06	1.54865E-06	7.47891E-07	4.38478E-07
45	1.82211E-06	1.76100E-06	1.79093E-06	1.27617E-06	1.18544E-06	1.28758E-06	6.21613E-07	3.64294E-07
46	1.52118E-06	1.46797E-06	1.49051E-06	1.06073E-06	9.84135E-07	1.06768E-06	5.14876E-07	3.01606E-07
47	1.26194E-06	1.21493E-06	1.23037E-06	8.73699E-07	8.09141E-07	8.76129E-07	4.22063E-07	2.47049E-07
48	1.04010E-06	9.96703E-07	1.00456E-06	7.10766E-07	6.56275E-07	7.08615E-07	3.40650E-07	1.99192E-07
49	8.33839E-07	7.92470E-07	7.92393E-07	5.57414E-07	5.12453E-07	5.51111E-07	2.64308E-07	1.54344E-07
50	6.47544E-07	6.04732E-07	5.96084E-07	4.15587E-07	3.79719E-07	4.06303E-07	1.94202E-07	1.13203E-07
51	4.15862E-07	3.77869E-07	3.66260E-07	2.53071E-07	2.29768E-07	2.44909E-07	1.16507E-07	6.78862E-08

INT.	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24
1	1.60392E-04	1.40086E-04	2.60599E-04	8.60717E-04	2.63986E-04	5.03619E-04	1.78982E-03	2.58249E-03
2	1.59537E-04	1.39339E-04	2.59209E-04	8.56119E-04	2.62575E-04	5.00925E-04	1.78022E-03	2.56865E-03
3	1.57833E-04	1.37849E-04	2.56436E-04	8.46946E-04	2.59759E-04	4.95547E-04	1.76107E-03	2.54094E-03
4	1.55288E-04	1.35626E-04	2.52297E-04	8.33253E-04	2.55556E-04	4.87524E-04	1.73252E-03	2.49978E-03
5	1.51913E-04	1.32676E-04	2.46807E-04	8.15091E-04	2.49979E-04	4.76878E-04	1.69465E-03	2.44503E-03
6	1.47725E-04	1.29018E-04	2.39997E-04	7.92560E-04	2.43064E-04	4.63686E-04	1.64785E-03	2.37769E-03
7	1.42741E-04	1.24662E-04	2.31889E-04	7.65743E-04	2.34831E-04	4.47986E-04	1.59227E-03	2.29760E-03
8	1.36984E-04	1.19633E-04	2.22528E-04	7.34795E-04	2.25339E-04	4.29914E-04	1.52877E-03	2.20683E-03
9	1.30475E-04	1.13947E-04	2.11950E-04	6.99851E-04	2.14622E-04	4.09548E-04	1.45788E-03	2.10573E-03
10	1.23263E-04	1.07649E-04	2.00236E-04	6.61213E-04	2.02797E-04	3.87180E-04	1.38174E-03	1.99932E-03
11	1.15392E-04	1.00779E-04	1.87473E-04	6.19202E-04	1.89951E-04	3.63042E-04	1.30250E-03	1.89086E-03
12	1.06987E-04	9.34505E-05	1.73868E-04	5.74558E-04	1.76362E-04	3.37876E-04	1.22663E-03	1.79504E-03
13	9.81842E-05	8.57788E-05	1.59657E-04	5.28105E-04	1.62261E-04	3.12386E-04	1.16254E-03	1.72852E-03
14	8.93081E-05	7.80620E-05	1.45366E-04	4.81599E-04	1.48302E-04	2.88470E-04	1.13131E-03	1.74336E-03
15	8.06614E-05	7.05423E-05	1.31483E-04	4.36586E-04	1.34891E-04	2.67670E-04	1.16153E-03	1.91752E-03
16	7.30704E-05	6.40220E-05	1.19298E-04	3.97139E-04	1.23818E-04	2.54977E-04	1.31382E-03	2.46101E-03
17	6.57451E-05	5.78506E-05	1.07458E-04	3.58580E-04	1.13779E-04	2.47980E-04	1.59552E-03	3.44599E-03
18	5.66691E-05	4.99857E-05	9.27777E-05	3.10470E-04	9.97400E-05	2.30698E-04	1.79389E-03	4.19407E-03

19	4.68170E-05	4.13288E-05	7.68458E-05	2.58154E-04	8.35235E-05	2.03207E-04	1.79660E-03	4.34184E-03
20	3.76530E-05	3.32815E-05	6.19575E-05	2.08960E-04	6.81354E-05	1.73170E-04	1.67862E-03	4.13807E-03
21	2.96855E-05	2.62579E-05	4.89486E-05	1.65635E-04	5.43452E-05	1.43578E-04	1.49649E-03	3.74053E-03
22	2.31890E-05	2.05089E-05	3.82590E-05	1.29787E-04	4.28423E-05	1.17150E-04	1.29406E-03	3.26873E-03
23	1.79777E-05	1.59181E-05	2.97152E-05	1.00975E-04	3.34879E-05	9.44097E-05	1.09396E-03	2.78532E-03
24	1.39452E-05	1.23515E-05	2.30617E-05	7.84470E-05	2.61317E-05	7.56396E-05	9.10837E-04	2.33364E-03
25	1.08311E-05	9.59319E-06	1.79158E-05	6.09731E-05	2.03751E-05	6.03210E-05	7.49479E-04	1.92933E-03
26	8.44806E-06	7.48311E-06	1.39736E-05	4.75636E-05	1.59412E-05	4.80740E-05	6.12062E-04	1.58149E-03
27	6.61714E-06	5.86040E-06	1.09436E-05	3.72449E-05	1.25058E-05	3.82819E-05	4.96861E-04	1.28730E-03
28	5.21276E-06	4.61657E-06	8.61892E-06	2.93255E-05	9.86422E-06	3.05416E-05	4.02047E-04	1.04387E-03
29	4.12688E-06	3.65414E-06	6.82166E-06	2.32014E-05	7.81054E-06	2.43905E-05	3.24487E-04	8.43651E-04
30	3.28609E-06	2.90954E-06	5.43023E-06	1.84618E-05	6.22051E-06	1.95375E-05	2.61730E-04	6.81221E-04
31	2.62912E-06	2.32739E-06	4.34338E-06	1.47600E-05	4.97359E-06	1.56790E-05	2.11004E-04	5.49470E-04
32	2.11458E-06	1.87183E-06	3.49236E-06	1.18674E-05	3.99862E-06	1.26271E-05	1.70282E-04	4.43609E-04
33	1.70802E-06	1.51167E-06	2.82019E-06	9.57595E-06	3.22630E-06	1.01819E-05	1.37526E-04	3.58253E-04
34	1.38601E-06	1.22663E-06	2.28794E-06	7.76594E-06	2.61618E-06	8.25676E-06	1.11295E-04	2.89921E-04
35	1.12889E-06	9.98922E-07	1.86310E-06	6.32148E-06	2.12809E-06	6.70476E-06	9.02075E-05	2.34888E-04
36	9.23135E-07	8.16836E-07	1.52321E-06	5.16667E-06	1.73875E-06	5.46434E-06	7.33027E-05	1.90824E-04
37	7.57292E-07	6.70000E-07	1.24933E-06	4.23627E-06	1.42446E-06	4.46361E-06	5.96808E-05	1.55263E-04
38	6.23360E-07	5.51495E-07	1.02820E-06	3.48554E-06	1.17150E-06	3.65864E-06	4.87234E-05	1.26710E-04
39	5.14483E-07	4.55118E-07	8.48480E-07	2.87545E-06	9.65589E-07	3.00495E-06	3.98537E-05	1.03563E-04
40	4.25826E-07	3.76684E-07	7.02159E-07	2.37903E-06	7.98481E-07	2.47542E-06	3.26797E-05	8.48833E-05
41	3.53162E-07	3.12373E-07	5.82257E-07	1.97223E-06	6.61337E-07	2.04213E-06	2.68325E-05	6.96335E-05
42	2.93508E-07	2.59604E-07	4.83834E-07	1.63848E-06	5.49097E-07	1.68820E-06	2.20842E-05	5.72295E-05
43	2.44147E-07	2.15921E-07	4.02399E-07	1.36228E-06	4.56064E-07	1.39557E-06	1.81356E-05	4.69896E-05
44	2.03210E-07	1.79709E-07	3.34864E-07	1.13331E-06	3.79102E-07	1.15367E-06	1.48888E-05	3.85489E-05
45	1.68789E-07	1.49248E-07	2.78071E-07	9.40658E-07	3.14226E-07	9.50042E-07	1.21619E-05	3.14434E-05
46	1.39717E-07	1.23527E-07	2.30095E-07	7.77938E-07	2.59518E-07	7.78065E-07	9.85366E-06	2.54428E-05
47	1.14395E-07	1.01114E-07	1.88294E-07	6.36035E-07	2.11714E-07	6.27999E-07	7.84411E-06	2.02066E-05
48	9.21938E-08	8.14688E-08	1.51645E-07	5.11672E-07	1.69875E-07	4.96189E-07	6.07044E-06	1.55934E-05
49	7.13817E-08	6.30479E-08	1.17293E-07	3.94999E-07	1.30570E-07	3.73149E-07	4.42760E-06	1.13150E-05
50	5.23156E-08	4.61861E-08	8.58522E-08	2.88260E-07	9.46223E-08	2.59877E-07	2.89554E-06	7.30985E-06
51	3.13128E-08	2.75937E-08	5.11775E-08	1.69776E-07	5.44927E-08	1.39999E-07	1.36876E-06	3.26872E-06

INT	GRP 25	GRP 26	GRP 27
1	1.69235E-03	1.52580E-03	3.24246E-04
2	1.68329E-03	1.51766E-03	3.22529E-04
3	1.66510E-03	1.50122E-03	3.19013E-04
4	1.63817E-03	1.47699E-03	3.13900E-04
5	1.60223E-03	1.44451E-03	3.06949E-04
6	1.55818E-03	1.40491E-03	2.98599E-04
7	1.50563E-03	1.35738E-03	2.88411E-04
8	1.44635E-03	1.30413E-03	2.77200E-04
9	1.38010E-03	1.24415E-03	2.64296E-04
10	1.31093E-03	1.18211E-03	2.51285E-04
11	1.24030E-03	1.11798E-03	2.37322E-04
12	1.17936E-03	1.06367E-03	2.26107E-04
13	1.13828E-03	1.02567E-03	2.17043E-04
14	1.15570E-03	1.04320E-03	2.21931E-04
15	1.28871E-03	1.15765E-03	2.40871E-04
16	1.74203E-03	1.64058E-03	3.52505E-04
17	2.60348E-03	2.63689E-03	6.12000E-04
18	3.24907E-03	3.35552E-03	7.87084E-04
19	3.37588E-03	3.47904E-03	8.11587E-04
20	3.22593E-03	3.32839E-03	7.77822E-04
21	2.92094E-03	3.01365E-03	7.03196E-04
22	2.55605E-03	2.63826E-03	6.15951E-04
23	2.18002E-03	2.25015E-03	5.24946E-04
24	1.82802E-03	1.88734E-03	4.40460E-04
25	1.51207E-03	1.56108E-03	3.64126E-04
26	1.24010E-03	1.28057E-03	2.98799E-04
27	1.00967E-03	1.04253E-03	2.43143E-04
28	8.19009E-04	8.45824E-04	1.97344E-04
29	6.61971E-04	6.83550E-04	1.59407E-04
30	5.34637E-04	5.52178E-04	1.28831E-04
31	4.31213E-04	4.45275E-04	1.03834E-04

32	3.48191E-04	3.59631E-04	8.39107E-05
33	2.81153E-04	2.90316E-04	6.76951E-05
34	2.27559E-04	2.35043E-04	5.48461E-05
35	1.84322E-04	1.90321E-04	4.43755E-05
36	1.49767E-04	1.54697E-04	3.61021E-05
37	1.21822E-04	1.25779E-04	2.93241E-05
38	9.94364E-05	1.02713E-04	2.39742E-05
39	8.12434E-05	8.38758E-05	1.95525E-05
40	6.66042E-05	6.88011E-05	1.60620E-05
41	5.46164E-05	5.63808E-05	1.31410E-05
42	4.48990E-05	4.63820E-05	1.08308E-05
43	3.68479E-05	3.80341E-05	8.86292E-06
44	3.02377E-05	3.12381E-05	7.29687E-06
45	2.46498E-05	2.54395E-05	5.92621E-06
46	1.99515E-05	2.06130E-05	4.81729E-06
47	1.58331E-05	1.63363E-05	3.80362E-06
48	1.22209E-05	1.26277E-05	2.95337E-06
49	8.85668E-06	9.13187E-06	2.12408E-06
50	5.71931E-06	5.91877E-06	1.38757E-06
51	2.48361E-06	2.49719E-06	5.75085E-07

ELAPSED TIME 3.05 MIN.

FINE GROUP SUMMARY FOR ZONE 1 BY GROUP INCLUDING SUM FOR ALL GROUPS IN LINE 28

GRP	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	2.12611E-02	0.00000E+00	1.07102E-02	1.24839E-02	1.53536E-03	7.83750E-03	9.99878E-01
2	0.00000E+00	1.88838E-01	6.23510E-03	1.42534E-01	1.36406E-01	5.66184E-03	5.30025E-02	1.00002E+00
3	0.00000E+00	2.14979E-01	6.53839E-02	1.03870E-01	2.16751E-01	3.99094E-03	5.95959E-02	1.00004E+00
4	0.00000E+00	1.24462E-01	9.22405E-02	8.26975E-02	1.82034E-01	1.84771E-03	3.28056E-02	1.00004E+00
5	0.00000E+00	1.65962E-01	1.60353E-01	2.20609E-01	2.83783E-01	1.13596E-03	4.13725E-02	1.00004E+00
6	0.00000E+00	1.80150E-01	3.11957E-01	5.05537E-01	4.34788E-01	1.47767E-03	5.57733E-02	1.00007E+00
7	0.00000E+00	8.94500E-02	4.87636E-01	7.85373E-01	5.33138E-01	1.84302E-03	4.22433E-02	1.00005E+00
8	0.00000E+00	1.38125E-02	5.66975E-01	8.93959E-01	5.54575E-01	2.94647E-03	2.33049E-02	9.99966E-01
9	0.00000E+00	1.00304E-03	5.49337E-01	7.93150E-01	5.31544E-01	4.87157E-03	1.39829E-02	9.99947E-01
10	0.00000E+00	7.45081E-05	5.30043E-01	7.50396E-01	5.10015E-01	9.40518E-03	1.07473E-02	9.99953E-01
11	0.00000E+00	5.86189E-06	5.13528E-01	7.28924E-01	4.84838E-01	1.98643E-02	8.86118E-03	9.99971E-01
12	0.00000E+00	4.11789E-07	4.99956E-01	4.05456E-01	3.88526E-01	2.64493E-02	4.98472E-03	9.99995E-01
13	0.00000E+00	6.53883E-08	3.80021E-01	3.28100E-01	3.49850E-01	2.63012E-02	3.87746E-03	9.99990E-01
14	0.00000E+00	1.29582E-08	3.73821E-01	3.26084E-01	3.30545E-01	4.02939E-02	2.58250E-03	1.00000E+00
15	0.00000E+00	1.48442E-09	2.11291E-01	1.19112E-01	2.07435E-01	2.19319E-03	1.66229E-03	1.00000E+00
16	0.00000E+00	4.30005E-10	1.36543E-01	5.30763E-02	1.34272E-01	1.29171E-03	9.78609E-04	1.00000E+00
17	0.00000E+00	1.38483E-10	7.13690E-02	1.63963E-02	6.95192E-02	1.42386E-03	4.26000E-04	1.00000E+00
18	0.00000E+00	9.91496E-11	6.37829E-02	1.40254E-02	6.17684E-02	1.65747E-03	3.57944E-04	9.99992E-01
19	0.00000E+00	1.40176E-10	1.07784E-01	3.72662E-02	1.05026E-01	2.08718E-03	6.69840E-04	1.00000E+00
20	0.00000E+00	2.27941E-10	2.59878E-01	2.42580E-01	2.48966E-01	8.91841E-03	1.99656E-03	9.99994E-01
21	0.00000E+00	3.33632E-11	1.15877E-01	5.28835E-02	1.10502E-01	4.91709E-03	4.60607E-04	9.99990E-01
22	0.00000E+00	3.87089E-11	2.02315E-01	1.45141E-01	1.89311E-01	1.26947E-02	3.12654E-04	9.99992E-01
23	0.00000E+00	3.70100E-11	5.72739E-01	9.38668E-01	5.26946E-01	5.35958E-02	-7.79523E-03	9.99993E-01
24	0.00000E+00	1.00737E-11	1.00099E+00	1.82324E+00	8.98269E-01	1.24387E-01	-2.16536E-02	9.99995E-01
25	0.00000E+00	2.94890E-12	9.96805E-01	1.27212E+00	8.97292E-01	1.15085E-01	-1.55607E-02	9.99995E-01
26	0.00000E+00	2.06779E-12	8.91064E-01	1.71941E+00	7.50526E-01	1.55033E-01	-1.44881E-02	9.99996E-01
27	0.00000E+00	4.92765E-13	3.31286E-01	4.25130E-01	2.70022E-01	6.43289E-02	-3.06355E-03	9.99998E-01
28	0.00000E+00	9.99999E-01	9.41920E+00	1.29664E+01	9.41912E+00	6.95038E-01	3.05674E-01	9.99998E-01

GRP	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	1.69000E-04	7.83750E-03	3.86229E-04	0.00000E+00	5.90348E-04	7.06942E-04	0.00000E+00	1.78214E-01
2	1.21603E-03	5.30025E-02	2.95555E-03	0.00000E+00	5.70197E-03	3.24761E-03	0.00000E+00	1.34750E+00
3	1.40621E-03	5.95959E-02	3.49250E-03	0.00000E+00	0.00000E+00	3.72444E-03	0.00000E+00	1.58531E+00
4	8.24379E-04	3.28056E-02	2.08097E-03	0.00000E+00	0.00000E+00	1.57180E-03	0.00000E+00	9.41732E-01
5	1.15042E-03	4.13725E-02	2.96000E-03	0.00000E+00	0.00000E+00	5.50681E-04	0.00000E+00	1.33544E+00
6	1.74013E-03	5.57733E-02	4.56402E-03	0.00000E+00	0.00000E+00	5.01632E-04	0.00000E+00	2.04218E+00
7	1.65594E-03	4.22433E-02	4.43476E-03	0.00000E+00	0.00000E+00	5.35303E-04	0.00000E+00	1.96575E+00
8	1.24174E-03	2.33049E-02	3.34149E-03	0.00000E+00	0.00000E+00	5.91337E-04	0.00000E+00	1.46910E+00
9	9.73045E-04	1.39829E-02	2.59226E-03	0.00000E+00	0.00000E+00	8.26204E-04	0.00000E+00	1.13443E+00
10	9.08329E-04	1.07473E-02	2.38522E-03	0.00000E+00	0.00000E+00	1.77254E-03	0.00000E+00	1.04116E+00
11	8.83230E-04	8.86118E-03	2.27032E-03	0.00000E+00	0.00000E+00	3.81087E-03	0.00000E+00	9.90030E-01
12	5.96388E-04	4.98472E-03	1.48441E-03	0.00000E+00	0.00000E+00	5.25636E-03	0.00000E+00	6.47765E-01
13	5.31422E-04	3.87746E-03	1.28721E-03	0.00000E+00	0.00000E+00	5.12327E-03	0.00000E+00	5.62554E-01
14	5.39802E-04	2.98250E-03	1.24797E-03	0.00000E+00	0.00000E+00	4.12416E-03	0.00000E+00	5.47114E-01
15	2.61898E-04	1.66229E-03	6.10479E-04	0.00000E+00	0.00000E+00	7.75845E-04	0.00000E+00	2.67971E-01
16	1.52140E-04	9.78609E-04	3.52802E-04	0.00000E+00	0.00000E+00	5.32055E-04	0.00000E+00	1.55001E-01
17	6.97489E-05	4.26000E-04	1.60602E-04	0.00000E+00	0.00000E+00	8.40312E-04	0.00000E+00	7.06020E-02
18	6.12322E-05	3.57944E-04	1.40270E-04	0.00000E+00	0.00000E+00	1.15042E-03	0.00000E+00	6.16903E-02
19	1.13957E-04	6.69840E-04	2.60941E-04	0.00000E+00	0.00000E+00	1.38783E-03	0.00000E+00	1.14807E-01
20	3.79863E-04	1.99656E-03	8.61850E-04	0.00000E+00	0.00000E+00	5.98052E-03	0.00000E+00	3.79733E-01
21	1.19414E-04	4.60607E-04	2.64343E-04	0.00000E+00	0.00000E+00	3.41300E-03	0.00000E+00	1.16757E-01
22	2.52071E-04	3.12654E-04	5.04309E-04	0.00000E+00	0.00000E+00	8.71371E-03	0.00000E+00	2.25622E-01
23	1.43369E-03	-7.79523E-03	1.79243E-03	0.00000E+00	0.00000E+00	3.66904E-02	0.00000E+00	8.61458E-01
24	2.87305E-03	-2.16536E-02	2.58701E-03	0.00000E+00	0.00000E+00	8.79506E-02	0.00000E+00	1.31721E+00
25	2.09857E-03	-1.55607E-02	1.69598E-03	0.00000E+00	0.00000E+00	8.24384E-02	0.00000E+00	8.77019E-01
26	2.04824E-03	-1.44881E-02	1.53046E-03	0.00000E+00	0.00000E+00	1.11736E-01	0.00000E+00	7.95871E-01
27	4.57995E-04	-3.06355E-03	3.26191E-04	0.00000E+00	0.00000E+00	4.64797E-02	0.00000E+00	1.69008E-01
28	2.41550E-02	3.05620E-01	4.65675E-02	0.00000E+00	5.96050E-04	4.20432E-01	0.00000E+00	2.12009E+01

FINE GROUP SUMMARY FOR ZONE 2 BY GROUP INCLUDING SUM FOR ALL GROUPS IN LINE 28

GRP.	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	0.00000E+00	0.00000E+00	5.41418E-03	7.16652E-03	3.81893E-04	-7.54856E-03	0.00000E+00
2	0.00000E+00	0.00000E+00	4.11178E-03	4.27693E-02	5.62248E-02	6.01410E-04	-5.27125E-02	9.99763E-01
3	0.00000E+00	0.00000E+00	2.70850E-02	3.32150E-02	8.64483E-02	1.26717E-06	-5.93701E-02	1.00010E+00
4	0.00000E+00	0.00000E+00	3.50954E-02	1.97298E-02	6.78014E-02	6.91104E-07	-3.27119E-02	1.00007E+00
5	0.00000E+00	0.00000E+00	6.03512E-02	5.60819E-02	1.01621E-01	9.18394E-07	-4.12770E-02	1.00005E+00
6	0.00000E+00	0.00000E+00	1.13958E-01	1.42664E-01	1.69601E-01	1.56481E-06	-5.56524E-02	1.00003E+00
7	0.00000E+00	0.00000E+00	1.88313E-01	2.59488E-01	2.30447E-01	2.78937E-06	-4.21441E-02	1.00002E+00
8	0.00000E+00	0.00000E+00	2.42340E-01	3.54161E-01	2.65585E-01	7.17355E-06	-2.32399E-02	9.99975E-01
9	0.00000E+00	0.00000E+00	2.59235E-01	3.44931E-01	2.73172E-01	1.79767E-05	-1.39362E-02	9.99964E-01
10	0.00000E+00	0.00000E+00	2.68557E-01	3.47434E-01	2.79235E-01	4.29168E-05	-1.07058E-02	9.99973E-01
11	0.00000E+00	0.00000E+00	2.77383E-01	3.58346E-01	2.86108E-01	1.02528E-04	-8.82128E-03	9.99990E-01
12	0.00000E+00	0.00000E+00	2.43802E-01	2.11265E-01	2.48602E-01	1.49152E-04	-4.95720E-03	1.00002E+00
13	0.00000E+00	0.00000E+00	2.35841E-01	1.86693E-01	2.39443E-01	2.45184E-04	-3.85256E-03	1.00001E+00
14	0.00000E+00	0.00000E+00	2.47873E-01	2.09553E-01	2.50352E-01	4.69654E-04	-2.95592E-03	1.00002E+00
15	0.00000E+00	0.00000E+00	1.52516E-01	7.21783E-02	1.53815E-01	3.44797E-04	-1.64976E-03	1.00002E+00
16	0.00000E+00	0.00000E+00	9.89223E-02	3.13588E-02	9.98401E-02	2.48855E-04	-9.71273E-04	1.00002E+00
17	0.00000E+00	0.00000E+00	5.12447E-02	9.52076E-03	5.15389E-02	1.28752E-04	-4.22632E-04	9.99996E-01
18	0.00000E+00	0.00000E+00	4.59291E-02	8.34466E-03	4.61627E-02	1.21465E-04	-3.54991E-04	9.99999E-01
19	0.00000E+00	0.00000E+00	7.88053E-02	2.32276E-02	7.92216E-02	2.46659E-04	-6.64390E-04	1.00001E+00
20	0.00000E+00	0.00000E+00	1.94597E-01	1.66626E-01	1.95530E-01	1.05086E-03	-1.97903E-03	9.99986E-01
21	0.00000E+00	0.00000E+00	9.04675E-02	3.83293E-02	9.04975E-02	4.28582E-04	-4.55258E-04	9.99982E-01
22	0.00000E+00	0.00000E+00	2.13433E-01	1.47021E-01	2.12438E-01	1.29926E-03	-2.98959E-04	9.99989E-01
23	0.00000E+00	0.00000E+00	1.63012E+00	2.67921E+00	1.60389E+00	1.83466E-02	7.89574E-03	9.99997E-01
24	0.00000E+00	0.00000E+00	4.50092E+00	8.67534E+00	4.41276E+00	6.63239E-02	2.18543E-02	9.99999E-01
25	0.00000E+00	0.00000E+00	5.24299E+00	7.18180E+00	5.15899E+00	6.83172E-02	1.56931E-02	1.00000E+00
26	0.00000E+00	0.00000E+00	5.04984E+00	1.11312E+01	4.93183E+00	1.00401E-01	1.46015E-02	1.00000E+00
27	0.00000E+00	0.00000E+00	2.01001E+00	3.03984E+00	1.96251E+00	4.44127E-02	3.08550E-03	9.99999E-01
28	0.00000E+00	0.00000E+00	2.15637E+01	3.57557E+01	2.15636E+01	3.03696E-01	-3.03551E-01	9.99999E-01

GRP.	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	1.14889E-06	2.88934E-04	1.69000E-04	7.83750E-03	0.00000E+00	0.00000E+00	0.00000E+00	1.10280E-01
2	1.25355E-06	2.90060E-04	1.21603E-03	5.30025E-02	0.00000E+00	0.00000E+00	0.00000E+00	5.01392E-01
3	9.91115E-07	2.25842E-04	1.40621E-03	5.95959E-02	0.00000E+00	0.00000E+00	0.00000E+00	5.44889E-01
4	4.44585E-07	9.37513E-05	8.24379E-04	3.28056E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.01622E-01
5	4.87235E-07	9.54559E-05	1.15042E-03	4.13725E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.99076E-01
6	6.53901E-07	1.20887E-04	1.74013E-03	5.57733E-02	0.00000E+00	0.00000E+00	0.00000E+00	6.36538E-01
7	5.55928E-07	9.91717E-05	1.65594E-03	4.22433E-02	0.00000E+00	0.00000E+00	0.00000E+00	6.53432E-01
8	3.66129E-07	6.50023E-05	1.24174E-03	2.33049E-02	0.00000E+00	0.00000E+00	0.00000E+00	5.25448E-01
9	2.61888E-07	4.66811E-05	9.73045E-04	1.39829E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.34703E-01
10	2.31620E-07	4.14545E-05	9.08329E-04	1.07473E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.24161E-01
11	2.22076E-07	3.99026E-05	8.83230E-04	8.86118E-03	0.00000E+00	0.00000E+00	0.00000E+00	4.33358E-01
12	1.52814E-07	2.75168E-05	5.96388E-04	4.98472E-03	0.00000E+00	0.00000E+00	0.00000E+00	3.08623E-01
13	1.38115E-07	2.49020E-05	5.31422E-04	3.87746E-03	0.00000E+00	0.00000E+00	0.00000E+00	2.85984E-01
14	1.47232E-07	2.65767E-05	5.39802E-04	2.98250E-03	0.00000E+00	0.00000E+00	0.00000E+00	3.08648E-01
15	6.93814E-08	1.25390E-05	2.61898E-04	1.66229E-03	0.00000E+00	0.00000E+00	0.00000E+00	1.48739E-01
16	4.05840E-08	7.33595E-06	1.52140E-04	9.78609E-04	0.00000E+00	0.00000E+00	0.00000E+00	8.70523E-02
17	1.86533E-08	3.36811E-06	6.97489E-05	4.26000E-04	0.00000E+00	0.00000E+00	0.00000E+00	4.02910E-02
18	1.63714E-08	2.95323E-06	6.12322E-05	3.57944E-04	0.00000E+00	0.00000E+00	0.00000E+00	3.55992E-02
19	3.02253E-08	5.44913E-06	1.13957E-04	6.69840E-04	0.00000E+00	0.00000E+00	0.00000E+00	6.62881E-02
20	9.76567E-08	1.75293E-05	3.79863E-04	1.99656E-03	0.00000E+00	0.00000E+00	0.00000E+00	2.23600E-01
21	2.99996E-08	5.34876E-06	1.19414E-04	4.60607E-04	0.00000E+00	0.00000E+00	0.00000E+00	7.31350E-02
22	7.08725E-08	1.26949E-05	2.52071E-04	3.12654E-04	0.00000E+00	0.00000E+00	0.00000E+00	1.91827E-01
23	5.55503E-07	1.00508E-04	1.43369E-03	-7.79523E-03	0.00000E+00	0.00000E+00	0.00000E+00	1.97347E+00
24	1.12925E-06	2.00718E-04	2.87305E-03	-2.16536E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.91258E+00
25	7.80735E-07	1.32377E-04	2.09857E-03	-1.55607E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.83130E+00
26	7.75692E-07	1.33362E-04	2.04824E-03	-1.44881E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.84988E+00
27	1.89668E-07	2.19500E-05	4.57995E-04	-3.06355E-03	0.00000E+00	0.00000E+00	0.00000E+00	9.21813E-01
28	1.08593E-05	2.12216E-03	2.41550E-02	3.05620E-01	0.00000E+00	0.00000E+00	0.00000E+00	2.23237E+01

FINE GROUP SUMMARY FOR SYSTEM

GRP	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	2.12611E-02	0.00000E+00	1.61243E-02	1.96505E-02	1.91725E-03	2.88934E-04	9.99881E-01
2	0.00000E+00	1.88838E-01	1.03469E-02	1.85303E-01	1.92631E-01	6.26325E-03	2.90060E-04	1.00002E+00
3	0.00000E+00	2.14979E-01	9.24689E-02	1.67085E-01	3.03199E-01	3.99220E-03	2.25842E-04	1.00005E+00
4	0.00000E+00	1.24462E-01	1.27336E-01	1.02427E-01	2.49835E-01	1.84840E-03	9.37513E-05	1.00004E+00
5	0.00000E+00	1.65962E-01	2.20704E-01	2.76690E-01	3.85403E-01	1.13687E-03	9.54559E-05	1.00004E+00
6	0.00000E+00	1.80150E-01	4.25915E-01	6.48201E-01	6.04389E-01	1.47923E-03	1.20887E-04	1.00006E+00
7	0.00000E+00	8.94500E-02	6.75949E-01	1.04486E+00	7.63585E-01	1.64581E-03	9.91717E-05	1.00004E+00
8	0.00000E+00	1.38125E-02	8.09315E-01	1.24812E+00	8.20160E-01	2.95365E-03	6.50023E-05	9.99969E-01
9	0.00000E+00	1.00304E-03	8.08572E-01	1.13808E+00	8.04716E-01	4.88954E-03	4.66811E-05	9.99952E-01
10	0.00000E+00	7.45081E-05	7.98600E-01	1.09783E+00	7.89249E-01	9.44809E-03	4.14545E-05	9.99960E-01
11	0.00000E+00	5.86189E-06	7.90911E-01	1.08727E+00	7.70946E-01	1.99669E-02	3.99026E-05	9.99978E-01
12	0.00000E+00	4.11789E-07	6.63758E-01	6.16721E-01	6.37128E-01	2.65985E-02	2.75168E-05	1.00000E+00
13	0.00000E+00	6.53883E-08	6.15852E-01	5.14792E-01	5.89293E-01	2.65464E-02	2.49020E-05	9.99998E-01
14	0.00000E+00	1.29582E-08	6.21695E-01	5.35637E-01	5.80897E-01	4.07636E-02	2.65787E-05	1.00001E+00
15	0.00000E+00	1.46442E-09	3.63807E-01	1.91290E-01	3.61250E-01	2.53798E-03	1.25390E-05	1.00001E+00
16	0.00000E+00	4.30005E-10	2.35465E-01	8.44351E-02	2.33913E-01	1.54056E-03	7.33595E-06	1.00001E+00
17	0.00000E+00	1.38483E-10	1.22614E-01	2.59171E-02	1.21058E-01	1.55261E-03	3.36811E-06	9.99999E-01
18	0.00000E+00	9.91496E-11	1.09712E-01	2.23700E-02	1.07931E-01	1.77894E-03	2.95323E-06	9.99995E-01
19	0.00000E+00	1.40176E-10	1.86589E-01	6.04939E-02	1.84247E-01	2.33384E-03	5.44913E-06	1.00001E+00
20	0.00000E+00	2.27941E-10	4.54475E-01	4.09206E-01	4.44497E-01	9.96927E-03	1.75293E-05	9.99990E-01
21	0.00000E+00	3.33632E-11	2.06345E-01	9.12127E-02	2.01000E-01	5.34567E-03	5.34876E-06	9.99986E-01
22	0.00000E+00	3.87089E-11	4.15748E-01	2.92162E-01	4.01750E-01	1.39940E-02	1.26949E-05	9.99990E-01
23	0.00000E+00	3.70100E-11	2.20286E+00	3.61788E+00	2.13083E+00	7.19423E-02	1.00508E-04	9.99996E-01
24	0.00000E+00	1.00737E-11	5.50191E+00	1.04986E+01	5.31102E+00	1.90711E-01	2.00718E-04	9.99998E-01
25	0.00000E+00	2.94890E-12	6.23980E+00	8.43393E+00	6.05628E+00	1.83403E-01	1.32377E-04	9.99999E-01
26	0.00000E+00	2.06779E-12	5.94090E+00	1.28506E+01	5.68536E+00	2.55434E-01	1.13362E-04	1.00000E+00
27	0.00000E+00	4.92765E-13	2.34129E+00	3.46497E+00	2.23253E+00	1.08742E-01	2.19500E-05	9.99999E-01
28	0.00000E+00	9.99999E-01	3.09829E+01	4.87222E+01	3.09827E+01	9.98733E-01	2.12227E-03	9.99999E-01

GRP	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	1.14889E-06	2.88934E-04	3.86229E-04	0.00000E+00	5.90348E-04	7.06942E-04	0.00000E+00	2.88493E-01
2	1.25355E-06	2.90060E-04	2.95555E-03	0.00000E+00	5.70197E-06	3.24761E-03	0.00000E+00	1.84889E+00
3	9.91115E-07	2.25842E-04	3.49250E-03	0.00000E+00	0.00000E+00	3.72444E-03	0.00000E+00	2.13020E+00
4	4.44585E-07	9.37513E-05	2.08097E-03	0.00000E+00	0.00000E+00	1.57180E-03	0.00000E+00	1.24335E+00
5	4.87235E-07	9.54559E-05	2.96000E-03	0.00000E+00	0.00000E+00	5.50681E-04	0.00000E+00	1.73451E+00
6	6.53901E-07	1.20887E-04	4.56402E-03	0.00000E+00	0.00000E+00	5.01632E-04	0.00000E+00	2.67872E+00
7	5.55928E-07	9.91717E-05	4.43476E-03	0.00000E+00	0.00000E+00	5.35303E-04	0.00000E+00	2.61918E+00
8	3.96129E-07	6.50023E-05	3.34149E-03	0.00000E+00	0.00000E+00	5.91337E-04	0.00000E+00	1.99455E+00
9	2.61888E-07	4.66811E-05	2.59226E-03	0.00000E+00	0.00000E+00	8.26204E-04	0.00000E+00	1.56914E+00
10	2.31620E-07	4.14545E-05	2.38522E-03	0.00000E+00	0.00000E+00	1.77254E-03	0.00000E+00	1.46532E+00
11	2.22076E-07	3.99026E-05	2.27032E-03	0.00000E+00	0.00000E+00	3.81087E-03	0.00000E+00	1.42339E+00
12	1.52814E-07	2.75168E-05	1.48441E-03	0.00000E+00	0.00000E+00	5.25636E-03	0.00000E+00	9.56387E-01
13	1.38115E-07	2.49020E-05	1.28721E-03	0.00000E+00	0.00000E+00	5.12327E-03	0.00000E+00	8.48539E-01
14	1.47232E-07	2.65767E-05	1.24797E-03	0.00000E+00	0.00000E+00	4.12416E-03	0.00000E+00	8.55761E-01
15	6.93814E-08	1.25390E-05	6.10479E-04	0.00000E+00	0.00000E+00	7.75845E-04	0.00000E+00	4.16710E-01
16	4.05840E-08	7.33595E-06	3.52802E-04	0.00000E+00	0.00000E+00	5.32055E-04	0.00000E+00	2.42053E-01
17	1.86533E-08	3.36811E-06	1.60602E-04	0.00000E+00	0.00000E+00	8.40312E-04	0.00000E+00	1.10893E-01
18	1.63714E-08	2.95323E-06	1.40270E-04	0.00000E+00	0.00000E+00	1.15042E-03	0.00000E+00	9.72894E-02
19	3.02253E-08	5.44913E-06	2.60941E-04	0.00000E+00	0.00000E+00	1.38783E-03	0.00000E+00	1.81095E-01
20	9.76567E-08	1.75293E-05	8.61850E-04	0.00000E+00	0.00000E+00	5.98052E-03	0.00000E+00	6.03332E-01
21	2.99996E-08	5.34876E-06	2.64343E-04	0.00000E+00	0.00000E+00	3.41300E-03	0.00000E+00	1.89892E-01
22	7.08725E-08	1.26949E-05	5.04309E-04	0.00000E+00	0.00000E+00	8.71371E-03	0.00000E+00	4.17449E-01
23	5.55503E-07	1.00508E-04	1.79243E-03	0.00000E+00	0.00000E+00	3.66904E-02	0.00000E+00	2.83493E+00
24	1.12925E-06	2.00718E-04	2.58701E-03	0.00000E+00	0.00000E+00	8.79506E-02	0.00000E+00	6.22978E+00
25	7.80735E-07	1.32377E-04	1.69598E-03	0.00000E+00	0.00000E+00	8.24384E-02	0.00000E+00	4.70832E+00
26	7.75692E-07	1.13362E-04	1.53046E-03	0.00000E+00	0.00000E+00	1.11736E-01	0.00000E+00	4.74575E+00
27	1.89668E-07	2.19500E-05	3.26191E-04	0.00000E+00	0.00000E+00	4.64797E-02	0.00000E+00	1.09082E+00
28	1.08593E-05	2.12216E-03	4.65675E-02	0.00000E+00	5.96050E-04	4.20432E-01	0.00000E+00	4.35245E+01

ELAPSED TIME 3.05 MIN.

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*   RJP NEWS   *                                                                                 *
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*                                                                                                *
*         REVISED: 04/02/93 14:56:12      BY MKD                                                 *
*         00/00/00 THIS COMPUTER AND ITS ASSOCIATED SUBSYSTEMS, INCLUDING                        *
*                  ELECTRONIC MAIL, ARE FOR OFFICAL USE ONLY BY AUTHORIZED                       *
*                  EMPLOYEES OF MARTIN MARIETTA ENERGY SYSTEMS, INC.                             *
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*                  ENERGY SYSTEMS, UNDER TERMS OF ENERGY SYSTEMS' CONTRACT                       *
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*                  ALL MESSAGES AND TO ACCESS ANY COMPUTER FILES WITHOUT                         *
*                  PRIOR KNOWLEDGE OR CONSENT OF USER, SENDER, OR ADDRESSEE.                     *
*                                                                                                *
*         04/02/93 THE FOLLOWING CHANGES TO THE WAY JOB OUTPUT IS                                *
*                  PROCESSED WILL BE EFFECTIVE ON APRIL 12.  OUTPUT                              *
*                  HELD IN CLASS T WILL BE HELD FIVE DAYS, INSTEAD OF                            *
*                  SEVEN DAYS, BEFORE IT IS PRINTED.  THE NEW OUTPUT                             *
*                  CLASS C WILL ALSO BE AVAILABLE.  OUTPUT IN CLASS C                            *
*                  WILL BE HELD 4 DAYS AND THEN WILL BE DELETED.  FOR                            *
*                  MORE INFORMATION, REFER TO "CHANGES TO JOB OUTPUT                             *
*                  PROCESSING" IN THE JAN-FEB C&T NEWS.                                          *
*                                                                                                *
*         03/26/93 ATTENTION SYSTEM SELECT 9 AND 47 USERS:  ON APRIL 12,                         *
*                  SSN 9 AND 47 WILL NO LONGER PROMPT YOU FOR YOUR                               *
*                  TERMINAL TYPE; THE DEFAULT WILL BE VT100.  THE REST OF                        *
*                  THE LOG ON PROCEDURE WILL REMAIN THE SAME.  IF YOU ARE                        *
*                  NOT USING OR EMULATING A VT100, YOU WILL NEED TO USE                          *
*                  SSN 90, WHICH WILL PROMPT YOU FOR YOUR TERMINAL TYPE.                         *
*                  THEN YOU SHOULD ENTER THE SPECIFIC APPLICATION ID (E.G.,                      *
*                  TSOK, TSOX, TSOY, IDMSK).  IF YOU HAVE ANY QUESTIONS,                         *
*                  PLEASE CALL USER SERVICES AT 4-4000.                                          *
*                                                                                                *
*         03/09/93 THE OUTCODE FOR THE Y-12 UNCLASSIFIED TAPE LIBRARY                            *
*                  WAS PUBLISHED INCORRECTLY IN THE C&T NEWS.  THE                               *
*                  CORRECT OUTCODE IS IUCP.                                                      *
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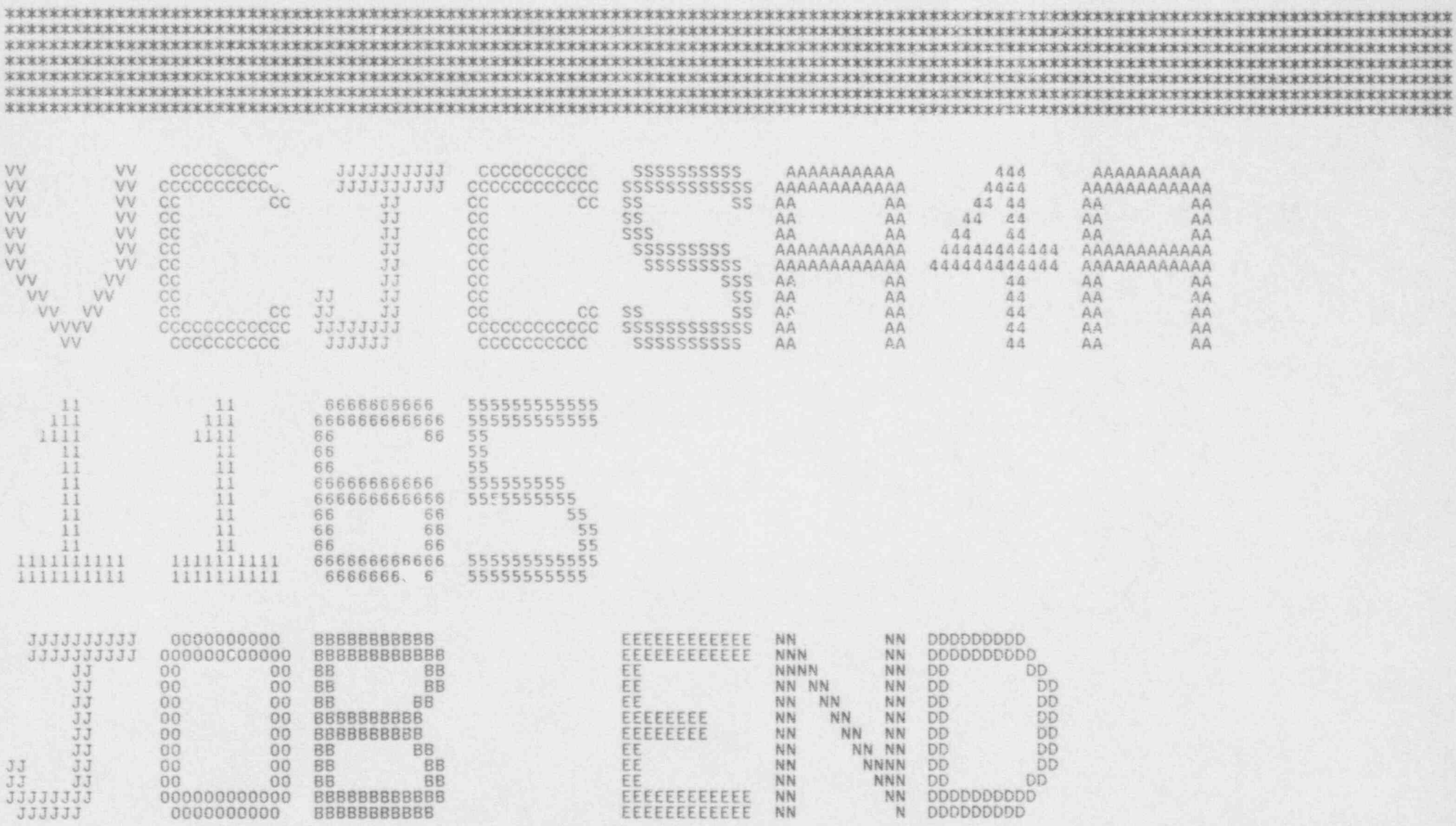
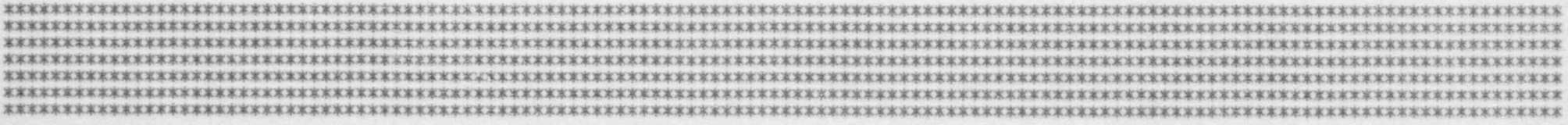
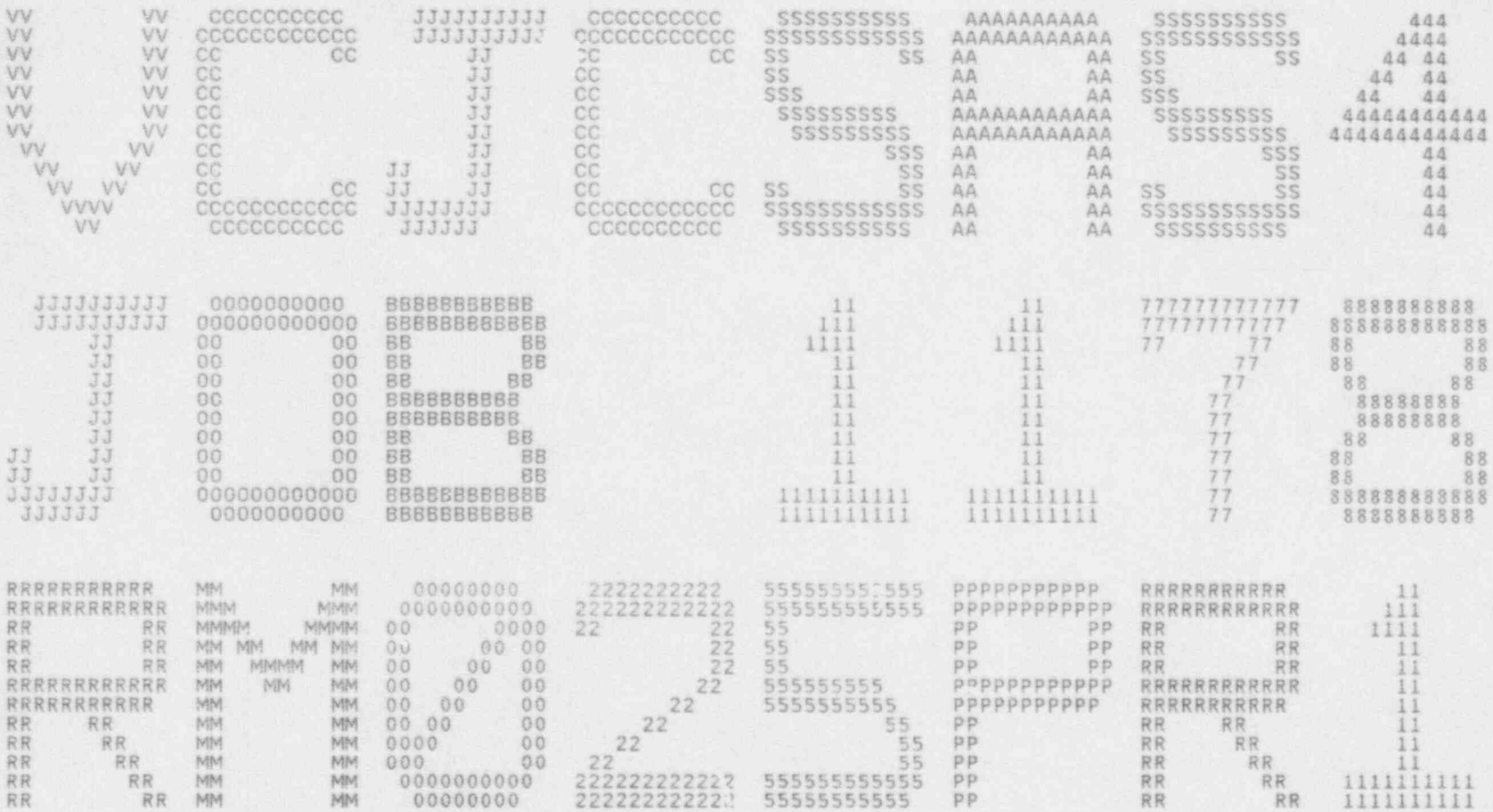
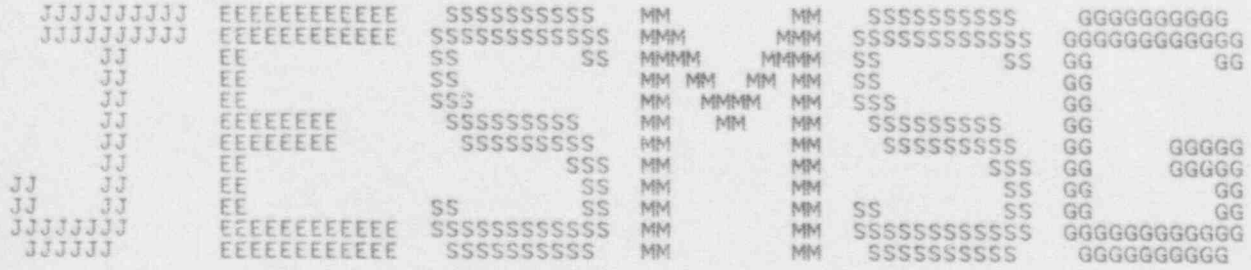




VCJCSAS4 'VCJ-CJ WITHEE NRC ' 1178

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JJ EE SS MM MM MM MM SS GG
JJ EE SSS MM MMMM MM SSS GG
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JJ EE SSS MM MM SSS GG GGGGG
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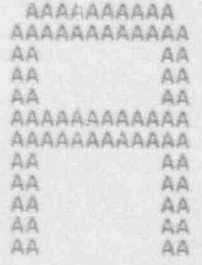

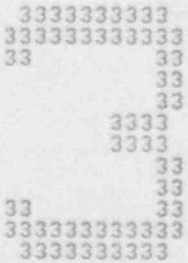

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IAT6140 JOB ORIGIN FROM GROUP=RM040     , DSP=CR  , DEVICE=RM040RD1, 0B1
*ACF01137 VCJ LAST SYSTEM ACCESS 14.38-04/06/93 FROM RM040RD1
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=MARSLIB  DSN=E.TZA27286.SCALE.MARS77
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=MIPLIB   DSN=E.TZA27286.NEAD.MIPLIB77
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDS00
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=MODULES  DSN=E.TZA27286.NEAD.PGMS77
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PGDE01
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=OVLY     DSN=E.TZA27286.NEAD.OVLY77
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDS00
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=SYSLIB   DSN=E.TZA27286.NEAD.SUBLIB77
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDS00
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=SYSLIB   DSN=SYS2.VSFLINK
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDS00
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=SYSLIB   DSN=SYS2.VSFFORT
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE03
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=SYSLIB   DSN=GRAPHICS.DISV.LIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=SYSLIB   DSN=GRAPHICS.INTLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=LKED      DD=SYSLIN   DSN=E.TZA27286.NEAD.OVLY77
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDS00
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=STEPLIB  DSN=E.TZA27286.NEAD.PGMS77
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PGDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FORTLIB  DSN=SYS2.VSFLOAD
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDS03
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT21F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT22F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT23F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT24F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT25F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT26F001 DSN=E.TZA27286.ORIGENS.BINRYLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT27F001 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT27F002 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT27F003 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT27F004 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT27F005 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT27F006 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT28F001 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT28F002 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT28F003 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT28F004 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT28F005 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT28F006 DSN=E.TZA27286.ORIGENS.CARDLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO        DD=FT78F001 DSN=E.TZA27286.SCALE.HEATLIB
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14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT79F001 DSN=E.TZA27286.KENO5.ALBEDOS
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT80F001 DSN=E.TZA27286.KENO4.WGTS
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT81F001 DSN=C.TZA27286.SCALE4.REV02.XN16
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE03
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT82F001 DSN=C.TZA27286.SCALE4.REV02.XN27
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT83F001 DSN=C.TZA27286.SCALE4.REV02.XN123
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT84F001 DSN=C.TZA27286.SCALE4.REV02.XN218
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE04
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT85F001 DSN=C.TZA27286.SCALE4.REV02.XN22G18
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT86F001 DSN=C.TZA27286.SCALE4.REV02.XG18
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE03
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT87F001 DSN=C.TZA27286.SCALE4.REV02.XN27BURN
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PBDE04
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT88F001 DSN=C.TZA27286.SCALE4.REV03.XN27G18
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE02
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=FT89F001 DSN=C.X4S27286.SCALE4.REV02.SCLIB
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDS01
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=MESSAGE  DSN=E.TZA27286.SCALE4.MESSAGES
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE01
14:41:24 IAT4401  LOCATE FOR STEP=GO       DD=QATABLE  DSN=E.TZA27286.SCALE4.QATABLE
14:41:24 IAT4402 UNIT=3380     ,VOL(S)=PSDE03
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PSDE01
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PBDS00
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PGDE01
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PSDS00
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PBDE03
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PBDE01
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PBDE02
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PBDS03
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PSDE03
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PSDE02
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PBDE04
22:05:24 IAT5110 JOB 1178 (VCJCSAS4) USES     D PSDS01
22:05:24 IAT5200 JOB 1178 (VCJCSAS4) IN SETUP ON MAIN=X101
22:05:24 IAT5210 JOB MARSLIB  (1178) X101     USING D PSDE01 ON 140
22:05:24 IAT5210 JOB MIPLIB   (1178) X101     USING D PBDS00 ON C06
22:05:24 IAT5210 JOB MODULES  (1178) X101     USING D PGDE01 ON 142
22:05:24 IAT5210 JOB OVLY     (1178) X101     USING D PSDS00 ON E00
22:05:24 IAT5210 JOB SYSLIB   (1178) X101     USING D PBDE03 ON 154
22:05:24 IAT5210 JOB SYSLIB   (1178) X101     USING D PBDE01 ON 141
22:05:24 IAT5210 JOB SYSLIB   (1178) X101     USING D PBDE02 ON 143
22:05:24 IAT5210 JOB FORTLIB  (1178) X101     USING D PBDS03 ON E0E
22:05:24 IAT5210 JOB FT81F001 (1178) X101     USING D PSDE03 ON 155
22:05:24 IAT5210 JOB FT82F001 (1178) X101     USING D PSDE02 ON 153
22:05:24 IAT5210 JOB FT84F001 (1178) X101     USING D PBDE04 ON 156
22:05:24 IAT5210 JOB FT89F001 (1178) X101     USING D PSDS01 ON C17
22:05:24 IAT2000 JOB 1178 VCJCSAS4 SELECTED X101     GRP=JS3BATCH
22:05:26  IEF403I VCJCSAS4 - STARTED - TIME=22.05.26
22:09:24  IEF404I VCJCSAS4 - ENDED - TIME=22.09.24
22:09:24 IAT5400 JOB 1178 (VCJCSAS4) IN BREAKDOWN
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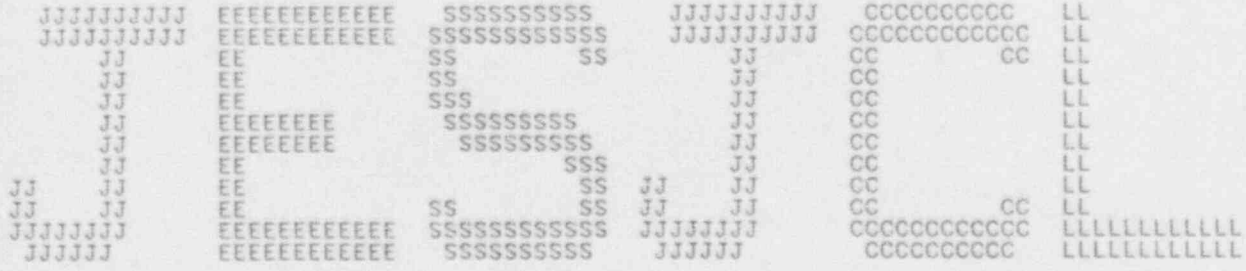
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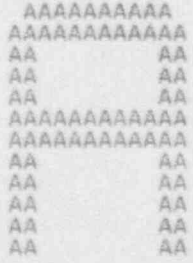
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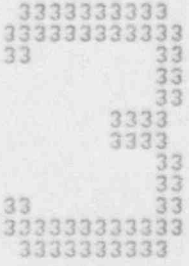
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```
//VCJCSAS4 JOB (17804),'VCJ-CJ WITHEE   NRC',TIME=20,                  *
// PASSWORD=
//*MAIN CLASS=STANDBY
//OUT1 OUTPUT DEFAULT=YES,JESDS=ALL,DEST=NK25B.RM025
//PROCLIB DD DISP=SHR,DSN=TZA.PROCLIB.CNTL
//A EXEC SCALE41,GOSIZE=2048K,TIME=20
//GO.FT01F001 DD SPACE=(TRK,(300,50))
//GO.FT18F001 DD SPACE=(TRK,(300,50))
//GO.SYSIN DD *
/*
//
```

```
1  //VCJCSAS4 JOB (17804),'VCJ-CJ WITHEE   NRC',TIME=20,                  *
   // PASSWORD=
2  //OUT1 OUTPUT DEFAULT=YES,JESDS=ALL,DEST=NK25B.RM025
3  //PROCLIB DD DISP=SHR,DSN=TZA.PROCLIB.CNTL
4  //A EXEC SCALE41,GOSIZE=2048K,TIME=20
5  XXSCALE41 PROC GOSIZE=2048K,BLKS=6136,SBUF=6136,
   XX             PLOT=DISV,OUT='*',LOUT='*'
   XX             ORGLIB='E.TZA27286.ORIGENS',
   XX             MESSAGE='E.TZA27286.SCALE4.MESSAGES',
   XX             H6LIB='E.TZA27286.SCALE.HEATLIB',
   XX             LBLIN='DISP=SHR,LABEL=(,,,IN),DCB=BUFL=',
   XX             DCBV='DCB=(RECFM=VBS,LRECL=X,BLKSIZE='
   ***
   ***      JAY MANNESCHMIDT     EXT 4-8717         BLDG 6011
   ***
6  XXLKED   EXEC  PGM=IEWL,REGION=1024K,
   XX             PARM='MAP,LIST,SIZE=(1000K,100K)'
7  XXMARSLIB  DD  DISP=SHR,DSN=E.TZA27286.SCALE.MARS77
8  XXMIPLIB   DD  DISP=SHR,DSN=E.TZA27286.NEAD.MIPLIB77
9  XXMODULES  DD  DISP=SHR,DSN=E.TZA27286.NEAD.PGMS77
10 XXOVLY     DD  DISP=SHR,DSN=E.TZA27286.NEAD.OVLY77
11 XXSYSLIB   DD  DISP=SHR,DSN=E.TZA27286.NEAD.SUBLIB77
12 XX         DD  DISP=SHR,DSN=SYS2.VSFLINK
13 XX         DD  DISP=SHR,DSN=SYS2.VSFFORT
14 XX         DD  DISP=SHR,DSN=GRAPHICS.&PLOT..LIB
   IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=GRAPHICS.DISV.LIB
15 XX         DD  DISP=SHR,DSN=GRAPHICS.INTLIB
16 XXSYSLIN   DD  DSN=E.TZA27286.NEAD.OVLY77(IEFBR14),DISP=SHR
17 XX         DD  DSN=&&LOADSET,UNIT=SYSDA,DISP=(MOD,DELETE),
   XX             SPACE=(TRK,0),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
18 XX         DD  DDNAME=SYSIN
19 XXSYSLMOD  DD  DSN=&&LIBRARY,UNIT=SYSDA,DISP=(,PASS),
   XX             SPACE=(TRK,(50,20,5),RLSE)
20 XXSYSPRINT DD  SYSOUT=&LOUT
   IEF653I SUBSTITUTION JCL - SYSOUT=*
21 XXSYSUT1   DD  UNIT=SYSDA,SPACE=(TRK,(50,10))
22 XXGO     EXEC  PGM=SCALE,COND=(4,LT,LKED),REGION=&GOSIZE,
   IEF653I SUBSTITUTION JCL - PGM=SCALE,COND=(4,LT,LKED),REGION=2048K,
   XX             PARM='/NOIOINIT,NOOCSTATUS,NOINQPCOPN,',TIME=1439
23 XXSTEPLIB  DD  DSN=*.LKED.SYSLMOD,DISP=(OLD,DELETE)
24 XX         DD  DISP=SHR,DSN=E.TZA27286.NEAD.PGMS77
25 XXFORTLIB  DD  DISP=SHR,DSN=SYS2.VSFLOAD
26 //GO.FT01F001 DD SPACE=(TRK,(300,50))
   X/FT01F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
27 XXFT02F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
28 XXFT03F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
29 XXFT04F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
30 XXFT05F001 DD  UNIT=SYSDA,SPACE=(480,(20,10)),DCB=BLKSIZE=480
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31 XXFT06F001 DD  SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
   IEF653I SUBSTITUTION JCL - SYSOUT=*,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
32 XXFT08F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
33 XXFT09F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
34 XXFT10F001 DD  UNIT=SYSDA,SPACE=(CYL,(4,1)),DCB=(DSORG=DA,RECFM=F)
35 XXFT11F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
36 XXFT12F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
37 XXFT13F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),
   XX             DCB=(RECFM=VB,LRECL=137,BLKSIZE=&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - DCB=(RECFM=VB,LRECL=137,BLKSIZE=6136,BUFL=6136)
38 XXFT14F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
39 XXFT15F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
40 XXFT16F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
41 XXFT17F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
42 //GO.FT18F001 DD SPACE=(TRK,(300,50))
   X/FT18F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
43 XXFT19F001 DD  UNIT=SYSDA,SPACE=(TRK,(20,10)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(20,10)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
44 XXFT21F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(BASICLWR)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(BASICLWR)
45 XXFT22F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY1)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY1)
46 XXFT23F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY2)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY2)
47 XXFT24F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(PWR33CY3)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(PWR33CY3)
48 XXFT25F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(BASLMFBR)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(BASLMFBR)
49 XXFT26F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..BINRYLIB(MAPHUO2B)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.BINRYLIB(MAPHUO2B)
50 XXFT27F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(SMALLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(SMALLITE)
51 XXFT27F002 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(ACTINIDE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(ACTINIDE)
52 XXFT27F003 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(BIGFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(BIGFISP)
53 XXFT27F004 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOLITE)
54 XXFT27F005 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOACT)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOACT)
55 XXFT27F006 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOFISP)
56 XXFT28F001 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(BIGLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(BIGLITE)
57 XXFT28F002 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(ACTINIDE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(ACTINIDE)
58 XXFT28F003 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(BIGFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(BIGFISP)
59 XXFT28F004 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOLITE)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOLITE)
60 XXFT28F005 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOACT)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOACT)
61 XXFT28F006 DD  &LBLIN&SBUF,DSN=&ORGLIB..CARDLIB(PHOFISP)
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DCB=BUFL=6136,DSN=E.TZA27286.ORIGENS.CARDLIB(PHOFISP)
62 XXFT78F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=&H6LIB
   IEF653I SUBSTITUTION JCL - DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.SCALE.HEATLIB
63 XXFT79F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.KENO5.ALBEDOS
64 XXFT80F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=E.TZA27286.KENO4.WGTS
65 XXFT81F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN16
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66 XXFT82F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN27
67 XXFT83F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN123
68 XXFT84F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XN218
69 XXFT85F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV02.XN22G18
70 XXFT86F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.TZA27286.SCALE4.REV02.XG18
71 XXFT87F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV02.XN27GURN
72 XXFT88F001 DD  DISP=SHR,LABEL=(,,,IN),
   XX  DSN=C.TZA27286.SCALE4.REV03.XN27G18
73 XXFT89F001 DD  DISP=SHR,LABEL=(,,,IN),DSN=C.X4S27286.SCALE4.REV02.SCLIB
74 XXFT90F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
75 XXFT91F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
76 XXFT92F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
77 XXFT93F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
78 XXFT94F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
79 XXFT95F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
80 XXFT96F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
81 XXFT97F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
82 XXFT98F001 DD  UNIT=SYSDA,SPACE=(TRK,(05,05)),&DCBV&BLKS,BUFL=&SBUF)
   IEF653I SUBSTITUTION JCL - UNIT=SYSDA,SPACE=(TRK,(05,05)),DCB=(RECFM=VBS,LRECL=X,BLKSIZE=6136,BUFL=6136)
83 XXFT99F001 DD  SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
   IEF653I SUBSTITUTION JCL - SYSOUT=*,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1100)
84 XXMESSAGE  DD  DISP=SHR,DSN=&MESSAGE
   IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=E.TZA27286.SCALE4.MESSAGES
85 XXPRINT    DD  SYSOUT=&OUT
   IEF653I SUBSTITUTION JCL - SYSOUT=*
86 XXQATABLE  DD  DISP=SHR,DSN=E.TZA27286.SCALE4.QATABLE
87 //GO.SYSIN DD *,DCB=BLKSIZE=80
   //
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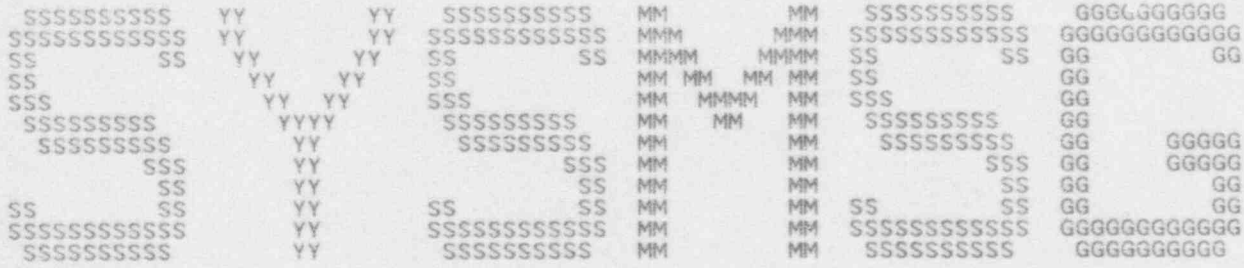
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SS YY YY SS MM MM MM MM SS GG
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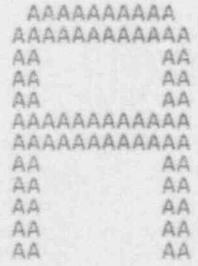
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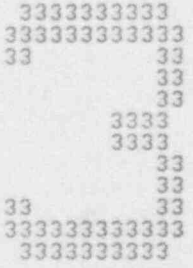
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 STMT NO. MESSAGE
-
       22 IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVED
IEF236I ALLOC. FOR VCJCSAS4 LKED A
IEF237I 140  ALLOCATED TO MARSLIB
IEF237I 141  ALLOCATED TO SYS00114
IEF237I C06  ALLOCATED TO MIPLIB
IEF237I 142  ALLOCATED TO MODULES
IEF237I E00  ALLOCATED TO OVLY
IEF237I C06  ALLOCATED TO SYSLIB
IEF237I E00  ALLOCATED TO
IEF237I 154  ALLOCATED TO
IEF237I 141  ALLOCATED TO
IEF237I 143  ALLOCATED TO
IEF237I 153  ALLOCATED TO SYS00116
IEF237I E00  ALLOCATED TO SYSLIN
IEF237I 900  ALLOCATED TO
IEF237I DMY  ALLOCATED TO
IEF237I C00  ALLOCATED TO SYSLMOD
IEF237I JES3 ALLOCATED TO SYSPRINT
IEF237I 900  ALLOCATED TO SYSUT1
IEF142I VCJCSAS4 LKED A - STEP WAS EXECUTED - COND CODE 0000
IEF285I   E.TZA27286.SCALE.MARS77                          KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   CATALOG.ICF.VPBDE01                              KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.NEAD.MIPLIB77                         KEPT
IEF285I   VOL SER NOS= PBDS00.
IEF285I   E.TZA27286.NEAD.PGMS77                           KEPT
IEF285I   VOL SER NOS= PGDE01.
IEF285I   E.TZA27286.NEAD.OVLY77                           KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   E.TZA27286.NEAD.SUBLIB77                         KEPT
IEF285I   VOL SER NOS= PBDS00.
IEF285I   SYS2.VSFLINK                                     KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   SYS2.VSFFORT                                     KEPT
IEF285I   VOL SER NOS= PBDE03.
IEF285I   GRAPHICS.DISV.LIB                                KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   GRAPHICS.INTLIB                                  KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   CATALOG.ICF.VPSDE02                              KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   E.TZA27286.NEAD.OVLY77                           KEPT
IEF285I   VOL SER NOS= PSDS00.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.LOADSET          DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.LIBRARY          PASSED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   LKED.A.SYSPRINT                                  SYSOUT
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000002         DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF373I STEP /LKED    / START 93096.2205
IEF374I STEP /LKED    / STOP  93096.2205 CPU    0MIN 00.24SEC SRB    0MIN 00.01SEC VIRT  1032K SYS   204K EXT       4K SYS    8744K
*-------------------------------------------------------------------------------*
*KXY0001  DDNAME   CUU DSNAME                                  EXCP'S(IO) BLOCKSIZE*
*KXY0002  MARSLIB  140 E.TZA27286.SCALE.MARS77                                    *
*KXY0002  SYS00114 141 CATALOG.ICF.VPBDE01                                        *
*KXY0002  MIPLIB   C06 E.TZA27286.NEAD.MIPLIB77                                   *
*KXY0002  MODULES  142 E.TZA27286.NEAD.PGMS77                                     *
*KXY0002  OVLY     E00 E.TZA27286.NEAD.OVLY77                                     *
*KXY0002  SYSLIB   C06 E.TZA27286.NEAD.SUBLIB77                                   *
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*KXY0002           E00 SYS2.VSFLINK                                                *
*KXY0002           154 SYS2.VSFFORT                                                *
*KXY0002           141 GRAPHICS.DISV.LIB                                           *
*KXY0002           143 GRAPHICS.INTLIB                                             *
*KXY0002  SYS00116 153 CATALOG.ICF.VPSDE02                                         *
*KXY0002  SYSLIN   E00 E.TZA27286.NEAD.OVLY77                        3       800  *
*KXY0002           900 SYS93096.T144120.RA000.VCJCSAS4.LOADSET                3200  *
*KXY0002  SYSLMOD  C00 SYS93096.T144120.RA000.VCJCSAS4.LIBRARY       9     32760  *
*KXY0002  SYSUT1   900 SYS93096.T144120.RA000.VCJCSAS4.R0000002                   *
*KXY0003  VIRTUAL STORAGE USED  1032K     TOTAL EXCP COUNT FOR STEP        12     *
*KXY0004  06 APR 93.096  22.05.30.83        CPU TIME FOR STEP 0000 MIN 00.25 SEC  *
*--------------------------------------------------------------------------------*
IEF236I ALLOC. FOR VCJCSAS4 GO A
IEF237I C00  ALLOCATED TO STEPLIB
IEF237I 142  ALLOCATED TO
IEF237I 141  ALLOCATED TO SYS00118
IEF237I E0E  ALLOCATED TO FORTLIB
IEF237I 900  ALLOCATED TO FT01F001
IEF237I C00  ALLOCATED TO FT02F001
IEF237I 900  ALLOCATED TO FT03F001
IEF237I C00  ALLOCATED TO FT04F001
IEF237I C00  ALLOCATED TO FT05F001
IEF237I JES3 ALLOCATED TO FT06F001
IEF237I C00  ALLOCATED TO FT08F001
IEF237I C00  ALLOCATED TO FT09F001
IEF237I C00  ALLOCATED TO FT10F001
IEF237I C00  ALLOCATED TO FT11F001
IEF237I C00  ALLOCATED TO FT12F001
IEF237I C00  ALLOCATED TO FT13F001
IEF237I 900  ALLOCATED TO FT14F001
IEF237I C00  ALLOCATED TO FT15F001
IEF237I 900  ALLOCATED TO FT16F001
IEF237I 900  ALLOCATED TO FT17F001
IEF237I 900  ALLOCATED TO FT18F001
IEF237I C00  ALLOCATED TO FT19F001
IEF237I 141  ALLOCATED TO FT21F001
IEF237I 141  ALLOCATED TO FT22F001
IEF237I 141  ALLOCATED TO FT23F001
IEF237I 141  ALLOCATED TO FT24F001
IEF237I 141  ALLOCATED TO FT25F001
IEF237I 141  ALLOCATED TO FT26F001
IEF237I 143  ALLOCATED TO FT27F001
IEF237I 143  ALLOCATED TO FT27F002
IEF237I 143  ALLOCATED TO FT27F003
IEF237I 143  ALLOCATED TO FT27F004
IEF237I 143  ALLOCATED TO FT27F00
IEF237I 143  ALLOCATED TO FT27F0
IEF237I 143  ALLOCATED TO FT28F001
IEF237I 143  ALLOCATED TO FT28F002
IEF237I 143  ALLOCATED TO FT28F003
IEF237I 143  ALLOCATED TO FT28F004
IEF237I 143  ALLOCATED TO FT28F005
IEF237I 143  ALLOCATED TO FT28F006
IEF237I 140  ALLOCATED TO FT78F001
IEF237I 140  ALLOCATED TO FT79F001
IEF237I 140  ALLOCATED TO FT80F001
IEF237I 155  ALLOCATED TO FT81F001
IEF237I 153  ALLOCATED TO FT82F001
IEF237I 141  ALLOCATED TO FT83F001
IEF237I 156  ALLOCATED TO FT84F001
IEF237I 140  ALLOCATED TO FT85F001
IEF237I 155  ALLOCATED TO FT86F001
IEF237I 156  ALLOCATED TO FT87F001
IEF237I 153  ALLOCATED TO FT88F001
IEF237I C17  ALLOCATED TO FT89F001
IEF237I 900  ALLOCATED TO FT90F001
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IEF237I C00  ALLOCATED TO FT91F001
IEF237I C00  ALLOCATED TO FT92F001
IEF237I 900  ALLOCATED TO FT93F001
IEF237I C00  ALLOCATED TO FT94F001
IEF237I 900  ALLOCATED TO FT95F001
IEF237I 900  ALLOCATED TO FT96F001
IEF237I 900  ALLOCATED TO FT97F001
IEF237I C00  ALLOCATED TO FT98F001
IEF237I JES3 ALLOCATED TO FT99F001
IEF237I 140  ALLOCATED TO MESSAGE
IEF237I JES3 ALLOCATED TO PRINT
IEF237I 155  ALLOCATED TO QATABLE
IEF237I JES3 ALLOCATED TO SYSIN
IEF142I VCJCSAS4 GO A - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.LIBRARY       DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   E.TZA27286.NEAD.PAMS77                        KEPT
IEF285I   VOL SER NOS= PGDE01.
IEF285I   CATALOG.ICF.VPBDE01                           KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   SYS2.VSFLOAD                                  KEPT
IEF285I   VOL SER NOS= PBDS03.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000003      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000004      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000005      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000006      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000007      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   GO.A.FT06F001                                 SYSOUT
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000009      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000010      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000011      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000012      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000013      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000014      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000015      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000016      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000017      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000018      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000019      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000020      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                   KEPT
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IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.BINRYLIB                    KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.ORIGENS.CARDLIB                     KEPT
IEF285I   VOL SER NOS= PBDE02.
IEF285I   E.TZA27286.SCALE.HEATLIB                       KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   E.TZA27286.KENO5.ALBEDOS                       KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   E.TZA27286.KENO4.WGTS                          KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XN16                   KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   C.TZA27286.SCALE4.REV02.XN27                   KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   C.TZA27286.SCALE4.REV02.XN123                  KEPT
IEF285I   VOL SER NOS= PBDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XN218                  KEPT
IEF285I   VOL SER NOS= PBDE04.
IEF285I   C.TZA27286.SCALE4.REV02.XN22G18                KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   C.TZA27286.SCALE4.REV02.XG18                   KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   C.TZA27286.SCALE4.REV02.XN27BURN               KEPT
IEF285I   VOL SER NOS= PBDE04.
IEF285I   C.TZA27286.SCALE4.REV03.XN27G18                KEPT
IEF285I   VOL SER NOS= PSDE02.
IEF285I   C.X4S27286.SCALE4.REV02.SCLIB                  KEPT
IEF285I   VOL SER NOS= PSDS01.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000021      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000022      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000023      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000024      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000025      DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000026      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000027      DELETED
IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000028      DELETED
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IEF285I   VOL SER NOS= SYSSA1.
IEF285I   SYS93096.T144120.RA000.VCJCSAS4.R0000029     DELETED
IEF285I   VOL SER NOS= SYSSA2.
IEF285I   GO.A.FT99F001                                SYSOUT
IEF285I   E.TZA27286.SCALE4.MESSAGES                   KEPT
IEF285I   VOL SER NOS= PSDE01.
IEF285I   GO.A.PRINT                                   SYSOUT
IEF285I   E.TZA27286.SCALE4.QATABLE                    KEPT
IEF285I   VOL SER NOS= PSDE03.
IEF285I   JESI0001                                     SYSIN
IEF373I STEP /GO      / START 93096.2205
IEF374I STEP /GO      / STOP  93096.2209 CPU    1MIN 07.04SEC SRB    0MIN 01.21SEC VIRT  1612K SYS   232K EXT       8K SYS    8760K
*-------------------------------------------------------------------------------------*
*KXY0001  DDNAME   CUU DSNAME                                        EXCP'S(IO) BLOCKSIZE*
*KXY0002  STEPLIB  C00 SYS93096.T144120.RA000.VCJCSAS4.LIBRARY              5      32760  *
*KXY0002           142 E.TZA27286.NEAD.PGMS77                             784             *
*KXY0002  SYS00118 141 CATALOG.ICF.VPBDE01                                                *
*KXY0002  FORTLIB  E0E SYS2.VSFLOAD                                                       *
*KXY0002  FT01F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000003             73       6136  *
*KXY0002  FT02F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000004             24       6136  *
*KXY0002  FT03F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000005                      6136  *
*KXY0002  FT04F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000006             55       6136  *
*KXY0002  FT05F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000007             14        480  *
*KXY0002  FT08F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000009            606       1776  *
*KXY0002  FT09F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000010          1,920       2816  *
*KXY0002  FT10F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000011                           *
*KXY0002  FT11F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000012             29       6136  *
*KXY0002  FT12F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000013                      6136  *
*KXY0002  FT13F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000014                      6136  *
*KXY0002  FT14F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000015              6       6136  *
*KXY0002  FT15F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000016                      6136  *
*KXY0002  FT16F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000017             82       6136  *
*KXY0002  FT17F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000018                      6136  *
*KXY0002  FT18F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000019             78       6136  *
*KXY0002  FT19F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000020             18       6136  *
*KXY0002  FT21F001 141 E.TZA27286.ORIGENS.BINRYLIB                                        *
*KXY0002  FT22F001 141 E.TZA27286.ORIGENS.BINRYLIB                                        *
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*KXY0002  FT24F001 141 E.TZA27286.ORIGENS.BINRYLIB                                        *
*KXY0002  FT25F001 141 E.TZA27286.ORIGENS.BINRYLIB                                        *
*KXY0002  FT26F001 141 E.TZA27286.ORIGENS.BINRYLIB                                        *
*KXY0002  FT27F001 143 E.TZA27286.ORIGENS.CARDLIB                                         *
*KXY0002  FT27F002 143 E.TZA27286.ORIGENS.CARDLIB                                         *
*KXY0002  FT27F003 143 E.TZA27286.ORIGENS.CARDLIB                                         *
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*KXY0002  FT79F001 140 E.TZA27286.KENO5.ALBEDOS                                           *
*KXY0002  FT80F001 140 E.TZA27286.KENO4.WGTS                                              *
*KXY0002  FT81F001 155 C.TZA27286.SCALE4.REV02.XN16                                       *
*KXY0002  FT82F001 153 C.TZA27286.SCALE4.REV02.XN27                         133       6136  *
*KXY0002  FT83F001 141 C.TZA27286.SCALE4.REV02.XN123                                      *
*KXY0002  FT84F001 156 C.TZA27286.SCALE4.REV02.XN218                                      *
*KXY0002  FT85F001 140 C.TZA27286.SCALE4.REV02.XN22G18                                    *
*KXY0002  FT86F001 155 C.TZA27286.SCALE4.REV02.XG18                                       *
*KXY0002  FT87F001 156 C.TZA27286.SCALE4.REV02.XN27BURN                                   *
*KXY0002  FT88F001 153 C.TZA27286.SCALE4.REV03.XN27G18                                    *
*KXY0002  FT89F001 C17 C.X4S27286.SCALE4.REV02.SCLIB                        166        100  *
*KXY0002  FT90F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000021             402       1024  *
```

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*KXY0002  FT91F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000022                    6136  *
*KXY0002  FT92F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000023          3         6136  *
*KXY0002  FT93F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000024                    6136  *
*KXY0002  FT94F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000025                    6136  *
*KXY0002  FT95F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000026                    6136  *
*KXY0002  FT96F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000027          3         6136  *
*KXY0002  FT97F001 900 SYS93096.T144120.RA000.VCJCSAS4.R0000028          3         6136  *
*KXY0002  FT98F001 C00 SYS93096.T144120.RA000.VCJCSAS4.R0000029                    6136  *
*KXY0002  MESSAGE  140 E.TZA27286.SCALE4.MESSAGES                        3         4254  *
*KXY0002  QATABLE  155 E.TZA27286.SCALE4.QATABLE                        15         4000  *
*KXY0003  VIRTUAL STORAGE USED  1612K      TOTAL EXCP COUNT FOR STEP     4,422          *
*KXY0004  06 APR 93.096  22.09.24.40         CPU TIME FOR STEP 0001 MIN 08.25 SEC       *
*-------------------------------------------------------------------------------------*
IEF375I  JOB /VCJCSAS4/ START 93096.2205
IEF376I  JOB /VCJCSAS4/ STOP  93096.2209 CPU    1MIN 07.28SEC SRB    0MIN 01.22SEC
*-------------------------------------------------------------------------------------*
*KXY0003                                  TOTAL EXCP  COUNT FOR JOB     4,434          *
*KXY0006                                  TOTAL PRINT LINES FOR JOB     1,703          *
*KXY0006                                  TOTAL PUNCH CARDS FOR JOB                    *
*KXY0004  06 APR 93.096  22.09.24.47         CPU TIME FOR JOB  0001 MIN 08.50 SEC       *
*-------------------------------------------------------------------------------------*
*KXY0005  X10 IBM 3090                    **APPROXIMATE JOB COST* $     25.67          *
*-------------------------------------------------------------------------------------*
```


LL KK KK EEEEEEEEEEEE DDDDDDDDD
LL KK KK EEEEEEEEEEEE DDDDDDDDDD
LL KK KK EE DD DD
LL KK KK EE DD DD
LL KK KK EE DD DD
LL KKKKKKK EEEEEEEE DD DD
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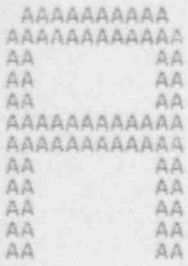
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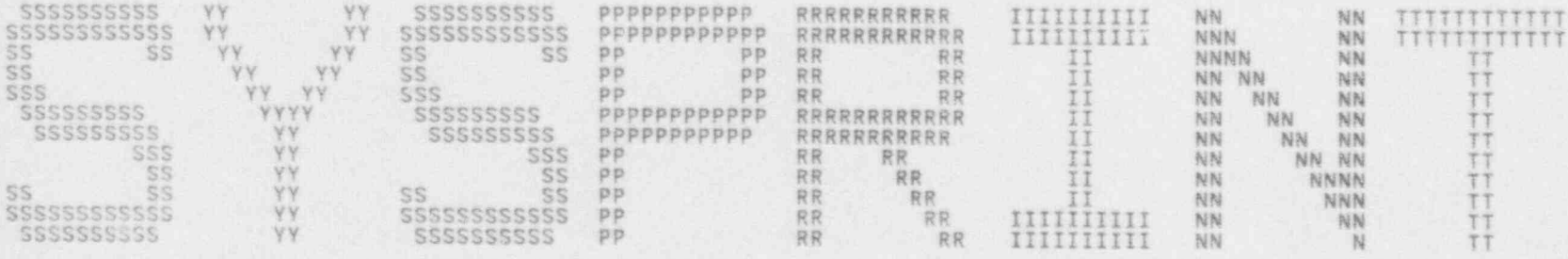
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SS SS YY YY SS SS PP PP RR RR II NNNN NN TT
SS YY YY SS PP PP RR RR II NN NN NN TT
SSS YY YY SSS PP PP RR RR II NN NN NN TT
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SSS YY SSS PP RR RR II NN NN NN TT
SS YY SS PP RR RR II NN NN NN TT
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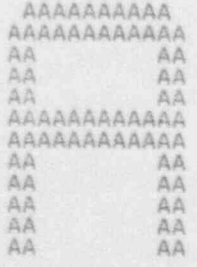
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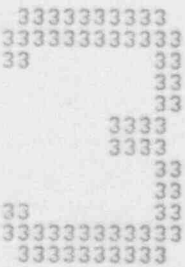
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```
MVS/XA DFP VER 2 LINKAGE EDITOR                22:05:28  TUE  APR 06, 1993
JOB VCJCSAS4   STEP A          PROCEDURE LKED
INVOCATION PARAMETERS - MAP,LIST,SIZE=(1000K,100K)
ACTUAL SIZE=(892928,86016)
OUTPUT DATA SET SYS93096.T144120.RA000.VCJCSAS4.LIBRARY IS ON VOLUME SYSSA2
IEW0000          NAME     IEFBR14(R)                                          00010000

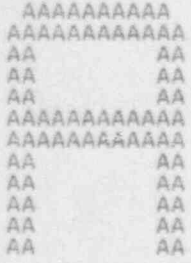
                                        MODULE MAP

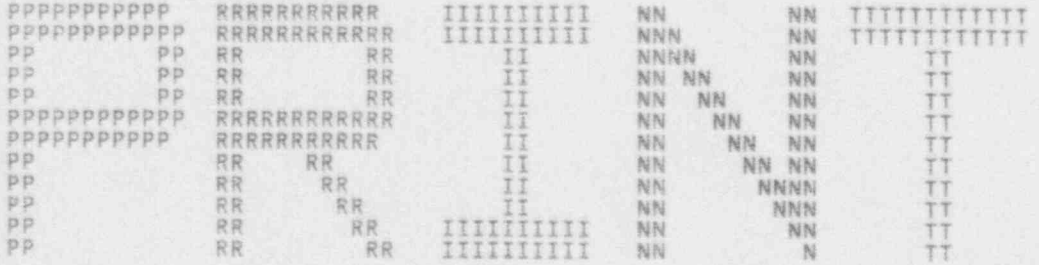
 CONTROL SECTION                      ENTRY

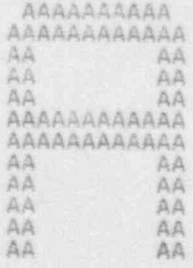
   NAME     ORIGIN  LENGTH              NAME    LOCATION     NAME    LOCATION     NAME   LOCATION     NAME   LOCATION
 IEFBR14       00        4

ENTRY ADDRESS        00

TOTAL LENGTH          8
** IEFBR14  DID NOT PREVIOUSLY EXIST BUT WAS ADDED AND HAS AMODE 24
** LOAD MODULE HAS RMODE 24
** AUTHORIZATION CODE IS         0.
```







PRIMARY MODULE ACCESS AND INPUT RECORD (SCALE DRIVER - 10/10/91 - 15.58)

```
*****************************************************************************
*     MESSAGES OF CURRENT INTEREST TO SCALE4 USERS WILL APPEAR HERE         *
*                                                                           *
*                  SCALE4  BULLETIN  BOARD                                  *
*                  ------  --------  -----                                  *
*                                                                           *
*     NOTICE TO ALL SCALE USERS:  THE SCALE CONFIGURATION MANAGEMENT        *
*     PLAN WAS UPDATED ON JUNE 10, 1992.  IF YOU HAVE ANY QUESTIONS,        *
*     CONTACT STEVE BOWMAN (4-5263).  ANY USER WHO DISCOVERS A              *
*     DISCREPANCY IN A SCALE MODULE SHOULD REPORT IT IMMEDIATELY TO         *
*     STEVE BOWMAN (4-5263) OR KAY MARTIN (4-9213) SO THAT CORRECTIVE       *
*     ACTION MAY BE TAKEN IN A TIMELY MANNER.                               *
*                                                                           *
*     1/13/92 - KENO-V.A - MODULE WAS CORRECTED TO PERFORM RESTART          *
*     CALCULATIONS FOR PROBLEMS HAVING NESTED HOLES AND/OR ARRAYS WITH      *
*     SMU AND FDN HAVING DIFFERENT VALUES. (MRR 92-001) ADDED MINOR         *
*     CHANGES FOR CONSISTENCY WITH NCSS VERSION.  (MRR 92-004)              *
*                                                                           *
*     1/14/92 - ALL CONTROL MODULES - CORRECTED THE CALCULATION OF          *
*     STORAGE NEEDED TO COLLAPSE THE BONDARENKO FACTORS WHEN USING          *
*     COLLAPSE OPTION. (MRR 92-003)                                         *
*                                                                           *
*     1/22/92 - SAS2 - CORRECTED SEVERAL MINOR ERRORS THAT WOULD HAVE       *
*     CAUSED JOB TO FAIL WHEN ENCOUNTERED. (MRR 92-002)                     *
*                                                                           *
*     1/29/92 - SAS2 - CORRECTED ERROR THAT RESET NUCLIDE NUMBER            *
*     DENSITY TO ORIGINAL INPUT VALUE IF IT DECAYED TO ZERO AFTER A         *
*     LONG COOLING TIME (E.G., XE-135).  CORRECTED ERROR THAT APPLIED       *
*     CYCLE TEMPERATURE CHANGE VARIABLE TEMKCYC ONLY TO FUEL ZONE           *
*     NUCLIDES.  (MRR 92-006)                                               *
*                                                                           *
*     2/10/92 - ALL CONTROL MODULES - CORRECTED ERROR IN LINKING OF         *
*     MODULES THAT CAUSED ERROR MESSAGES TO BE PRINTED ON WRONG OUTPUT      *
*     FILE AND ALLOWED CSAS TO LOOP IF THE CROSS-SECTION LIBRARY WAS        *
*     MISSPELLED. (MRR 92-007)                                              *
*                                                                           *
*     4/20/92 - KENO-V.A - MODULE WAS FIXED TO CORRECTLY CALCULATE          *
*     MATRIX K-EFF BY ARRAY NUMBER FOR A BARE ARRAY. (MRR 92-009)           *
*                                                                           *
*     5/27/92 - AIM - DELETED UNNECESSARY CONVERSIONS FROM FLOATING         *
*     POINT VALUES TO INTEGER. (MRR 92-013)                                 *
*                                                                           *
*     6/22/92 - MORSE AND SAS4 - (1) FIXED THE OPTION THAT ALLOWS THE       *
*     GEOMETRY MEDIA NUMBER TO DIFFER FROM THE CROSS SECTION MEDIA          *
*     NUMBER.  IF YOU HAVE PREVIOUSLY RUN PROBLEMS WITH DIFFERENT           *
*     GEOMETRY AND CROSS SECTION MEDIA NUMBERS, RE-RUN WITH NEW             *
*     VERSION.  (MRR 92-010) (2) ERROR RECOVERY PROCEDURE WAS ADDED SO      *
*     THAT WHEN A FATAL GEOMETRY ERROR OCCURS RESULTS WILL BE               *
*     NORMALIZED AND PRINTED FOR N-1 BATCHES, WHERE N IS THE BATCH          *
*     NUMBER IN WHICH THE ERROR OCCURRED. (MRR 92-011)                      *
*                                                                           *
*     8/03/92 - ALL CONTROL MODULES- (1) CORRECTED AN ERROR IN              *
*     CALCULATING NUMBER DENSITIES FOR A CELL-WEIGHTED MIXTURE WHEN A       *
*     MIXTURE NUMBER HAS BEEN ASSIGNED TO MORE THAN ONE ZONE IN THE         *
*     UNIT CELL SPECIFICATION.  (2) MADE A CORRECTION TO ACCEPT AN          *
*     INPUT DANCOFF FACTOR OF ZERO AND USE IT.  ADDED A CHECK TO            *
*     ENSURE THAT ALL DANCOFF FACTORS INPUT ARE BETWEEN ZERO AND ONE.       *
*     (MRR 92-019)                                                          *
*                                                                           *
*     8/10/92 - KENO-V.A AND CSAS4 - THE PROGRAM VERIFICATION TABLE         *
*     WAS MODIFIED TO PRINT THE CORRECT VERSION NUMBERS FOR THESE           *
```

```
*      MODULES.  VERSION 1.10 WAS PRINTING AS 1.1 DUE TO INSUFFICIENT          *
*      SPACE IN A FORMAT STATEMENT.  (MRR 92-015)                              *
*                                                                              *
*      10/02/92 - STANDARD COMPOSITION LIBRARY - UPDATED RESONANCE DATA        *
*      FLAGS FOR NUCLIDES THAT HAVE RESONANCE DATA IN ENDF/B-V.                *
*                                                                              *
*      11/24/92 - MIPLIB - CORRECTED THE DIMENSIONAL CONSISTENCY TEST          *
*      FOR ANNULAR CELLS AND ASYMMETRIC SLAB CELLS.  THIS ALLOWS               *
*      CORRECT PROBLEMS THAT PREVIOUSLY WOULD NOT RUN TO RUN. (MRR 92-024)     *
*                                                                              *
********************************************************************************

 MODULE CSASI    WILL BE CALLED.  TIME OF DAY 22.05.38  DATE 93.096

   UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLO.CJW
   27GROUPNDF4                INFHOMMEDIUM
   SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
   H2O          2  1.0  293  END
   END COMP
   END

 SECONDARY MODULE 000008   HAS BEEN CALLED

 MODULE 000008   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED      1.14 (SECONDS). I/O'S USED        0.

 SECONDARY MODULE 000002   HAS BEEN CALLED

 MODULE 000002   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED     14.56 (SECONDS). I/O'S USED        0.

 SECONDARY MODULE 000007   HAS BEEN CALLED

 MODULE 000007   IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED      3.33 (SECONDS). I/O'S USED        0.

 MODULE CSASI    IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED     20.24 (SECONDS). I/O'S USED        0.

 MODULE XSDRN    WILL BE CALLED.  TIME OF DAY 22.07.40  DATE 93.096

   SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
   0$$  A3 2  E
   1$$  1 2 50 1 0   2 2 16 3 1
    10 50 0 0 0
   2$$  -2 0 0 0 0    0 -1 0 0 0
   3$$  0 0 0 1 0     0 0 0 0 0
        0 0
   5**  A4 0  0  E
     T
   13$$  1 2
   14$$  1 2
   15**  F1
     T
   34**  F1
     T
   35**  9I0 39I7.1 47.1
   36$$  10R1 40R2
   39$$  1 2
   40$$  F3
     T
   END

 MODULE XSDRN    IS FINISHED.  COMPLETION CODE - SYSTEM 000 USER  0000. CPU TIME USED     46.75 (SECONDS). I/O'S USED        0.

  THE FOLLOWING DATA CARDS PRECEDE AN = CARD
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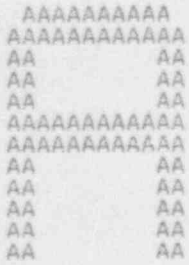
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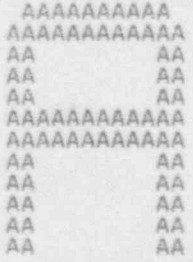
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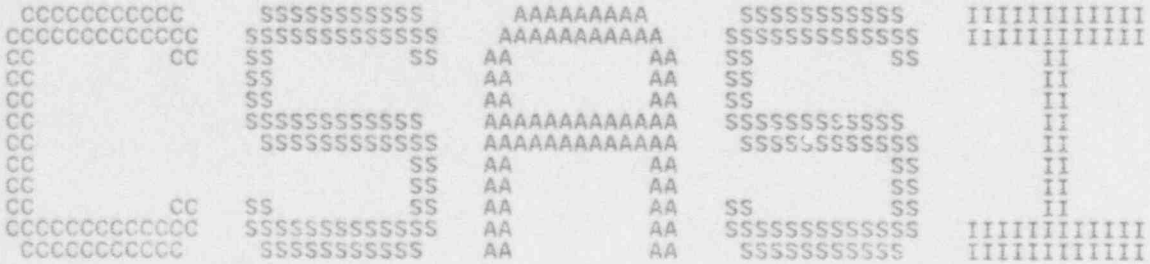
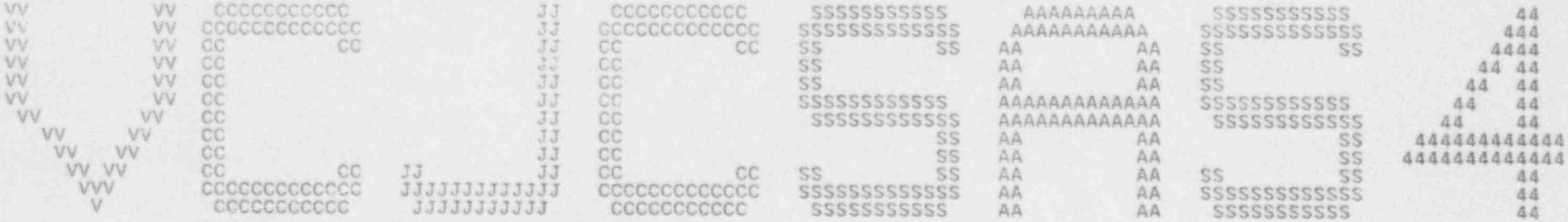
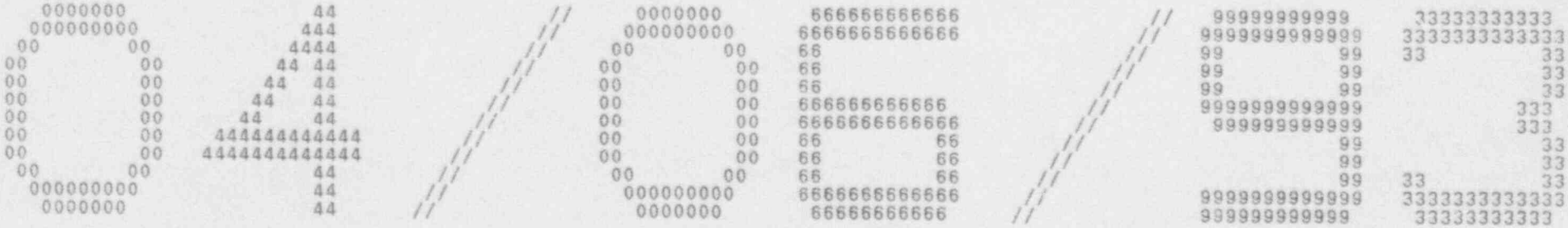
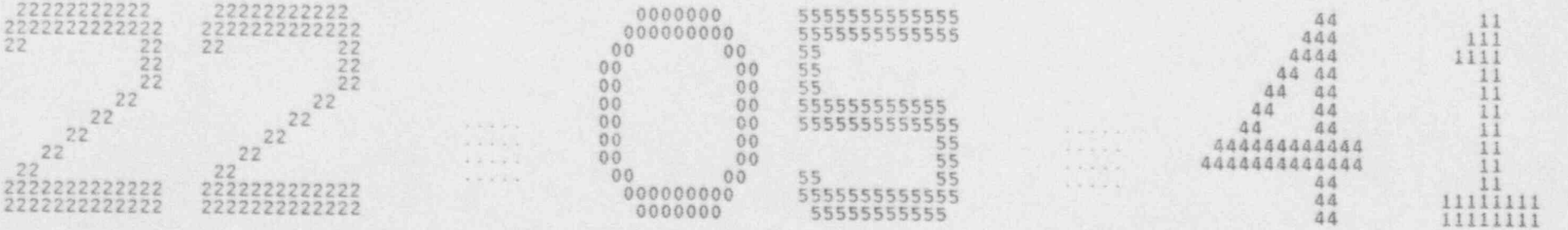
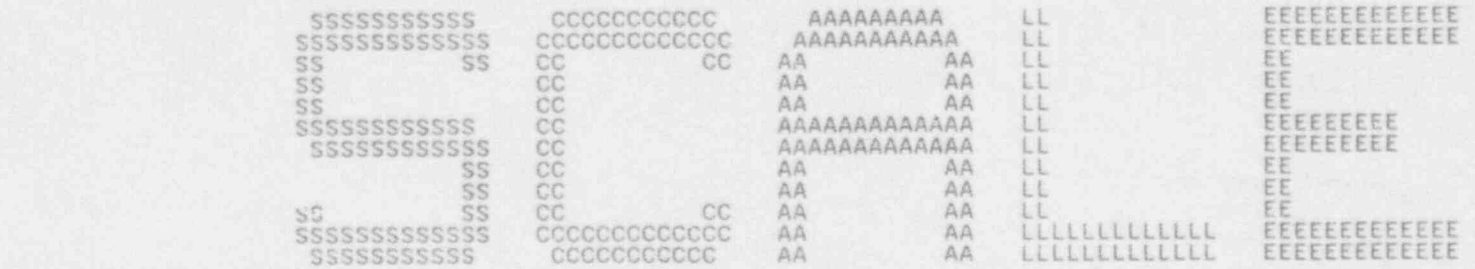










PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: CSASI

CREATION DATE: 92.329

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: CSAS25

VERSION: 1.12

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.05.42

```
UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLO.CJW

**** PROBLEM PARAMETERS ****

LIB 27GROUPNDF4  LIBRARY
MXX              2 MIXTURES
MSC              2 COMPOSITION SPECIFICATIONS
IZM              1 MATERIAL ZONES
GE  INFHOMMEDIUM GEOMETRY
MORE             0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLN             1 FUEL SOLUTIONS


**** PROBLEM COMPOSITION DESCRIPTION ****

SC  SOLNUO2F2    STANDARD COMPOSITION
MX               1 MIXTURE NO.
FD     1600.0000 SOLUTION FUEL DENSITY
AML       0.0000 ACID MOLARITY
VF        1.0000 VOLUME FRACTION
TEMP       293.0 DEG KELVIN
SPG       2.8069 DEFAULT SPECIFIC GRAVITY
           92235   5.02%
           92238  94.98%
END

SC  H2O          STANDARD COMPOSITION
MX               2 MIXTURE NO.
VF        1.0000 VOLUME FRACTION
ROTH      0.9982 THEORETICAL DENSITY
TEMP       293.0 DEG KELVIN
END


**** PROBLEM GEOMETRY ****

**** INFINITE HOMOGENEOUS MEDIUM ****
MFUEL            1 MIXTURE NO. OF THE INFINITE HOMOGENEOUS MEDIUM
```

UO2F2 SOLUTION OPTIIMIZE CONCENTRATION SLAB UOXSLO.CJW

********** DATA LIBRARY INFORMATION **********

UNIT NUMBER	DATA SET NAME	VOLUME NAME	UNIT FUNCTION
89	C.X4S27286.SCALE4.REV02.SCLIB	PSDS01	STANDARD COMPOSITION LIBRARY
82	C.TZA27286.SCALE4.REV02.XN27	PSDE02	CROSS SECTION LIBRARY
11	SYS93096.T144120.RA000.VCJCSAS4.R0000012	SYSSA2	SHORT CROSS SECTION LIBRARY
90	SYS93096.T144120.RA000.VCJCSAS4.R0000021	SYSSA1	INPUT DATA DIRECT ACCESS

STANDARD COMPOSITION LIBRARY DATA

UNIT NUMBER : 89

DATASET NAME : C.X4S27286.SCALE4.REV02.SCLIB

LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
380 STANDARD COMPOSITIONS, 327 NUCLIDES
10 ELEMENTS WITH VARIABLE ISOTOPIC DISTRBUTIONS.

CREATION DATE: 10/ 2/92

CROSS SECTION LIBRARY DATA

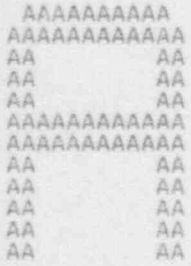
UNIT NUMBER : 82

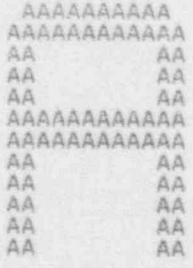
DATASET NAME : C.TZA27286.SCALE4.REV02.XN27

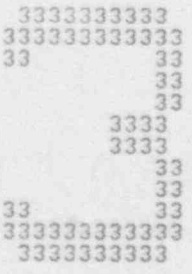
LIBRARY TITLE: SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89
LAST UPDATED 10/12/89
L.M.PETRIE ORNL

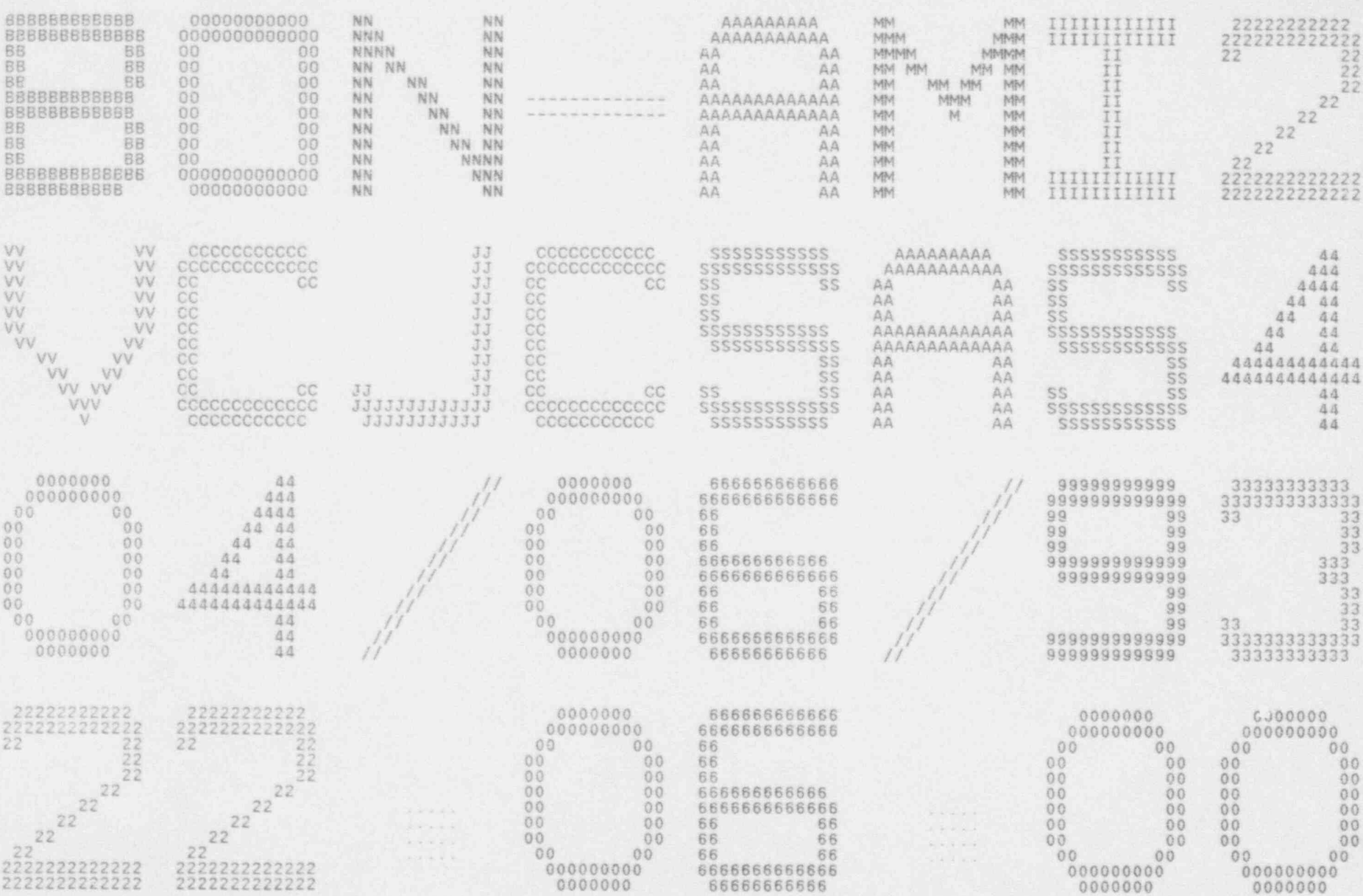
..... 0 IO'S WERE USED PROCESSING CSAS INPUT DATA .....

CONTROL MODULE CSASI IS COMPLETE.





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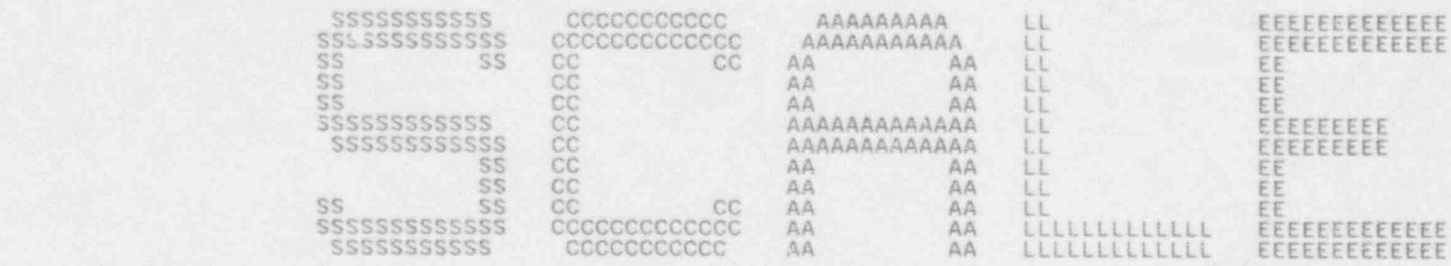


PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000008

CREATION DATE: 92.330

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: BONAMI

VERSION: 1.6

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.06.01

-1Q ARRAY HAS 1 ENTRIES.
0Q ARRAY HAS 4 ENTRIES.
1Q ARRAY HAS 6 ENTRIES.
2Q ARRAY HAS 2 ENTRIES.

LOGICAL ASSIGNMENTS

MASTER LIBRARY 11
WORKING LIBRARY 0
SCRATCH FILE 18
NEW LIBRARY 1

P R O B L E M D E S C R I P T I O N

IGR--GEOMETRY (0/1/2/3--INF MED/SLAB/CYL/SPHERE 1

IZM--NUMBER OF ZONES OR MATERIAL REGIONS 2

MS--MIXING TABLE LENGTH 7

IBL--SHIELDED CROSS SECTION EDIT OPTION (0/1--NO/YES) 0

IBR--BONDARENKO FACTOR EDIT OPTION (0/1--NO/YES) 0

ISSOPT--DANCOFF FACTOR OPTION 0

CONVERGENCE CRITERION 1.00000E-03

GEOMETRY CORRECTION FACTOR FOR WIGNER RATIONAL APPROXIMATION 1.000E+00

3Q ARRAY HAS 7 ENTRIES.

4Q ARRAY HAS 7 ENTRIES.

5Q ARRAY HAS 7 ENTRIES.

6Q ARRAY HAS 2 ENTRIES.

7Q ARRAY HAS 2 ENTRIES.

8Q ARRAY HAS 2 ENTRIES.

9Q ARRAY HAS 2 ENTRIES.

10Q ARRAY HAS 7 ENTRIES.

11Q ARRAY HAS 2 ENTRIES.

M I X I N G T A B L E

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	2.05790E-04	92235
2	1	92238	3.84443E-03	92238
3	1	8016	3.27175E-02	8016
4	2	8016	3.33757E-02	208016
5	1	9019	8.10044E-03	9019
6	1	1001	4.92340E-02	1001
7	2	1001	6.67514E-02	201001

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	1.00000E+00	2.93000E+02	0.00000E+00	0
2	2	6.00000E+00	2.93000E+02	0.00000E+00	0

2394 LOCATIONS OF 100000 AVAILABLE ARE REQUIRED TO MAKE A NEW MASTER CONTAINING THE SELF-SHIELDED VALUES

NO NUCLIDES IN YOUR PROBLEM HAVE BONDARENKO FACTOR DATA**BONAMI WILL COPY FROM LOGICAL 11 TO LOGICAL 1

```
COPY      1001   HYDROGEN        FROM LOG 11 TO LOG 18    BONDARENKO TRIGGER 0
COPY      1001   HYDROGEN        FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      1001   HYDROGEN        FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 11 TO LOG 18    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      8016   OXYGEN-16       FROM LOG 18 TO LOG  1    BONDARENKO TRIGGER 0
COPY      9019   FLUORINE        FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
COPY     92235   URANIUM-235     FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
COPY     92238   URANIUM-238     FROM LOG 11 TO LOG  1    BONDARENKO TRIGGER 0
```

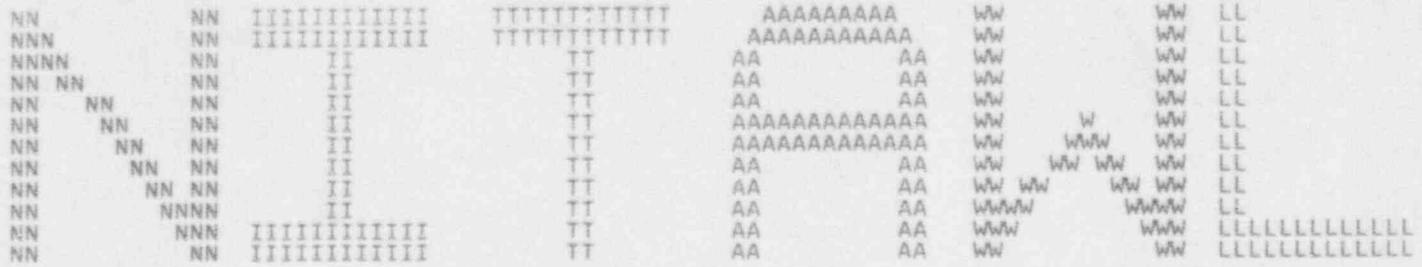
SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89
LAST UPDATED 10/12/89
L M.PETRIE ORNL

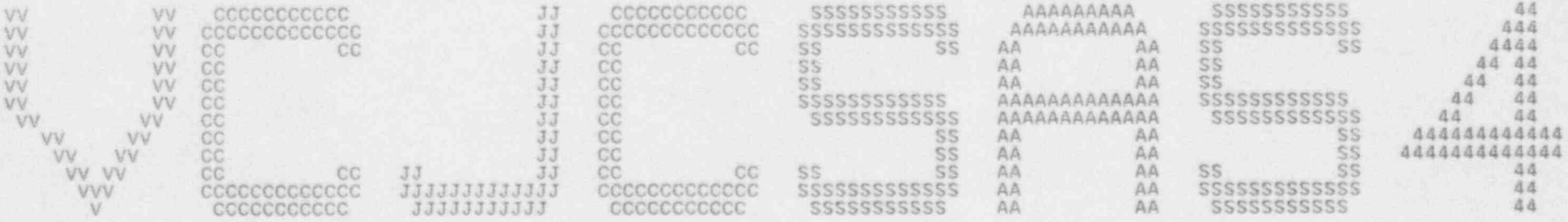
TAPE ID	4027000	NUMBER OF NUCLIDES	7
NUMBER OF NEUTRON GROUPS	27	NUMBER OF GAMMA GROUPS	0
FIRST THERMAL GROUP	15	LOGICAL UNIT	1

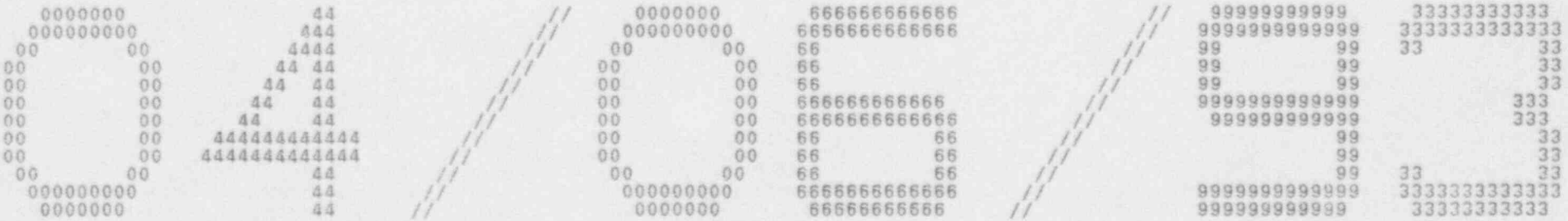
TABLE OF CONTENTS

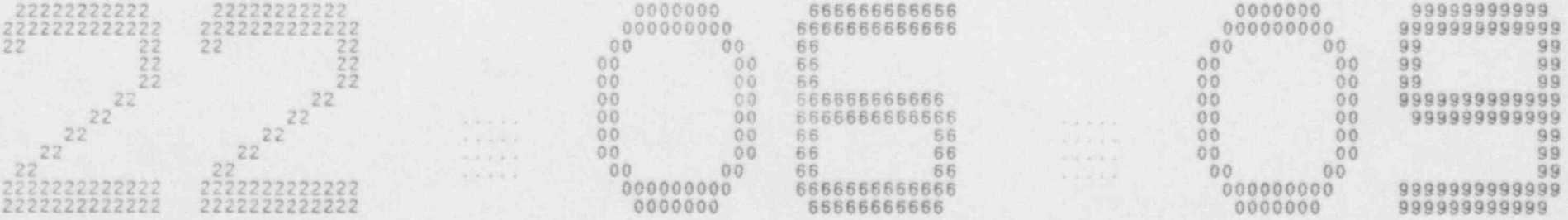
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	ID	1001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	ID	201001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	ID	8016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	ID	208016
FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89	ID	9019
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89	ID	92235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89	ID	92238

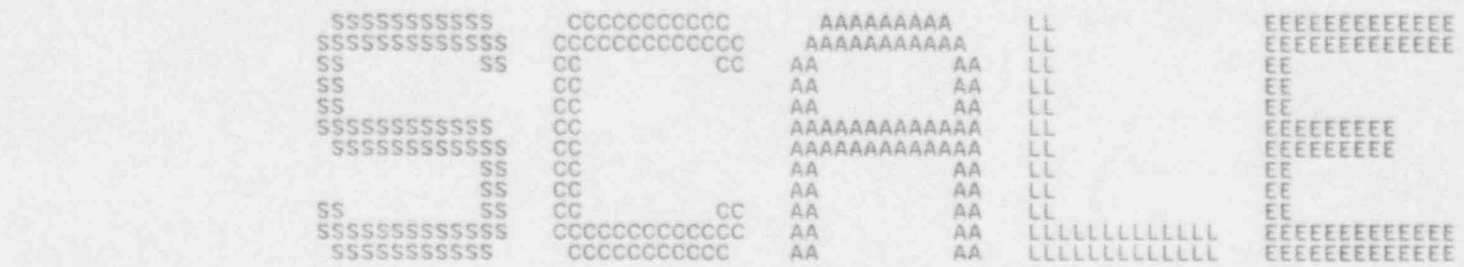
TAPE COPY USED 0 I/O'S, AND TOOK 0.67 SECONDS











PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000002

CREATION DATE: 91.350

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: NITAWL

REVISION: 1.6

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.06.10

```
       -1Q ARRAY HAS      1 ENTRIES.

        0Q ARRAY HAS      9 ENTRIES.

        1Q ARRAY HAS     12 ENTRIES.

SELECT  7 NUCLIDES FROM THE MASTER  LIBRARY ON LOGICAL  1
        0 NUCLIDES FROM THE WORKING LIBRARY ON LOGICAL  2
        0 NUCLIDES FROM THE WORKING LIBRARY ON LOGICAL  3
          TO CREATE THE NEW WORKING LIBRARY ON LOGICAL  4

        2 RESONANCE CALCULATIONS HAVE BEEN REQUESTED
       -1 OUTPUT OPTION FOR AMPX FORMATTED CROSS SECTION DATA

THE STORAGE ALLOCATED FOR THIS CASE IS 100000 WORDS

        2Q ARRAY HAS      7 ENTRIES.

        3Q ARRAY HAS     30 ENTRIES.

        4Q ARRAY HAS      7 ENTRIES.

 GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
   TAPE IDENTIFICATION NUMBER              4027000
   NUMBER OF NUCLIDES ON TAPE                    7
   NUMBER OF NEUTRON ENERGY GROUPS              27
   FIRST THERMAL NEUTRON ENERGY GROUP           15
   NUMBER OF GAMMA ENERGY GROUPS                 0

   DIRECT ACCESS UNIT NUMBER  9 REQUIRES 117 BLOCKS OF LENGTH  1484 WORDS


 XSDRN TAPE4027000
                    SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
                      BASED ON ENDF-B VERSION 4 DATA
                        COMPILED FOR NRC       1/27/89
                          LAST UPDATED        10/12/89
                            L.M.PETRIE        ORNL

 NUCLIDES FROM XSDRN TAPE
    1     HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              1001
    2     HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89            201001
    3     OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              8016
    4     OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89            208016
    5     FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89              9019
    6     URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89             92235
    7     URANIUM-238     ENDF/B-IV MAT 1262             UPDATED 10/12/89             92238

 HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              1001    TEMPERATURE=   293.00
                      THERMAL SCATTERING MATRIX NUMBER   1 AT A TEMPERATURE OF    293.00 WAS SELECTED.

 HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89            201001    TEMPERATURE=   293.00
                      THERMAL SCATTERING MATRIX NUMBER   1 AT A TEMPERATURE OF    293.00 WAS SELECTED.

 OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              8016    TEMPERATURE=   293.00

 OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89            208016    TEMPERATURE=   293.00

 FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89              9019    TEMPERATURE=   293.00

 URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89             92235    TEMPERATURE=   293.00
```

```
GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS  0.0000E+00
RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A)          =   233.025              TEMPERATURE(KELVIN)       =   293.000
POTENTIAL SCATTER SIGMA  =    11.500              LUMPED NUCLEAR DENSITY    = 2.0578971E-04
SPIN FACTOR (G)          = 15171.098              LUMP DIMENSION (A-BAR)    = 0.0000000E+00
INNER RADIUS             = 0.0000000E+00          DANCOFF CORRECTION (C)    = 0.0000000E+00
THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-1    =     1.008               SIGMA(PER ABSORBER ATOM)= 4.8805820E+03
MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-2    =    19.799               SIGMA(PER ABSORBER ATOM)= 8.9295386E+02
MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
THIS RESONANCE MATERIAL WILL BE TREATED AS A 0-DIMENSIONAL OBJECT.
VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000

GROUP        RES ABS          RES FISS         RES SCAT
 12      -1.273760E+00   -7.814561E-01   -3.331852E-02
 13      -4.360353E+00   -2.141225E+00   -1.007406E-01
 14      -3.107759E+00   -1.864935E+00   -2.266715E-02

EXCESS RESONANCE INTEGRALS

                 RESOLVED

ABSORPTION       2.17356E+02
FISSION          1.29257E+02

  ELAPSED TIME   0.10 MIN.
 URANIUM-238    ENDF/B-IV MAT 1262            UPDATED 10/12/89            92238     TEMPERATURE=   293.00
GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS  0.0000E+00
RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A)          =   236.006              TEMPERATURE(KELVIN)       =   293.000
POTENTIAL SCATTER SIGMA  =    10.599              LUMPED NUCLEAR DENSITY    = 3.8444269E-03
SPIN FACTOR (G)          =   656.527              LUMP DIMENSION (A-BAR)    = 0.0000000E+00
INNER RADIUS             = 0.0000000E+00          DANCOFF CORRECTION (C)    = 0.0000000E+00
THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-1    =     1.008               SIGMA(PER ABSORBER ATOM)= 2.6125439E+02
MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
MASS OF MODERATOR-2    =    16.725               SIGMA(PER ABSORBER ATOM)= 4.0061310E+01
MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
```

THIS RESONANCE MATERIAL WILL BE TREATED AS A 0-DIMENSIONAL OBJECT.

VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000

GROUP	RES ABS	RES FISS	RES SCAT
9	-1.782503E-02	0.000000E+00	-1.897987E-01
10	-6.216179E-01	-6.444589E-06	-4.087888E+00
11	-8.111181E+00	0.000000E+00	-2.312807E+01
12	-3.908702E+01	0.000000E+00	-4.588655E+01
13	-4.935625E+01	0.000000E+00	-1.625967E+01
14	-9.522398E+01	0.000000E+00	-5.548256E+00

EXCESS RESONANCE INTEGRALS

	RESOLVED
ABSORPTION	4.24719E+01
FISSION	5.22746E-04

ELAPSED TIME 0.22 MIN.

ELAPSED TIME 0.23 MIN.

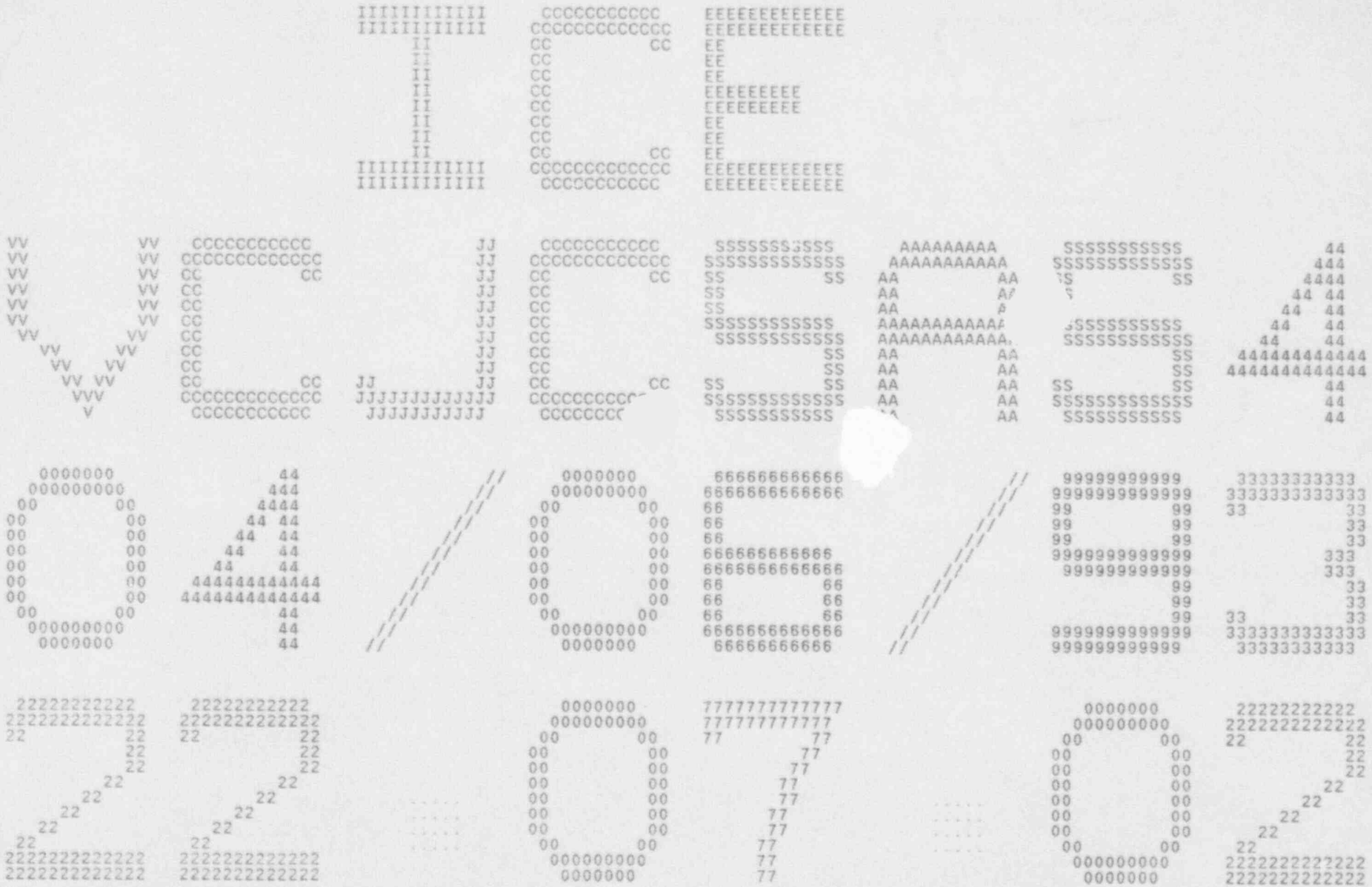
THIS XSDRN WORKING TAPE WAS CREATED 04/06/93 AT 22.06.17
THE TITLE OF THE PARENT CASE IS AS FOLLOWS
SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89

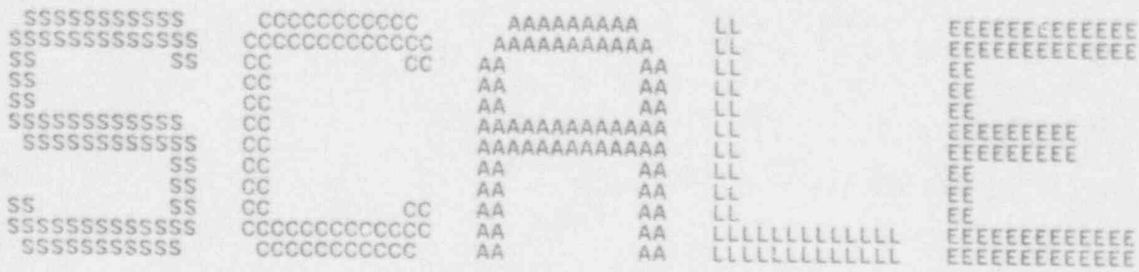
TAPE ID	4027000	NUMBER OF NUCLIDES	7
NUMBER OF NEUTRON GROUPS	27	NUMBER OF GAMMA GROUPS	0
FIRST THERMAL GROUP	15	LOGICAL UNIT	4

TABLE OF CONTENTS

HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	ID	1001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	ID	201001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	ID	8016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	ID	208016
FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89	ID	9019
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89	ID	92235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89	ID	92238

TAPE COPY USED 0 I/O'S, AND TOOK 0.42 SECONDS





PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM: 000007

CREATION DATE: 91.287

LIBRARY: E.TZA27286.NEAD.PGMS77

PRODUCTION CODE: ICE

REVISION: 1.4

JOBNAME: VCJCSAS4

DATE OF EXECUTION: 04/06/93

TIME OF EXECUTION: 22.07.03

```
UO2F2 SOLUTION   OPTIIMIZE CONCENTRATION   SLAB            UOXSLO.CJW              04/06/93    22.07.03

        0Q ARRAY HAS      3 ENTRIES.

        1Q ARRAY HAS      7 ENTRIES.

       -1Q ARRAY HAS      4 ENTRIES.


 0$ ARRAY
INTAPE        4          IOT3         21
IOT1          2          IOT4         14
IOT2          0


 1$ ARRAY
MIX           2          IFLAG(3)      0
NMIX          7          IFLAG(4)     10
IFLAG(1)     10          KOPT          4
IFLAG(2)      0

        2Q ARRAY HAS      7 ENTRIES.

        3Q ARRAY HAS      7 ENTRIES.

        4Q ARRAY HAS      7 ENTRIES.

        5Q ARRAY HAS      2 ENTRIES.

        7Q ARRAY HAS      3 ENTRIES.
 3.000E+02  1.300E+06  5.000E+00  6.750E+04  2.530E-02  1.265E-01  9.275E+03  6.006E-08  9.500E-01  2.000E+07
 6.434E+06  3.000E+06  1.850E+06  1.400E+06  9.000E+05  4.000E+05  1.000E+05  1.700E+04  1.00E+03   5.500E+02
 1.000E+02  3.000E+01  1.000E+01  3.050E+00  1.770E+00  1.300E+00  1.130E+00  1.000E+00  8.000E-01  4.000E-01
 3.250E-01  2.250E-01  1.000E-01  5.000E-02  3.000E-02  1.000E-02


 2$,3$,AND 4% ARRAYS
MIXTURE       1      ELEMENT   92235      DENSITY    0.20578971E-03
MIXTURE       1      ELEMENT   92238      DENSITY    0.38444269E-02
MIXTURE       1      ELEMENT    8016      DENSITY    0.32717451E-01
MIXTURE       2      ELEMENT  208016      DENSITY    0.33375714E-01
MIXTURE       1      ELEMENT    9019      DENSITY    0.81004351E-02
MIXTURE       1      ELEMENT    1001      DENSITY    0.49234036E-01
MIXTURE       2      ELEMENT  201001      DENSITY    0.66751420E-01


 5$ ARRAY
MIXTURE    1      NO. OF COEFICIENTS     4
MIXTURE    2      NO. OF COEF CIENTS     4


 7$ ARRAY
IHT=        3     IHS=       16     IHM=       42     LOPT=       0
NNGA=      27     NGGA=       0     NOPT=       0     NSCT=       2
IADJM=      0     NNGTP=      0
```

```
WORDS NEEDED TO READ INPUT TAPE=    1846
 WORDS CORE NEEDED FOR MIXING=    1556
 WORDS AVAILABLE FOR MIXING=  100000

 WORDS CORE NEEDED TO MAKE MIXED AMPX WORKING TAPE=    1150
```

```
     THIS XSDRN WORKING TAPE WAS CREATED 04/06/93 AT 22.06.17
     THE TITLE OF THE PARENT CASE IS AS FOLLOWS
     SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
       BASED ON ENDF-B VERSION 4 DATA
     MIXED CROSS SECTIONS BY ICE-THE PERFECT MIXER
        TAPE ID                          4027000          NUMBER OF NUCLIDES                  2
        NUMBER OF NEUTRON GROUPS              27          NUMBER OF GAMMA GROUPS              0
        FIRST THERMAL GROUP                   15          LOGICAL UNIT                        2
                                  TABLE OF CONTENTS
       MIXED CROSS SECTIONS FROM ICE                                                 ID        1
       MIXED CROSS SECTIONS FROM ICE                                                 ID        2

        TAPE COPY USED      0 I/O'S, AND TOOK    0.23 SECONDS
AN AMPX WORKING TAPE WAS MADE ON UNIT    2
 HAVE A DRINK
    1204 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


    1393 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


    1822 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


MSGPS=    1
    1850 WORDS WILL BE USED TO MAKE MORSE/KENO TAPE


A MORSE/KENO TAPE WAS MADE ON UNIT   14
 HAVE A DRINK
```


XX XX SSSSSSSSSS DDDDDDDDDD RRRRRRRRRR NN NN PPPPPPPPPP MM MM
XX XX SSSSSSSSSSSS DDDDDDDDDDDD RRRRRRRRRRRR NNN NN PPPPPPPPPPPP MMM MMM
XX XX SS SS DD DD RR RR NNNN NN PP PP MMMM MMMM
XX XX SS DD DD RR RR NN NN NN PP PP MM MM MM MM MM
XX XX SSSSSSSSSS DD DD RRRRRRRRRR NN NN NN PP PP MM MMM MM
XX XX SSSSSSSSSS DD DD RRRRRRRRRR NN NN NN PPPPPPPPPPPP MM M MM
XX XX SS DD DD RR RR NN NN NN PP MM MM
XX XX SS DD DD RR RR NN NN NN PP MM MM
XX XX SS SS DD DD RR RR NN NNNN PP MM MM
XX XX SSSSSSSSSSSS DDDDDDDDDDDD RR RR NN NNN PP MM MM
XX XX SSSSSSSSSS DDDDDDDDDD RR RR NN NN PP MM MM


VV VV CCCCCCCCCC JJ CCCCCCCCCC SSSSSSSSSS AAAAAAAA SSSSSSSSSS 44
VV VV CCCCCCCCCCCC JJ CCCCCCCCCCCC SSSSSSSSSSSS AAAAAAAAAA SSSSSSSSSSSS 444
VV VV CC CC JJ CC CC SS SS AA AA SS SS 4444
VV VV CC JJ CC SS AA AA SS 44 44
VV VV CC JJ CC SS AA AA SS 44 44
VV VV CC JJ CC SSSSSSSSSS AAAAAAAAAAAA SSSSSSSSSS 44 44
VV VV CC JJ CC SSSSSSSSSS AAAAAAAAAAAA SSSSSSSSSS 44444444444
VV VV CC JJ CC SS AA AA SS 44444444444
VV VV CC JJ CC SS AA AA SS 44
VV VV CC CC JJ JJ CC CC SS SS AA AA SS 44
VVV CCCCCCCCCCCC JJJJJJJJJJJJ CCCCCCCCCCCC SSSSSSSSSS AA AA SSSSSSSSSS 44
V CCCCCCCCCC JJJJJJJJJJ CCCCCCCCCC SSSSSSSSSS AA AA SSSSSSSSSS 44


0000000 44 0000000 6666666666 99999999999 33333333333
000000000 444 000000000 6666666666 9999999999999 3333333333333
00 00 4444 00 00 66 99 99 33 33
00 00 44 44 00 00 66 99 99 33
00 00 44 44 00 00 66 99 99 33
00 00 44 44 00 00 666666666666 9999999999999 333
00 00 44 44 00 00 6666666666666 999999999999 333
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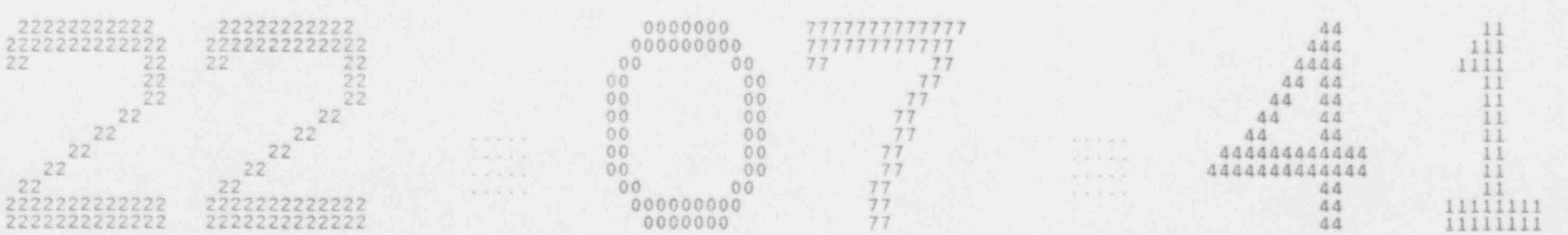
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22 22 22 22 00 00 77 77 4444 1111
22 22 22 22 00 00 77 44 44 11
22 22 00 00 77 44 44 11
22 22 00 00 77 44 44 11
22 22 00 00 77 44 44 11
22 22 00 00 77 444444444444 11
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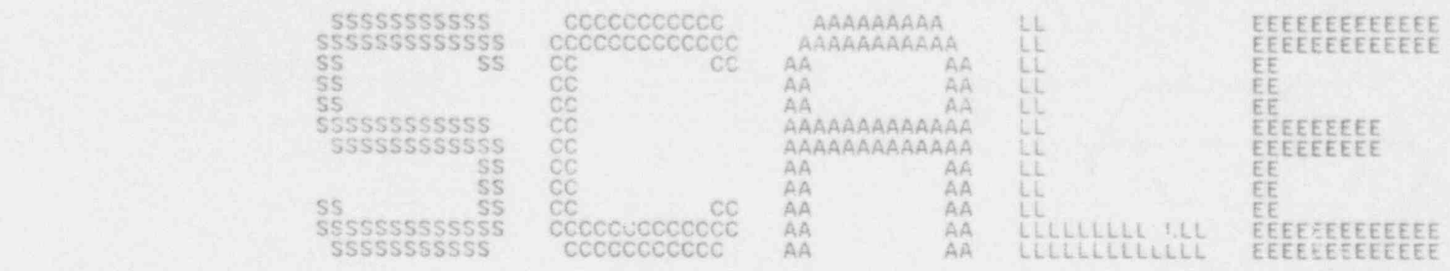

PROGRAM VERIFICATION INFORMATION

CODE SYSTEM: SCALE VERSION: 4.1

PROGRAM:	XSDRN
CREATION DATE:	91.287
LIBRARY:	E.TZA27286.NEAD.PGMS77
PRODUCTION CODE:	XSDRN
REVISION:	1.5
JOBNAME:	VCJCSAS4
DATE OF EXECUTION:	04/06/93
TIME OF EXECUTION:	22.07.42

SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

```
    0$ ARRAY      11 ENTRIES READ
    1$ ARRAY      15 ENTRIES READ
    2$ ARRAY      10 ENTRIES READ
    3$ ARRAY      12 ENTRIES READ
    5* ARRAY      12 ENTRIES READ
    0T
DIRECT ACCESS UNIT   9 REQUIRES     8 BLOCKS OF LENGTH  704 FOR CROSS SECTION MIXING.
```

SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

GENERAL PROBLEM DESCRIPTION DATA BLOCK

GENERAL PROBLEM DATA

IGE	1/2/3 = PLANE/CYLINDER/SPHERE	1	ISN	QUADRATURE ORDER	16
IZM	NUMBER OF ZONES	2	ISCT	ORDER OF SCATTERING	3
IM	NUMBER OF SPACIAL INTERVALS	50	IEVT	0/1/2/3/4/5/6=Q/K/ALPHA/C/Z/R/H	1
IBL	0/1/2/3 = VACUUM/REFL/PER/WHITE	1	IIM	INNER ITERATION MAXIMUM	10
IBR	RIGHT BOUNDARY CONDITION	0	ICM	OUTER ITERATION MAXIMUM	50
MXX	NUMBER OF MIXTURES	2	ICLC	-1/0/N--FLAT RES/SN/OPT	0
MS	MIXING TABLE LENGTH	2	ITH	0/1 = FORWARD/ADJOINT	0
IGM	NUMBER OF ENERGY GROUPS	27	IFLU	NOT USED(ALWAYS WGTD)	0
NNG	NUMBER OF NEUTRON GROUPS	27	IPRT	-2/-1/0/N=MIXTURE XSEC PRINT	-2
NGG	NUMBER OF GAMMA GROUPS	0	ID1	0/1/2/3=NO/PRT ND/PCH N/BOTH	0
IFTG	NUMBER OF FIRST THERMAL GROUP	15	IPBT	-1/0/1=NONE/FINE/ALL BAL. PRT	0

SPECIAL OPTIONS

IFG	0/1 = NONE/WEIGHTING CALCULATION	0	IPN	0/1/2 DIFF. COEF. PARAM	0
IQM	VOLUMETRIC SOURCES (0/N=NO/YES)	0	IDFM	0/1 = NONE/DENSITY FACTORS 38*	0
IPM	BOUNDARY SOURCES (0/N=NO/YES)	0	IAZ	0/N = NONE/N ACTIVITIES BY ZONE	0
IFN	0/1/2 = INPUT 33*/34*/USE LAST	1	IAI	0/1=NONE/ACTIVITIES BY INTERVAL	0
ITMX	MAXIMUM TIME (MINUTES)	0	IFCT	0/1=NO/YES UPSCATTER SCALING	0
IDT1	0/1/2/3=NO/XSECT/SRCE/FLUX--OUT	0	IPVT	0/1/2=NO/K/ALPHA PARAMETRIC SRCH	0
ISX	BROAD GROUP FLUXES	0	ISEN	OUTER ITERATION ACCELERATION	0
IBLN	ACTIVITY DATA UNIT	0	NBND	BAND REBALN PARAMETER	-1
JBKL	0/1/2 BUCKLING GEOMETRY	0			

FLOATING POINT PARAMETERS

EPS	OVERALL CONVERGENCE	1.00000E-04	DY	CYL/PLA HT FOR BUCKLING	0.00000E+00
PTC	POINT CONVERGENCE	1.00000E-04	DZ	PLANE DEPTH FOR BUCKLING	0.00000E+00
XNF	NORMALIZATION FACTOR	1.00000E+00	VSC	VOID STREAMING CORRECTION	0.00000E+00
EV	EIGENVALUE GUESS	0.00000E+00	PV	IPVT=1/2--K/ALPHA	0.00000E+00
EVM	EIGENVALUE MODIFIER	0.00000E+00	EQL	EV CHANGE EPS FOR SEARCH	1.00000E-03
BF	BUCKLING FACTOR=1.420892	1.42089E+00	XNPM	NEW PARAM MOD FOR SEARCH	7.50000E-01

THIS CASE WILL REQUIRE 1515 LOCATIONS FOR MIXING
THIS CASE HAS BEEN ALLOCATED 200000 LOCATIONS

SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

13$ ARRAY 2 ENTRIES READ

14$ ARRAY 2 ENTRIES READ

15* ARRAY 2 ENTRIES READ

0T

DATA BLOCK 2 (MIXING TABLE, ETC.)

NUCLIDES ON TAPE		CCCC IDENTIFICATION	MIXING TABLE MIXTURE	MIXING TABLE COMPONENT	ATOM DENSITY	EXTRA XSECT ID'S
1	1		1	1	1.00000E+00	
2	2		2	2	1.00000E+00	

ELAPSED TIME 0.01 MIN.

27407 LOCATIONS WILL BE USED

34* ARRAY 100 ENTRIES READ

0T

35* ARRAY 51 ENTRIES READ

36$ ARRAY 50 ENTRIES READ

39$ ARRAY 2 ENTRIES READ

40$ ARRAY 2 ENTRIES READ

0T

SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
NEUTRON GROUP PARAMETERS

GP	ENERGY BOUNDARIES	LETHARGY BOUNDARIES	MID PT VELOCITIES	BROAD GP NUMBERS	CALC TYPE	GROUP BAND	RIGHT ALBEDO	LEFT ALBEDO
1	2.00000E+07	-6.93147E-01	4.60581E+09	0	0	1		
2	6.43400E+06	4.40988E-01	2.88737E+09	0	0	2		
3	3.00000E+06	1.20397E+00	2.12201E+09	0	0	3		
4	1.85000E+06	1.68740E+00	1.75673E+09	0	0	4		
5	1.40000E+06	1.96611E+00	1.46535E+09	0	0	5		
6	9.00000E+05	2.40795E+00	1.06619E+09	0	0	6		
7	4.00000E+05	3.21888E+00	6.07557E+08	0	0	7		
8	1.00000E+05	4.60517E+00	2.72415E+08	0	0	8		
9	1.70000E+04	6.37713E+00	1.13526E+08	0	0	9		
10	3.00000E+03	8.11173E+00	4.82126E+07	0	0	10		
11	5.50000E+02	9.80818E+00	2.05946E+07	0	0	11		
12	1.00000E+02	1.15129E+01	1.01036E+07	0	0	12		
13	3.00000E+01	1.27169E+01	5.69594E+06	0	0	13		
14	1.00000E+01	1.38155E+01	3.20957E+06	0	0	14		
15	3.04999E+00	1.50030E+01	2.10601E+06	0	0	15		
16	1.77000E+00	1.55471E+01	1.70521E+06	0	0	15		
17	1.29999E+00	1.58557E+01	1.52544E+06	0	0	15		
18	1.12999E+00	1.59959E+01	1.42867E+06	0	0	15		
19	1.00000E+00	1.61181E+01	1.31002E+06	0	0	15		
20	8.00000E-01	1.63412E+01	9.05898E+05	0	0	15		
21	4.00000E-01	1.70344E+01	8.13318E+05	0	0	15		
22	3.25000E-01	1.72420E+01	6.90069E+05	0	0	15		
23	2.25000E-01	1.76098E+01	4.86933E+05	0	0	15		
24	9.99998E-02	1.84207E+01	3.57766E+05	0	0	15		
25	5.00000E-02	1.91138E+01	2.71895E+05	0	0	15		
26	3.00000E-02	1.96246E+01	1.87283E+05	0	0	15		
27	1.00000E-02	2.07233E+01	8.88202E+04	0	0	15		
28	1.00000E-05	2.76310E+01						

SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

	MIXTURE BY ZONE	ORDER P(L) BY ZONE	ACTIVITY TABLE MATL NO.	ACTIVITY TABLE REACTION	QUADRATURE CONSTANTS WEIGHTS	QUADRATURE CONSTANTS DIRECTIONS	QUADRATURE CONSTANTS REFL DIREC	QUADRATURE CONSTANTS WT X COS
1	1	3			0	-1.00000E+00	17	0
2	2	3			2.53071E-02	-9.80145E-01	17	-2.48047E-02
3					5.55953E-02	-8.98333E-01	16	-4.99431E-02
4					7.84267E-02	-7.62766E-01	15	-5.98212E-02
5					9.06709E-02	-5.91717E-01	14	-5.36516E-02
6					9.06709E-02	-4.08283E-01	13	-3.70194E-02
7					7.84267E-02	-2.37234E-01	12	-1.86054E-02
8					5.55953E-02	-1.01667E-01	11	-5.65219E-03
9					2.53071E-02	-1.98551E-02	10	-5.02475E-04
10					2.53071E-02	1.98551E-02	9	5.02475E-04
11					5.55953E-02	1.01667E-01	8	5.65219E-03
12					7.84267E-02	2.37234E-01	7	1.86054E-02
13					9.06709E-02	4.08283E-01	6	3.70194E-02
14					9.06709E-02	5.91717E-01	5	5.36516E-02
15					7.84267E-02	7.62766E-01	4	5.98212E-02
16					5.55953E-02	8.98333E-01	3	4.99431E-02
17					2.53071E-02	9.80145E-01	2	2.48047E-02

CONSTANTS FOR P(3) SCATTERING

ANGL	SET 1	SET 2	SET 3
1	-1.00000E+00	1.00000E+00	-9.99999E-01
2	-9.80145E-01	9.41025E-01	-8.83802E-01
3	-8.98333E-01	7.10503E-01	-4.64890E-01
4	-7.62766E-01	3.72718E-01	3.46832E-02
5	-5.91717E-01	2.51940E-02	3.69632E-01
6	-4.08283E-01	-2.49958E-01	4.42277E-01
7	-2.37234E-01	-4.15580E-01	3.22472E-01
8	-1.01667E-01	-4.84496E-01	1.49873E-01
9	-1.98551E-02	-4.99409E-01	2.97630E-02
10	1.98551E-02	-4.99409E-01	-2.97630E-02
11	1.01667E-01	-4.84496E-01	-1.49873E-01
12	2.37234E-01	-4.15580E-01	-3.22472E-01
13	4.08283E-01	-2.49958E-01	-4.42277E-01
14	5.91717E-01	2.51940E-02	-3.69632E-01
15	7.62766E-01	3.72718E-01	-3.46832E-02
16	8.98333E-01	7.10503E-01	4.64890E-01
17	9.80145E-01	9.41025E-01	8.83802E-01

INT	RADII	MID PTS	ZONE NO.	AREAS	VOLUMES	DENS FACT	RADIUS MOD	SPEC(INT)
1	0	3.55000E-01	1	1.00000E+00	7.10000E-01		0	
2	7.10000E-01	1.06500E+00	1	1.00000E+00	7.09999E-01		0	
3	1.42000E+00	1.77500E+00	1	1.00000E+00	7.10000E-01			
4	2.13000E+00	2.48500E+00	1	1.00000E+00	7.10000E-01			
5	2.84000E+00	3.19500E+00	1	1.00000E+00	7.10000E-01			
6	3.55000E+00	3.90500E+00	1	1.00000E+00	7.10000E-01			
7	4.26000E+00	4.61500E+00	1	1.00000E+00	7.10000E-01			
8	4.97000E+00	5.32500E+00	1	1.00000E+00	7.10000E-01			
9	5.68000E+00	6.03500E+00	1	1.00000E+00	7.10000E-01			
10	6.39000E+00	6.74500E+00	1	1.00000E+00	7.10000E-01			
11	7.10000E+00	7.60000E+00	2	1.00000E+00	1.00000E+00			
12	8.10000E+00	8.60000E+00	2	1.00000E+00	1.00000E+00			
13	9.10000E+00	9.60000E+00	2	1.00000E+00	1.00000E+00			
14	1.01000E+01	1.08000E+01	2	1.00000E+00	1.00000E+00			
15	1.11000E+01	1.16000E+01	2	1.00000E+00	1.00000E+00			
16	1.21000E+01	1.26000E+01	2	1.00000E+00	1.00000E+00			
17	1.31000E+01	1.36000E+01	2	1.00000E+00	1.00000E+00			
18	1.41000E+01	1.46000E+01	2	1.00000E+00	1.00000E+00			
19	1.51000E+01	1.56000E+01	2	1.00000E+00	9.99991E-01			
20	1.61000E+01	1.66000E+01	2	1.00000E+00	1.00000E+00			
21	1.71000E+01	1.76000E+01	2	1.00000E+00	1.00000E+00			
22	1.81000E+01	1.86000E+01	2	1.00000E+00	1.00000E+00			
23	1.91000E+01	1.96000E+01	2	1.00000E+00	1.00000E+00			
24	2.01000E+01	2.06000E+01	2	1.00000E+00	1.00000E+00			
25	2.11000E+01	2.16000E+01	2	1.00000E+00	1.00000E+00			
26	2.21000E+01	2.26000E+01	2	1.00000E+00	1.00000E+00			
27	2.31000E+01	2.36000E+01	2	1.00000E+00	1.00000E+00			
28	2.41000E+01	2.46000E+01	2	1.00000E+00	1.00000E+00			
29	2.51000E+01	2.56000E+01	2	1.00000E+00	1.00000E+00			
30	2.61000E+01	2.66000E+01	2	1.00000E+00	1.00000E+00			
31	2.71000E+01	2.76000E+01	2	1.00000E+00	1.00000E+00			
32	2.81000E+01	2.86000E+01	2	1.00000E+00	1.00000E+00			
33	2.91000E+01	2.96000E+01	2	1.00000E+00	1.00000E+00			
34	3.01000E+01	3.06000E+01	2	1.00000E+00	1.00000E+00			
35	3.11000E+01	3.16000E+01	2	1.00000E+00	1.00000E+00			
36	3.21000E+01	3.26000E+01	2	1.00000E+00	1.00000E+00			
37	3.31000E+01	3.36000E+01	2	1.00000E+00	1.00000E+00			
38	3.41000E+01	3.46000E+01	2	1.00000E+00	1.00000E+00			
39	3.51000E+01	3.56000E+01	2	1.00000E+00	1.00000E+00			
40	3.61000E+01	3.66000E+01	2	1.00000E+00	1.00000E+00			
41	3.71000E+01	3.76000E+01	2	1.00000E+00	1.00000E+00			
42	3.81000E+01	3.86000E+01	2	1.00000E+00	1.00000E+00			
43	3.91000E+01	3.96000E+01	2	1.00000E+00	1.00000E+00			
44	4.01000E+01	4.06000E+01	2	1.00000E+00	1.00000E+00			
45	4.11000E+01	4.16000E+01	2	1.00000E+00	1.00000E+00			
46	4.21000E+01	4.26000E+01	2	1.00000E+00	1.00000E+00			
47	4.31000E+01	4.36000E+01	2	1.00000E+00	1.00000E+00			
48	4.41000E+01	4.46000E+01	2	1.00000E+00	1.00000E+00			
49	4.51000E+01	4.56000E+01	2	1.00000E+00	1.00000E+00			
50	4.61000E+01	4.66000E+01	2	1.00000E+00	1.00000E+00			
51	4.71000E+01			1.00000E+00				

ELAPSED TIME 0.01 MIN.

OUTER ITER	INNER ITERS	1 - BALANCE	EIGENVALUE	1 - SOURCE RATIO	1 - SCATTER RATIO	1 - UPSCAT RATIO	SEARCH PARAMETER	TIME (MIN)
1	0	7.35523E-16	1.07268E+00	6.62871E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0143
2	215	1.23718E-02	9.22295E-01	-2.76575E+00	-7.11330E-01	-6.16034E-02	0.00000E+00	0.0775
3	413	3.70249E-03	1.03425E+00	8.86281E-02	-2.77770E-01	-1.56495E-02	0.00000E+00	0.1367
4	609	1.60461E-03	1.03786E+00	5.47312E-02	-1.24012E-01	-6.36091E-03	0.00000E+00	0.1960
5	795	7.38413E-04	1.03452E+00	3.01044E-02	-6.01491E-02	-2.88363E-03	0.00000E+00	0.2528
6	972	3.51413E-04	1.03133E+00	1.58525E-02	-2.94375E-02	-1.37783E-03	0.00000E+00	0.3082
7	1140	1.72047E-04	1.02910E+00	8.27595E-03	-1.46034E-02	-6.83514E-04	0.00000E+00	0.3613
8	1298	8.83942E-05	1.02768E+00	4.35511E-03	-7.38908E-03	-3.49694E-04	0.00000E+00	0.4133
9	1442	4.44968E-05	1.02679E+00	2.33181E-03	-3.82488E-03	-1.84152E-04	0.00000E+00	0.4620
10	1592	2.34913E-05	1.02624E+00	1.27533E-03	-2.02987E-03	-9.96709E-05	0.00000E+00	0.5118
11	1742	1.27199E-05	1.02589E+00	7.14347E-04	-1.10544E-03	-5.54401E-05	0.00000E+00	0.5618
12	1892	7.06932E-06	1.02568E+00	4.10304E-04	-6.18464E-04	-3.16961E-05	0.00000E+00	0.6118
13	2039	4.02767E-06	1.02554E+00	2.41594E-04	-3.55611E-04	-1.86048E-05	0.00000E+00	0.6613
14	2183	2.33586E-06	1.02546E+00	1.45299E-04	-2.09669E-04	-1.11569E-05	0.00000E+00	0.7103
15	2327	1.37866E-06	1.02540E+00	8.92513E-05	-1.26430E-04	-6.84349E-06	0.00000E+00	0.7585

GRP TO GRP	INNER ITERS	MFD INT.	MAX. FLUX DIFFERENCE	MSF INT.	MAX. SCALE FACTOR	COARSE MESH
1	1	10	3.12621E-05	50	9.99996E-01	6
2	1	10	2.94837E-05	31	9.99993E-01	9
3	1	10	3.08649E-05	23	9.99995E-01	10
4	1	10	3.51337E-05	5	1.00001E+00	12
5	1	10	2.77588E-05	4	1.00001E+00	16
6	1	10	2.21311E-05	4	1.00001E+00	16
7	1	9	1.64728E-05	3	1.00001E+00	24
8	1	10	9.64595E-06	2	1.00001E+00	45
9	1	1	7.94423E-06	2	1.00001E+00	45
10	1	1	6.97181E-06	17	9.99992E-01	45
11	1	17	6.41061E-06	18	9.99992E-01	45
12	1	19	7.75655E-06	19	9.99993E-01	45
13	1	19	8.05960E-06	19	9.99994E-01	45
14	1	19	7.76266E-06	20	9.99993E-01	45
15	2	10	7.57245E-07	31	1.00000E+00	45
16	2	50	1.44189E-06	50	1.00000E+00	45
17	2	50	1.66168E-06	50	1.00000E+00	45
18	2	50	1.61312E-06	50	1.00000E+00	45
19	2	50	1.93070E-06	50	1.00000E+00	45
20	2	50	1.42967E-06	31	9.99999E-01	45
21	2	50	2.06343E-06	50	9.99999E-01	50
22	2	50	1.86278E-06	50	9.99999E-01	50
23	1	36	3.02494E-05	36	1.00005E+00	50
24	1	37	8.12891E-05	37	1.00016E+00	50
25	2	49	7.24860E-07	30	1.00000E+00	50
26	2	50	1.96717E-06	50	9.99997E-01	50
27	2	49	1.83541E-06	50	9.99998E-01	50

OUTER ITER	INNER ITERS	1 - BALANCE	EIGENVALUE	1 - SOURCE RATIO	1 - SCATTER RATIO	1 - UPSCAT RATIO	SEARCH PARAMETER	TIME (MIN)
16	2365	-7.53432E-08	1.02544E+00	9.68155E-06	-5.79895E-05	-1.18336E-06	0.00000E+00	0.7703

FINAL MONITOR

LAMBDA 1.02544E+00 PRODUCTION/ABSORPTION 1.02612E+00 ANGULAR FLUX ON 16

ELAPSED TIME 0.77 MIN.

SLAB OPTIMIZATION U02F2 SOLUTION DENSITY VARIATION

INT	ZONE NUMBER	RADIUS	INT. MIDPOINT	AREA	VOLUME	PROD DENSITY
1	1	0.00000E+00	3.55000E-01	1.00000E+00	7.10000E-01	9.79631E-02
2	1	7.10000E-01	1.06500E+00	1.00000E+00	7.09999E-01	9.74228E-02
3	1	1.42000E+00	1.77500E+00	1.00000E+00	7.10000E-01	9.63804E-02
4	1	2.13000E+00	2.48500E+00	1.00000E+00	7.10000E-01	9.50984E-02
5	1	2.84000E+00	3.19500E+00	1.00000E+00	7.10000E-01	9.37784E-02
6	1	3.55000E+00	3.90500E+00	1.00000E+00	7.10000E-01	9.32599E-02
7	1	4.26000E+00	4.61500E+00	1.00000E+00	7.10000E-01	9.43183E-02
8	1	4.97000E+00	5.32500E+00	1.00000E+00	7.10000E-01	9.96380E-02
9	1	5.68000E+00	6.03500E+00	1.00000E+00	7.10000E-01	1.12186E-01
10	1	6.39000E+00	6.74500E+00	1.00000E+00	7.10000E-01	1.45397E-01
11	2	7.10000E+00	7.60000E+00	1.00000E+00	1.00000E+00	0.00000E+00
12	2	8.10000E+00	8.60000E+00	1.00000E+00	1.00000E+00	0.00000E+00
13	2	9.10000E+00	9.60000E+00	1.00000E+00	1.00000E+00	0.00000E+00
14	2	1.01000E+01	1.06000E+01	1.00000E+00	1.00000E+00	0.00000E+00
15	2	1.11000E+01	1.16000E+01	1.00000E+00	1.00000E+00	0.00000E+00
16	2	1.21000E+01	1.26000E+01	1.00000E+00	1.00000E+00	0.00000E+00
17	2	1.31000E+01	1.36000E+01	1.00000E+00	1.00000E+00	0.00000E+00
18	2	1.41000E+01	1.46000E+01	1.00000E+00	1.00000E+00	0.00000E+00
19	2	1.51000E+01	1.56000E+01	1.00000E+00	9.99991E-01	0.00000E+00
20	2	1.61000E+01	1.66000E+01	1.00000E+00	1.00000E+00	0.00000E+00
21	2	1.71000E+01	1.76000E+01	1.00000E+00	1.00000E+00	0.00000E+00
22	2	1.81000E+01	1.86000E+01	1.00000E+00	1.00000E+00	0.00000E+00
23	2	1.91000E+01	1.96000E+01	1.00000E+00	1.00000E+00	0.00000E+00
24	2	2.01000E+01	2.06000E+01	1.00000E+00	1.00000E+00	0.00000E+00
25	2	2.11000E+01	2.16000E+01	1.00000E+00	1.00000E+00	0.00000E+00
26	2	2.21000E+01	2.26000E+01	1.00000E+00	1.00000E+00	0.00000E+00
27	2	2.31000E+01	2.36000E+01	1.00000E+00	1.00000E+00	0.00000E+00
28	2	2.41000E+01	2.46000E+01	1.00000E+00	1.00000E+00	0.00000E+00
29	2	2.51000E+01	2.56000E+01	1.00000E+00	1.00000E+00	0.00000E+00
30	2	2.61000E+01	2.66000E+01	1.00000E+00	1.00000E+00	0.00000E+00
31	2	2.71000E+01	2.76000E+01	1.00000E+00	1.00000E+00	0.00000E+00
32	2	2.81000E+01	2.86000E+01	1.00000E+00	1.00000E+00	0.00000E+00
33	2	2.91000E+01	2.96000E+01	1.00000E+00	1.00000E+00	0.00000E+00
34	2	3.01000E+01	3.06000E+01	1.00000E+00	1.00000E+00	0.00000E+00
35	2	3.11000E+01	3.16000E+01	1.00000E+00	1.00000E+00	0.00000E+00
36	2	3.21000E+01	3.26000E+01	1.00000E+00	1.00000E+00	0.00000E+00
37	2	3.31000E+01	3.36000E+01	1.00000E+00	1.00000E+00	0.00000E+00
38	2	3.41000E+01	3.46000E+01	1.00000E+00	1.00000E+00	0.00000E+00
39	2	3.51000E+01	3.56000E+01	1.00000E+00	1.00000E+00	0.00000E+00
40	2	3.61000E+01	3.66000E+01	1.00000E+00	1.00000E+00	0.00000E+00
41	2	3.71000E+01	3.76000E+01	1.00000E+00	1.00000E+00	0.00000E+00
42	2	3.81000E+01	3.86000E+01	1.00000E+00	1.00000E+00	0.00000E+00
43	2	3.91000E+01	3.96000E+01	1.00000E+00	1.00000E+00	0.00000E+00
44	2	4.01000E+01	4.06000E+01	1.00000E+00	1.00000E+00	0.00000E+00
45	2	4.11000E+01	4.16000E+01	1.00000E+00	1.00000E+00	0.00000E+00
46	2	4.21000E+01	4.26000E+01	1.00000E+00	1.00000E+00	0.00000E+00
47	2	4.31000E+01	4.36000E+01	1.00000E+00	1.00000E+00	0.00000E+00
48	2	4.41000E+01	4.46000E+01	1.00000E+00	1.00000E+00	0.00000E+00
49	2	4.51000E+01	4.56000E+01	1.00000E+00	1.00000E+00	0.00000E+00
50	2	4.61000E+01	4.66000E+01	1.00000E+00	1.00000E+00	0.00000E+00
51		4.71000E+01		1.00000E+00		

SLAB OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION

TOTAL FLUX

INT.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	2.72297E-02	2.03879E-01	2.40096E-01	1.42775E-01	2.02810E-01	3.12298E-01	3.03284E-01	2.28396E-01
2	2.70882E-02	2.02745E-01	2.38723E-01	1.41945E-01	2.01615E-01	3.10372E-01	3.01325E-01	2.26849E-01
3	2.68115E-02	2.00585E-01	2.36125E-01	1.40382E-01	1.99369E-01	3.06670E-01	2.97460E-01	2.23750E-01
4	2.64048E-02	1.97312E-01	2.32164E-01	1.37978E-01	1.95904E-01	3.01011E-01	2.91602E-01	2.19055E-01
5	2.58922E-02	1.93342E-01	2.27348E-01	1.35070E-01	1.91681E-01	2.93848E-01	2.83895E-01	2.12726E-01
6	2.52643E-02	1.88255E-01	2.21148E-01	1.31298E-01	1.86232E-01	2.84682E-01	2.74054E-01	2.04613E-01
7	2.45919E-02	1.83091E-01	2.14764E-01	1.27350E-01	1.80355E-01	2.74220E-01	2.62228E-01	1.94574E-01
8	2.37029E-02	1.76051E-01	2.06109E-01	1.22073E-01	1.72591E-01	2.60777E-01	2.47347E-01	1.82166E-01
9	2.28164E-02	1.68793E-01	1.96941E-01	1.16302E-01	1.63772E-01	2.44913E-01	2.29241E-01	1.67001E-01
10	2.05760E-02	1.49593E-01	1.73688E-01	1.02163E-01	1.43069E-01	2.14040E-01	2.00660E-01	1.47337E-01
11	1.59752E-02	1.08020E-01	1.24197E-01	7.24174E-02	1.00666E-01	1.56459E-01	1.54426E-01	1.19822E-01
12	1.25750E-02	7.73073E-02	8.75777E-02	5.01708E-02	6.86096E-02	1.10431E-01	1.14223E-01	9.24631E-02
13	1.05122E-02	6.04205E-02	6.77775E-02	3.85044E-02	5.21135E-02	8.46598E-02	8.82651E-02	7.18516E-02
14	8.91230E-03	4.79745E-02	5.32111E-02	2.98185E-02	3.97633E-02	6.49026E-02	6.81673E-02	5.58229E-02
15	7.67682E-03	3.88363E-02	4.26367E-02	2.36540E-02	3.12198E-02	5.09707E-02	5.34323E-02	4.36397E-02
16	6.65056E-03	3.16233E-02	3.43563E-02	1.88517E-02	2.46004E-02	4.00445E-02	4.19304E-02	3.42491E-02
17	5.80300E-03	2.60393E-02	2.80171E-02	1.52343E-02	1.96895E-02	3.19178E-02	3.32758E-02	2.70658E-02
18	5.08358E-03	2.15101E-02	2.29074E-02	1.23283E-02	1.57830E-02	2.54452E-02	2.64457E-02	2.14894E-02
19	4.47218E-03	1.78965E-02	1.88785E-02	1.00793E-02	1.28021E-02	2.05192E-02	2.12307E-02	1.71767E-02
20	3.94606E-03	1.49244E-02	1.55843E-02	8.24193E-03	1.03824E-02	1.65392E-02	1.70582E-02	1.37901E-02
21	3.49172E-03	1.25077E-02	1.29374E-02	6.79420E-03	8.50612E-03	1.34689E-02	1.38384E-02	1.11402E-02
22	3.09670E-03	1.05027E-02	1.07548E-02	5.59932E-03	6.96020E-03	1.09561E-02	1.12272E-02	9.03388E-03
23	2.75204E-03	8.85114E-03	8.97753E-03	4.64505E-03	5.74766E-03	8.99802E-03	9.19040E-03	7.36716E-03
24	2.45006E-03	7.47242E-03	7.50349E-03	3.85219E-03	4.73742E-03	7.37694E-03	7.52097E-03	6.02677E-03
25	2.18466E-03	6.32604E-03	6.29142E-03	3.21212E-03	3.93764E-03	6.10327E-03	6.20428E-03	4.95576E-03
26	1.95074E-03	5.36424E-03	5.28159E-03	2.67782E-03	3.26556E-03	5.03790E-03	5.11424E-03	4.08488E-03
27	1.74407E-03	4.55887E-03	4.44503E-03	2.24263E-03	2.72921E-03	4.19492E-03	4.24832E-03	3.38338E-03
28	1.56105E-03	3.88032E-03	3.74548E-03	1.87805E-03	2.27549E-03	3.48333E-03	3.52436E-03	2.80701E-03
29	1.39868E-03	3.30900E-03	3.16257E-03	1.57885E-03	1.91081E-03	2.91684E-03	2.94510E-03	2.33974E-03
30	1.25436E-03	2.82586E-03	2.67355E-03	1.32748E-03	1.60067E-03	2.43475E-03	2.45683E-03	1.95205E-03
31	1.12589E-03	2.41725E-03	2.26414E-03	1.11984E-03	1.34976E-03	2.04893E-03	2.06376E-03	1.63623E-03
32	1.01136E-03	2.07056E-03	1.91968E-03	9.44955E-04	1.13547E-03	1.71822E-03	1.73002E-03	1.37172E-03
33	9.09125E-04	1.77624E-03	1.63015E-03	7.99678E-04	9.61059E-04	1.45234E-03	1.45993E-03	1.15552E-03
34	8.17749E-04	1.52575E-03	1.38590E-03	6.77032E-04	8.11590E-04	1.22295E-03	1.22913E-03	9.72811E-04
35	7.35990E-04	1.31239E-03	1.17990E-03	5.74639E-04	6.89250E-04	1.03780E-03	1.04149E-03	8.23083E-04
36	6.62759E-04	1.13028E-03	1.00566E-03	4.87999E-04	5.84098E-04	8.77130E-04	8.80197E-04	6.95633E-04
37	5.97100E-04	9.74687E-04	8.58247E-04	4.15337E-04	4.97571E-04	7.46958E-04	7.48544E-04	5.90750E-04
38	5.38177E-04	8.41501E-04	7.33235E-04	3.53709E-04	4.23002E-04	6.33396E-04	6.34746E-04	5.00994E-04
39	4.85250E-04	7.27366E-04	6.27161E-04	3.01804E-04	3.61322E-04	5.41053E-04	5.41515E-04	4.26821E-04
40	4.37667E-04	6.29373E-04	5.36950E-04	2.57660E-04	3.08020E-04	4.60075E-04	4.60468E-04	3.62993E-04
41	3.94852E-04	5.45140E-04	4.60174E-04	2.20329E-04	2.63701E-04	3.93967E-04	3.93819E-04	3.10024E-04
42	3.56290E-04	4.72562E-04	3.94655E-04	1.88465E-04	2.25264E-04	3.35656E-04	3.35486E-04	2.64124E-04
43	3.21528E-04	4.09961E-04	3.38705E-04	1.61401E-04	1.93124E-04	2.87819E-04	2.87287E-04	2.25839E-04
44	2.90150E-04	3.55754E-04	2.90722E-04	1.38171E-04	1.65083E-04	2.45272E-04	2.44670E-04	1.92284E-04
45	2.61802E-04	3.08797E-04	2.49567E-04	1.18335E-04	1.41461E-04	2.10096E-04	2.09176E-04	1.64047E-04
46	2.36119E-04	2.67769E-04	2.13952E-04	1.01123E-04	1.20594E-04	1.78307E-04	1.77133E-04	1.38670E-04
47	2.12852E-04	2.31990E-04	1.83181E-04	8.62883E-05	1.02784E-04	1.51622E-04	1.49991E-04	1.16871E-04
48	1.91556E-04	2.00058E-04	1.55979E-04	7.30600E-05	8.64780E-05	1.26417E-04	1.24032E-04	9.58309E-05
49	1.72156E-04	1.71702E-04	1.32022E-04	6.13958E-05	7.21307E-05	1.04478E-04	1.01106E-04	7.68243E-05
50	1.53516E-04	1.43516E-04	1.08411E-04	4.92839E-05	5.60381E-05	7.82088E-05	7.19038E-05	5.18233E-05

INT.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	1.77011E-01	1.62640E-01	1.54534E-01	1.00890E-01	8.73730E-02	8.46043E-02	4.13489E-02	2.38835E-02
2	1.75756E-01	1.61440E-01	1.53358E-01	1.00109E-01	8.66913E-02	8.39440E-02	4.10265E-02	2.36980E-02
3	1.73231E-01	1.59023E-01	1.50991E-01	9.85394E-02	8.53235E-02	8.26198E-02	4.03845E-02	2.33291E-02
4	1.69401E-01	1.55361E-01	1.47421E-01	9.61836E-02	8.32796E-02	8.06552E-02	3.94309E-02	2.27825E-02
5	1.64204E-01	1.50404E-01	1.42612E-01	9.30239E-02	8.05548E-02	7.80480E-02	3.81803E-02	2.20677E-02
6	1.57553E-01	1.44100E-01	1.36562E-01	8.90943E-02	7.71982E-02	7.48816E-02	3.66626E-02	2.12037E-02

7	1.49319E-01	1.36384E-01	1.29254E-01	8.43953E-02	7.32331E-02	7.11812E-02	3.49237E-02	2.02173E-02
8	1.39354E-01	1.27250E-01	1.20798E-01	7.90877E-02	6.88387E-02	6.72093E-02	3.30466E-02	1.91565E-02
9	1.27508E-01	1.16732E-01	1.11303E-01	7.32470E-02	6.41162E-02	6.30521E-02	3.11398E-02	1.80757E-02
10	1.13770E-01	1.05230E-01	1.01440E-01	6.76896E-02	5.98750E-02	5.99371E-02	2.94138E-02	1.70823E-02
11	9.59502E-02	9.07465E-02	8.94755E-02	6.14718E-02	5.52683E-02	5.72598E-02	2.73174E-02	1.58600E-02
12	7.63752E-02	7.39026E-02	7.45544E-02	5.24651E-02	4.79519E-02	5.09707E-02	2.41727E-02	1.40484E-02
13	5.99673E-02	5.87984E-02	6.01695E-02	4.28555E-02	3.96404E-02	4.26672E-02	2.04674E-02	1.19379E-02
14	4.68802E-02	4.63236E-02	4.78772E-02	3.44229E-02	3.21069E-02	3.49149E-02	1.68306E-02	9.85352E-03
15	3.66719E-02	3.63558E-02	3.77724E-02	2.72929E-02	2.55971E-02	2.80041E-02	1.35797E-02	7.97217E-03
16	2.87848E-02	2.85665E-02	2.97595E-02	2.15737E-02	2.02991E-02	2.23074E-02	1.08402E-02	6.37650E-03
17	2.26998E-02	2.25127E-02	2.34622E-02	1.70228E-02	1.60430E-02	1.76649E-02	8.60711E-03	5.06880E-03
18	1.79973E-02	1.78268E-02	1.85698E-02	1.34772E-02	1.27073E-02	1.40095E-02	6.82656E-03	4.02284E-03
19	1.43470E-02	1.41851E-02	1.47551E-02	1.06983E-02	1.00844E-02	1.11154E-02	5.42144E-03	3.19536E-03
20	1.14997E-02	1.13498E-02	1.17884E-02	8.54043E-03	8.04453E-03	8.86492E-03	4.31952E-03	2.54578E-03
21	9.26560E-03	9.12676E-03	9.46152E-03	6.84416E-03	6.44065E-03	7.08952E-03	3.45527E-03	2.03585E-03
22	7.50308E-03	7.37801E-03	7.63633E-03	5.51822E-03	5.18737E-03	5.70587E-03	2.77698E-03	1.63567E-03
23	6.10414E-03	5.99152E-03	6.18995E-03	4.46592E-03	4.19369E-03	4.60656E-03	2.24215E-03	1.32008E-03
24	4.98810E-03	4.88882E-03	5.04350E-03	3.63543E-03	3.41024E-03	3.74319E-03	1.81909E-03	1.07060E-03
25	4.09268E-03	4.00488E-03	4.12483E-03	2.96882E-03	2.78218E-03	3.04968E-03	1.48235E-03	8.72033E-04
26	3.37100E-03	3.29464E-03	3.38930E-03	2.43767E-03	2.28232E-03	2.50027E-03	1.21334E-03	7.13536E-04
27	2.78634E-03	2.71950E-03	2.79361E-03	2.00649E-03	1.87702E-03	2.05363E-03	9.97004E-04	5.86081E-04
28	2.31082E-03	2.25317E-03	2.31239E-03	1.66005E-03	1.55172E-03	1.69706E-03	8.22514E-04	4.83366E-04
29	1.92229E-03	1.87208E-03	1.91885E-03	1.37576E-03	1.28505E-03	1.40370E-03	6.80795E-04	3.99945E-04
30	1.60376E-03	1.56067E-03	1.59851E-03	1.14579E-03	1.06955E-03	1.16801E-03	5.65508E-04	3.32138E-04
31	1.34156E-03	1.30411E-03	1.33420E-03	9.55131E-04	8.91030E-04	9.72140E-04	4.71050E-04	2.76575E-04
32	1.12509E-03	1.09305E-03	1.11770E-03	8.00112E-04	7.46014E-04	8.13608E-04	3.93599E-04	2.31060E-04
33	9.45750E-04	9.17906E-04	9.37593E-04	6.70370E-04	6.24717E-04	6.80896E-04	3.29663E-04	1.93471E-04
34	7.96782E-04	7.73004E-04	7.89332E-04	5.64393E-04	5.25717E-04	5.72729E-04	2.76883E-04	1.62477E-04
35	6.72661E-04	6.51971E-04	6.65040E-04	4.75042E-04	4.42297E-04	4.81621E-04	2.33018E-04	1.36698E-04
36	5.69010E-04	5.51356E-04	5.62328E-04	4.01648E-04	3.73807E-04	4.06875E-04	1.96591E-04	1.15321E-04
37	4.82181E-04	4.66791E-04	4.75568E-04	3.39425E-04	3.15783E-04	3.43576E-04	1.66127E-04	9.74232E-05
38	4.09318E-04	3.96195E-04	4.03657E-04	2.88034E-04	2.67867E-04	2.91336E-04	1.40696E-04	8.25079E-05
39	3.47980E-04	3.36504E-04	3.42447E-04	2.44237E-04	2.27064E-04	2.46866E-04	1.19299E-04	6.99389E-05
40	2.96243E-04	2.86462E-04	2.91556E-04	2.07859E-04	1.93170E-04	2.09939E-04	1.01339E-04	5.94112E-05
41	2.52473E-04	2.43878E-04	2.47943E-04	1.76691E-04	1.64146E-04	1.78325E-04	8.61258E-05	5.04746E-05
42	2.15306E-04	2.07980E-04	2.11424E-04	1.50593E-04	1.39840E-04	1.51852E-04	7.32604E-05	4.29356E-05
43	1.83671E-04	1.77179E-04	1.79907E-04	1.28067E-04	1.18860E-04	1.28993E-04	6.22518E-05	3.64666E-05
44	1.56491E-04	1.50931E-04	1.53149E-04	1.08927E-04	1.01018E-04	1.09544E-04	5.28005E-05	3.09278E-05
45	1.33105E-04	1.28080E-04	1.29723E-04	9.21434E-05	8.53540E-05	9.24422E-05	4.45463E-05	2.60724E-05
46	1.12445E-04	1.08037E-04	1.09150E-04	7.73626E-05	7.15298E-05	7.73259E-05	3.71950E-05	2.17613E-05
47	9.41938E-05	8.99903E-05	9.04751E-05	6.38910E-05	5.88980E-05	6.34870E-05	3.04940E-05	1.78152E-05
48	7.67133E-05	7.27501E-05	7.25604E-05	5.09452E-05	4.67594E-05	5.02049E-05	2.40448E-05	1.40340E-05
49	6.02715E-05	5.61245E-05	5.51928E-05	3.84092E-05	3.50402E-05	3.74318E-05	1.78739E-05	1.04114E-05
50	3.91553E-05	3.55213E-05	3.43581E-05	2.37003E-05	2.14859E-05	2.28674E-05	1.08649E-05	6.32730E-06

INT.	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24
1	1.08695E-02	9.49212E-03	1.76546E-02	5.82844E-02	1.78725E-02	3.41071E-02	1.21480E-01	1.75540E-01
2	1.07853E-02	9.41874E-03	1.75185E-02	5.78386E-02	1.77370E-02	3.38571E-02	1.20739E-01	1.74614E-01
3	1.06179E-02	9.27275E-03	1.72479E-02	5.69536E-02	1.74681E-02	3.33633E-02	1.19322E-01	1.72883E-01
4	1.03702E-02	9.05707E-03	1.68483E-02	5.56496E-02	1.70733E-02	3.26474E-02	1.17434E-01	1.70807E-01
5	1.00465E-02	8.77522E-03	1.63269E-02	5.39536E-02	1.65607E-02	3.17342E-02	1.15363E-01	1.68948E-01
6	9.65632E-03	8.43617E-03	1.57002E-02	5.19224E-02	1.59516E-02	3.06856E-02	1.13757E-01	1.68827E-01
7	9.21117E-03	8.04946E-03	1.49872E-02	4.96208E-02	1.52647E-02	2.95646E-02	1.13493E-01	1.72403E-01
8	8.73468E-03	7.63689E-03	1.42259E-02	4.71739E-02	1.45475E-02	2.85168E-02	1.16392E-01	1.84520E-01
9	8.24810E-03	7.21552E-03	1.34502E-02	4.46868E-02	1.38282E-02	2.76526E-02	1.24658E-01	2.11685E-01
10	7.81263E-03	6.84658E-03	1.27554E-02	4.24628E-02	1.32496E-02	2.73678E-02	1.42885E-01	2.70168E-01
11	7.29528E-03	6.41936E-03	1.19222E-02	3.97737E-02	1.26185E-02	2.74776E-02	1.76310E-01	3.80534E-01
12	6.48308E-03	5.71823E-03	1.06135E-02	3.55131E-02	1.14060E-02	2.63532E-02	2.04317E-01	4.77246E-01
13	5.51650E-03	4.86983E-03	9.05452E-03	3.04156E-02	9.83917E-03	2.39063E-02	2.10710E-01	5.08857E-01
14	4.56293E-03	4.03303E-03	7.50794E-03	2.53197E-02	8.25394E-03	2.09477E-02	2.02477E-01	4.98842E-01
15	3.69628E-03	3.26948E-03	6.09449E-03	2.06210E-02	6.76442E-03	1.78434E-02	1.85453E-01	4.63309E-01
16	2.95989E-03	2.61995E-03	4.88741E-03	1.65781E-02	5.47075E-03	1.49350E-02	1.64538E-01	4.15417E-01
17	2.35405E-03	2.08436E-03	3.89081E-03	1.32201E-02	4.38337E-03	1.23364E-02	1.42573E-01	3.62851E-01
18	1.86916E-03	1.65549E-03	3.09097E-03	1.05134E-02	3.50103E-03	1.01165E-02	1.21526E-01	3.11235E-01
19	1.48469E-03	1.31500E-03	2.45575E-03	8.35719E-03	2.79203E-03	8.25163E-03	1.02285E-01	2.63214E-01
20	1.18299E-03	1.04784E-03	1.95668E-03	6.65977E-03	2.23137E-03	6.71806E-03	8.53508E-02	2.20461E-01

21	9.45804E-04	8.37643E-04	1.56417E-03	5.32322E-03	1.78701E-03	5.46159E-03	7.07442E-02	1.83239E-01
22	7.59854E-04	8.72938E-04	1.25634E-03	4.27445E-03	1.43740E-03	4.44391E-03	5.83949E-02	1.51573E-01
23	6.13050E-04	5.42823E-04	1.01335E-03	3.44646E-03	1.16001E-03	3.61749E-03	4.80470E-02	1.24894E-01
24	4.97153E-04	4.40183E-04	8.21528E-04	2.79292E-03	9.40827E-04	2.95126E-03	3.94777E-02	1.02727E-01
25	4.04805E-04	3.58345E-04	6.68744E-04	2.27255E-03	7.65641E-04	2.41094E-03	3.24027E-02	8.43664E-02
26	3.31215E-04	2.93192E-04	5.47011E-04	1.85809E-03	6.26161E-04	1.97527E-03	2.66052E-02	6.92964E-02
27	2.71958E-04	2.40690E-04	4.49039E-04	1.52469E-03	5.13618E-04	1.62107E-03	2.18513E-02	5.69163E-02
28	2.24297E-04	1.98507E-04	3.70246E-04	1.25667E-03	4.23283E-04	1.33475E-03	1.79737E-02	4.68128E-02
29	1.85523E-04	1.64159E-04	3.06183E-04	1.03887E-03	3.49680E-04	1.10094E-03	1.48006E-02	3.85361E-02
30	1.54079E-04	1.36340E-04	2.54229E-04	8.62296E-04	2.90164E-04	9.11271E-04	1.22147E-02	3.17928E-02
31	1.28257E-04	1.13468E-04	2.11590E-04	7.17455E-04	2.41213E-04	7.55502E-04	1.00962E-02	2.62652E-02
32	1.07165E-04	9.48145E-05	1.76758E-04	5.99172E-04	2.01380E-04	6.28643E-04	8.36738E-03	2.17576E-02
33	8.96958E-05	7.93406E-05	1.47925E-04	5.01307E-04	1.68322E-04	5.23783E-04	6.94639E-03	1.80515E-02
34	7.53428E-05	8.66525E-05	1.24232E-04	4.20907E-04	1.41287E-04	4.38050E-04	5.78344E-03	1.50215E-02
35	6.33603E-05	5.60377E-05	1.04464E-04	3.53853E-04	1.18653E-04	3.66680E-04	4.82296E-03	1.25186E-02
36	5.34683E-05	4.72971E-05	8.81407E-05	2.98493E-04	1.00069E-04	3.08117E-04	4.03387E-03	1.04649E-02
37	4.51466E-05	3.99238E-05	7.44165E-05	2.51969E-04	8.43889E-05	2.58980E-04	3.37816E-03	8.75805E-03
38	3.82504E-05	3.38318E-05	6.30397E-05	2.13403E-04	7.14497E-05	2.18514E-04	2.83693E-03	7.35100E-03
39	3.24034E-05	2.86541E-05	5.34000E-05	1.80739E-04	6.04660E-05	1.84301E-04	2.38374E-03	6.17249E-03
40	2.75395E-05	2.43544E-05	4.53776E-05	1.53555E-04	5.13440E-05	1.55943E-04	2.00735E-03	5.19500E-03
41	2.33816E-05	2.06755E-05	3.85228E-05	1.30334E-04	4.35511E-05	1.31784E-04	1.68888E-03	4.36740E-03
42	1.98983E-05	1.75944E-05	3.27788E-05	1.10871E-04	3.70186E-05	1.11550E-04	1.42180E-03	3.67422E-03
43	1.68901E-05	1.49334E-05	2.78190E-05	9.40708E-05	3.13836E-05	9.41094E-05	1.19212E-03	3.07785E-03
44	1.43280E-05	1.26667E-05	2.35928E-05	7.97428E-05	2.65728E-05	7.92084E-05	9.95601E-04	2.56750E-03
45	1.20719E-05	1.06708E-05	1.98714E-05	6.71298E-05	2.23396E-05	6.60724E-05	8.22041E-04	2.11672E-03
46	1.00742E-05	8.90279E-06	1.65738E-05	5.59382E-05	1.85778E-05	5.43881E-05	6.67478E-04	1.71516E-03
47	8.24250E-06	7.28216E-06	1.35515E-05	4.56887E-05	1.51351E-05	4.36604E-05	5.25009E-04	1.34481E-03
48	6.48852E-06	5.72984E-06	1.06564E-05	3.58573E-05	1.18289E-05	3.34046E-05	3.89528E-04	9.92928E-04
49	4.80985E-06	4.24548E-06	7.88975E-06	2.64714E-05	8.67319E-06	2.35648E-05	2.58062E-04	6.49350E-04
50	2.91760E-06	2.57056E-06	4.76612E-06	1.57982E-05	5.06256E-06	1.28812E-05	1.23727E-04	2.94664E-04

INT.	GRP. 25	GRP. 26	GRP. 27
1	1.15063E-01	1.03739E-01	2.20432E-02
2	1.14476E-01	1.03216E-01	2.19342E-02
3	1.13371E-01	1.02207E-01	2.17097E-02
4	1.12094E-01	1.01076E-01	2.14766E-02
5	1.10990E-01	1.00048E-01	2.12287E-02
6	1.11188E-01	1.00277E-01	2.12913E-02
7	1.13975E-01	1.02717E-01	2.17219E-02
8	1.23080E-01	1.11114E-01	2.35571E-02
9	1.43672E-01	1.29889E-01	2.70523E-02
10	1.92019E-01	1.81545E-01	3.91193E-02
11	2.87502E-01	2.91237E-01	6.76047E-02
12	3.69627E-01	3.81667E-01	8.95124E-02
13	3.95616E-01	4.07723E-01	9.51269E-02
14	3.88851E-01	4.01186E-01	9.37475E-02
15	3.61770E-01	3.73255E-01	8.71013E-02
16	3.24820E-01	3.35261E-01	7.82692E-02
17	2.83983E-01	2.93121E-01	6.83876E-02
18	2.43786E-01	2.51691E-01	5.87363E-02
19	2.06282E-01	2.12970E-01	4.96790E-02
20	1.72862E-01	1.78498E-01	4.16473E-02
21	1.43718E-01	1.48397E-01	3.46124E-02
22	1.18916E-01	1.22805E-01	2.86504E-02
23	9.79981E-02	1.01196E-01	2.36015E-02
24	8.06180E-02	8.32591E-02	1.94237E-02
25	6.62100E-02	6.83725E-02	1.59457E-02
26	5.43880E-02	5.61713E-02	1.31044E-02
27	4.46687E-02	4.61277E-02	1.07576E-02
28	3.67409E-02	3.79459E-02	8.85290E-03
29	3.02418E-02	3.12290E-02	7.28296E-03
30	2.49504E-02	2.57687E-02	6.01225E-03
31	2.06096E-02	2.12817E-02	4.96308E-03
32	1.70729E-02	1.76327E-02	4.11427E-03
33	1.41624E-02	1.46238E-02	3.41033E-03
34	1.17856E-02	1.21720E-02	2.84034E-03

35	9.82013E-03	1.01396E-02	2.36452E-03
36	8.20942E-03	8.47857E-03	1.97866E-03
37	6.86912E-03	7.09225E-03	1.65381E-03
38	5.76587E-03	5.95492E-03	1.38985E-03
39	4.84045E-03	4.99739E-03	1.16525E-03
40	4.07421E-03	4.20776E-03	9.82165E-04
41	3.42436E-03	3.53532E-03	8.24312E-04
42	2.88103E-03	2.97541E-03	6.94594E-04
43	2.41285E-03	2.49088E-03	5.80728E-04
44	2.01273E-03	2.07868E-03	4.85352E-04
45	1.65883E-03	1.71227E-03	3.99144E-04
46	1.34401E-03	1.38809E-03	3.24210E-04
47	1.05316E-03	1.08679E-03	2.53277E-04
48	7.77392E-04	8.02820E-04	1.87464E-04
49	5.07445E-04	5.23933E-04	1.22459E-04
50	2.24184E-04	2.26099E-04	5.21454E-05

ELAPSED TIME 0.77 MIN.

FINE GROUP SUMMARY FOR ZONE 1 BY GROUP INCLUDING SUM FOR ALL GROUPS IN LINE 28

GRP	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	2.12611E-02	0.00000E+00	1.06834E-02	1.24528E-02	1.53152E-03	7.87113E-03	9.99874E-01
2	0.00000E+00	1.88838E-01	6.21951E-03	1.39962E-01	1.33947E-01	5.55969E-03	5.55504E-02	1.00002E+00
3	0.00000E+00	2.14979E-01	6.42328E-02	1.31128E-01	2.12314E-01	3.90921E-03	6.29658E-02	1.00004E+00
4	0.00000E+00	1.24462E-01	9.04115E-02	8.08834E-02	1.78049E-01	1.80725E-03	3.50039E-02	1.00003E+00
5	0.00000E+00	1.65962E-01	1.57013E-01	2.15506E-01	2.77221E-01	1.10968E-03	4.46231E-02	1.00003E+00
6	0.00000E+00	1.80150E-01	3.05080E-01	4.92621E-01	4.23681E-01	1.43992E-03	6.00431E-02	1.00007E+00
7	0.00000E+00	8.94499E-02	4.75730E-01	7.63367E-01	5.18203E-01	1.59698E-03	4.53213E-02	1.00005E+00
8	0.00000E+00	1.38125E-02	5.51523E-01	8.66876E-01	5.37777E-01	2.85721E-03	2.47428E-02	9.99964E-01
9	0.00000E+00	1.00304E-03	5.32970E-01	7.67988E-01	5.14683E-01	4.71702E-03	1.46321E-02	9.99944E-01
10	0.00000E+00	7.45081E-05	5.13409E-01	7.25904E-01	4.93371E-01	9.09820E-03	1.10642E-02	9.99951E-01
11	0.00000E+00	5.86189E-06	4.96886E-01	7.04807E-01	4.68800E-01	1.92071E-02	8.91725E-03	9.99968E-01
12	0.00000E+00	4.11789E-07	4.06115E-01	3.92086E-01	3.75717E-01	2.55771E-02	4.82763E-03	9.99992E-01
13	0.00000E+00	6.53883E-08	3.67492E-01	3.17397E-01	3.38439E-01	2.54432E-02	3.61883E-03	9.99988E-01
14	0.00000E+00	1.29582E-08	3.61582E-01	3.15737E-01	3.20059E-01	3.90154E-02	2.50993E-03	9.99998E-01
15	0.00000E+00	1.46442E-09	2.04519E-01	1.15367E-01	2.00915E-01	2.12424E-03	1.48138E-03	9.99995E-01
16	0.00000E+00	4.30005E-10	1.32204E-01	5.14194E-02	1.30082E-01	1.25138E-03	8.71399E-04	9.99996E-01
17	0.00000E+00	1.38483E-10	6.91143E-02	1.58873E-02	6.73614E-02	1.37965E-03	3.73708E-04	9.99997E-01
18	0.00000E+00	9.91497E-11	6.17741E-02	1.35916E-02	5.98582E-02	1.60621E-03	3.10126E-04	9.99996E-01
19	0.00000E+00	1.40176E-10	1.04396E-01	3.61173E-02	1.01789E-01	2.02284E-03	5.83814E-04	9.99999E-01
20	0.00000E+00	2.27941E-10	2.51743E-01	2.35192E-01	2.41385E-01	8.64679E-03	1.71526E-03	9.99993E-01
21	0.00000E+00	3.33632E-11	1.12346E-01	5.13098E-02	1.07215E-01	4.77078E-03	3.62873E-04	9.99990E-01
22	0.00000E+00	3.87089E-11	1.96761E-01	1.41358E-01	1.84378E-01	1.23639E-02	2.27322E-05	9.99991E-01
23	0.00000E+00	3.70100E-11	5.65971E-01	9.32634E-01	5.23560E-01	5.32513E-02	-1.08305E-02	9.99992E-01
24	0.00000E+00	1.00737E-11	1.00282E+00	1.83816E+00	9.05617E-01	1.25404E-01	-2.81908E-02	9.99993E-01
25	0.00000E+00	2.94890E-12	1.00446E+00	1.28725E+00	9.07963E-01	1.16454E-01	-1.99408E-02	9.99993E-01
26	0.00000E+00	2.06779E-12	8.99263E-01	1.74224E+00	7.60491E-01	1.57091E-01	-1.83110E-02	9.99995E-01
27	0.00000E+00	4.92766E-13	3.34876E-01	4.30658E-01	2.73533E-01	6.51653E-02	-3.82115E-03	9.99999E-01
28	0.00000E+00	9.99999E-01	9.26890E+00	1.28161E+01	9.26885E+00	6.94401E-01	3.06317E-01	9.99997E-01

GRP	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	1.86536E-02	7.87115E-03	2.72647E-02	1.56490E-08	5.88872E-04	7.05175E-04	0.00000E+00	1.77768E-01
2	1.32642E-01	5.55505E-02	2.04105E-01	2.73046E-08	5.59909E-06	3.18902E-03	0.00000E+00	1.32319E+00
3	1.53486E-01	6.29658E-02	2.40355E-01	2.67441E-08	0.00000E+00	3.64817E-03	0.00000E+00	1.55285E+00
4	9.00285E-02	3.50039E-02	1.42873E-01	2.59795E-08	0.00000E+00	1.53738E-03	0.00000E+00	9.21108E-01
5	1.25660E-01	4.46231E-02	2.02811E-01	2.72567E-08	0.00000E+00	5.37945E-04	0.00000E+00	1.30455E+00
6	1.90181E-01	6.00433E-02	3.12317E-01	2.26711E-07	0.00000E+00	4.88816E-04	0.00000E+00	1.99001E+00
7	1.81184E-01	4.53216E-02	3.03419E-01	2.20080E-07	0.00000E+00	5.20304E-04	0.00000E+00	1.91068E+00
8	1.35852E-01	2.47428E-02	2.28703E-01	2.97634E-08	0.00000E+00	5.73422E-04	0.00000E+00	1.42459E+00
9	1.06446E-01	1.46322E-02	1.77324E-01	2.62071E-08	0.00000E+00	7.99993E-04	0.00000E+00	1.09844E+00
10	9.93518E-02	1.10643E-02	1.62953E-01	2.70382E-08	0.00000E+00	1.71469E-03	0.00000E+00	1.00718E+00
11	9.66299E-02	8.91727E-03	1.54860E-01	2.57111E-08	0.00000E+00	3.68479E-03	0.00000E+00	9.57274E-01
12	6.52750E-02	4.82766E-03	1.01137E-01	2.53469E-08	0.00000E+00	5.08304E-03	0.00000E+00	6.26404E-01
13	5.81564E-02	3.61885E-03	8.75922E-02	2.32588E-08	0.00000E+00	4.95614E-03	0.00000E+00	5.44203E-01
14	5.90973E-02	2.50995E-03	8.48538E-02	2.28255E-08	0.00000E+00	3.99331E-03	0.00000E+00	5.29754E-01
15	2.86393E-02	1.48140E-03	4.14325E-02	2.19132E-08	0.00000E+00	7.51453E-04	0.00000E+00	2.59546E-01
16	1.66320E-02	8.71418E-04	2.39324E-02	1.91271E-08	0.00000E+00	5.15446E-04	0.00000E+00	1.50162E-01
17	7.62541E-03	3.73709E-04	1.08932E-02	1.64052E-09	0.00000E+00	8.14222E-04	0.00000E+00	6.84100E-02
18	6.69447E-03	3.10127E-04	9.51365E-03	1.53807E-09	0.00000E+00	1.11484E-03	0.00000E+00	5.97824E-02
19	1.24558E-02	5.83829E-04	1.76929E-02	1.48953E-08	0.00000E+00	1.34504E-03	0.00000E+00	1.11268E-01
20	4.15066E-02	1.71528E-03	5.84104E-02	2.43627E-08	0.00000E+00	5.79838E-03	0.00000E+00	3.68168E-01
21	1.30449E-02	3.62887E-04	1.79154E-02	1.33799E-08	0.00000E+00	3.31143E-03	0.00000E+00	1.13283E-01
22	2.74981E-02	2.27514E-05	3.41923E-02	1.91467E-08	0.00000E+00	8.48661E-03	0.00000E+00	2.19742E-01
23	1.55603E-01	-1.08305E-02	1.21823E-01	2.57277E-08	0.00000E+00	3.64546E-02	0.00000E+00	8.55921E-01
24	3.11232E-01	-2.81908E-02	1.76277E-01	2.84242E-08	0.00000E+00	8.86700E-02	0.00000E+00	1.32798E+00
25	2.27278E-01	-1.99408E-02	1.15707E-01	2.30560E-08	0.00000E+00	8.34188E-02	0.00000E+00	8.87448E-01
26	2.21853E-01	-1.83110E-02	1.04599E-01	2.51697E-08	0.00000E+00	1.13219E-01	0.00000E+00	8.06438E-01
27	4.96381E-02	-3.82114E-03	2.23930E-02	1.58064E-08	0.00000E+00	4.70840E-02	0.00000E+00	1.71205E-01
28	2.63220E+00	3.06307E-01	3.18518E+00	9.95557E-07	5.94471E-04	4.22416E-01	0.00000E+00	2.07673E+01

FINE GROUP SUMMARY FOR ZONE 2 BY GROUP INCLUDING SUM FO. ALL GROUPS IN LINE 28

GRP.	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	0.00000E+00	0.00000E+00	5.56745E-03	7.36936E-03	3.92704E-04	-7.76237E-03	0.00000E+00
2	0.00000E+00	0.00000E+00	4.22819E-03	4.49249E-02	5.90585E-02	6.31722E-04	-5.54603E-02	9.99799E-01
3	0.00000E+00	0.00000E+00	2.84261E-02	3.50861E-02	9.13178E-02	1.33855E-06	-6.28992E-02	1.00011E+00
4	0.00000E+00	0.00000E+00	3.70158E-02	2.09475E-02	7.19848E-02	7.33757E-07	-3.49763E-02	1.00009E+00
5	0.00000E+00	0.00000E+00	6.38500E-02	5.98440E-02	1.08437E-01	9.79994E-07	-4.45947E-02	1.00005E+00
6	0.00000E+00	0.00000E+00	1.21106E-01	1.52340E-01	1.81104E-01	1.67094E-06	-6.00071E-02	1.00003E+00
7	0.00000E+00	0.00000E+00	2.00744E-01	2.77030E-01	2.46027E-01	2.97795E-06	-4.52916E-02	1.00001E+00
8	0.00000E+00	0.00000E+00	2.58641E-01	3.77876E-01	2.83370E-01	7.65390E-06	-2.47231E-02	9.99974E-01
9	0.00000E+00	0.00000E+00	2.76606E-01	3.67726E-01	2.91226E-01	1.91646E-05	-1.46180E-02	9.99961E-01
10	0.00000E+00	0.00000E+00	2.86346E-01	3.69996E-01	2.97368E-01	4.57038E-05	-1.10517E-02	9.99972E-01
11	0.00000E+00	0.00000E+00	2.95459E-01	3.81083E-01	3.04260E-01	1.09034E-04	-8.90522E-03	9.99992E-01
12	0.00000E+00	0.00000E+00	2.59344E-01	2.24348E-01	2.63996E-01	1.58388E-04	-4.81936E-03	1.00002E+00
13	0.00000E+00	0.00000E+00	2.50571E-01	1.97978E-01	2.53917E-01	2.60003E-04	-3.61136E-03	1.00001E+00
14	0.00000E+00	0.00000E+00	2.63019E-01	2.21828E-01	2.65015E-01	4.97165E-04	-2.50196E-03	1.00002E+00
15	0.00000E+00	0.00000E+00	1.61565E-01	7.63344E-02	1.62671E-01	3.64651E-04	-1.47764E-03	1.00002E+00
16	0.00000E+00	0.00000E+00	1.04714E-01	3.31453E-02	1.05316E-01	2.53029E-04	-8.69217E-04	1.00002E+00
17	0.00000E+00	0.00000E+00	5.42198E-02	1.00598E-02	5.44569E-02	1.36042E-04	-3.72699E-04	9.99996E-01
18	0.00000E+00	0.00000E+00	4.85851E-02	8.81530E-03	4.87662E-02	1.28315E-04	-3.09241E-04	9.99998E-01
19	0.00000E+00	0.00000E+00	8.33483E-02	2.45318E-02	8.36672E-02	2.60507E-04	-5.82194E-04	1.00002E+00
20	0.00000E+00	0.00000E+00	2.05743E-01	1.75847E-01	2.06350E-01	1.10901E-03	-1.71002E-03	9.99985E-01
21	0.00000E+00	0.00000E+00	9.53821E-02	4.03614E-02	9.52946E-02	4.51302E-04	-3.61283E-04	9.99987E-01
22	0.00000E+00	0.00000E+00	2.21931E-01	1.52673E-01	2.20606E-01	1.34921E-03	-1.89743E-05	9.99989E-01
23	0.00000E+00	0.00000E+00	1.65224E+00	2.71085E+00	1.62282E+00	1.85633E-02	1.08600E-02	9.99998E-01
24	0.00000E+00	0.00000E+00	4.53637E+00	8.73163E+00	4.44138E+00	6.67541E-02	2.82497E-02	9.99999E-01
25	0.00000E+00	0.00000E+00	5.27693E+00	7.20244E+00	5.18825E+00	6.87046E-02	1.99795E-02	1.00000E+00
26	0.00000E+00	0.00000E+00	5.08083E+00	1.11915E+01	4.96154E+00	1.00945E-01	1.83440E-02	1.00000E+00
27	0.00000E+00	0.00000E+00	2.02169E+00	3.05642E+00	1.97321E+00	4.46549E-02	3.82757E-03	1.00000E+00
28	0.00000E+00	0.00000E+00	2.18889E+01	3.61511E+01	2.18888E+01	3.05813E-01	-3.05662E-01	1.00000E+00

GRP.	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	1.44015E-04	1.08771E-04	1.86536E-02	7.87115E-03	0.00000E+00	0.00000E+00	0.00000E+00	1.13402E-01
2	1.28221E-04	9.01773E-05	1.32842E-01	5.55505E-02	0.00000E+00	0.00000E+00	0.00000E+00	5.26662E-01
3	9.56385E-05	6.65643E-05	1.53486E-01	6.29658E-02	0.00000E+00	0.00000E+00	0.00000E+00	5.75584E-01
4	4.23462E-05	2.75901E-05	9.00285E-02	3.50039E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.20238E-01
5	4.65038E-05	2.83962E-05	1.25660E-01	4.46231E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.25847E-01
6	6.30676E-05	3.62079E-05	1.90181E-01	6.00433E-02	0.00000E+00	0.00000E+00	0.00000E+00	6.79709E-01
7	5.40790E-05	2.99503E-05	1.81184E-01	4.53216E-02	0.00000E+00	0.00000E+00	0.00000E+00	6.97607E-01
8	3.58432E-05	1.96997E-05	1.35852E-01	2.47428E-02	0.00000E+00	0.00000E+00	0.00000E+00	5.60633E-01
9	2.43373E-05	1.41254E-05	1.06446E-01	1.46322E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.63430E-01
10	2.13854E-05	1.25334E-05	9.93518E-02	1.10643E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.51705E-01
11	2.04910E-05	1.20456E-05	9.66299E-02	8.91727E-03	0.00000E+00	0.00000E+00	0.00000E+00	4.60855E-01
12	1.40791E-05	8.29365E-06	6.52750E-02	4.82766E-03	0.00000E+00	0.00000E+00	0.00000E+00	3.27735E-01
13	1.27113E-05	7.49546E-06	5.81564E-02	3.61885E-03	0.00000E+00	0.00000E+00	0.00000E+00	3.03272E-01
14	1.35253E-05	7.98695E-06	5.90973E-02	2.50995E-03	0.00000E+00	0.00000E+00	0.00000E+00	3.26727E-01
15	6.37753E-06	3.76568E-06	2.86393E-02	1.48140E-03	0.00000E+00	0.00000E+00	0.00000E+00	1.57304E-01
16	3.72527E-06	2.20129E-06	1.66320E-02	8.71418E-04	0.00000E+00	0.00000E+00	0.00000E+00	9.20115E-02
17	1.71103E-06	1.01042E-06	7.62541E-03	3.73709E-04	0.00000E+00	0.00000E+00	0.00000E+00	4.25722E-02
18	1.50118E-06	8.85888E-07	6.69447E-03	3.10127E-04	0.00000E+00	0.00000E+00	0.00000E+00	3.76070E-02
19	2.77171E-06	1.63443E-06	1.24558E-02	5.83829E-04	0.00000E+00	0.00000E+00	0.00000E+00	7.00093E-02
20	8.94665E-06	5.25765E-06	4.15066E-02	1.71528E-03	0.00000E+00	0.00000E+00	0.00000E+00	2.35974E-01
21	2.74062E-06	1.60316E-06	1.30449E-02	3.62887E-04	0.00000E+00	0.00000E+00	0.00000E+00	7.70121E-02
22	6.43148E-06	3.77708E-06	2.74981E-02	2.27514E-05	0.00000E+00	0.00000E+00	0.00000E+00	1.99202E-01
23	4.99036E-05	2.95173E-05	1.55603E-01	-1.08305E-02	0.00000E+00	0.00000E+00	0.00000E+00	1.99677E+00
24	9.96861E-05	5.88872E-05	3.11232E-01	-2.81908E-02	0.00000E+00	0.00000E+00	0.00000E+00	4.94446E+00
25	6.45793E-05	3.87134E-05	2.27278E-01	-1.99408E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.85304E+00
26	5.56364E-05	3.30006E-05	2.21853E-01	-1.83110E-02	0.00000E+00	0.00000E+00	0.00000E+00	3.97126E+00
27	1.10754E-05	6.42896E-06	4.96381E-02	-3.82114E-03	0.00000E+00	0.00000E+00	0.00000E+00	9.26841E-01
28	1.03131E-03	6.56499E-04	2.63220E+00	3.06307E-01	0.00000E+00	0.00000E+00	0.00000E+00	2.28374E+01

FINE GROUP SUMMARY FOR SYSTEM

GRP.	FIX SOURCE	FISS SOURCE	IN SCATTER	SLF SCATTER	OUT SCATTER	ABSORPTION	LEAKAGE	BALANCE
1	0.00000E+00	2.12611E-02	0.00000E+00	1.62508E-02	1.98222E-02	1.92422E-03	1.08756E-04	9.99881E-01
2	0.00000E+00	1.88838E-01	1.04477E-02	1.84887E-01	1.93005E-01	6.19141E-03	9.01500E-05	1.00001E+00
3	0.00000E+00	2.14979E-01	9.26588E-02	1.66214E-01	3.03632E-01	3.91055E-03	6.65375E-05	1.00005E+00
4	0.00000E+00	1.24462E-01	1.27427E-01	1.01834E-01	2.50034E-01	1.80798E-03	2.75641E-05	1.00004E+00
5	0.00000E+00	1.65962E-01	2.20863E-01	2.75350E-01	3.85658E-01	1.11066E-03	2.83689E-05	1.00004E+00
6	0.00000E+00	1.80150E-01	4.26186E-01	6.44961E-01	6.04785E-01	1.44159E-03	3.59812E-05	1.00006E+00
7	0.00000E+00	8.94499E-02	6.76473E-01	1.04040E+00	7.64230E-01	1.59996E-03	2.97302E-05	1.00004E+00
8	0.00000E+00	1.38125E-02	8.10164E-01	1.24475E+00	8.21146E-01	2.86486E-03	1.96700E-05	9.99967E-01
9	0.00000E+00	1.00304E-03	8.09576E-01	1.13571E+00	8.05909E-01	4.73618E-03	1.40992E-05	9.99950E-01
10	0.00000E+00	7.45081E-05	7.99754E-01	1.09590E+00	7.90739E-01	9.14390E-03	1.25063E-05	9.99958E-01
11	0.00000E+00	5.86189E-06	7.92346E-01	1.08589E+00	7.73060E-01	1.93161E-02	1.20199E-05	9.99977E-01
12	0.00000E+00	4.11789E-07	6.65459E-01	6.16434E-01	6.39713E-01	2.57355E-02	8.26830E-06	1.00000E+00
13	0.00000E+00	6.53883E-08	6.18063E-01	5.15375E-01	5.92356E-01	2.57032E-02	7.47220E-06	9.99997E-01
14	0.00000E+00	1.29582E-08	6.24602E-01	5.37565E-01	5.85074E-01	3.95126E-02	7.96413E-06	1.00001E+00
15	0.00000E+00	1.46442E-09	3.66083E-01	1.91702E-01	3.63585E-01	2.48889E-03	3.74377E-06	1.00001E+00
16	0.00000E+00	4.30005E-10	2.36918E-01	8.45647E-02	2.35398E-01	1.51441E-03	2.18216E-06	1.00001E+00
17	0.00000E+00	1.38483E-10	1.23334E-01	2.59471E-02	1.21818E-01	1.51570E-03	1.00878E-06	9.99996E-01
18	0.00000E+00	9.91497E-11	1.10359E-01	2.24069E-02	1.08624E-01	1.73453E-03	8.84350E-07	9.99998E-01
19	0.00000E+00	1.40176E-10	1.87744E-01	6.06491E-02	1.85457E-01	2.28334E-03	1.61953E-06	1.00001E+00
20	0.00000E+00	2.27941E-10	4.57487E-01	4.11039E-01	4.47735E-01	9.75580E-03	5.23328E-06	9.99990E-01
21	0.00000E+00	3.33632E-11	2.07728E-01	9.16712E-02	2.02509E-01	5.22208E-03	1.58978E-06	9.99989E-01
22	0.00000E+00	3.87089E-11	4.18692E-01	2.94031E-01	4.04984E-01	1.37131E-02	3.75793E-06	9.99990E-01
23	0.00000E+00	3.70100E-11	2.21821E+00	3.64349E+00	2.14638E+00	7.18145E-02	2.94916E-05	9.99996E-01
24	0.00000E+00	1.00737E-11	5.53919E+00	1.05698E+01	5.34699E+00	1.92158E-01	5.88588E-05	9.99998E-01
25	0.00000E+00	2.94890E-12	6.28139E+00	8.48969E+00	6.09621E+00	1.85159E-01	3.86904E-05	9.99999E-01
26	0.00000E+00	2.06779E-12	5.98009E+00	1.29337E+01	5.72203E+00	2.58036E-01	3.29754E-05	9.99999E-01
27	0.00000E+00	4.92766E-13	2.35657E+00	3.48708E+00	2.24674E+00	1.09820E-01	6.41317E-06	1.00000E+00
28	0.00000E+00	9.99999E-01	3.11578E+01	4.89672E+01	3.11576E+01	1.00021E+00	6.55530E-04	9.99998E-01

GRP.	RT BDY FLUX	RT LEAKAGE	LFT BDY FLUX	LFT LEAKAGE	N2N RATE	FISS RATE	FLUX*DB**2	TOTAL FLUX
1	1.44015E-04	1.08771E-04	2.72647E-02	1.56490E-08	5.88872E-04	7.05175E-04	0.00000E+00	2.91170E-01
2	1.28221E-04	9.01773E-05	2.04105E-01	2.73046E-08	5.59909E-06	3.18902E-03	0.00000E+00	1.84985E+00
3	9.56385E-05	6.65643E-05	2.40355E-01	2.67441E-08	0.00000E+00	3.64817E-03	0.00000E+00	2.12843E+00
4	4.23462E-05	2.75901E-05	1.42873E-01	2.59795E-08	0.00000E+00	1.53738E-03	0.00000E+00	1.24135E+00
5	4.65038E-05	2.83962E-05	2.02811E-01	2.72567E-08	0.00000E+00	5.37945E-04	0.00000E+00	1.73040E+00
6	6.30678E-05	3.62079E-05	3.12317E-01	2.26711E-07	0.00000E+00	4.88816E-04	0.00000E+00	2.66972E+00
7	5.40790E-05	2.99503E-05	3.03419E-01	2.20080E-07	0.00000E+00	5.20304E-04	0.00000E+00	2.60828E+00
8	3.58432E-05	1.96997E-05	2.28703E-01	2.97634E-08	0.00000E+00	5.73422E-04	0.00000E+00	1.98522E+00
9	2.43373E-05	1.41254E-05	1.77324E-01	2.62071E-08	0.00000E+00	7.99993E-04	0.00000E+00	1.56187E+00
10	2.13854E-05	1.25334E-05	1.62953E-01	2.70382E-08	0.00000E+00	1.71469E-03	0.00000E+00	1.45888E+00
11	2.04910E-05	1.20456E-05	1.54860E-01	2.57111E-08	0.00000E+00	3.68479E-03	0.00000E+00	1.41813E+00
12	1.40791E-05	8.29365E-06	1.01137E-01	2.53469E-08	0.00000E+00	5.08304E-03	0.00000E+00	9.54139E-01
13	1.27113E-05	7.49546E-06	8.75922E-02	2.32588E-08	0.00000E+00	4.95614E-03	0.00000E+00	8.47475E-01
14	1.35253E-05	7.98695E-06	8.48538E-02	2.28255E-08	0.00000E+00	3.99331E-03	0.00000E+00	8.56481E-01
15	6.37753E-06	3.76568E-06	4.14325E-02	2.19132E-08	0.00000E+00	7.51453E-04	0.00000E+00	4.16850E-01
16	3.72527E-06	2.20129E-06	2.39324E-02	1.91271E-08	0.00000E+00	5.15446E-04	0.00000E+00	2.42174E-01
17	1.71103E-06	1.01042E-06	1.08932E-02	1.64052E-09	0.00000E+00	8.14222E-04	0.00000E+00	1.10982E-01
18	1.50118E-06	8.85888E-07	9.51365E-03	1.53807E-09	0.00000E+00	1.11484E-03	0.00000E+00	9.73893E-02
19	2.77171E-06	1.63443E-06	1.76929E-02	1.48953E-08	0.00000E+00	1.34504E-03	0.00000E+00	1.81277E-01
20	8.94665E-06	5.25765E-06	5.84104E-02	2.43627E-08	0.00000E+00	5.79838E-03	0.00000E+00	6.04141E-01
21	2.74062E-06	1.60316E-06	1.79154E-02	1.33799E-08	0.00000E+00	3.31143E-03	0.00000E+00	1.90295E-01
22	6.43148E-06	3.77708E-06	3.41923E-02	1.91467E-08	0.00000E+00	8.48661E-03	0.00000E+00	4.18944E-01
23	4.99036E-05	2.95173E-05	1.21823E-01	2.57277E-08	0.00000E+00	3.64546E-02	0.00000E+00	2.85269E+00
24	9.96861E-05	5.88872E-05	1.76277E-01	2.84242E-08	0.00000E+00	8.86700E-02	0.00000E+00	6.27244E+00
25	6.45793E-05	3.87134E-05	1.15707E-01	2.30560E-08	0.00000E+00	8.34188E-02	0.00000E+00	4.74049E+00
26	5.56364E-05	3.30006E-05	1.04599E-01	2.51697E-08	0.00000E+00	1.13219E-01	0.00000E+00	4.77770E+00
27	1.10754E-05	6.42898E-06	2.23930E-02	1.58064E-08	0.00000E+00	4.70840E-02	0.00000E+00	1.09805E+00
28	1.03131E-03	6.56499E-04	3.18518E+00	9.95557E-07	5.94471E-04	4.22416E-01	0.00000E+00	4.36046E+01

ELAPSED TIME 0.78 MIN.

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************************************************************************************************************
*   RJP NEWS   *                                                                                           *
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*                                                                                                          *
*           REVISED: 04/02/93 14:56:12      BY MKD                                                         *
*           00/00/00 THIS COMPUTER AND ITS ASSOCIATED SUBSYSTEMS, INCLUDING                                *
*                    ELECTRONIC MAIL, ARE FOR OFFICAL USE ONLY BY AUTHORIZED                               *
*                    EMPLOYEES OF MARTIN MARIETTA ENERGY SYSTEMS, INC.                                     *
*                    (ENERGY SYSTEMS), OR BY OTHER PERSONS AUTHORIZED BY                                   *
*                    ENERGY SYSTEMS, UNDER TERMS OF ENERGY SYSTEMS' CONTRACT                               *
*                    WITH THE U.S. DEPARTMENT OF ENERGY. ENERGY SYSTEMS                                    *
*                    THEREFORE RETAINS THE RIGHT TO MONITOR THE CONTENT OF                                 *
*                    ALL MESSAGES AND TO ACCESS ANY COMPUTER FILES WITHOUT                                 *
*                    PRIOR KNOWLEDGE OR CONSENT OF USER, SENDER, OR ADDRESSEE.                             *
*                                                                                                          *
*           04/02/93 THE FOLLOWING CHANGES TO THE WAY JOB OUTPUT IS                                        *
*                    PROCESSED WILL BE EFFECTIVE ON APRIL 12.  OUTPUT                                      *
*                    HELD IN CLASS T WILL BE HELD FIVE DAYS, INSTEAD OF                                    *
*                    SEVEN DAYS, BEFORE IT IS PRINTED.  THE NEW OUTPUT                                     *
*                    CLASS C WILL ALSO BE AVAILABLE.  OUTPUT IN CLASS C                                    *
*                    WILL BE HELD 4 DAYS AND THEN WILL BE DELETED.  FOR                                    *
*                    MORE INFORMATION, REFER TO "CHANGES TO JOB OUTPUT                                     *
*                    PROCESSING" IN THE JAN-FEB C&T NEWS.                                                  *
*                                                                                                          *
*           03/26/93 ATTENTION SYSTEM SELECT 9 AND 47 USERS:  ON APRIL 12,                                 *
*                    SSN 9 AND 47 WILL NO LONGER PROMPT YOU FOR YOUR                                       *
*                    TERMINAL TYPE; THE DEFAULT WILL BE VT100.  THE REST OF                                *
*                    THE LOG ON PROCEDURE WILL REMAIN THE SAME.  IF YOU ARE                                *
*                    NOT USING OR EMULATING A VT100, YOU WILL NEED TO USE                                  *
*                    SSN 90, WHICH WILL PROMPT YOU FOR YOUR TERMINAL TYPE.                                 *
*                    THEN YOU SHOULD ENTER THE SPECIFIC APPLICATION ID (E.G.,                              *
*                    TSOK, TSOX, TSOY, IDMSK).  IF YOU HAVE ANY QUESTIONS,                                 *
*                    PLEASE CALL USER SERVICES AT 4-4000.                                                  *
*                                                                                                          *
*           03/09/93 THE OUTCODE FOR THE Y-12 UNCLASSIFIED TAPE LIBRARY                                    *
*                    WAS PUBLISHED INCORRECTLY IN THE C&T NEWS.  THE                                       *
*                    CORRECT OUTCODE IS IUCP.                                                              *
*                                                                                                          *
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*                                                                                                          *
*                                                                                                          *
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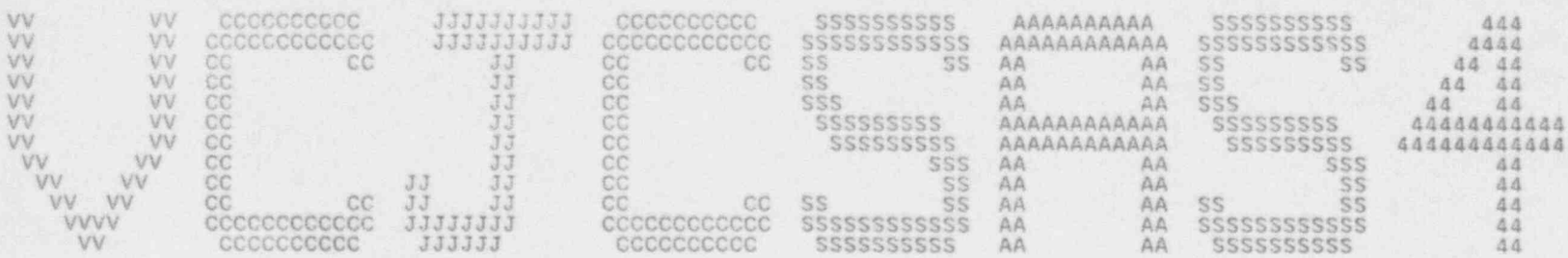

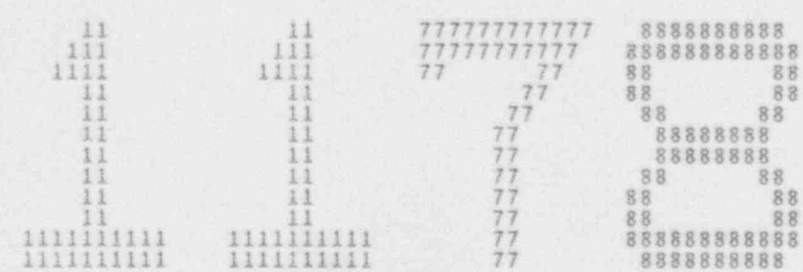

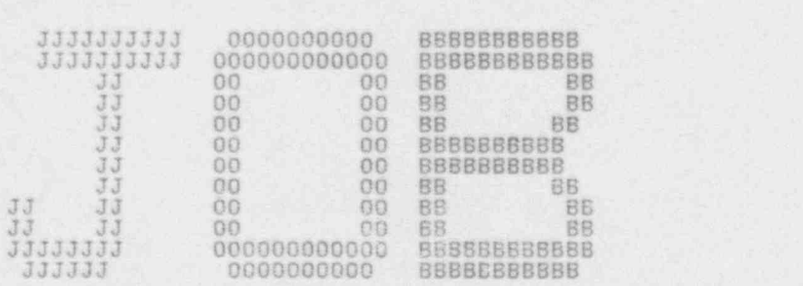

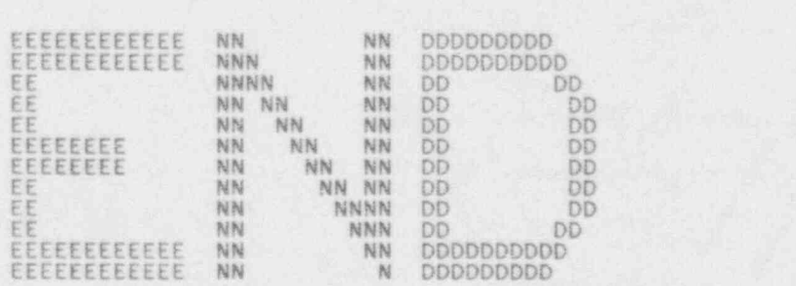

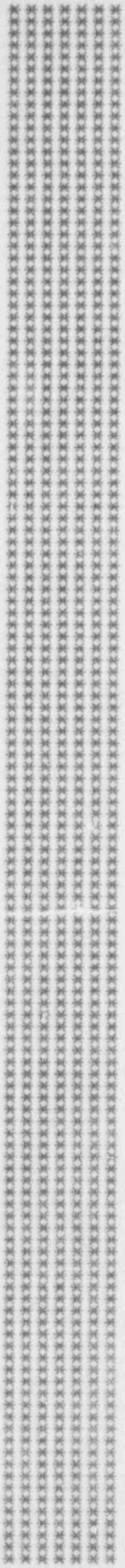

TABLE 8
K_{eff} Values for XSDRNPM Calculations on the ORNL Computer

CONCENTRATION (GRAMS U/L)	SPHERE	CYLINDER	SLAB
1600	1.01666	1.02071	1.02544

TABLE 9
KENO Benchmark Values of K_{eff} for Critical Experiments

40FCYCRP.CJW

Reported $H/^{235}U$	SCALE's $H/^{235}U$	G ^{235}U per CM^3	CYLINDER DESCRIPTION	HEIGHT CM	K_{eff}
524	526.0	0.04254	15"-dia.,Al shell	44.78	0.99820±0.00392[F]
643	645.3	0.03562	30"-dia.,Al shell*	26.49	0.99970±0.00385[D]
735	733.7	0.03179	20"-dia.,SS shell	40.09	1.00324±0.00389[E]
991	988.1	0.02428	30"-dia.,Al shell*	40.49	1.00522±0.00316[B]
994	990.7	0.02422	20"-dia.,SS shell	85.72	0.99845±0.00330[C]

* Top surface of cylinder is not reflected.

Mixing Tables

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**************************************************************************************
#CSAS25
BENCHMARK   CYLINDER    REFLECTED ALL SIDES    UO2F2           UOFCYCRF.CJW
27GROUPNDF4                 INFHOMMEDIUM
SOLNUO2F2   1  869.94 0 1.0 293  92235 4.89  92238 95.11  END
AL          2  1.0 293 END
H2O         3  1.0 END
O           4  0  1-20  END
END COMP
BENCHMARK   CYLINDER OF UO2F2   REFLECTED ALL SIDES
READ PARM  RUN=YES PLT=NO  TME=45 END PARM
READ GEOM
GLOBAL UNIT  1
COM=! CYLINDER OF UO2F2!
CYLINDER   1 1    19.05       2P22.39
CYLINDER   2 1    19.20875    2P22.54875
CUBOID     3 1    4P50.0      2P53.0
END GEOM
READ BNDS  XFC=VACUUM  YFC=VACUUM  ZFC=VACUUM  END BNDS
READ START  NST=6  TFX=0.0 TFY=0.0 TFZ=0.0  LNU=300  END START
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-35 YUL=35 ZUL=0 XLR=35 YLR=-35 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VFW' END
END PLOT
END DATA
END
**************************************************************************************
```

benchmark cylinder of uo2f2 reflected all sides

lifetime = 1.71059E-04 + or - 1.56459E-06 generation time = 7.83081E-05 + or - 6.84185E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.99820	+ or - 0.00392	0.99428 to 1.00213	0.99036 to 1.00605	0.98643 to 1.00997	30000
4	0.99815	+ or - 0.00396	0.99418 to 1.00211	0.99022 to 1.00607	0.98626 to 1.01003	29700
5	0.99738	+ or - 0.00393	0.99345 to 1.00130	0.98952 to 1.00523	0.98560 to 1.00916	29400
6	0.99761	+ or - 0.00396	0.99365 to 1.00157	0.98969 to 1.00553	0.98573 to 1.00949	29100
7	0.99733	+ or - 0.00399	0.99334 to 1.00132	0.98934 to 1.00531	0.98535 to 1.00931	28800
8	0.99746	+ or - 0.00403	0.99343 to 1.00149	0.98940 to 1.00553	0.98536 to 1.00956	28500
9	0.99793	+ or - 0.00405	0.99389 to 1.00198	0.98984 to 1.00603	0.98579 to 1.01008	28200
10	0.99735	+ or - 0.00405	0.99330 to 1.00140	0.98925 to 1.00545	0.98520 to 1.00950	27900
11	0.99753	+ or - 0.00409	0.99345 to 1.00162	0.98936 to 1.00571	0.98527 to 1.00980	27600
12	0.99753	+ or - 0.00413	0.99339 to 1.00166	0.98926 to 1.00579	0.98512 to 1.00993	27300
17	0.99724	+ or - 0.00433	0.99291 to 1.00158	0.98857 to 1.00591	0.98424 to 1.01025	25800
22	0.99734	+ or - 0.00452	0.99283 to 1.00186	0.98831 to 1.00637	0.98380 to 1.01089	24300
27	0.99817	+ or - 0.00466	0.99351 to 1.00283	0.98885 to 1.00749	0.98419 to 1.01215	22800
32	1.00050	+ or - 0.00480	0.99571 to 1.00530	0.99091 to 1.01010	0.98611 to 1.01490	21300
37	0.99751	+ or - 0.00479	0.99271 to 1.00230	0.98792 to 1.00709	0.98313 to 1.01188	19800
42	0.99793	+ or - 0.00502	0.99291 to 1.00295	0.98789 to 1.00797	0.98287 to 1.01299	18300
47	0.99722	+ or - 0.00528	0.99194 to 1.00250	0.98667 to 1.00777	0.98139 to 1.01305	16800
52	0.99564	+ or - 0.00550	0.99014 to 1.00115	0.98463 to 1.00665	0.97913 to 1.01215	15300
57	0.99829	+ or - 0.00580	0.99250 to 1.00409	0.98670 to 1.00989	0.98090 to 1.01569	13800
62	0.99811	+ or - 0.00582	0.99229 to 1.00393	0.98647 to 1.00976	0.98065 to 1.01558	12300
67	0.99543	+ or - 0.00614	0.98929 to 1.00157	0.98315 to 1.00770	0.97702 to 1.01384	10800
72	0.99496	+ or - 0.00675	0.98821 to 1.00171	0.98147 to 1.00846	0.97472 to 1.01521	9300
77	0.99846	+ or - 0.00677	0.99169 to 1.00522	0.98493 to 1.01199	0.97816 to 1.01876	7800
82	0.99591	+ or - 0.00770	0.98821 to 1.00361	0.98051 to 1.01130	0.97281 to 1.01900	6300
87	0.98590	+ or - 0.00726	0.97864 to 0.99315	0.97139 to 1.00041	0.96413 to 1.00767	4800
92	0.97883	+ or - 0.00773	0.97110 to 0.98657	0.96337 to 0.99430	0.95564 to 1.00203	3300

benchmark cylinder of uo2f2 reflected all sides
mixing table

number of scattering angles = 2
cross section message threshold =3.0E-05

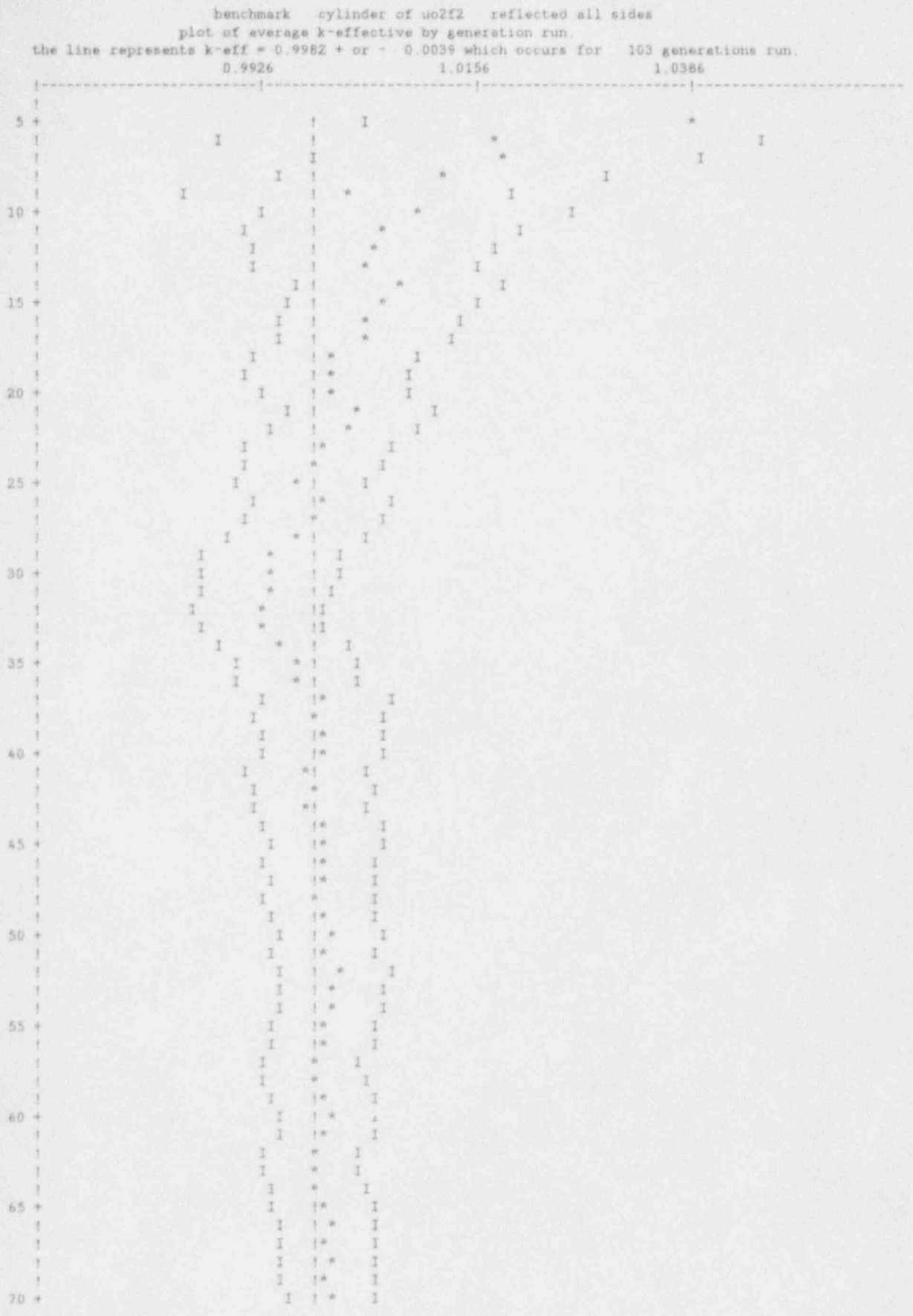
entry	mixture	nuclide	density
1	1	92235	1.08993E-04
2	1	92238	2.09313E-03
3	1	8016	3.30675E-02
4	3	308016	3.33757E-02
5	4	408016	1.00000E-20
6	1	9019	4.40425E-03
7	1	1001	5.73265E-02
8	3	301001	6.67514E-02
9	2	13027	6.02374E-02

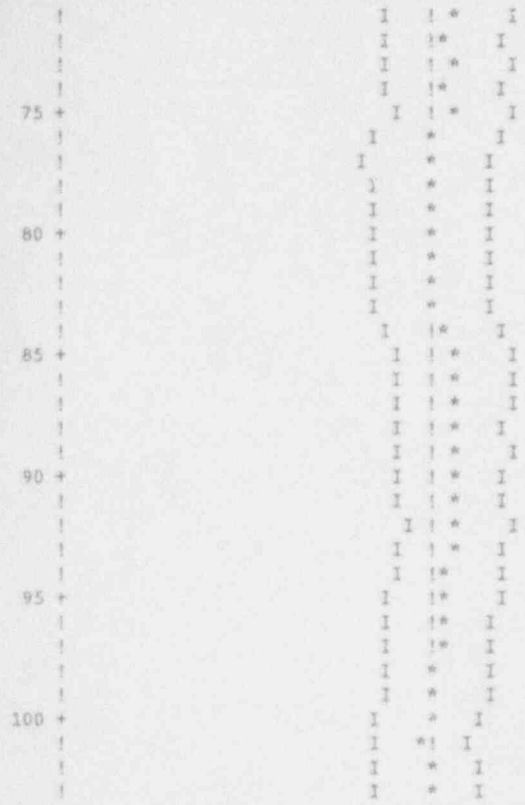
H
U^{235} = 52.596

cross sections read from the ampx working library on unit 4

1001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
301001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
8016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
308016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
408016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
9019	FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89
13027	AL-27 1193 218 GP 040375(5)		
92235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89
92238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89

..... 0 io's were used mixing cross-sections .....
..... 0 io's were used preparing the cross sections .....


benchmark cylinder of uo2f2 reflected all sides
plot of average k-effective by generation run.
the line represents k-eff = 0.9982 + or - 0.0039 which occurs for 103 generations run.
0.9926
1.0156
1.0386
5
10
15
20
25
30
35
40
45
50
55
60
65
70

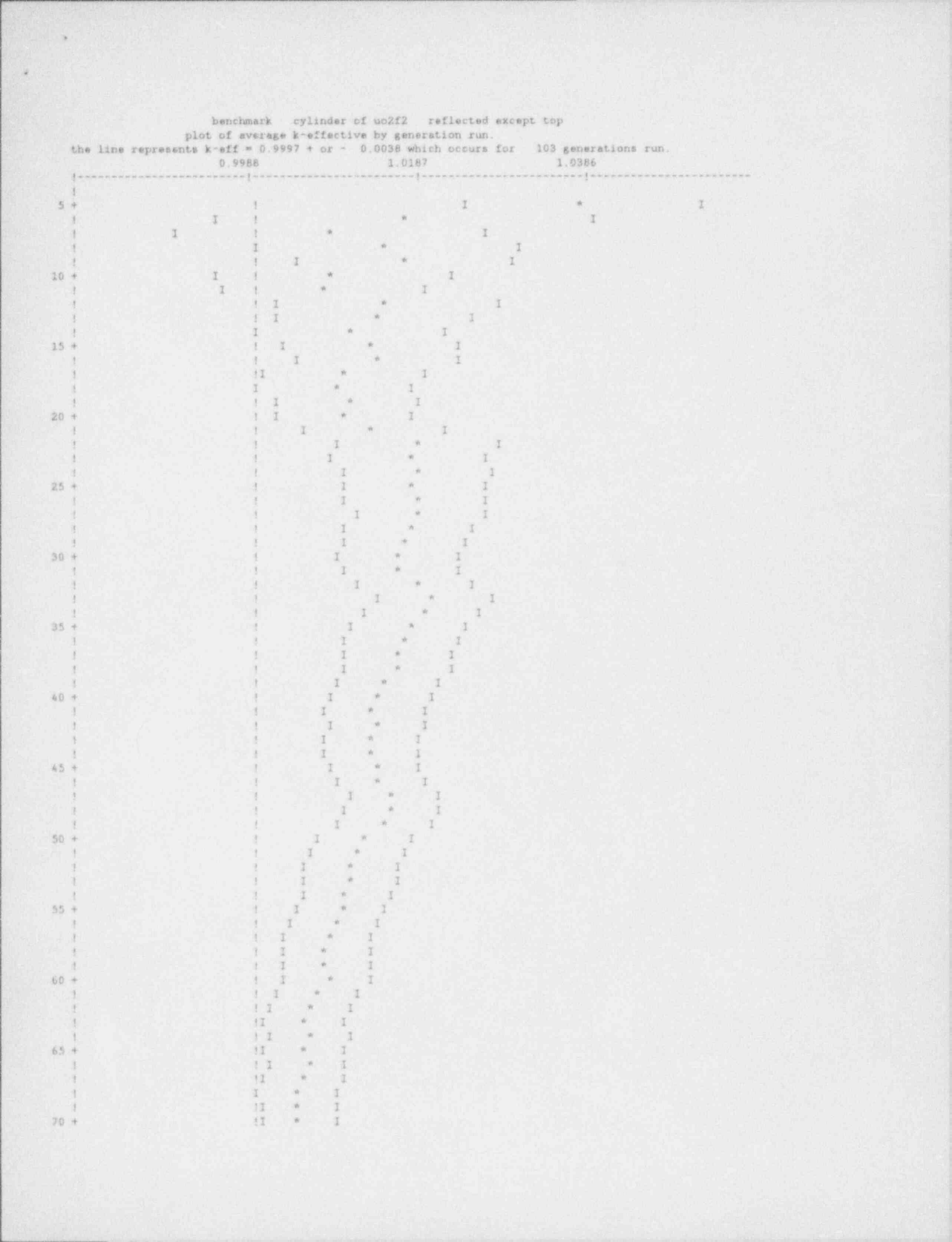

75
80
85
90
95
100

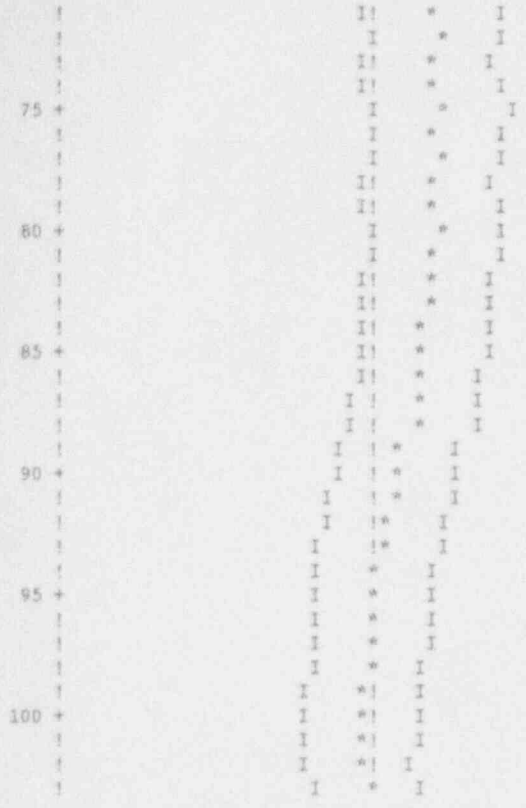
```
********************************************************************************
 #CSAS25
 BENCHMARK   CYLINDER    REFLECTED EXCEPT TOP    UO2F2          UOFCYCRD.CJW
 27GROUPNDF4                 INFHOMMEDIUM
 SOLNUO2F2   1  728.43 0 1.0 293  92235 4.89  92238 95.11  END
 AL          2  1.0 293 END
 H2O         3  1.0 END
 O           4  0  1-5  END
 END COMP
 BENCHMARK   CYLINDER OF UO2F2   REFLECTED EXCEPT TOP
 READ PARM  RUN=YES PLT=NO  TME=45  END PARM
 READ GEOM
 GLOBAL UNIT  1
 COM='! CYLINDER OF UO2F2!
 CYLINDER   1 1    38.1       2P13.245
 CYLINDER   2 1    38.25875   13.245 -13.40375
 CYLINDER   4 1    38.25875   100.0  -13.40375
 CUBOID     3 1    4P70.0     100.0  -45.0
 END GEOM
 READ BNDS  XFC=VACUUM  YFC=VACUUM  ZFC=VACUUM  END BNDS
 READ START  NST=6  TFX=0.0 TFY=0.0 TFZ=0.0  LNU=300  END START
 READ PLOT
 TTL='X - Y  SLICE AT Z = 0.0'
 PLT=NO PIC=MIXTURE XUL=-35 YUL=35 ZUL=0 XLR=35 YLR=-35 ZLR=0
 UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=190
 NCH='VFW' END
 END PLOT
 END DATA
 END
********************************************************************************
```

benchmark cylinder of uo2f2 reflected except top

lifetime = 1.88411E-04 + or - 1.87644E-06 generation time = 8.74644E-05 + or - 7.81390E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.99970	+ or - 0.00385	0.99585 to 1.00355	0.99200 to 1.00740	0.98815 to 1.01125	30000
4	0.99945	+ or - 0.00388	0.99557 to 1.00333	0.99169 to 1.00721	0.98781 to 1.01109	29700
5	0.99891	+ or - 0.00388	0.99503 to 1.00279	0.99115 to 1.00667	0.98726 to 1.01055	29400
6	0.99915	+ or - 0.00391	0.99523 to 1.00306	0.99132 to 1.00698	0.98741 to 1.01089	29100
7	0.99933	+ or - 0.00395	0.99538 to 1.00328	0.99143 to 1.00723	0.98748 to 1.01118	28800
8	0.99887	+ or - 0.00397	0.99491 to 1.00284	0.99094 to 1.00681	0.98698 to 1.01077	28500
9	0.99857	+ or - 0.00400	0.99458 to 1.00257	0.99058 to 1.00657	0.98658 to 1.01057	28200
10	0.99901	+ or - 0.00402	0.99499 to 1.00302	0.99097 to 1.00704	0.98696 to 1.01106	27900
11	0.99898	+ or - 0.00406	0.99492 to 1.00304	0.99086 to 1.00710	0.98680 to 1.01116	27600
12	0.99815	+ or - 0.00402	0.99413 to 1.00216	0.99011 to 1.00618	0.98609 to 1.01020	27300
17	0.99797	+ or - 0.00419	0.99378 to 1.00215	0.98959 to 1.00634	0.98540 to 1.01053	25800
22	0.99514	+ or - 0.00405	0.99109 to 0.99920	0.98704 to 1.00325	0.98299 to 1.00730	24300
27	0.99345	+ or - 0.00422	0.98924 to 0.99767	0.98502 to 1.00189	0.98080 to 1.00610	22800
32	0.99192	+ or - 0.00437	0.98755 to 0.99629	0.98317 to 1.00067	0.97880 to 1.00504	21300
37	0.99098	+ or - 0.00450	0.98647 to 0.99548	0.98197 to 0.99998	0.97747 to 1.00448	19800
42	0.99047	+ or - 0.00480	0.98567 to 0.99527	0.98087 to 1.00007	0.97606 to 1.00488	18300
47	0.98670	+ or - 0.00472	0.98198 to 0.99141	0.97726 to 0.99613	0.97255 to 1.00085	16800
52	0.98859	+ or - 0.00498	0.98361 to 0.99357	0.97863 to 0.99855	0.97366 to 1.00352	15300
57	0.98928	+ or - 0.00547	0.98381 to 0.99475	0.97834 to 1.00022	0.97287 to 1.00569	13800
62	0.99036	+ or - 0.00587	0.98449 to 0.99624	0.97862 to 1.00211	0.97274 to 1.00798	12300
67	0.98895	+ or - 0.00649	0.98246 to 0.99544	0.97597 to 1.00194	0.96948 to 1.00843	10800
72	0.98916	+ or - 0.00662	0.98254 to 0.99577	0.97593 to 1.00239	0.96931 to 1.00900	9300
77	0.98598	+ or - 0.00677	0.97921 to 0.99275	0.97244 to 0.99953	0.96566 to 1.00630	7800
82	0.98501	+ or - 0.00763	0.97738 to 0.99264	0.96975 to 1.00026	0.96212 to 1.00789	6300
87	0.98290	+ or - 0.00980	0.97310 to 0.99269	0.96331 to 1.00249	0.95351 to 1.01228	4800
92	0.99151	+ or - 0.01170	0.97982 to 1.00321	0.96812 to 1.01490	0.95643 to 1.02660	3300


benchmark cylinder of uo2f2 reflected except top
plot of average k-effective by generation run.
the line represents k-eff = 0.9997 + or - 0.0038 which occurs for 103 generations run.
0.9988
1.0187
1.0386
5
10
15
20
25
30
35
40
45
50
55
60
65
70


75
80
85
90
95
100

benchmark cylinder of uo2f2 reflected except top
mixing table

number of scattering angles = 2
cross section message threshold =3.0E-05

entry	mixture	nuclide	density
1	1	92235	9.12637E-05
2	1	92238	1.75265E-03
3	1	8016	3.31354E-02
4	3	308016	3.33757E-02
5	4	408016	1.00000E-05
6	1	9019	3.68782E-03
7	1	1001	5.88951E-02
8	3	301001	6.67514E-02
9	2	13027	6.02374E-02

$\frac{H}{U^{235}} = 645.3$

cross sections read from the ampx working library on unit 4

1001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
301001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
8016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
308016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
408016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
9019	FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89
13027	AL-27 1193 218 GP 040375(5)		
92235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89
92238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89

..... 0 io's were used mixing cross-sections .....
..... 0 io's were used preparing the cross sections .....

```
********************************************************************************
#CSAS25
BENCHMARK    CYLINDER    REFLECTED ON ALL SIDES    UO2F2       UOFCYCRE.CJW
27GROUPNDF4                 INFHOMMEDIUM
SOLNUO2F2    1  650.10 0 1.0 293  92235 4.89  92238 95.11  END
SS316        2  1.0 293 END
H2O          3  1.0 END
O            4  0  1-20  END
END COMP
BENCHMARK CYLINDER OF UO2F2 REFLECTED
READ PARM  RUN=YES PLT=NO  TME=45 END PARM
READ GEOM
GLOBAL UNIT  1
COM=! CYLINDER OF UO2F2!
CYLINDER    1 1    25.4       2P20.045
CYLINDER    2 1    25.55875   2P20.20375
CUBOID      3 1    4P56.0     2P50.0
END GEOM
READ BNDS  XFC=VACUUM  YFC=VACUUM  ZFC=VACUUM  END
READ START  NST=6  TFX=0.0 TFY=0.0 TFZ=0.0  LNU=300  END START
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-35 YUL=35 ZUL=0 XLR=35 YLR=-35 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VFW' END
END PLOT
END DATA
END
********************************************************************************
```

benchmark cylinder of uo2f2 reflected

lifetime = 1.63648E-04 + or - 1.34843E-06 generation time = 8.61055E-05 + or - 5.08753E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	1.00324	+ or - 0.00389	0.99935 to 1.00713	0.99546 to 1.01102	0.99156 to 1.01492	30000
4	1.00221	+ or - 0.00379	0.99842 to 1.00600	0.99463 to 1.00979	0.99084 to 1.01358	29700
5	1.00154	+ or - 0.00377	0.99777 to 1.00531	0.99400 to 1.00908	0.99023 to 1.01285	29400
6	1.00093	+ or - 0.00376	0.99717 to 1.00469	0.99341 to 1.00845	0.98966 to 1.01221	29100
7	1.00093	+ or - 0.00380	0.99714 to 1.00473	0.99334 to 1.00853	0.98954 to 1.01233	28800
8	1.00085	+ or - 0.00384	0.99702 to 1.00469	0.99318 to 1.00853	0.98934 to 1.01237	28500
9	1.00083	+ or - 0.00388	0.99695 to 1.00471	0.99307 to 1.00859	0.98920 to 1.01247	28200
10	1.00100	+ or - 0.00392	0.99708 to 1.00492	0.99317 to 1.00883	0.98925 to 1.01275	27900
11	1.00082	+ or - 0.00396	0.99686 to 1.00477	0.99291 to 1.00873	0.98895 to 1.01268	27600
12	1.00040	+ or - 0.00398	0.99642 to 1.00438	0.99245 to 1.00835	0.98847 to 1.01233	27300
17	1.00045	+ or - 0.00415	0.99630 to 1.00460	0.99214 to 1.00876	0.98799 to 1.01291	25800
22	1.00115	+ or - 0.00431	0.99684 to 1.00545	0.99253 to 1.00976	0.98823 to 1.01406	24300
27	1.00097	+ or - 0.00452	0.99645 to 1.00548	0.99194 to 1.01000	0.98742 to 1.01452	22800
32	0.99976	+ or - 0.00472	0.99505 to 1.00448	0.99033 to 1.00920	0.98561 to 1.01392	21300
37	1.00090	+ or - 0.00489	0.99601 to 1.00579	0.99113 to 1.01067	0.98624 to 1.01556	19800
42	1.00282	+ or - 0.00501	0.99781 to 1.00783	0.99280 to 1.01285	0.98779 to 1.01786	18300
47	1.00160	+ or - 0.00531	0.99629 to 1.00691	0.99097 to 1.01223	0.98566 to 1.01754	16800
52	1.00108	+ or - 0.00557	0.99551 to 1.00665	0.98994 to 1.01222	0.98437 to 1.01779	15300
57	1.00030	+ or - 0.00579	0.99452 to 1.00609	0.98873 to 1.01188	0.98294 to 1.01766	13800
62	1.00332	+ or - 0.00570	0.99762 to 1.00902	0.99191 to 1.01472	0.98621 to 1.02042	12300
67	1.00237	+ or - 0.00621	0.99616 to 1.00857	0.98995 to 1.01478	0.98375 to 1.02099	10800
72	1.00259	+ or - 0.00707	0.99551 to 1.00966	0.98844 to 1.01673	0.98137 to 1.02381	9300
77	0.99504	+ or - 0.00684	0.98820 to 1.00188	0.98136 to 1.00872	0.97452 to 1.01555	7800
82	0.99500	+ or - 0.00634	0.98866 to 1.00134	0.98232 to 1.00767	0.97598 to 1.01401	6300
87	0.98915	+ or - 0.00718	0.98197 to 0.99634	0.97479 to 1.00352	0.96760 to 1.01071	4800
92	0.98703	+ or - 0.01004	0.97699 to 0.99707	0.96695 to 1.00711	0.95691 to 1.01715	3300

benchmark cylinder of uo2f2 reflected
mixing table

number of scattering angles = 2
cross section message threshold =3.0E-05

entry	mixture	nuclide	density
1	1	92235	8.14499E-05
2	1	92238	1.56418E-03
3	1	8016	3.31729E-02
4	3	308016	3.33757E-02
5	4	408016	1.00000E-20
6	1	9019	3.29126E-03
7	1	1001	5.97633E-02
8	3	301001	6.67514E-02
9	2	6012	3.11144E-04
10	2	14000	1.66178E-03
11	2	24304	1.52593E-02
12	2	25055	1.69906E-03
13	2	26304	5.46740E-02
14	2	28304	9.54318E-03
15	2	42000	1.21616E-03

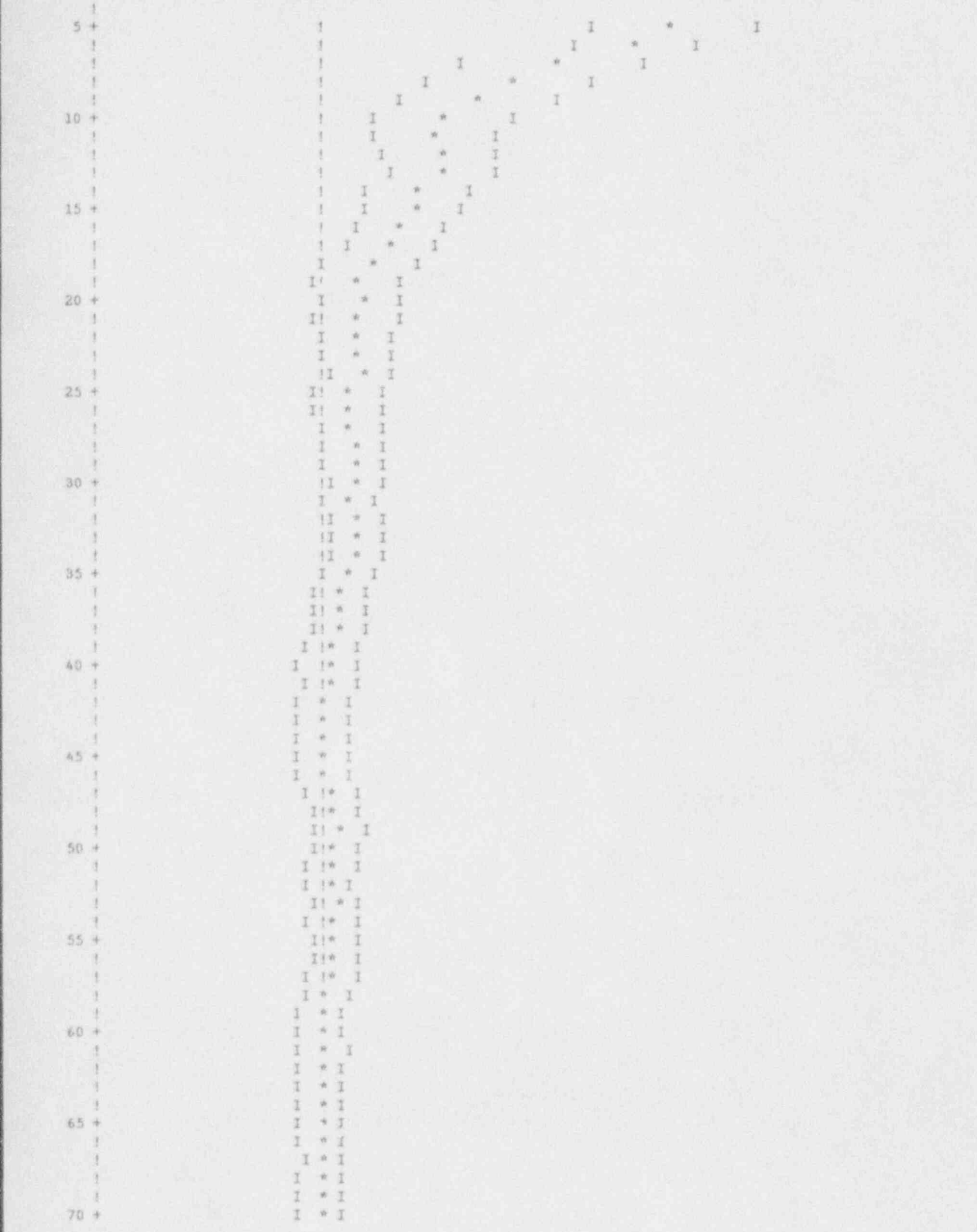
cross sections read from the ampx working library on unit 4

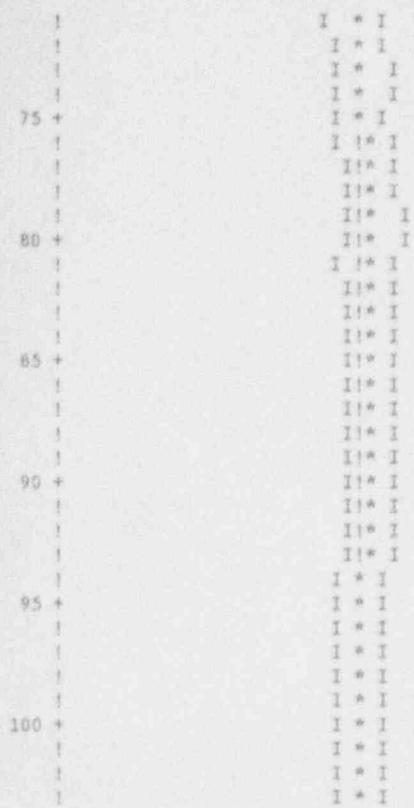
1001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
301001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
6012	CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 10/12/89
8016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
308016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
408016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
9019	FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89
14000	SILICON	ENDF/B-IV MAT 1194	UPDATED 10/12/89
24304	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		
25055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 10/12/89
26304	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		
28304	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		
42000	MO (1287) SIGP=5+4 NEWXLACS 218NGP F-1/E-M P-3 293K		
92235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89
92238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89

..... 0 io's were used mixing cross-sections .....
..... 0 io's were used preparing the cross sections .....

$\frac{H}{U^{235}} = 7387$

benchmark cylinder of uo2f2 reflected
plot of average k-effective by generation run.
the line represents k-eff = 1.0032 + or - 0.0039 which occurs for 103 generations run.




75
80
85
90
95
100

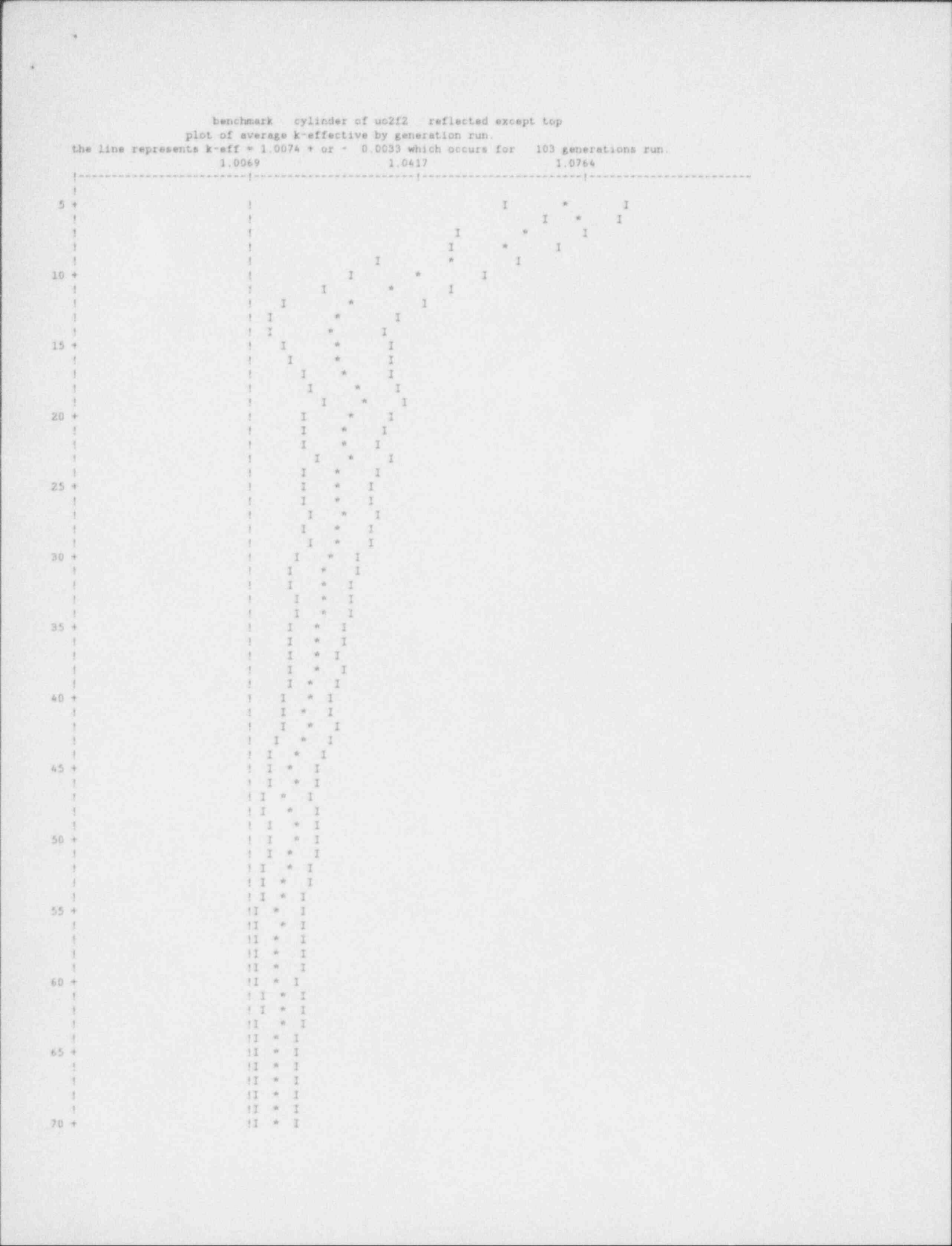
```
=csas25
BENCHMARK   CYLINDER    REFLECTED EXCEPT TOP    UO2F2          UOFCYCRB.CJW
27GROUPNDF4                 INFHOMMEDIUM
SOLNUO2F2   1  496.52 0 1.0 293  92235 4.89  92238 95.11  END
AL          2  1.0 293 END
H2O         3  1.0 END
O           4  0  1-5  END
END COMP
BENCHMARK   CYLINDER OF UO2F2   REFLECTED EXCEPT TOP
READ PARM  RUN=YES PLT=NO  TME=45 END PARM
READ GEOM
GLOBAL UNIT  1
COM='! CYLINDER OF UO2F2'
CYLINDER   1 1    38.1      2P20.245
CYLINDER   2 1    38.25875  20.245 -20.40375
CYLINDER   4 1    38.25875  100.0  -20.40375
CUBOID     3 1    4P70.0    100.0  -50.0
END GEOM
READ BNDS  XFC=VACUUM  YFC=VACUUM  ZFC=VACUUM  END BNDS
READ START  NST=6  TFX=0.0 TFY=0.0 TFZ=0.0  LNU=300  END START
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-35 YUL=35 ZUL=0 XLR=35 YLR=-35 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VPW' END
END PLOT
END DATA
END
```

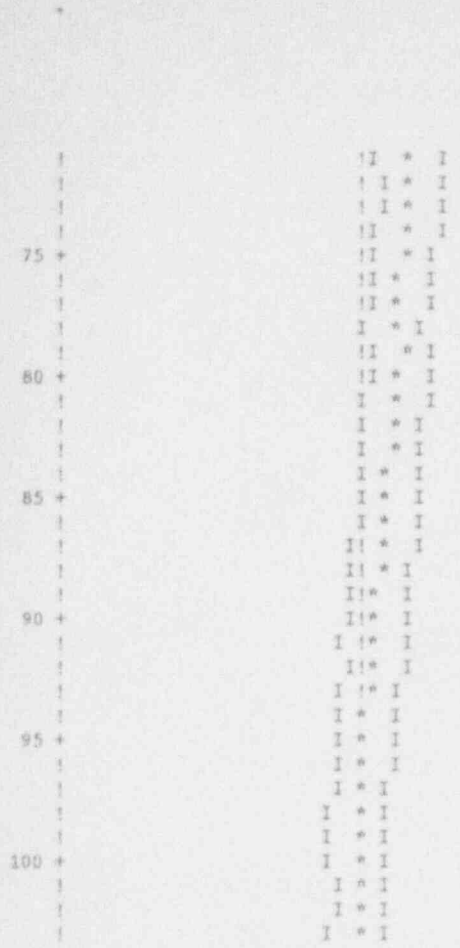
benchmark cylinder of uo2f2 reflected except top

lifetime = 1.85926E-04 + or - 1.70599E-06 generation time = 1.06124E-04 + or - 6.12718E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	1.00736	+ or - 0.00330	1.00406 to 1.01067	1.00075 to 1.01397	0.99745 to 1.01727	30000
4	1.00683	+ or - 0.00329	1.00353 to 1.01012	1.00024 to 1.01341	0.99694 to 1.01671	29700
5	1.00603	+ or - 0.00323	1.00280 to 1.00926	0.99957 to 1.01249	0.99634 to 1.01572	29400
6	1.00522	+ or - 0.00316	1.00206 to 1.00838	0.99890 to 1.01154	0.99575 to 1.01470	29100
7	1.00500	+ or - 0.00318	1.00181 to 1.00818	0.99863 to 1.01137	0.99544 to 1.01455	28800
8	1.00455	+ or - 0.00319	1.00137 to 1.00774	0.99818 to 1.01093	0.99499 to 1.01411	28500
9	1.00471	+ or - 0.00322	1.00149 to 1.00793	0.99828 to 1.01114	0.99506 to 1.01436	28200
10	1.00468	+ or - 0.00325	1.00143 to 1.00794	0.99818 to 1.01119	0.99493 to 1.01444	27900
11	1.00486	+ or - 0.00328	1.00158 to 1.00814	0.99829 to 1.01142	0.99501 to 1.01471	27600
12	1.00522	+ or - 0.00330	1.00192 to 1.00851	0.99862 to 1.01181	0.99532 to 1.01511	27300
17	1.00405	+ or - 0.00341	1.00064 to 1.00746	0.99723 to 1.01087	0.99382 to 1.01428	25800
22	1.00285	+ or - 0.00350	0.99935 to 1.00635	0.99585 to 1.00985	0.99236 to 1.01335	24300
27	1.00118	+ or - 0.00350	0.99768 to 1.00468	0.99418 to 1.00819	0.99067 to 1.01169	22800
32	1.00124	+ or - 0.00368	0.99755 to 1.00492	0.99387 to 1.00860	0.99019 to 1.01228	21300
37	1.00044	+ or - 0.00387	0.99657 to 1.00431	0.99270 to 1.00818	0.98883 to 1.01206	19800
42	0.99919	+ or - 0.00400	0.99519 to 1.00320	0.99118 to 1.00720	0.98718 to 1.01121	18300
47	1.00124	+ or - 0.00405	0.99719 to 1.00528	0.99314 to 1.00933	0.98910 to 1.01338	16800
52	0.99958	+ or - 0.00415	0.99543 to 1.00373	0.99129 to 1.00788	0.98714 to 1.01203	15300
57	0.99984	+ or - 0.00446	0.99537 to 1.00430	0.99091 to 1.00876	0.98645 to 1.01323	13800
62	0.99779	+ or - 0.00474	0.99305 to 1.00252	0.98832 to 1.00726	0.98358 to 1.01200	12300
67	0.99798	+ or - 0.00539	0.99259 to 1.00337	0.98721 to 1.00876	0.98182 to 1.01414	10800
72	0.99361	+ or - 0.00587	0.98774 to 0.99948	0.98186 to 1.00535	0.97599 to 1.01122	9300
77	0.99363	+ or - 0.00696	0.98667 to 1.00059	0.97972 to 1.00755	0.97276 to 1.01450	7800
82	0.99229	+ or - 0.00623	0.98606 to 0.99852	0.97983 to 1.00475	0.97360 to 1.01098	6300
87	0.99164	+ or - 0.00798	0.98365 to 0.99962	0.97567 to 1.00760	0.96768 to 1.01559	4800
92	0.99372	+ or - 0.01035	0.98337 to 1.00407	0.97302 to 1.01442	0.96267 to 1.02477	3300

benchmark cylinder of uo2f2 reflected except top
plot of average k-effective by generation run.
the line represents k-eff = 1.0074 + or - 0.0033 which occurs for 103 generations run.




75
80
85
90
95
100

benchmark cylinder of uo2f2 reflected except top
mixing table

number of scattering angles = 2
cross section message threshold =3.0E-05

entry	mixture	nuclide	density
1	1	92235	6.22081E-05
2	1	92238	1.19466E-03
3	1	8016	3.32466E-02
4	3	308016	3.33757E-02
5	4	408016	1.00000E-05
6	1	9019	2.51373E-03
7	1	1001	6.14657E-02
8	3	301001	6.67514E-02
9	2	13027	6.02374E-02

$\frac{\#}{n^{235}} = 988.07$

cross sections read from the ampx working library on unit 4

1001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
301001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
8016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
308016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
408016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
9019	FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89
13027	AL-27 1193 218 GP 040375(5)		
92235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89
92238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89

..... 0 io's were used mixing cross-sections .....
..... 0 io's were used preparing the cross sections .....

```
*******************************************************************************
#CSAS25
BENCHMARK    CYLINDER    REFLECTED ON ALL SIDES    UO2F2       UOFCYCRC.CJW
27GROUPNDF4                 INFHOMMEDIUM
SOLNUO2F2    1  495.30 0 1.0 293  92235 4.89  92238 95.11  END
SS316        2  1.0 293 END
H2O          3  1.0 END
O            4  0  1-20  END
END COMP
BENCHMARK CYLINDER OF UO2F2 REFLECTED
READ PARM  RUN=YES PLT=NO  TME=45 END PARM
READ GEOM
GLOBAL UNIT  1
COM='! CYLINDER OF UO2F2!
CYLINDER    1 1    25.4       2P42.86
CYLINDER    2 1    25.55875   2P43.01875
CUBOID      3 1    4P56.0     2P75.0
END GEOM
READ BNDS  XFC=VACUUM  YFC=VACUUM  ZFC=VACUUM  END BNDS
READ START  NST=6  TFX=0.0 TFY=0.0 TFZ=0.0  LNU=300  END START
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-35 YUL=35 ZUL=0 XLR=35 YLR=-35 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VFW' END
END PLOT
END DATA
END
*******************************************************************************
```

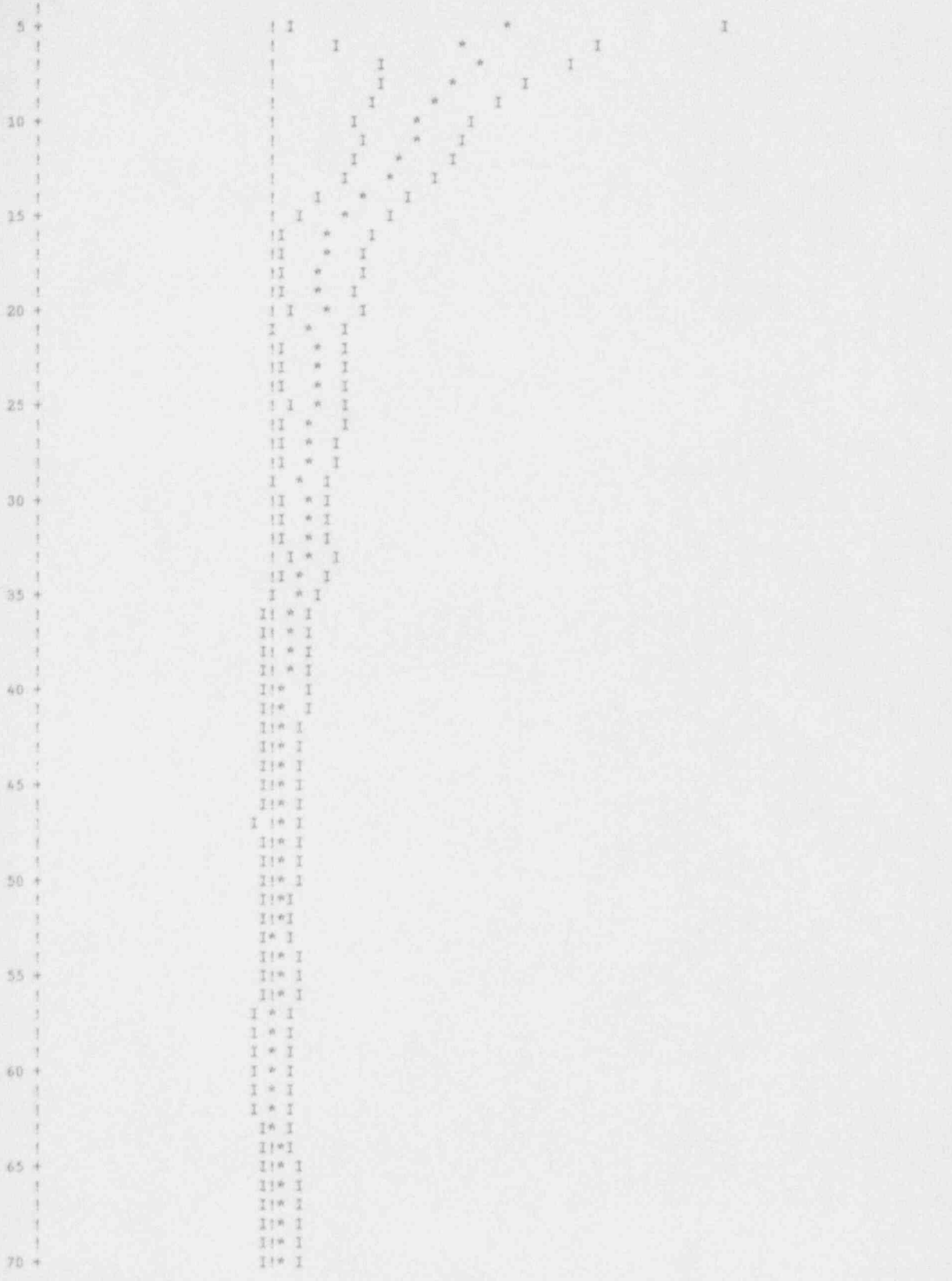
benchmark cylinder of uo2f2 reflected

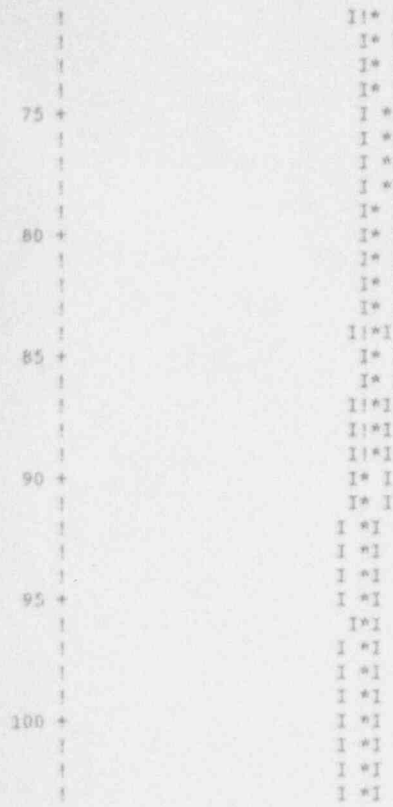
lifetime = 1.66662E-04 + or - 1.12741E-06 generation time = 1.01053E-04 + or - 5.50187E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.99845	+ or - 0.00330	0.99516 to 1.00175	0.99186 to 1.00504	0.98856 to 1.00834	30000
4	0.99723	+ or - 0.00309	0.99414 to 1.00032	0.99104 to 1.00341	0.98795 to 1.00651	29700
5	0.99715	+ or - 0.00312	0.99403 to 1.00027	0.99090 to 1.00340	0.98778 to 1.00652	29400
6	0.99682	+ or - 0.00314	0.99368 to 0.99996	0.99054 to 1.00310	0.98741 to 1.00623	29100
7	0.99611	+ or - 0.00309	0.99303 to 0.99920	0.98994 to 1.00229	0.98685 to 1.00538	28800
8	0.99585	+ or - 0.00311	0.99274 to 0.99896	0.98963 to 1.00207	0.98651 to 1.00518	28500
9	0.99553	+ or - 0.00313	0.99240 to 0.99866	0.98928 to 1.00179	0.98615 to 1.00491	28200
10	0.99552	+ or - 0.00316	0.99236 to 0.99868	0.98920 to 1.00185	0.98604 to 1.00501	27900
11	0.99505	+ or - 0.00316	0.99189 to 0.99821	0.98873 to 1.00137	0.98557 to 1.00453	27600
12	0.99491	+ or - 0.00319	0.99172 to 0.99811	0.98853 to 1.00130	0.98534 to 1.00449	27300
17	0.99609	+ or - 0.00331	0.99278 to 0.99940	0.98948 to 1.00271	0.98617 to 1.00602	25800
22	0.99553	+ or - 0.00342	0.99211 to 0.99894	0.98869 to 1.00236	0.98527 to 1.00578	24300
27	0.99481	+ or - 0.00360	0.99121 to 0.99842	0.98761 to 1.00202	0.98401 to 1.00562	22800
32	0.99419	+ or - 0.00378	0.99040 to 0.99797	0.98662 to 1.00176	0.98283 to 1.00555	21300
37	0.99589	+ or - 0.00382	0.99207 to 0.99971	0.98825 to 1.00353	0.98443 to 1.00736	19800
42	0.99618	+ or - 0.00411	0.99207 to 1.00030	0.98796 to 1.00441	0.98384 to 1.00852	18300
47	0.99667	+ or - 0.00441	0.99226 to 1.00107	0.98785 to 1.00548	0.98344 to 1.00989	16800
52	0.99633	+ or - 0.00482	0.99151 to 1.00116	0.98669 to 1.00598	0.98187 to 1.01080	15300
57	0.99734	+ or - 0.00473	0.99260 to 1.00207	0.98787 to 1.00680	0.98314 to 1.01154	13800
62	0.99624	+ or - 0.00507	0.99116 to 1.00131	0.98609 to 1.00638	0.98102 to 1.01145	12300
67	0.99224	+ or - 0.00508	0.98715 to 0.99732	0.98207 to 1.00241	0.97698 to 1.00749	10800
72	0.98939	+ or - 0.00537	0.98402 to 0.99476	0.97865 to 1.00014	0.97328 to 1.00551	9300
77	0.98411	+ or - 0.00571	0.97841 to 0.98982	0.97270 to 0.99553	0.96699 to 1.00124	7800
82	0.98400	+ or - 0.00670	0.97730 to 0.99070	0.97060 to 0.99740	0.96390 to 1.00410	6300
87	0.98263	+ or - 0.00776	0.97487 to 0.99039	0.96711 to 0.99814	0.95936 to 1.00590	4800
92	0.99260	+ or - 0.00856	0.98404 to 1.00117	0.97548 to 1.00973	0.96692 to 1.01829	3300

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       4
ms--mixing table length                                       15
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has     15 entries.
        4q array has     15 entries.
        5q array has     15 entries.
        6q array has      4 entries.
        7q array has      4 entries.
        8q array has      4 entries.
        9q array has      4 entries.
       10q array has     15 entries.
       11q array has      4 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     6.20553E-05          92235
   2        1     92238     1.19172E-03          92238
   3        1      8016     3.32472E-02           8016
   4        3      8016     3.33757E-02         308016
   5        4      8016     1.00000E-20         408016
   6        1      9019     2.50756E-03           9019
   7        1      1001     6.14792E-02           1001
   8        3      1001     6.67514E-02         301001
   9        2      6012     3.11144E-04           6012
  10        2     14000     1.66178E-03          14000
  11        2     24304     1.52593E-02          24304
  12        2     25055     1.69906E-03          25055
  13        2     26304     5.46740E-02          26304
  14        2     28304     9.54318E-03          28304
  15        2     42000     1.21616E-03          42000
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1        1      1.00000E+00    2.93000E+02    0.00000E+00              0
   2        2      6.00000E+00    2.93000E+02    0.00000E+00              0
   3        3      1.10000E+01    2.93000E+02    0.00000E+00              0
   4        4      1.60000E+01    2.93000E+02    0.00000E+00              0
    3388 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN         from log 11 to log 18    bondarenko trigger 0
copy      1001   HYDROGEN         from log 18 to log  1    bondarenko trigger 0
copy      1001   HYDROGEN         from log 18 to log  1    bondarenko trigger 0
copy      6012   CARBON-12        from log 11 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16        from log 11 to log 18    bondarenko trigger 0
copy      8016   OXYGEN-16        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16        from log 18 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16        from log 18 to log  1    bondarenko trigger 0
copy      9019   FLUORINE         from log 11 to log  1    bondarenko trigger 0
copy     14000   SILICON          from log 11 to log  1    bondarenko trigger 0
copy     24304   CR 1191 WT SS-30 from log 11 to log  1    bondarenko trigger 0
copy     25055   MANGANESE-55     from log 11 to log  1    bondarenko trigger 0
copy     26304   FE 1192 WT SS-30 from log 11 to log  1    bondarenko trigger 0
copy     28304   NI 1190 WT SS-30 from log 11 to log  1    bondarenko trigger 0
copy     42000   MO (1287) SIGP=5 from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235      from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238      from log 11 to log  1    bondarenko trigger 0
```

benchmark cylinder of uo2f2 reflected
plot of average k-effective by generation run.
the line represents k-eff = 0.9985 + or - 0.0033 which occurs for 103 generations run.




75
80
85
90
95
100

Non-Table Output

Search for critical dimensions

Sphere UOXSPSR1.CJW
Cylinder UOXCYSR1.CJW
Slab UOXSLSR1.CJW

Keff of safe geometry limits for $\rho_u = 1600$ g U/L

Sphere UOXSPSF1.CJW
Cylinder UOXCYSF1.CJW
Slab UOXSLSF1.CJW

Keff of safe ~~volume~~ mass in a sphere $\rho_u = 583.72$ g U/L
(optimum for a sphere at 78 kg U)

Mass of 28.3 kg U UOXSPVOD.CJW
Mass of 17.0 kg U UOXSPVOE.CJW

Keff of benchmark sphere from ORNL-3979 data
UOXSPCRA.CJW

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
- module CSASI    will be called
  UO2F2 SOLUTION SEARCH            SPHERE              UOXSPSR1.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUG2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
- module XSDRN    will be called
  SPHERE SEARCH UO2F2 SOLUTION DENSITY 1600 G U/L
  0$$  A3 2  E
  1$$  3 2 58 1 0   2 2 16 3 4
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  -.1  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
     T
  34**  F1
     T
  35**  2ZI0 34I20.5025 55.5025
  36$$  23R1 35R2
  39$$  1 2
  40$$  F3
  41**  1 0
     T
WARNING: an "END" statement is assumed at end of input file
  module xsdrn    is finished.
```

SPHERE SEARCH UO2F2 SOLUTION DENSITY 1600 G U/L

int.	zone number	radius	int. midpoint	area	volume	prod density
1	1	0.00000E+00	4.31111E-01	0.00000E+00	2.68501E+00	1.34544E-04
2	1	8.62222E-01	1.29333E+00	9.34217E+00	1.87951E+01	9.39247E-04
3	1	1.72444E+00	2.15555E+00	3.73687E+01	5.10152E+01	2.53247E-03
4	1	2.58667E+00	3.01778E+00	8.40796E+01	9.93453E+01	4.88089E-03
5	1	3.44889E+00	3.88000E+00	1.49475E+02	1.63785E+02	7.93503E-03
6	1	4.31111E+00	4.74222E+00	2.33554E+02	2.44336E+02	1.16292E-02
7	1	5.17333E+00	5.60444E+00	3.36318E+02	3.40996E+02	1.58849E-02
8	1	6.03555E+00	6.46666E+00	4.57767E+02	4.53766E+02	2.06067E-02
9	1	6.89778E+00	7.32889E+00	5.97899E+02	5.82647E+02	2.56928E-02
10	1	7.76000E+00	8.19111E+00	7.56716E+02	7.27637E+02	3.10219E-02
11	1	8.62222E+00	9.05333E+00	9.34217E+02	8.88739E+02	3.64773E-02
12	1	9.48444E+00	9.91555E+00	1.13040E+03	1.06595E+03	4.19147E-02
13	1	1.03467E+01	1.07778E+01	1.34527E+03	1.25927E+03	4.72168E-02
14	1	1.12089E+01	1.16400E+01	1.57883E+03	1.46870E+03	5.22220E-02
15	1	1.20711E+01	1.25022E+01	1.83107E+03	1.69424E+03	5.68421E-02
16	1	1.29333E+01	1.33644E+01	2.10199E+03	1.93589E+03	6.09216E-02
17	1	1.37955E+01	1.42267E+01	2.39160E+03	2.19365E+03	6.44959E-02
18	1	1.46578E+01	1.50889E+01	2.69989E+03	2.46753E+03	6.75249E-02
19	1	1.55200E+01	1.59511E+01	3.02687E+03	2.75750E+03	7.05248E-02
20	1	1.63822E+01	1.68133E+01	3.37253E+03	3.06359E+03	7.40777E-02
21	1	1.72444E+01	1.76755E+01	3.73687E+03	3.38579E+03	8.07721E-02
22	1	1.81067E+01	1.85378E+01	4.11990E+03	3.72411E+03	9.42848E-02
23	1	1.89689E+01	1.94000E+01	4.52161E+03	4.07852E+03	1.31490E-01
24	2	1.98311E+01	2.03311E+01	4.94201E+03	5.19540E+03	0.00000E+00
25	2	2.08311E+01	2.13311E+01	5.45299E+03	5.71895E+03	0.00000E+00
26	2	2.18311E+01	2.23311E+01	5.98910E+03	6.26762E+03	0.00000E+00
27	2	2.28311E+01	2.33311E+01	6.55034E+03	6.84143E+03	0.00000E+00
28	2	2.38311E+01	2.43311E+01	7.13671E+03	7.44037E+03	0.00000E+00
29	2	2.48311E+01	2.53311E+01	7.74822E+03	8.06444E+03	0.00000E+00
30	2	2.58311E+01	2.63311E+01	8.38486E+03	8.71366E+03	0.00000E+00
31	2	2.68311E+01	2.73311E+01	9.04663E+03	9.38799E+03	0.00000E+00
32	2	2.78311E+01	2.83311E+01	9.73354E+03	1.00875E+04	0.00000E+00
33	2	2.88311E+01	2.93311E+01	1.04456E+04	1.08121E+04	0.00000E+00
34	2	2.98311E+01	3.03311E+01	1.11827E+04	1.15618E+04	0.00000E+00
35	2	3.08311E+01	3.13311E+01	1.19451E+04	1.23366E+04	0.00000E+00
36	2	3.18311E+01	3.23311E+01	1.27325E+04	1.31367E+04	0.00000E+00
37	2	3.28311E+01	3.33311E+01	1.35451E+04	1.39619E+04	0.00000E+00
38	2	3.38311E+01	3.43311E+01	1.43828E+04	1.48121E+04	0.00000E+00
39	2	3.48311E+01	3.53311E+01	1.52456E+04	1.56875E+04	0.00000E+00
40	2	3.58311E+01	3.63311E+01	1.61336E+04	1.65880E+04	0.00000E+00
41	2	3.68311E+01	3.73311E+01	1.70467E+04	1.75137E+04	0.00000E+00
42	2	3.78311E+01	3.83311E+01	1.79849E+04	1.84645E+04	0.00000E+00
43	2	3.88311E+01	3.93311E+01	1.89483E+04	1.94404E+04	0.00000E+00
44	2	3.98311E+01	4.03311E+01	1.99368E+04	2.04415E+04	0.00000E+00
45	2	4.08311E+01	4.13311E+01	2.09504E+04	2.14677E+04	0.00000E+00
46	2	4.18311E+01	4.23311E+01	2.19892E+04	2.25190E+04	0.00000E+00
47	2	4.28311E+01	4.33311E+01	2.30530E+04	2.35955E+04	0.00000E+00
48	2	4.38311E+01	4.43311E+01	2.41421E+04	2.46971E+04	0.00000E+00
49	2	4.48311E+01	4.53311E+01	2.52562E+04	2.58238E+04	0.00000E+00
50	2	4.58311E+01	4.63311E+01	2.63955E+04	2.69757E+04	0.00000E+00
51	2	4.68311E+01	4.73311E+01	2.75600E+04	2.81526E+04	0.00000E+00
52	2	4.78311E+01	4.83311E+01	2.87495E+04	2.93548E+04	0.00000E+00
53	2	4.88311E+01	4.93311E+01	2.99642E+04	3.05820E+04	0.00000E+00
54	2	4.98311E+01	5.03311E+01	3.12040E+04	3.18344E+04	0.00000E+00
55	2	5.08311E+01	5.13311E+01	3.24690E+04	3.31119E+04	0.00000E+00
56	2	5.18311E+01	5.23311E+01	3.37591E+04	3.44146E+04	0.00000E+00
57	2	5.28311E+01	5.33311E+01	3.50743E+04	3.57424E+04	0.00000E+00
58	2	5.38311E+01	5.43311E+01	3.64147E+04	3.70953E+04	0.00000E+00
59		5.48311E+01		3.77802E+04		

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	4.44089E-16	1.10275E+00	5.86581E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0733
2	224	1.08057E-02	1.01784E+00	-2.18874E+00	-6.35901E-01	-5.80850E-02	0.00000E+00	0.4387
3	436	4.36977E-03	1.07039E+00	8.20670E-02	-2.45986E-01	-1.94265E-02	0.00000E+00	0.7882
4	637	2.31211E-03	1.05428E+00	6.42108E-02	-1.43903E-01	-9.45361E-03	0.00000E+00	1.1233
5	832	1.24085E-03	1.04022E+00	4.32952E-02	-8.59253E-02	-4.89558E-03	0.00000E+00	1.4503
6	1012	6.70143E-04	1.03058E+00	2.68844E-02	-4.94612E-02	-2.60705E-03	0.00000E+00	1.7827
7	1185	3.62678E-04	1.02459E+00	1.58786E-02	-2.78594E-02	-1.40781E-03	0.00000E+00	2.0563
8	1353	1.95355E-04	1.02110E+00	9.07598E-03	-1.54671E-02	-7.62386E-04	0.00000E+00	2.3482
9	1519	1.04467E-04	1.01912E+00	5.07349E-03	-8.48146E-03	-4.12043E-04	0.00000E+00	2.6373
10	1683	5.54898E-05	1.01801E+00	2.79677E-03	-4.60553E-03	-2.22139E-04	0.00000E+00	2.9242
11	1841	2.92192E-05	1.01740E+00	1.52751E-03	-2.48211E-03	-1.19255E-04	0.00000E+00	3.2033
12	1999	1.51555E-05	1.01706E+00	8.25996E-04	-1.32615E-03	-6.34363E-05	-5.00000E-02	3.4815
- elapsed time 3.48 min.								
13	2183	-1.83941E-04	9.95887E-01	2.77978E-02	-4.05851E-02	6.17226E-04	-5.00000E-02	3.7963
14	2352	-1.90716E-05	9.91445E-01	-1.44799E-03	5.63855E-03	7.79374E-05	-5.00000E-02	4.0893
15	2506	-2.47134E-06	9.91097E-01	-2.51837E-04	6.92310E-04	1.27600E-05	-4.36612E-02	4.3558
- elapsed time 4.36 min.								
16	2673	2.67851E-05	9.91751E-01	-3.73029E-03	5.18431E-03	-9.00051E-05	-4.36612E-02	4.6477
17	2834	4.27837E-06	9.94288E-01	2.61564E-04	-8.51934E-04	-1.64449E-05	-3.33366E-02	4.9305
- elapsed time 4.93 min.								
18	3002	4.30745E-05	9.98695E-01	-5.81604E-03	7.98187E-03	-1.48045E-04	-3.33366E-02	5.2237
19	3168	5.62578E-06	9.99626E-01	3.96024E-04	-1.34749E-03	-2.32951E-05	-3.30858E-02	5.5128
- elapsed time 5.51 min.								
20	3326	1.99494E-06	9.99797E-01	-3.98012E-05	-2.91435E-05	-8.33816E-06	-3.24689E-02	5.7922
- elapsed time 5.79 min.								
21	3393	5.19110E-06	1.00002E+00	-3.27535E-04	4.62926E-04	-1.42541E-05	-3.24689E-02	5.9055
22	3482	-7.12438E-08	1.00018E+00	2.19508E-05	-1.23864E-04	-1.47295E-06	-3.26014E-02	6.0602
- elapsed time 6.06 min.								
23	3554	-1.37448E-06	1.00014E+00	7.88329E-05	-1.24177E-04	3.04572E-06	-3.27471E-02	6.1867
- elapsed time 6.19 min.								
24	3614	-1.53360E-06	1.00007E+00	7.65498E-05	-9.67903E-05	3.94358E-06	-3.27471E-02	6.2[illegible]

grp to grp	inner iters	mfd int.	max flux difference	msf int.	max scale factor	coarse mesh
1 1	1	45	2.47116E-05	58	9.99988E-01	7
2 2	1	1	2.17848E-05	58	9.99988E-01	10
3 3	1	1	2.18925E-05	6	1.00001E+00	11
4 4	1	1	2.26674E-05	5	1.00001E+00	14
5 5	1	1	1.90894E-05	4	1.00001E+00	18
6 6	1	1	1.44391E-05	3	1.00001E+00	20
7 7	1	3	1.09434E-05	2	1.00001E+00	29
8 8	1	3	9.13109E-06	2	1.00001E+00	46
9 9	1	2	6.79439E-06	1	1.00001E+00	58
10 10	1	2	5.50950E-06	1	1.00001E+00	58
11 11	1	25	5.78935E-06	25	1.00001E+00	58
12 12	1	25	5.81073E-06	25	1.00000E+00	58
13 13	1	25	5.64604E-06	26	1.00000E+00	58
14 14	1	26	5.29753E-06	26	1.00000E+00	58
15 15	1	25	5.58775E-05	26	1.00003E+00	58
16 16	1	26	6.27473E-05	26	1.00002E+00	58
17 17	1	26	6.87696E-05	23	1.00001E+00	58
18 18	1	26	6.90401E-05	26	1.00001E+00	58
19 19	1	26	6.45048E-05	26	1.00002E+00	58
20 20	1	54	6.50264E-05	54	9.99944E-01	58
21 21	1	54	8.36161E-05	54	9.99965E-01	58
22 22	1	58	5.48698E-05	58	9.99963E-01	58
23 23	1	20	1.02874E-05	21	1.00002E+00	58
24 24	1	52	1.62143E-05	53	1.00003E+00	58
25 25	1	54	2.40294E-05	54	1.00003E+00	58
26 26	1	54	2.68272E-05	54	1.00006E+00	58
27 27	1	53	4.24764E-05	53	1.00006E+00	58

25	3641	2.37176E-10	1.00002E+00	-3.26999E-06	3.39280E-05	4.36129E-07	-3.27471E-02	6.3533
final monitor								
lambda 1.00002E+00			production/absorption 1.00293E+00			angular flux on 16		
- elapsed time 6.35 min.								

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION SEARCH   CYLINDER                          UOXCYSR1.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  CYLINDER SEARCH UO2F2 SOLUTION DENSITY 1600 G U/L
  0$$  A3 2  E
  1$$  2 2 51 1 0   2 2 16 3 4
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  -.1  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  15I0 34I14.25 49.25
  36$$  16R1 35R2
  39$$  1 2
  40$$  F3
  41**  1 0
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

CYLINDER SEARCH UO2F2 SOLUTION DENSITY 1600 G U/L

int.	zone number	radius	int. midpoint	area	volume	prod density
1	1	0.00000E+00	4.25392E-01	0.00000E+00	2.27399E+00	4.86640E-03
2	1	8.50783E-01	1.27617E+00	5.34563E+00	6.82196E+00	1.45230E-02
3	1	1.70157E+00	2.12696E+00	1.06913E+01	1.13699E+01	2.39496E-02
4	1	2.55235E+00	2.97774E+00	1.60369E+01	1.59179E+01	3.30006E-02
5	1	3.40313E+00	3.82852E+00	2.13825E+01	2.04659E+01	4.15217E-02
6	1	4.25392E+00	4.67931E+00	2.67281E+01	2.50138E+01	4.93910E-02
7	1	5.10470E+00	5.53009E+00	3.20738E+01	2.95618E+01	5.64553E-02
8	1	5.95548E+00	6.38087E+00	3.74194E+01	3.41098E+01	6.26525E-02
9	1	6.80627E+00	7.23166E+00	4.27650E+01	3.86578E+01	6.78517E-02
10	1	7.65705E+00	8.08244E+00	4.81107E+01	4.32057E+01	7.21594E-02
11	1	8.50783E+00	8.93322E+00	5.34563E+01	4.77537E+01	7.55818E-02
12	1	9.35862E+00	9.78401E+00	5.88019E+01	5.23017E+01	7.87905E-02
13	1	1.02094E+01	1.06348E+01	6.41476E+01	5.68496E+01	8.24571E-02
14	1	1.10602E+01	1.14856E+01	6.94932E+01	6.13976E+01	8.95198E-02
15	1	1.19110E+01	1.23364E+01	7.48388E+01	6.59456E+01	1.03839E-01
16	1	1.27617E+01	1.31871E+01	8.01844E+01	7.04936E+01	1.43426E-01
17	2	1.36125E+01	1.41125E+01	8.55301E+01	8.86717E+01	0.00000E+00
18	2	1.46125E+01	1.51125E+01	9.18133E+01	9.49548E+01	0.00000E+00
19	2	1.56125E+01	1.61125E+01	9.80964E+01	1.01238E+02	0.00000E+00
20	2	1.66125E+01	1.71125E+01	1.04380E+02	1.07521E+02	0.00000E+00
21	2	1.76125E+01	1.81125E+01	1.10663E+02	1.13804E+02	0.00000E+00
22	2	1.86125E+01	1.91125E+01	1.16946E+02	1.20088E+02	0.00000E+00
23	2	1.96125E+01	2.01125E+01	1.23229E+02	1.26371E+02	0.00000E+00
24	2	2.06125E+01	2.11125E+01	1.29512E+02	1.32654E+02	0.00000E+00
25	2	2.16125E+01	2.21125E+01	1.35796E+02	1.38937E+02	0.00000E+00
26	2	2.26125E+01	2.31125E+01	1.42079E+02	1.45220E+02	0.00000E+00
27	2	2.36125E+01	2.41125E+01	1.48362E+02	1.51504E+02	0.00000E+00
28	2	2.46125E+01	2.51125E+01	1.54645E+02	1.57787E+02	0.00000E+00
29	2	2.56125E+01	2.61125E+01	1.60928E+02	1.64070E+02	0.00000E+00
30	2	2.66125E+01	2.71125E+01	1.67211E+02	1.70353E+02	0.00000E+00
31	2	2.76125E+01	2.81125E+01	1.73495E+02	1.76636E+02	0.00000E+00
32	2	2.86125E+01	2.91125E+01	1.79778E+02	1.82919E+02	0.00000E+00
33	2	2.96125E+01	3.01125E+01	1.86061E+02	1.89203E+02	0.00000E+00
34	2	3.06125E+01	3.11125E+01	1.92344E+02	1.95486E+02	0.00000E+00
35	2	3.16125E+01	3.21125E+01	1.98627E+02	2.01769E+02	0.00000E+00
36	2	3.26125E+01	3.31125E+01	2.04911E+02	2.08052E+02	0.00000E+00
37	2	3.36125E+01	3.41125E+01	2.11194E+02	2.14335E+02	0.00000E+00
38	2	3.46125E+01	3.51125E+01	2.17477E+02	2.20618E+02	0.00000E+00
39	2	3.56125E+01	3.61125E+01	2.23760E+02	2.26902E+02	0.00000E+00
40	2	3.66125E+01	3.71125E+01	2.30043E+02	2.33185E+02	0.00000E+00
41	2	3.76125E+01	3.81125E+01	2.36327E+02	2.39468E+02	0.00000E+00
42	2	3.86125E+01	3.91125E+01	2.42610E+02	2.45751E+02	0.00000E+00
43	2	3.96125E+01	4.01125E+01	2.48893E+02	2.52035E+02	0.00000E+00
44	2	4.06125E+01	4.11125E+01	2.55176E+02	2.58317E+02	0.00000E+00
45	2	4.16125E+01	4.21125E+01	2.61459E+02	2.64601E+02	0.00000E+00
46	2	4.26125E+01	4.31125E+01	2.67742E+02	2.70884E+02	0.00000E+00
47	2	4.36125E+01	4.41125E+01	2.74026E+02	2.77168E+02	0.00000E+00
48	2	4.46125E+01	4.51125E+01	2.80309E+02	2.83450E+02	0.00000E+00
49	2	4.56125E+01	4.61125E+01	2.86592E+02	2.89733E+02	0.00000E+00
50	2	4.66125E+01	4.71125E+01	2.92875E+02	2.96017E+02	0.00000E+00
51	2	4.76125E+01	4.81125E+01	2.99158E+02	3.02300E+02	0.00000E+00
52		4.86125E+01		3.05442E+02		

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	1.09018E+00	6.18349E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0842
2	215	1.16258E-02	9.69777E-01	-2.39204E+00	-6.74785E-01	-6.01798E-02	0.00000E+00	1.3657
3	416	4.07796E-03	1.04962E+00	8.67567E-02	-2.61966E-01	-1.76701E-02	0.00000E+00	2.5703
4	609	1.95761E-03	1.04357E+00	6.05892E-02	-1.35338E-01	-7.87640E-03	0.00000E+00	3.7293
5	794	9.77464E-04	1.03517E+00	3.70320E-02	-7.32350E-02	-3.83161E-03	0.00000E+00	4.8453
6	969	4.96898E-04	1.03917E+00	2.11844E-02	-3.90236E-02	-1.93644E-03	0.00000E+00	5.9043
7	1136	2.53996E-04	1.02153E+00	1.16751E-02	-2.06009E-02	-9.95104E-04	0.00000E+00	6.9198
8	1302	1.29747E-04	1.02344E+00	6.29635E-03	-1.07984E-02	-5.14774E-04	0.00000E+00	7.9293
9	1463	6.64168E-05	1.02225E+00	3.36641E-03	-5.63861E-03	-2.68267E-04	0.00000E+00	8.9108
10	1613	3.40120E-05	1.02158E+00	1.79718E-03	-2.94721E-03	-1.40589E-04	0.00000E+00	9.8317
11	1763	1.73753E-05	1.02119E+00	9.60360E-04	-1.54298E-03	-7.39581E-05	-5.00000E-02	10.7525
- elapsed time 10.75 min.								
12	1945	-1.40438E-04	1.00180E+00	2.45002E-02	-3.58241E-02	4.64023E-04	-5.00000E-02	11.8530
13	2114	-7.74133E-06	9.97815E-01	-7.46265E-04	4.01698E-03	3.27870E-05	-5.00000E-02	12.8792
14	2280	4.18197E-07	9.97553E-01	-3.42458E-05	2.39758E-04	-1.09416E-06	-4.81202E-02	13.8888
- elapsed time 13.89 min.								
15	2440	7.21176E-06	9.98224E-01	-9.15397E-04	1.28923E-03	-2.49126E-05	-4.49933E-02	14.8663
- elapsed time 14.87 min.								
16	2600	1.10889E-05	9.99589E-01	-1.50566E-03	1.96077E-03	-3.85550E-05	-4.49933E-02	15.8442
17	2758	1.08558E-06	9.99851E-01	9.40755E-05	-3.44286E-04	-5.04658E-06	-4.48018E-02	16.8098
- elapsed time 16.81 min.								
18	2916	8.10723E-07	9.99932E-01	-7.10135E-05	8.51238E-05	-3.37540E-06	-4.47345E-02	17.7765
- elapsed time 17.78 min.								
19	2974	2.68374E-07	9.99977E-01	-2.59797E-05	2.09774E-05	-1.46799E-06	-4.47345E-02	18.1298

grp to grp	inner iters	mfd int.	max. flux difference	maf int.	max. scale factor	coarse mesh
1	1	1	2.53232E-05	9	1.00001E+00	6
2	1	1	2.38040E-05	6	1.00001E+00	9
3	1	1	2.66680E-05	6	1.00001E+00	10
4	1	1	2.77940E-05	5	1.00001E+00	12
5	1	1	2.34433E-05	4	1.00001E+00	16
6	1	4	2.10877E-05	3	1.00002E+00	17
7	1	1	1.59914E-05	2	1.00002E+00	26
8	1	3	1.46651E-05	2	1.00002E+00	43
9	1	1	1.47995E-05	2	1.00002E+00	43
10	1	1	1.29493E-05	1	1.00002E+00	51
11	1	1	1.22659E-05	1	1.00002E+00	51
12	1	1	1.43938E-05	1	1.00001E+00	51
13	1	1	1.46570E-05	1	1.00001E+00	51
14	1	1	1.41548E-05	1	1.00001E+00	51
15	2	51	1.73533E-07	40	1.00000E+00	51
16	2	51	5.14056E-07	51	1.00000E+00	51
17	2	51	5.93972E-07	51	1.00000E+00	51
18	2	51	5.78834E-07	51	1.00000E+00	51
19	2	51	7.00736E-07	51	1.00000E+00	51
20	2	51	5.89138E-07	40	1.00000E+00	51
21	2	51	8.02459E-07	51	1.00000E+00	51
22	1	51	8.52311E-05	51	9.99943E-01	51
23	1	44	8.20147E-06	43	1.00001E+00	51
24	1	44	2.35675E-05	44	1.00005E+00	51
25	1	44	3.42001E-05	44	1.00005E+00	51
26	1	43	3.74601E-05	44	1.00008E+00	51
27	1	43	5.98229E-05	44	1.00009E+00	51

20	3008	-3.78552E-08	9.99987E-01	1.62610E-06	-1.27790E-05	-6.94268E-08	-4.47345E-02	18.3882
	final monitor							
	lambda	9.99986E-01		production/absorption	1.00223E+00		angular flux on	16
- elapsed time 18.39 min.								

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION   SEARCH  SLAB                      UOXSLSR1.CJW
     27GROUPNDF4               INFHOMMEDIUM
     SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
     SLAB SEARCH UO2F2 SOLUTION DENSITY 1600 G U/L
     0$$  A3 2  E
     1$$  1 2 50 1 0   2 2 16 3 4
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  -.1  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  9I0 39I7.1 47.1
     36$$  10R1 40R2
     39$$  1 2
     40$$  F3
     41**  1 0
       T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

SLAB SEARCH UO2F2 SOLUTION DENSITY 1600 G U/L

int.	zone number	radius	int. midpoint	area	volume	prod density
1	1	0.00000E+00	3.29914E-01	1.00000E+00	6.59829E-01	9.35041E-02
2	1	6.59829E-01	9.89743E-01	1.00000E+00	6.59829E-01	9.30956E-02
3	1	1.31966E+00	1.64957E+00	1.00000E+00	6.59829E-01	9.23263E-02
4	1	1.97949E+00	2.30940E+00	1.00000E+00	6.59828E-01	9.14629E-02
5	1	2.63931E+00	2.96923E+00	1.00000E+00	6.59829E-01	9.07299E-02
6	1	3.29914E+00	3.62906E+00	1.00000E+00	6.59829E-01	9.09474E-02
7	1	3.95897E+00	4.28889E+00	1.00000E+00	6.59828E-01	9.28837E-02
8	1	4.61880E+00	4.94871E+00	1.00000E+00	6.59829E-01	9.90338E-02
9	1	5.27863E+00	5.60854E+00	1.00000E+00	6.59829E-01	1.12096E-01
10	1	5.93846E+00	6.26837E+00	1.00000E+00	6.59829E-01	1.43949E-01
11	2	6.59829E+00	7.09829E+00	1.00000E+00	1.00000E+00	0.00000E+00
12	2	7.59829E+00	8.09829E+00	1.00000E+00	1.00000E+00	0.00000E+00
13	2	8.59829E+00	9.09829E+00	1.00000E+00	1.00000E+00	0.00000E+00
14	2	9.59829E+00	1.00983E+01	1.00000E+00	1.00000E+00	0.00000E+00
15	2	1.05983E+01	1.10983E+01	1.00000E+00	1.00000E+00	0.00000E+00
16	2	1.15983E+01	1.20983E+01	1.00000E+00	1.00000E+00	0.00000E+00
17	2	1.25983E+01	1.30983E+01	1.00000E+00	1.00000E+00	0.00000E+00
18	2	1.35983E+01	1.40983E+01	1.00000E+00	1.00000E+00	0.00000E+00
19	2	1.45983E+01	1.50983E+01	1.00000E+00	1.00000E+00	0.00000E+00
20	2	1.55983E+01	1.60983E+01	1.00000E+00	9.99999E-01	0.00000E+00
21	2	1.65983E+01	1.70983E+01	1.00000E+00	1.00000E+00	0.00000E+00
22	2	1.75983E+01	1.80983E+01	1.00000E+00	1.00000E+00	0.00000E+00
23	2	1.85983E+01	1.90983E+01	1.00000E+00	1.00000E+00	0.00000E+00
24	2	1.95983E+01	2.00983E+01	1.00000E+00	1.00000E+00	0.00000E+00
25	2	2.05983E+01	2.10983E+01	1.00000E+00	1.00000E+00	0.00000E+00
26	2	2.15983E+01	2.20983E+01	1.00000E+00	1.00000E+00	0.00000E+00
27	2	2.25983E+01	2.30983E+01	1.00000E+00	1.00000E+00	0.00000E+00
28	2	2.35983E+01	2.40983E+01	1.00000E+00	1.00000E+00	0.00000E+00
29	2	2.45983E+01	2.50983E+01	1.00000E+00	1.00000E+00	0.00000E+00
30	2	2.55983E+01	2.60983E+01	1.00000E+00	1.00000E+00	0.00000E+00
31	2	2.65983E+01	2.70983E+01	1.00000E+00	1.00000E+00	0.00000E+00
32	2	2.75983E+01	2.80983E+01	1.00000E+00	1.00000E+00	0.00000E+00
33	2	2.85983E+01	2.90983E+01	1.00000E+00	1.00000E+00	0.00000E+00
34	2	2.95983E+01	3.00983E+01	1.00000E+00	1.00000E+00	0.00000E+00
35	2	3.05983E+01	3.10983E+01	1.00000E+00	9.99998E-01	0.00000E+00
36	2	3.15983E+01	3.20983E+01	1.00000E+00	9.99998E-01	0.00000E+00
37	2	3.25983E+01	3.30983E+01	1.00000E+00	1.00000E+00	0.00000E+00
38	2	3.35983E+01	3.40983E+01	1.00000E+00	1.00000E+00	0.00000E+00
39	2	3.45983E+01	3.50983E+01	1.00000E+00	1.00000E+00	0.00000E+00
40	2	3.55983E+01	3.60983E+01	1.00000E+00	1.00000E+00	0.00000E+00
41	2	3.65983E+01	3.70983E+01	1.00000E+00	1.00000E+00	0.00000E+00
42	2	3.75983E+01	3.80983E+01	1.00000E+00	1.00000E+00	0.00000E+00
43	2	3.85983E+01	3.90983E+01	1.00000E+00	1.00000E+00	0.00000E+00
44	2	3.95983E+01	4.00983E+01	1.00000E+00	1.00000E+00	0.00000E+00
45	2	4.05983E+01	4.10983E+01	1.00000E+00	1.00000E+00	0.00000E+00
46	2	4.15983E+01	4.20983E+01	1.00000E+00	1.00000E+00	0.00000E+00
47	2	4.25983E+01	4.30983E+01	1.00000E+00	1.00000E+00	0.00000E+00
48	2	4.35983E+01	4.40983E+01	1.00000E+00	1.00000E+00	0.00000E+00
49	2	4.45983E+01	4.50983E+01	1.00000E+00	1.00000E+00	0.00000E+00
50	2	4.55983E+01	4.60983E+01	1.00000E+00	1.00000E+00	0.00000E+00
51		4.65983E+01		1.00000E+00		

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	1.11022E-16	1.07278E+00	6.62853E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0678
2	215	1.23714E-02	9.22337E-01	-2.76563E+00	-7.11313E-01	-6.16021E-02	0.00000E+00	0.3250
3	413	3.70248E-03	1.03429E+00	8.86197E-02	-2.77748E-01	-1.56495E-02	0.00000E+00	0.5673
4	609	1.60463E-03	1.03790E+00	5.47274E-02	-1.24003E-01	-6.36094E-03	0.00000E+00	0.8073
5	795	7.38446E-04	1.03456E+00	3.01023E-02	-6.01446E-02	-2.88365E-03	0.00000E+00	1.0382
6	972	3.51449E-04	1.03137E+00	1.58513E-02	-2.94354E-02	-1.37784E-03	0.00000E+00	1.2615
7	1140	1.72084E-04	1.02914E+00	8.27526E-03	-1.46024E-02	-6.83522E-04	0.00000E+00	1.4765
8	1298	8.64317E-05	1.02772E+00	4.35472E-03	-7.38855E-03	-3.49697E-04	0.00000E+00	1.6823
9	1442	4.45344E-05	1.02683E+00	2.33158E-03	-3.82459E-03	-1.84153E-04	0.00000E+00	1.8757
10	1592	2.35289E-05	1.02628E+00	1.27519E-03	-2.02971E-03	-9.96708E-05	0.00000E+00	2.0742
11	1742	1.27575E-05	1.02594E+00	7.14260E-04	-1.10535E-03	-5.54395E-05	-5.00000E-02	2.2728
- elapsed time 2.27 min.								
12	1928	-9.37330E-05	1.01058E+00	1.86847E-02	-2.77843E-02	3.01649E-04	-5.00000E-02	2.5055
13	2102	-5.94140E-06	1.00788E+00	-4.36749E-04	2.60854E-03	2.15565E-05	-5.00000E-02	2.7262
14	2253	-1.67432E-06	1.00779E+00	-6.27346E-05	2.06985E-04	4.49081E-06	-6.55163E-02	2.9257
- elapsed time 2.93 min.								
15	2428	-3.48614E-05	1.00288E+00	6.04886E-03	-8.63549E-03	1.14017E-04	-6.55163E-02	3.1472
16	2593	-3.78132E-06	1.00201E+00	-2.42155E-04	1.03562E-03	1.40927E-05	-7.04691E-02	3.3597
- elapsed time 3.36 min.								
17	2758	-1.28837E-05	1.00044E+00	1.89397E-03	-2.63788E-03	4.26956E-05	-7.04691E-02	3.5728
18	2851	-8.84973E-07	1.00010E+00	-8.81543E-05	3.79404E-04	6.68784E-06	-7.06029E-02	3.6900
- elapsed time 3.69 min.								
19	2882	4.45150E-08	1.00003E+00	3.51983E-05	-2.15801E-05	3.95325E-06	-7.06639E-02	3.7283
- elapsed time 3.73 min.								
20	2909	4.79391E-07	1.00000E+00	1.03116E-05	-1.58176E-06	2.35186E-06	-7.06639E-02	3.7632

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	29	9.24713E-06	50	9.99993E-01	6
2	1	20	8.23754E-06	50	9.99993E-01	8
3	1	50	6.84571E-06	50	9.99996E-01	10
4	1	48	7.46560E-06	50	9.99997E-01	12
5	1	47	5.59236E-06	49	9.99996E-01	16
6	1	48	4.78934E-06	47	9.99996E-01	16
7	1	48	4.01289E-06	47	9.99995E-01	24
8	1	46	3.50215E-06	46	9.99995E-01	45
9	1	50	6.47058E-06	50	9.99994E-01	45
10	1	50	5.12172E-06	50	9.99995E-01	45
11	1	50	4.27949E-06	50	9.99995E-01	45
12	1	50	5.17450E-06	50	9.99996E-01	45
13	1	50	5.43549E-06	50	9.99996E-01	45
14	1	50	5.34173E-06	50	9.99996E-01	45
15	1	38	6.89166E-05	38	9.99967E-01	45
16	1	38	7.98764E-05	38	9.99975E-01	45
17	1	38	8.65071E-05	38	9.99984E-01	45
18	1	38	8.79697E-05	38	9.99984E-01	45
19	1	38	8.73893E-05	38	9.99974E-01	45
20	1	38	8.39052E-05	38	9.99928E-01	45
21	2	9	2.14949E-06	8	1.00000E+00	45
22	1	18	4.87636E-05	18	1.00003E+00	50
23	1	38	1.60338E-05	38	1.00003E+00	50
24	1	38	2.76717E-05	38	1.00005E+00	50
25	1	38	3.84266E-05	38	1.00005E+00	50
26	1	37	4.10100E-05	38	1.00009E+00	50
27	1	37	6.50986E-05	38	1.00010E+00	50

21	2937	-3.76988E-08	1.00003E+00	-9.49150E-06	1.81638E-05	1.22419E-06	-7.06639E-02	3.8137

final monitor lambda 1.00003E+00 production/absorption 1.00072E+00 angular flux on 16

- elapsed time 3.81 min.

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION SAFE VOLUME            SPHERE            UCXSPSF1.CJW
  27GROUPNDF4              INFHOMMEDIUM
  SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished
 module csasi    is finished.
 module XSDRN    will be called
  SPHERE SAFE VOLUME=26.9L    UO2F2 SOLUTION DENSITY 1600 G U/L
  0$$  A3 2  E
  1$$  3 2 58 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  22I0 34I18.588 53.588
  36$$  23R1 35R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	1.11022E-16	1.09312E+00	6.07915E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0750
2	227	1.18192E-02	9.59357E-01	-2.28728E+00	-6.85350E-01	-6.10798E-02	0.00000E+00	0.4440
3	442	4.47759E-03	1.01733E+00	9.81317E-02	-2.80410E-01	-1.91056E-02	0.00000E+00	0.7975
4	645	2.20119E-03	1.00204E+00	7.32573E-02	-1.54898E-01	-8.67094E-03	0.00000E+00	1.1343
5	843	1.10636E-03	9.88269E-01	4.66273E-02	-8.64072E-02	-4.23015E-03	0.00000E+00	1.4657
6	1026	5.62710E-04	9.79076E-01	2.72633E-02	-4.66064E-02	-2.13437E-03	0.00000E+00	1.7768
7	1200	2.87628E-04	9.73589E-01	1.51909E-02	-2.47183E-02	-1.09514E-03	0.00000E+00	2.0773
8	1369	1.46547E-04	9.70515E-01	8.22004E-03	-1.29759E-02	-5.64575E-04	0.00000E+00	2.3702
9	1535	7.42158E-05	9.68834E-01	4.36948E-03	-6.75113E-03	-2.91125E-04	0.00000E+00	2.6595
10	1695	3.73277E-05	9.67921E-01	2.30027E-03	-3.48880E-03	-1.50013E-04	0.00000E+00	2.9405
11	1858	1.85125E-05	9.67432E-01	1.20141E-03	-1.79162E-03	-7.68451E-05	0.00000E+00	3.2132
12	1998	9.03447E-06	9.67169E-01	6.24257E-04	-9.12266E-04	-3.91481E-05	0.00000E+00	3.4815
13	2153	4.31893E-06	9.67026E-01	3.23900E-04	-4.60886E-04	-1.98315E-05	0.00000E+00	3.7560
14	2307	2.00159E-06	9.66946E-01	1.67919E-04	-2.30878E-04	-9.97027E-06	0.00000E+00	4.0297
15	2456	8.73296E-07	9.66905E-01	8.67267E-05	-1.14132E-04	-4.92778E-06	0.00000E+00	4.2970

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	2	20	1.14505E-05	56	1.00000E+00	7
2	1	1	9.35554E-05	6	1.00005E+00	10
3	2	19	1.12807E-05	24	1.00000E+00	11
4	2	20	7.93979E-06	25	1.00000E+00	14
5	1	1	9.19295E-05	4	1.00006E+00	18
6	1	1	7.59714E-05	3	1.00007E+00	20
7	1	1	6.23995E-05	2	1.00008E+00	29
8	1	1	5.70760E-05	2	1.00008E+00	46
9	1	1	5.81974E-05	2	1.00008E+00	46
10	1	1	5.79425E-05	2	1.00008E+00	46
11	1	1	5.48925E-05	1	1.00008E+00	58
12	1	1	6.63139E-05	1	1.00006E+00	58
13	1	1	6.89929E-05	1	1.00006E+00	58
14	1	1	6.78837E-05	1	1.00006E+00	58
15	2	15	1.63708E-06	44	1.00000E+00	46
16	2	58	1.73628E-06	58	1.00000E+00	46
17	2	58	1.98541E-06	58	1.00000E+00	46
18	2	58	1.92698E-06	58	1.00000E+00	58
19	2	58	2.29112E-06	58	1.00000E+00	58
20	2	58	1.83763E-06	44	9.99999E-01	58
21	2	58	2.65430E-06	58	9.99999E-01	58
22	2	58	2.44111E-06	58	9.99999E-01	58
23	1	48	2.96291E-05	48	1.00005E+00	78
24	1	48	8.01920E-05	49	1.00015E+00	58
25	2	57	1.05522E-06	57	9.99999E-01	58
26	2	58	2.17753E-06	58	9.99997E-01	58
27	2	58	1.71572E-06	58	9.99998E-01	58

16	2497	-7.91749E-11	9.66930E-01	7.24154E-06	-4.59603E-05	-1.74116E-07	0.00000E+00	4.3793

final monitor lambda 9.66931E-01 production/absorption 9.69981E-01 angular flux on 16

elapsed time 4.38 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION  SAFE DIAMETER  CYLINDER                UOXCYSF1.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUO2F2    1  1600.0 0 1.0 293  92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  CYLINDER  SAFE DIAMETER=25.4CM   UO2F2 SOLUTION DENSITY=1600 G U/L
  0$$  A3 2  E
  1$$  2 2 51 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  15I0 34I12.7 47.7
  36$$  16R1 35R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-4.44089E-16	1.07755E+00	6.43762E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0833
2	217	1.26241E-02	9.08325E-01	-2.53947E+00	-7.25277E-01	-6.29082E-02	0.00000E+00	1.3757
3	416	4.11296E-03	9.96253E-01	1.02522E-01	-2.98361E-01	-1.71533E-02	0.00000E+00	2.5697
4	613	1.84139E-03	9.90560E-01	6.83897E-02	-1.44571E-01	-7.15561E-03	0.00000E+00	3.7513
5	800	8.64363E-04	9.81966E-01	3.95828E-02	-7.31134E-02	-3.29093E-03	0.00000E+00	4.8773
6	979	4.14601E-04	9.76029E-01	2.14100E-02	-3.66098E-02	-1.57917E-03	0.00000E+00	5.9592
7	1150	2.01063E-04	9.72504E-01	1.12098E-02	-1.82692E-02	-7.74899E-04	0.00000E+00	6.9965
8	1314	9.81625E-05	9.70505E-01	5.79500E-03	-9.12514E-03	-3.85805E-04	0.00000E+00	7.9953
9	1472	4.80637E-05	9.69394E-01	2.98745E-03	-4.57416E-03	-1.94040E-04	0.00000E+00	8.9610
10	1626	2.36576E-05	9.68769E-01	1.54928E-03	-2.30590E-03	-9.87993E-05	0.00000E+00	9.9038
11	1784	1.16852E-05	9.68414E-01	8.11991E-04	-1.17329E-03	-5.09185E-05	0.00000E+00	10.8687
12	1942	5.86155E-06	9.68204E-01	4.34437E-04	-6.05257E-04	-2.68423E-05	0.00000E+00	11.8335
13	2094	2.97641E-06	9.68078E-01	2.37769E-04	-3.19086E-04	-1.44593E-05	0.00000E+00	12.7655
14	2243	1.49251E-06	9.68005E-01	1.31946E-04	-1.70957E-04	-7.84292E-06	0.00000E+00	13.6810
15	2387	7.44631E-07	9.67960E-01	7.46404E-05	-9.24434E-05	-4.32641E-06	0.00000E+00	14.5680

grp to grp	inner iters	mfd int.	max. flux difference	maf int.	max. scale factor	coarse mesh
1	1	1	6.28657E-05	10	1.00001E+00	6
2	1	16	5.85267E-05	6	1.00003E+00	9
3	1	1	6.31644E-05	6	1.00002E+00	10
4	1	1	6.47658E-05	5	1.00002E+00	12
5	1	16	6.21044E-05	4	1.00003E+00	16
6	1	1	4.35461E-05	3	1.00004E+00	17
7	1	1	3.43047E-05	2	1.00004E+00	26
8	1	1	3.04635E-05	2	1.00004E+00	43
9	1	1	3.01716E-05	2	1.00004E+00	43
10	1	1	2.92784E-05	2	1.00004E+00	43
11	1	1	2.81816E-05	2	1.00004E+00	43
12	1	1	3.14478E-05	1	1.00003E+00	51
13	1	1	3.33192E-05	2	1.00003E+00	43
14	1	1	3.11449E-05	1	1.00003E+00	51
15	2	10	8.97408E-07	38	1.00000E+00	43
16	2	51	1.58046E-06	51	1.00000E+00	43
17	2	51	1.82011E-06	51	1.00000E+00	43
18	2	51	1.76967E-06	51	1.00000E+00	43
19	2	51	2.12306E-06	51	1.00000E+00	43
20	2	51	1.66763E-06	37	9.99999E-01	51
21	2	51	2.35170E-06	51	9.99999E-01	51
22	2	51	2.12800E-06	51	9.99999E-01	51
23	1	42	2.89677E-05	42	1.00005E+00	51
24	1	42	7.73182E-05	42	1.00015E+00	51
25	2	50	8.41480E-07	37	1.00000E+00	51
26	2	50	1.76560E-06	37	1.00000E+00	51
27	2	51	3.09935E-06	51	9.99997E-01	51

16	2425	-3.79793E-08	9.67982E-01	6.92869E-06	-4.07468E-05	-3.73872E-07	0.00000E+00	14.8482

final monitor

lambda 9.67981E-01 production/absorption 9.70306E-01 angular flux on 16

elapsed time 14.85 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
      UO2F2 SOLUTION   SAFE THICKNESS            SLAB            UOXSLSF1.CJW
      27GROUPNDF4                 INFDOMMEDIUM
      SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
      H2O          2  1.0  293  END
      END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
      SLAB   SAFE THICKNESS=12.0    UO2F2 SOLUTION DENSITY=1600 G U/L
      0$$  A3 2  E
      1$$  1 2 50 1 0   2 2 16 3 1
       10 50 0 0 0
      2$$  -2 0 0 0 0    0 -1 0 0 0
      3$$  0 0 0 1 0     0 0 0 0 0
           0 0
      5**  A4 0  0  E
        T
      13$$  1 2
      14$$  1 2
      15**  F3
        T
      34**  F1
        T
      35**  9I0 39I6.0 46.0
      36$$  10R1 40R2
      39$$  1 2
      40$$  F3
        T
  WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
      UO2F2 SOLUTION   SAFE THICKNESS             SLAB            UOXSLSF1.CJW
      27GROUPNDF4                 INFHOMMEDIUM
      SOLNUO2F2    1  1600.0 0 1.0 293   92235 5.02  92238 94.98  END
      H2O          2  1.0  293  END
      END COMP
    secondary module o0o008   has been called.
    module o0o008   is finished.
    secondary module o0o002   has been called.
    module o0o002   is finished.
    secondary module o0o007   has been called.
    module o0o007   is finished.
    module csasi    is finished.
-   module XSDRN    will be called
      SLAB   SAFE THICKNESS=12.0    UO2F2 SOLUTION DENSITY=1600 G U/L
      0$$  A3 2  E
      1$$  1 2 50 1 0   2 2 16 3 1
       10 50 0 0 0
      2$$  -2 0 0 0 0    0 -1 0 0 0
      3$$  0 0 0 1 0     0 0 0 0 0
           0 0
      5**  A4 0  0  E
        T
      13$$  1 2
      14$$  1 2
      15**  F1
        T
      34**  F1
        T
      35**  9I0 39I6.0 46.0
      36$$  10R1 40R2
      39$$  1 2
      40$$  F3
        T
  WARNING: an "END" statement is assumed at end of input file
    module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-4.44089E-16	1.05552E+00	6.93362E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0678
2	215	1.34484E-02	8.52004E-01	-3.00383E+00	-7.68678E-01	-6.43246E-02	0.00000E+00	0.3250
3	412	3.67336E-03	9.75903E-01	1.04739E-01	-3.20499E-01	-1.49379E-02	0.00000E+00	0.5667
4	606	1.46405E-03	9.80604E-01	6.10538E-02	-1.31526E-01	-5.60989E-03	0.00000E+00	0.8047
5	789	6.28130E-04	9.77020E-01	3.15301E-02	-5.87049E-02	-2.38794E-03	0.00000E+00	1.0327
6	960	2.83008E-04	9.73538E-01	1.57511E-02	-2.68575E-02	-1.08824E-03	0.00000E+00	1.2505
7	1125	1.32876E-04	9.71150E-01	7.90927E-03	-1.26706E-02	-5.21622E-04	0.00000E+00	1.4630
8	1269	6.50203E-05	9.69629E-01	4.06948E-03	-6.19415E-03	-2.61840E-04	0.00000E+00	1.6560
9	1420	3.30242E-05	9.68692E-01	2.15755E-03	-3.14727E-03	-1.36831E-04	0.00000E+00	1.8555
10	1571	1.74231E-05	9.68112E-01	1.18232E-03	-1.66028E-03	-7.43438E-05	0.00000E+00	2.0552
11	1721	9.54644E-06	9.67750E-01	6.69972E-04	-9.09656E-04	-4.19169E-05	0.00000E+00	2.2537
12	1870	5.40524E-06	9.67523E-01	3.91220E-04	-5.16501E-04	-2.43950E-05	0.00000E+00	2.4517
13	2014	3.14907E-06	9.67378E-01	2.34501E-04	-3.02487E-04	-1.45912E-05	0.00000E+00	2.6457
14	2158	1.88149E-06	9.67286E-01	1.43884E-04	-1.82028E-04	-8.94365E-06	0.00000E+00	2.8387
15	2302	1.14542E-06	9.67226E-01	9.00613E-05	-1.12168E-04	-5.59301E-06	0.00000E+00	3.0320

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	10	2.39214E-05	50	9.99997E-01	6
2	1	10	2.25489E-05	26	9.99996E-01	8
3	1	10	2.37198E-05	24	9.99997E-01	10
4	1	10	2.51888E-05	6	1.00000E+00	12
5	1	10	2.79734E-05	5	1.00001E+00	16
6	1	10	1.68904E-05	4	1.00001E+00	16
7	1	9	1.21317E-05	3	1.00001E+00	24
8	1	1	6.52562E-06	2	1.00001E+00	45
9	1	1	5.28770E-06	2	1.00001E+00	45
10	1	1	4.28145E-06	2	1.00001E+00	45
11	1	19	3.84615E-06	19	9.99995E-01	45
12	1	19	4.69533E-06	19	9.99996E-01	45
13	1	19	4.83187E-06	20	9.99996E-01	45
14	1	20	4.65134E-06	21	9.99996E-01	45
15	2	10	7.43943E-07	31	1.00000E+00	45
16	2	50	1.37755E-06	50	1.00000E+00	45
17	2	50	1.58745E-06	50	1.00000E+00	45
18	2	50	1.54191E-06	50	1.00000E+00	45
19	2	50	1.85016E-06	50	1.00000E+00	45
20	2	50	1.38715E-06	31	9.99999E-01	45
21	2	50	1.98938E-06	50	1.00000E+00	45
22	2	50	1.79707E-06	50	9.99999E-01	45
23	1	36	2.96095E-05	36	1.00005E+00	50
24	1	37	7.86536E-05	37	1.00015E+00	50
25	2	49	7.03809E-07	31	1.00000E+00	50
26	2	50	1.87810E-06	50	9.99997E-01	50
27	2	50	1.87039E-06	50	9.99998E-01	50

16	2340	-3.78194E-08	9.67259E-01	9.59115E-06	-5.36648E-05	-9.40712E-07	0.00000E+00	3.0915

final monitor

lambda 9.67259E-01 production/absorption 9.67967E-01 angular flux on 16

elapsed time 3.09 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
     UO2F2 SOLUTION OPTIMIZE VOLUME  MASS=28.3 KGS U   SPHERE     UOXSPVOD.CJW
     27GROUPNDF4                INFHOMMEDIUM
     SOLNUO2F2    1  883.721 0 1.0 293   92235 5.02  92238 94.98  END
     H2O          2  1.0  293  END
     END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been called.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-   module XSDRN    will be called
     SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION  VOL=32.02L
     0$$  A3 2  E
     1$$  3 2 114 1 0   2 2 16 3 1
      10 50 0 0 0
     2$$  -2 0 0 0 0    0 -1 0 0 0
     3$$  0 0 0 1 0     0 0 0 0 0
          0 0
     5**  A4 0  0  E
       T
     13$$  1 2
     14$$  1 2
     15**  F1
       T
     34**  F1
       T
     35**  42I0 70I19.7 54.7
     36$$  43R1 71RZ
     39$$  1 2
     40$$  F3
       T
 WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-2.22045E-16	9.52049E-01	7.57952E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0933
2	224	1.31231E-02	8.39719E-01	-4.02547E+00	-8.21363E-01	-6.02595E-02	0.00000E+00	0.8018
3	434	2.80055E-03	1.02939E+00	7.25290E-02	-2.89470E-01	-1.18661E-02	0.00000E+00	1.4755
4	632	1.46189E-03	1.01090E+00	5.43907E-02	-1.05829E-01	-5.86278E-03	0.00000E+00	2.1183
5	823	8.14403E-04	9.90903E-01	3.96676E-02	-6.20859E-02	-3.31412E-03	0.00000E+00	2.7427
6	1006	4.88801E-04	9.77074E-01	2.60450E-02	-3.79273E-02	-1.92102E-03	0.00000E+00	3.3477
7	1187	2.85430E-04	9.68203E-01	1.64458E-02	-2.29500E-02	-1.12269E-03	0.00000E+00	3.9463
8	1362	1.66918E-04	9.62678E-01	1.01316E-02	-1.37513E-02	-6.59201E-04	0.00000E+00	4.5315
9	1531	9.73583E-05	9.59320E-01	6.13345E-03	-8.18333E-03	-3.86974E-04	0.00000E+00	5.0998
10	1697	5.66600E-05	9.57301E-01	3.67024E-03	-4.83934E-03	-2.27033E-04	0.00000E+00	5.6608
11	1860	3.28535E-05	9.56099E-01	2.17867E-03	-2.84861E-03	-1.32917E-04	0.00000E+00	6.2138
12	2018	1.89278E-05	9.55389E-01	1.28381E-03	-1.66837E-03	-7.74595E-05	0.00000E+00	6.7548
13	2176	1.07851E-05	9.54977E-01	7.49472E-04	-9.70182E-04	-4.47528E-05	0.00000E+00	7.2958
14	2331	6.10080E-06	9.54737E-01	4.35128E-04	-5.59384E-04	-2.57253E-05	0.00000E+00	7.8287
15	2475	3.42416E-06	9.54596E-01	2.51634E-04	-3.20724E-04	-1.47147E-05	0.00000E+00	8.3340
16	2619	1.89468E-06	9.54516E-01	1.44554E-04	-1.82656E-04	-8.33606E-06	0.00000E+00	8.8392
17	2763	1.02864E-06	9.54470E-01	8.23498E-05	-1.02895E-04	-4.66396E-06	0.00000E+00	9.3438

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	2	2.58682E-05	18	1.00001E+00	7
2	1	43	3.13301E-05	11	1.00001E+00	11
3	1	43	2.92493E-05	10	1.00001E+00	12
4	1	43	3.02125E-05	8	1.00001E+00	16
5	1	42	2.90957E-05	6	1.00001E+00	19
6	1	43	2.19362E-05	5	1.00002E+00	23
7	1	1	1.74666E-05	4	1.00002E+00	35
8	1	1	1.61736E-05	3	1.00002E+00	50
9	1	1	1.70417E-05	2	1.00002E+00	57
10	1	1	1.75171E-05	2	1.00002E+00	57
11	1	1	1.77463E-05	2	1.00002E+00	57
12	1	1	2.17689E-05	2	1.00002E+00	57
13	1	1	2.29097E-05	2	1.00002E+00	57
14	1	1	2.26689E-05	2	1.00002E+00	57
15	2	78	2.05781E-06	90	1.00000E+00	57
16	2	78	1.59362E-06	114	1.00000E+00	57
17	2	114	1.90480E-06	114	1.00000E+00	57
18	2	114	1.83736E-06	114	1.00000E+00	57
19	2	114	2.10679E-06	114	1.00000E+00	57
20	2	78	4.69317E-06	90	1.00000E+00	57
21	2	78	2.79523E-06	114	1.00000E+00	57
22	2	114	3.92397E-06	114	9.99999E-01	57
23	1	96	1.72658E-05	96	1.00003E+00	92
24	1	97	4.96693E-05	98	1.00010E+00	114
25	1	97	7.22741E-05	98	1.00010E+00	114
26	1	97	7.92308E-05	97	1.00018E+00	114
27	2	113	5.03272E-07	113	1.00000E+00	114

18	2799	1.75207E-10	9.54502E-01	6.72761E-06	-4.56910E-05	-5.53499E-07	0.00000E+00	9.4892

final monitor
lambda 9.54502E-01 production/absorption 9.57263E-01 angular flux on 16

elapsed time 9.49 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
 module CSASI    will be called
  UO2F2 SOLUTION OPTIMIZE VOLUME  MASS=17.0 KGS U   SPHERE     UOXSPVOE.CJW
  27GROUPNDF4                INFHOMMEDIUM
  SOLNUO2F2    1  883.721 0 1.0 293   92235 5.02  92238 94.98  END
  H2O          2  1.0  293  END
  END COMP
 secondary module o0o008   has been called.
 module o0o008   is finished.
 secondary module o0o002   has been called.
 module o0o002   is finished.
 secondary module o0o007   has been called.
 module o0o007   is finished.
 module csasi    is finished.
 module XSDRN    will be called
  SPHERE OPTIMIZATION UO2F2 SOLUTION VOLUME VARIATION  VOL=19.24L
  0$$  A3 2  E
  1$$  3 2 114 1 0   2 2 16 3 1
   10 50 0 0 0
  2$$  -2 0 0 0 0    0 -1 0 0 0
  3$$  0 0 0 1 0     0 0 0 0 0
       0 0
  5**  A4 0  0  E
    T
  13$$  1 2
  14$$  1 2
  15**  F1
    T
  34**  F1
    T
  35**  42I0 70I16.622 51.622
  36$$  43R1 71R2
  39$$  1 2
  40$$  F3
    T
WARNING: an "END" statement is assumed at end of input file
 module xsdrn    is finished.
```

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	-4.44089E-16	9.29723E-01	7.80367E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0905
2	226	1.43870E-02	7.51915E-01	-4.26267E+00	-8.82667E-01	-6.40949E-02	0.00000E+00	0.8043
3	434	2.93103E-03	9.39758E-01	9.76388E-02	-3.51941E-01	-1.19444E-02	0.00000E+00	1.4727
4	632	1.37639E-03	9.19344E-01	7.09338E-02	-1.20673E-01	-5.30866E-03	0.00000E+00	2.1155
5	820	7.18862E-04	8.98673E-01	4.56333E-02	-6.37252E-02	-2.74009E-03	0.00000E+00	2.7323
6	1003	3.83326E-04	8.85376E-01	2.75294E-02	-3.54071E-02	-1.46286E-03	0.00000E+00	3.3365
7	1180	2.06038E-04	8.77440E-01	1.59957E-02	-1.96284E-02	-7.91987E-04	0.00000E+00	3.9262
8	1350	1.10863E-04	8.72871E-01	9.08088E-03	-1.08322E-02	-4.31031E-04	0.00000E+00	4.4972
9	1516	5.95801E-05	8.70282E-01	5.08360E-03	-5.95165E-03	-2.35078E-04	0.00000E+00	5.0583
10	1679	3.19152E-05	8.68829E-01	2.82256E-03	-3.25913E-03	-1.28220E-04	0.00000E+00	5.6113
11	1837	1.69739E-05	8.68019E-01	1.55730E-03	-1.77838E-03	-6.97262E-05	0.00000E+00	6.1525
12	1987	8.95559E-06	8.67569E-01	8.55893E-04	-9.65806E-04	-3.78003E-05	0.00000E+00	6.6723
13	2131	4.66770E-06	8.67319E-01	4.68681E-04	-5.22037E-04	-2.03846E-05	0.00000E+00	7.1777
14	2277	2.39708E-06	8.67180E-01	2.56088E-04	-2.80430E-04	-1.09327E-05	0.00000E+00	7.6875
15	2424	1.21175E-06	8.67102E-01	1.40132E-04	-1.49775E-04	-5.84218E-06	0.00000E+00	8.2002
16	2568	6.02077E-07	8.67058E-01	7.71173E-05	-7.96988E-05	-3.11795E-06	0.00000E+00	8.7055

grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	2	6.83304E-05	21	1.00001E+00	6
2	1	2	6.22244E-05	13	1.00002E+00	10
3	1	2	6.84835E-05	12	1.00002E+00	11
4	1	2	7.04570E-05	10	1.00002E+00	15
5	1	2	5.92655E-05	7	1.00003E+00	18
6	1	2	4.88480E-05	6	1.00004E+00	22
7	1	1	3.95991E-05	4	1.00004E+00	35
8	1	1	3.46583E-05	3	1.00005E+00	50
9	1	1	3.49198E-05	3	1.00004E+00	50
10	1	1	3.37320E-05	2	1.00004E+00	57
11	1	1	3.28006E-05	2	1.00004E+00	57
12	1	1	3.90156E-05	2	1.00003E+00	57
13	1	1	4.01457E-05	2	1.00003E+00	57
14	1	1	3.89194E-05	2	1.00003E+00	57
15	2	78	2.54225E-06	90	1.00000E+00	57
16	2	78	1.95621E-06	114	1.00000E+00	57
17	2	114	2.11758E-06	114	1.00000E+00	57
18	2	114	2.04507E-06	114	1.00000E+00	57
19	2	114	2.35634E-06	114	1.00000E+00	57
20	2	80	5.80662E-06	90	9.99999E-01	57
21	2	78	3.44859E-06	114	1.00000E+00	57
22	2	114	4.44510E-06	114	9.99999E-01	57
23	1	97	2.15964E-05	97	1.00004E+00	92
24	1	98	5.93275E-05	98	1.00012E+00	92
25	1	97	8.61122E-05	98	1.00012E+00	114
26	1	97	9.42777E-05	97	1.00021E+00	114
27	2	113	5.93562E-07	113	1.00000E+00	114

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
17	2604	3.19868E-10	8.67075E-01	5.89096E-06	-3.52921E-05	-2.59176E-07	0.00000E+00	8.8500

final monitor lambda 8.67075E-01 production/absorptio.. 8.70177E-01 angular flux on 16

- elapsed time 8.85 min.

```
        primary module access and input record ( scale driver - 10/31/90 - 14:00 )
-   module CSASI    will be called
    UO2F2 BENCHMARK  CONCENTRATION       SPHERE              UOXSPCRA.CJW
    27GROUPNDF4                  INFHOMMEDIUM
    SOLNUO2F2    1  910.18 0 1.0 293   92235 4.98  92238 95.02  END
    SS304        2  1.0  293  END
    END COMP
   secondary module o0o008   has been called.
   module o0o008   is finished.
   secondary module o0o002   has been call. '.
   module o0o002   is finished.
   secondary module o0o007   has been called.
   module o0o007   is finished.
   module csasi    is finished.
-  module XSDRN    will be called
    SPHERE OPTIMIZATION UO2F2 SOLUTION DENSITY VARIATION
    0$$  A3 2  E
    1$$  3 2 35 1 0   2 2 16 3 1
     10 50 0 0 0
    2$$  -2 0 0 0 0    0 -1 0 0 0
    3$$  0 0 0 1 0     0 0 0 0 0
         0 0
    5**  A4 0  0  E
      T
    13$$  1 2
    14$$  1 2
    15**  F1
      T
    34**  F1
      T
    35**  30I0 3I25.3873 25.4381
    36$$  31R1 4R2
    39$$  1 2
    40$$  F3
      T
WARNING: an "END" statement is assumed at end of input file
   module xsdrn    is finished.
```

logical assignments
master library 11
working library 0
scratch file 18
new library 1
p r o b l e m d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere 1
izm--number of zones or material regions 2
ms--mixing table length 9
ibl--shielded cross section edit option (0/1--no/yes) 0
ibr--bondarenko factor edit option (0/1--no/yes) 0
issopt--dancoff factor option 0
convergence criterion 1.00000E-03
geometry correction factor for wigner rational approximation 1.000E+00
3q array has 9 entries.
4q array has 9 entries.
5q array has 9 entries.
6q array has 2 entries.
7q array has 2 entries.
8q array has 2 entries.
9q array has 2 entries.
10q array has 9 entries.
11q array has 2 entries.
m i x i n g t a b l e

entry	mixture	isotope	number density	new identifier
1	1	92235	1.16134E-04	92235
2	1	92238	2.18788E-03	92238
3	1	8016	3.30482E-02	8016
4	1	9019	4.60802E-03	9019
5	1	1001	5.68804E-02	1001
6	2	24304	1.74286E-02	24304
7	2	25055	1.73633E-03	25055
8	2	26304	5.93579E-02	26304
9	2	28304	7.72074E-03	28304

$\frac{H}{U^{235}} = \frac{5.68804 \times 10^{-2}}{1.16134 \times 10^{-4}} = 489.8$

geometry and material description

zone	mixture	outer dimension	temperature	extra xs	type (0/1--fuel/mod)
1	1	1.00000E+00	2.93000E+02	0.00000E+00	0
2	2	6.00000E+00	2.93000E+02	0.00000E+00	0

2788 locations of 100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical 1
copy 1001 HYDROGEN from log 11 to log 1 bondarenko trigger 0
copy 8016 OXYGEN-16 from log 11 to log 1 bondarenko trigger 0
copy 9019 FLUORINE from log 11 to log 1 bondarenko trigger 0
copy 24304 CR 1191 WT SS-30 from log 11 to log 1 bondarenko trigger 0
copy 25055 MANGANESE-55 from log 11 to log 1 bondarenko trigger 0
copy 26304 FE 1192 WT SS-30 from log 11 to log 1 bondarenko trigger 0
copy 28304 NI 1190 WT SS-30 from log 11 to log 1 bondarenko trigger 0
copy 92235 URANIUM-235 from log 11 to log 1 bondarenko trigger 0
copy 92238 URANIUM-238 from log 11 to log 1 bondarenko trigger 0

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	0	0.00000E+00	5.37508E-01	7.41683E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.0658
2	221	6.83784E-03	9.01961E-01	-3.06761E+00	-5.56638E-01	-3.83245E-02	0.00000E+00	0.2837
3	430	1.36537E-04	1.03189E+00	1.42733E-02	-4.77732E-02	-1.15631E-03	0.00000E+00	0.4908
4	627	-1.05002E-04	1.02371E+00	1.38316E-02	8.65468E-03	4.40938E-04	0.00000E+00	0.6893
5	818	-7.60727E-05	1.01403E+00	8.87674E-03	7.74352E-03	3.43110E-04	0.00000E+00	0.8825
6	1000	-4.55845E-05	1.00801E+00	5.27120E-03	4.74880E-03	2.07318E-04	0.00000E+00	1.0692
7	1178	-2.61688E-05	1.00453E+00	3.02861E-03	2.75022E-03	1.19299E-04	0.00000E+00	1.2522
8	1350	-1.48071E-05	1.00256E+00	1.71361E-03	1.55798E-03	6.75706E-05	0.00000E+00	1.4310
9	1516	-8.26600E-06	1.00146E+00	9.57604E-04	8.73571E-04	3.77471E-05	0.00000E+00	1.6048
10	1680	-4.55037E-06	1.00085E+00	5.27596E-04	4.82719E-04	2.07908E-05	0.00000E+00	1.7777
11	1827	-2.91654E-06	1.00052E+00	2.86298E-04	2.59529E-04	1.31874E-05	0.00000E+00	1.9325
12	1894	-4.19118E-06	1.00041E+00	1.37332E-04	1.10086E-04	1.69880E-05	0.00000E+00	2.0003
13	1935	-1.12425E-06	1.00031E+00	3.94005E-05	5.87896E-05	7.15840E-06	0.00000E+00	2.0387

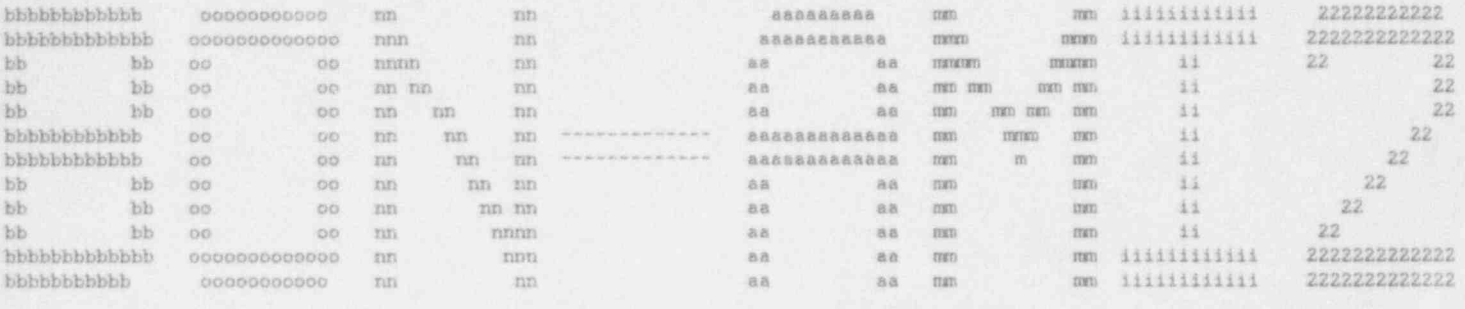
grp to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	7.36507E-05	10	9.99982E-01	4
2	1	1	6.91179E-05	6	9.99968E-01	6
3	1	1	8.00961E-05	6	9.99975E-01	6
4	1	1	8.42861E-05	5	9.99977E-01	7
5	1	1	7.09731E-05	4	9.99964E-01	8
6	1	1	5.66769E-05	3	9.99954E-01	11
7	1	2	4.56246E-05	2	9.99947E-01	16
8	1	2	3.93770E-05	2	9.99947E-01	16
9	1	1	3.78082E-05	1	9.99950E-01	32
10	1	1	3.65029E-05	1	9.99952E-01	32
11	1	1	3.49571E-05	1	9.99954E-01	32
12	1	1	4.16694E-05	1	9.99963E-01	32
13	1	1	4.29588E-05	1	9.99965E-01	32
14	1	1	4.16897E-05	1	9.99966E-01	32
15	1	1	4.31826E-05	1	1.00002E+00	32
16	1	1	4.91299E-05	1	1.00002E+00	32
17	1	1	5.49842E-05	1	1.00001E+00	32
18	1	1	5.53468E-05	1	1.00001E+00	32
19	1	1	5.07558E-05	1	1.00002E+00	32
20	1	33	3.67557E-05	35	1.00003E+00	32
21	1	30	4.72961E-05	35	1.00002E+00	32
22	1	31	4.35507E-05	35	1.00003E+00	32
23	1	32	2.79364E-05	35	1.00004E+00	32
24	1	1	3.19057E-05	1	9.99942E-01	32
25	1	1	4.53231E-05	1	9.99942E-01	32
26	1	1	4.93991E-05	1	9.99901E-01	32
27	1	1	7.60122E-05	1	9.99896E-01	32

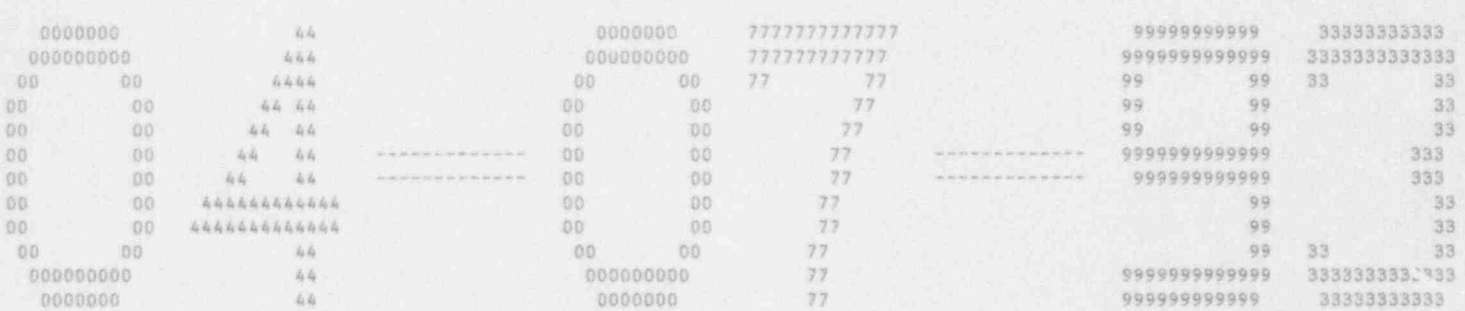
14	1962	-2.46905E-10	1.00027E+00	1.39401E-05	1.65457E-05	3.35425E-06	0.00000E+00	2.0780

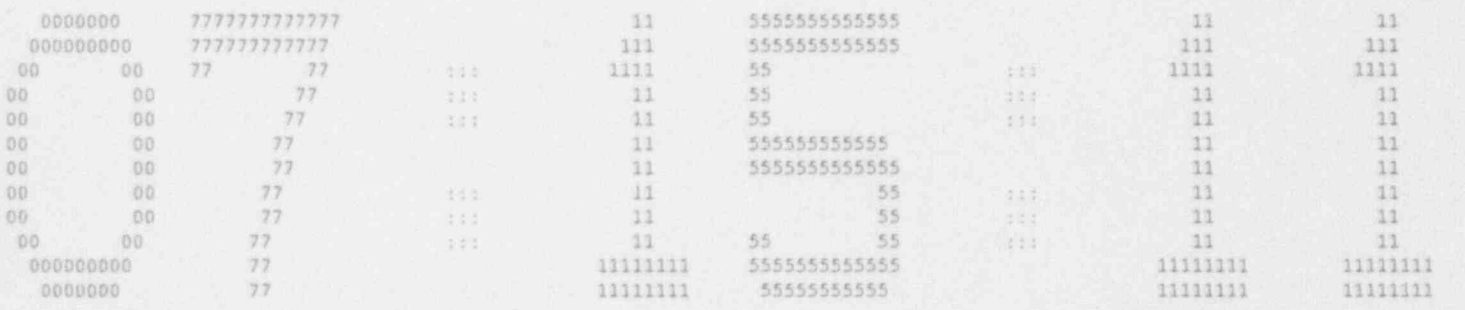
final monitor
lambda 1.00027E+00 production/absorption 1.37395E+00 angular flux on 16

- elapsed time 2.08 min.

Sample KENO Va Output







```
*******************************************************************************
*******************************************************************************
*******************************************************************************
*****                                                                     *****
*****                  program verification information                *****
*****                                                                     *****
*****                        version:  scale 4.0                          *****
*****                                                                     *****
*******************************************************************************
*******************************************************************************
*****                                                                     *****
*****                                                                     *****
*****             program:  bonami                                        *****
*****                                                                     *****
*****       creation date:  08/09/91                                      *****
*****                                                                     *****
*****             library:  scale-4 libraries                             *****
*****                                                                     *****
*****                                                                     *****
*****             jobname:  effincy1                                      *****
*****                                                                     *****
*****   date of execution:  04-07-93                                      *****
*****                                                                     *****
*****   time of execution:  07:15:11                                      *****
*****                                                                     *****
*****                                                                     *****
*******************************************************************************
*******************************************************************************
*******************************************************************************
```

BON-AMI - INEL IBMPC-386 (Extended) Configuration Release 1.00

```
-1q array has       1 entries.
 0q array has       4 entries.
 1q array has       6 entries.
 2q array has       2 entries.
```

```
logical assignments
master library   11
working library   0
scratch file     18
new library       1
p r o b l e m   d e s c r i p t i o n
igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1
izm--number of zones or material regions                       3
ms--mixing table length                                        7
ibl--shielded cross section edit option (0/1--no/yes)          0
ibr--bondarenko factor edit option (0/1--no/yes)               0
issopt--dancoff factor option                                  0
convergence criterion    1.00000E-03
geometry correction factor for wigner rational approximation  1.000E+00
        3q array has       7 entries.
        4q array has       7 entries.
        5q array has       7 entries.
        6q array has       3 entries.
        7q array has       3 entries.
        8q array has       3 entries.
        9q array has       3 entries.
       10q array has       7 entries.
       11q array has       3 entries.
m i x i n g   t a b l e
entry   mixture   isotope   number density   new identifier
   1        1     92235     4.21729E-04          92235
   2        1     92238     7.87847E-03          92238
   3        1      9019     4.98012E-02           9019
   4        2      6012     3.92503E-03           6012
   5        2     26000     8.34982E-02          26000
   6        3      1001     6.67514E-11           1001
   7        3      8016     3.33757E-11           8016
geometry and material description
zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1      1         1.00000E+00    2.93000E+02    0.00000E+00             0
   2      2         6.00000E+00    2.93000E+02    0.00000E+00             0
   3      3         1.10000E+01    2.93000E+02    0.00000E+00             0
     2427 locations of   100000 available are required to make a new master containing the self-shielded values
no nuclides in your problem have bondarenko factor data**bonami will copy from logical 11 to logical  1
copy      1001   HYDROGEN        from log 11 to log  1    bondarenko trigger 0
copy      6012   CARBON-12       from log 11 to log  1    bondarenko trigger 0
copy      8016   OXYGEN-16       from log 11 to log  1    bondarenko trigger 0
copy      9019   FLUORINE        from log 11 to log  1    bondarenko trigger 0
copy     26000   IRON            from log 11 to log  1    bondarenko trigger 0
copy     92235   URANIUM-235     from log 11 to log  1    bondarenko trigger 0
copy     92238   URANIUM-238     from log 11 to log  1    bondarenko trigger 0
```

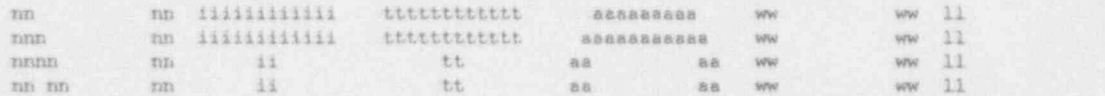
SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89
LAST UPDATED 10/12/89
L.M.PETRIE ORNL

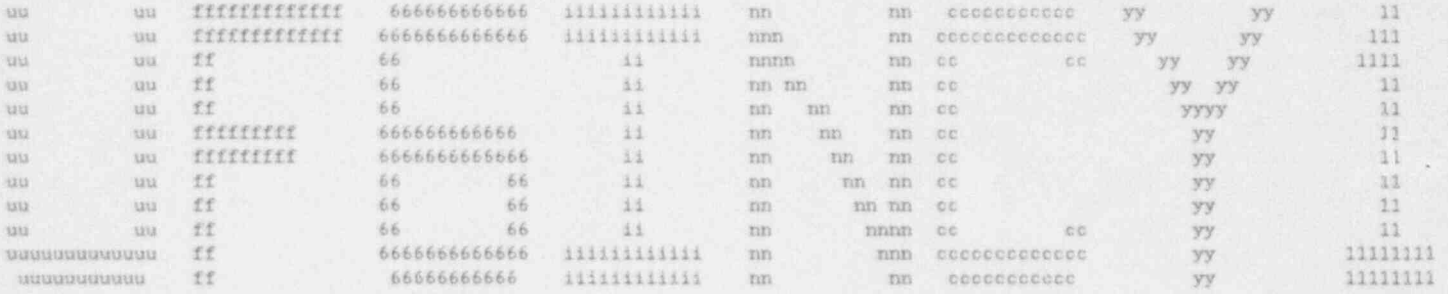
tape id	4027000	number of nuclides	7
number of neutron groups	27	number of gamma groups	0
first thermal group	15	logical unit	1

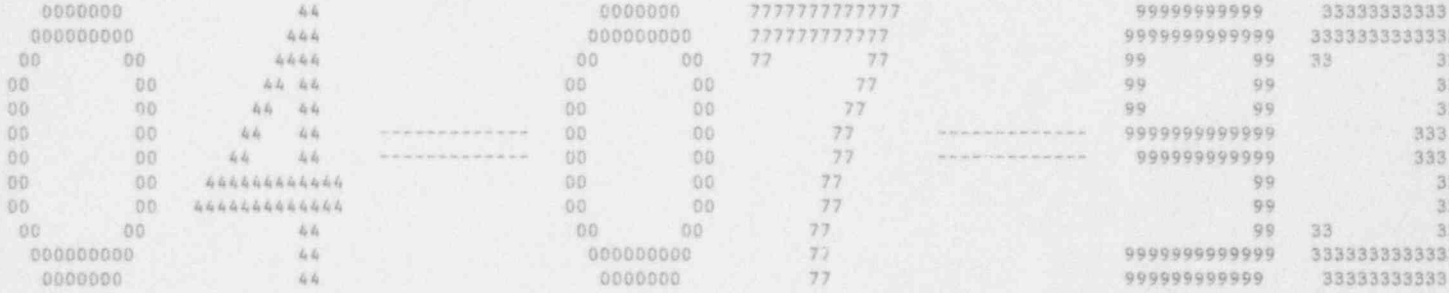
table of contents

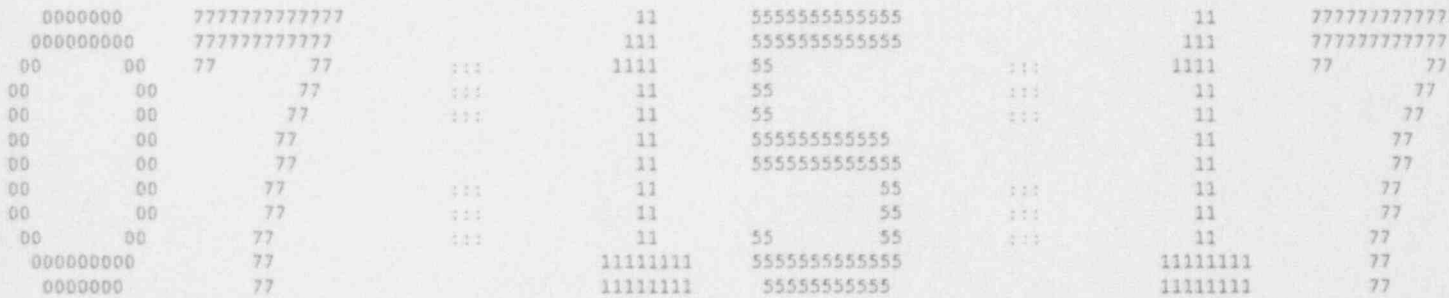
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	id	1001
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 10/12/89	id	6012
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	id	8016
FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89	id	9019
IRON	ENDF/B-IV MAT 1192	UPDATED 10/12/89	id	26000
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89	id	92235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89	id	92238

tape copy used 0 i/o's, and took 2.58 seconds


nn nn iiiiiiiiiiii tttttttttttt aaaaaaaaa ww ww ll
nnn nn iiiiiiiiiiii tttttttttttt aaaaaaaaaaa ww ww ll
nnnn nn ii tt aa aa ww ww ll
nn nn nn ii tt aa aa ww ww ll
nn nn nn ii tt aa aa ww ww ll
nn nn nn ii tt aaaaaaaaaaaaa ww w ww ll
nn nn nn ii tt aaaaaaaaaaaaa ww www ww ll
nn nn nn ii tt aa aa ww ww ww ww ll
nn nn nn ii tt aa aa ww ww ww ww ll
nn nnnn ii tt aa aa wwww wwww ll
nn nnn iiiiiiiiiiii tt aa aa www www llllllllllll
nn nn iiiiiiiiiiii tt aa aa ww ww llllllllllll


uu uu fffffffffffff 666666666666 iiiiiiiiiiii nn nn ccccccccccc yy yy ll
uu uu fffffffffffff 6666666666666 iiiiiiiiiiii nnn nn ccccccccccccc yy yy lll
uu uu ff 66 ii nnnn nn cc cc yy yy llll
uu uu ff 66 ii nn nn nn cc yy yy ll
uu uu ff 66 ii nn nn nn cc yyyy ll
uu uu fffffffff 666666666666 ii nn nn nn cc yy ll
uu uu fffffffff 6666666666666 ii nn nn nn cc yy ll
uu uu ff 66 66 ii nn nn nn cc yy ll
uu uu ff 66 66 ii nn nn nn cc yy ll
uu uu ff 66 66 ii nn nnnn cc cc yy ll
uuuuuuuuuuuuu ff 6666666666666 iiiiiiiiiiii nn nnn ccccccccccccc yy llllllll
uuuuuuuuuuu ff 66666666666 iiiiiiiiiiii nn nn ccccccccccc yy llllllll


0000000 44 0000000 7777777777777 99999999999 33333333333
000000000 444 000000000 777777777777 9999999999999 3333333333333
00 00 4444 00 00 77 77 99 99 33 33
00 00 44 44 00 00 77 99 99 33
00 00 44 44 00 00 77 99 99 333
00 00 44 44 00 00 77 99999999999 333
00 00 44 44 00 00 77 999999999999 333
00 00 444444444444 00 00 77 99 33
00 00 444444444444 00 00 77 99 33
00 00 44 00 00 77 99 33 33
000000000 44 000000000 77 99999999999 3333333333333
0000000 44 0000000 77 999999999999 33333333333


0000000 7777777777777 11 5555555555555 11 7777777777777
000000000 777777777777 111 5555555555555 111 777777777777
00 00 77 77 1111 55 1111 77 77
00 00 77 11 55 11 77
00 00 77 11 55 11 77
00 00 77 11 555555555555 11 77
00 00 77 11 5555555555555 11 77
00 00 77 11 55 11 77
00 00 77 11 55 11 77
00 00 77 11 55 55 11 77
000000000 77 11111111 5555555555555 11111111 77
0000000 77 11111111 55555555555 11111111 77

```
*******************************************************************************
*******************************************************************************
*******************************************************************************
*****                                                                     *****
*****                  program verification information                *****
*****                                                                     *****
*****                        version:  scale 4.0                          *****
*****                                                                     *****
*******************************************************************************
*******************************************************************************
*****                                                                     *****
*****                                                                     *****
*****              program:  nitawl                                       *****
*****                                                                     *****
*****        creation date:  08/09/91                                     *****
*****                                                                     *****
*****              library:  scale-4 libraries                            *****
*****                                                                     *****
*****                                                                     *****
*****              jobname:  uf6incyl                                     *****
*****                                                                     *****
*****    date of execution:  04-07-93                                     *****
*****                                                                     *****
*****    time of execution:  07:15:17                                     *****
*****                                                                     *****
*****                                                                     *****
*******************************************************************************
*******************************************************************************
*******************************************************************************
```

NITAWL - INEL IBMPC-386 (Extended) Configuration Release 1.00

```
      -1q array has      1 entries.
       0q array has      9 entries.
       1q array has     12 entries.
select  7 nuclides from the master  library on logical  1
        0 nuclides from the working library on logical  2
        0 nuclides from the working library on logical  3
          to create the new working library on logical  4

       3 reso ance calculations have been requested
      -1 out  option for ampx formatted cross section data
the storage allocated for this case is 100000 words
       2q array has      7 entries.
       3q array has     45 entries.
       4q array has      7 entries.
 general information concerning cross section library
   tape identification number              4027000
   number of nuclides on tape                    7
   number of neutron energy groups              27
   first thermal neutron energy group           15
   number of gamma energy groups                 0
   direct access unit number  9 requires 118 blocks of length  1484 words
- xsdrn tape4027000
                      SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
                        BASED ON ENDF-B VERSION 4 DATA
                          COMPILED FOR NRC       1/27/89
                            LAST UPDATED        10/12/89
                              L.M.PETRIE       ORNL

 nuclides from xsdrn tape
    1     HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89                1001
    2     CARBON-12       ENDF/B-IV MAT 1274/THRM1065    UPDATED 10/12/89                6012
    3     OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89                8016
    4     FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89                9019
    5     IRON            ENDF/B-IV MAT 1192             UPDATED 10/12/89               26000
    6     URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89               92235
    7     URANIUM-238     ENDF/B-IV MAT 1262             UPDATED 10/12/89               92238
 HYDROGEN        ENDF/B-IV MAT 1269/THRM1002    UPDATED 10/12/89              1001     temperature=   293.00
                          thermal scattering matrix number   1 at a temperature of    293.00 was selected.
 CARBON-12       ENDF/B-IV MAT 1274/THRM1065    UPDATED 10/12/89              6012     temperature=   293.00
                          thermal scattering matrix number   1 at a temperature of    293.00 was selected.
 OXYGEN-16       ENDF/B-IV MAT 1276             UPDATED 10/12/89              8016     temperature=   293.00
 FLUORINE        ENDF/B-IV MAT 1277             UPDATED 10/12/89              9019     temperature=   293.00
 IRON            ENDF/B-IV MAT 1192             UPDATED 10/12/89             26000     temperature=   293.00
geometry has been set to homogeneous as lbar is  0.0000E+00
resonance data for this nuclide
mass number (a)          =    55.365              temperature(kelvin)       =   293.000
potential scatter sigma  =     2.659              lumped nuclear density    = 8.3498220E-02
spin factor (g)          =     0.748              lump dimension (a-bar)    = 0.000000-E+00
inner radius             = 0.000000-E+00          dancoff correction (c)    = 0.000000-E+00
the absorber will be treated by the nordheim integral method.
mass of moderator-1    =    12.000               sigma(per absorber atom)= 2.2093440E-01
moderator-1 will be treated by the nordheim integral method.
this resonance material will be treated as a 0-dimensional object.
volume fraction of lump in cell used to account for spatial self-shielding=1.00000
group        res abs          res fiss         res scat
  8      -1.296349E-03    0.000000E+00   -1.598289E+00
  9      -2.364160E-03    0.000000E+00   -7.769549E-01
 excess resonance integrals
                 resolved
 absorption       3.38214E-03
 fission          0.00000E+00
-  elapsed time   0.20 min.
 URANIUM-235     ENDF/B-IV MAT 1261             UPDATED 10/12/89             92235     temperature=   293.00
geometry has been set to homogeneous as lbar is  0.0000E+00
resonance data for this nuclide
mass number (a)          =   233.025              temperature(kelvin)       =   293.000
potential scatter sigma  =    11.500              lumped nuclear density    = 4.2172910E-04
spin factor (g)          = 15171.100              lump dimension (a-bar)    = 0.000000-E+00
inner radius             = 0.000000-E+00          dancoff correction (c)    = 0.000000-E+00
the absorber will be treated by the nordheim integral method.
mass of moderator-1    =    18.998               sigma(per absorber atom)= 4.2511730E+02
moderator-1 will be treated by the nordheim integral method.
```

```
mass of moderator-2    =   238.051              sigma(per absorber atom)= 1.5505530E+02
moderator-2 will be treated by the nordheim integral method.
this resonance material will be treated as a 0-dimensional object.
volume fraction of lump in cell used to account for spatial self-shielding=1.00000
group        res abs         res fiss        res scat
 12      -9.886504E+00   -6.106317E+00   -1.886509E-01
 13      -2.471869E+01   -1.189627E+01   -3.701339E-01
 14      -1.482797E+01   -8.038503E+00    1.944185E-02
excess resonance integrals
                 resolved
absorption       1.54355E+02
fission          9.42087E+01
  elapsed time   0.66 min.
 URANIUM-238    ENDF/B-IV MAT 1262            UPDATED 10/12/89              92238     temperature=   293.00
geometry has been set to homogeneous as lbar is  0.0000E+00
resonance data for this nuclide
mass number (a)          =   236.006              temperature(kelvin)       =   293.000
potential scatter sigma  =    10.599              lumped nuclear density    = 7.8784720E-03
spin factor (g)          =   656.527              lump dimension (a-bar)    = 0.000000-E+00
inner radius             = 0.000000-E+00          dancoff correction (c)    = 0.000000-E+00
the absorber will be treated by the nordheim integral method.
mass of moderator-1    =    18.998              sigma(per absorber atom)= 2.2756230E+01
moderator-1 will be treated by the nordheim integral method.
mass of moderator-2    =   235.044              sigma(per absorber atom)= 5.6205760E-01
moderator-2 will be treated by the nordheim integral method.
this resonance material will be treated as a 0-dimensional object.
volume fraction of lump in cell used to account for spatial self-shielding=1.00000
group        res abs         res fiss        res scat
  9      -6.822146E-02    0.000000E+00   -6.427957E-01
 10      -1.386352E+00   -4.776679E-05   -8.120655E+00
 11      -1.042793E+01    0.000000E+00   -2.831015E+01
 12      -4.414059E+01    0.000000E+00   -5.052312E+01
 13      -5.427521E+01    0.000000E+00   -1.705307E+01
 14      -1.048074E+02    0.000000E+00   -4.394868E+00
excess resonance integrals
                 resolved
absorption       9.37553E+00
fission          4.52151E-04
  elapsed time   1.21 min.
  elapsed time   1.36 min.
```

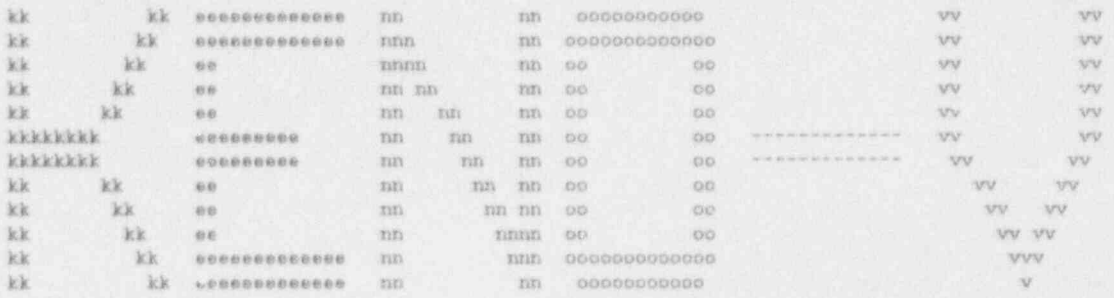
this xsdrn working tape was created 04-07-93 at 07:15:21
the title of the parent case is as follows
SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89

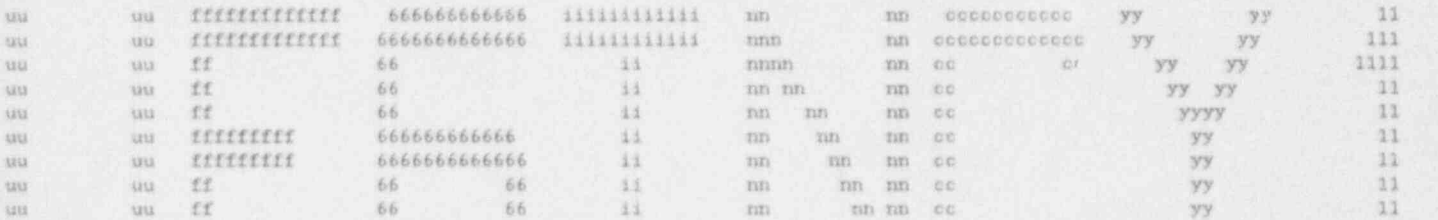
tape id	4027000	number of nuclides	7
number of neutron groups	27	number of gamma groups	0
first thermal group	15	logical unit	4

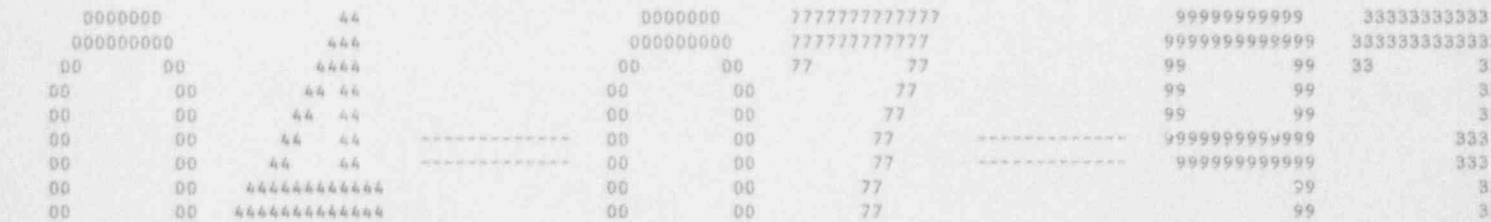
table of contents

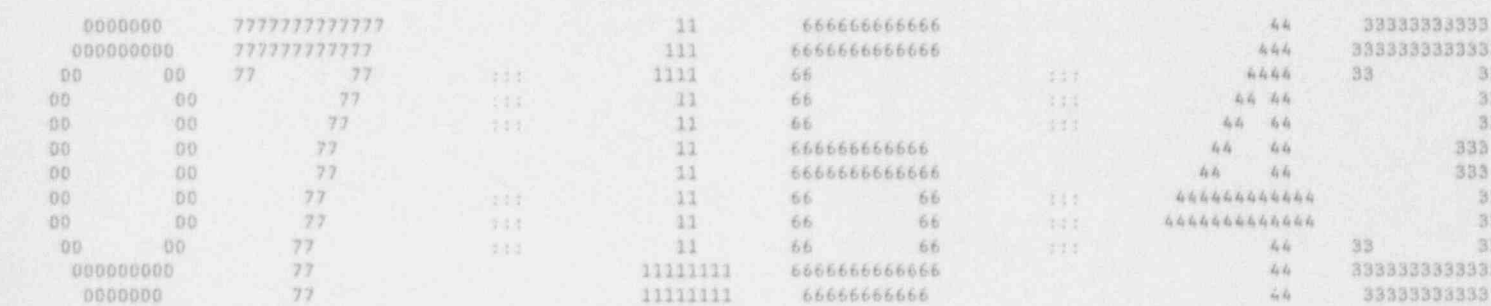
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89	id 1001
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 10/12/89	id 6012
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89	id 8016
FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89	id 9019
IRON	ENDF/B-IV MAT 1192	UPDATED 10/12/89	id 26000
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89	id 92235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89	id 92238

tape copy used 0 i/o's, and took 1.26 seconds


kk kk eeeeeeeeeeeee nn nn ooooooooooo vv vv
kk kk eeeeeeeeeeeee nnn nn oooooooooooo vv vv
kk kk ee nnnn nn oo oo vv vv
kk kk ee nn nn nn oo oo vv vv
kk kk ee nn nn nn oo oo vv vv
kkkkkkkk eeeeeeeee nn nn nn oo oo ---------- vv vv
kkkkkkkk eeeeeeeee nn nn nn oo oo ---------- vv vv
kk kk ee nn nn nn oo oo vv vv
kk kk ee nn nn nn oo oo vv vv
kk kk ee nn nnnn oo oo vv vv
kk kk eeeeeeeeeeeee nn nnn ooooooooooooo vvv
kk kk eeeeeeeeeeeee nn nn ooooooooooo v


uu uu fffffffffffff 666666666666 iiiiiiiiiiii nn nn ccccccccccc yy yy 11
uu uu fffffffffffff 6666666666666 iiiiiiiiiiii nnn nn ccccccccccccc yy yy 111
uu uu ff 66 ii nnnn nn cc cc yy yy 1111
uu uu ff 66 ii nn nn nn cc yy yy 11
uu uu ff 66 ii nn nn nn cc yyyy 11
uu uu fffffffff 666666666666 ii nn nn nn cc yy 11
uu uu fffffffff 6666666666666 ii nn nn nn cc yy 11
uu uu ff 66 66 ii nn nn nn cc yy 11
uu uu ff 66 66 ii nn nn nn cc yy 11
uu uu ff 66 66 ii nn nnnn cc cc yy 11
uuuuuuuuuuuuu ff 6666666666666 iiiiiiiiiiii nn nnn ccccccccccccc yy 11111111
uuuuuuuuuuu ff 66666666666 iiiiiiiiiiii nn nn ccccccccccc yy 11111111


0000000 44 0000000 7777777777777 99999999999 33333333333
000000000 444 000000000 777777777777 9999999999999 3333333333333
00 00 4444 00 00 77 77 99 99 33 33
00 00 44 44 00 00 77 99 99 33
00 00 44 44 00 00 77 99 99 333
00 00 44 44 ---------- 00 00 77 ---------- 999999999999 333
00 00 44 44 ---------- 00 00 77 ---------- 999999999999 333
00 00 444444444444 00 00 77 99 33
00 00 444444444444 00 00 77 99 33
00 00 44 00 00 77 99 33 33
000000000 44 000000000 77 9999999999999 3333333333333
0000000 44 0000000 77 999999999999 33333333333


0000000 7777777777777 11 666666666666 44 33333333333
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00 00 77 77 ::: 1111 66 ::: 4444 33 33
00 00 77 ::: 11 66 ::: 44 44 33
00 00 77 ::: 11 66 ::: 44 44 33
00 00 77 11 666666666666 44 44 333
00 00 77 11 6666666666666 44 44 333
00 00 77 ::: 11 66 66 ::: 444444444444 33
00 00 77 ::: 11 66 66 ::: 444444444444 33
00 00 77 ::: 11 66 66 ::: 44 33 33
000000000 77 11111111 6666666666666 44 3333333333333
0000000 77 11111111 66666666666 44 33333333333

```
*******************************************************************************
*******************************************************************************
*******************************************************************************
*****                                                                         *****
*****                  program verification information                    *****
*****                                                                         *****
*****                        version:  scale 4.0                          *****
*****                                                                         *****
*******************************************************************************
*******************************************************************************
*****                                                                         *****
*****                                                                         *****
*****             program:  kenova                                        *****
*****                                                                         *****
*****       creation date:  08/09/91                                      *****
*****                                                                         *****
*****             library:  scale-4 libraries                             *****
*****                                                                         *****
*****/*                                                                      *****
*****             jobname:  uf6incy1                                      *****
*****                                                                         *****
*****   date of execution:  04-07-93                                      *****
*****                                                                         *****
*****   time of execution:  07:16:43                                      *****
*****                                                                         *****
*****                                                                         *****
*******************************************************************************
*******************************************************************************
*******************************************************************************
```

KENO5A - INEL IBMPC-386 (Extended) Configuration Release 1.00

uf6 homogeneous infinite array of cylinders h/u=0

****** numeric parameters ******

tme	maximum problem time (min)	150.00
tba	time per generation (min)	0.50
gen	number of generations	103
npg	number per generation	300
nsk	number of generations to be skipped	3
beg	beginning generation number	1
res	generations between checkpoints	0
xld	number of extra 1-d cross sections	0
nbk	neutron bank size	325
xnb	extra positions in neutron bank	0
nfb	fission bank size	300
xfb	extra positions in fission bank	0
wta	default value of weight average	0.5000
wth	weight high for splitting	3.0000
wtl	weight low for russian roulette	0.3333
rnd	starting random number	656E6F6E656E6F6E
nb8	number of d.a. blocks on unit 8	200
nl8	length of d.a. blocks on unit 8	512
adj	mode of calculation	forward
	input data written on restart unit	no
	binary data interface	yes

```
*******************************************************************************************************************
*******************************************************************************************************************
***                                                                                                             ***
***                              uf6 homogeneous infinite array of cylinders h/u=0                              ***
***                                                                                                             ***
*******************************************************************************************************************
***                              ******      logical parameters       ******                                    ***
***                                                                                                             ***
***  run  execute problem after checking data    yes         plt  plot picture map(s)                     no ***
***                                                                                                             ***
***  flx  compute flux                             no         fdn  compute fission densities               no ***
***                                                                                                             ***
***  smu  compute avg unit self-multiplication     no         nub  compute nu-bar & avg fission group      no ***
***                                                                                                             ***
***  mku  compute matrix k-eff by unit number      no         mkp  compute matrix k-eff by unit location   no ***
***                                                                                                             ***
***  cku  compute cofactor k-eff by unit number    no         ckp  compute cofactor k-eff by unit location no ***
***                                                                                                             ***
***  fmu  print fiss prod matrix by unit number    no         fmp  print fiss prod matrix by unit location no ***
***                                                                                                             ***
***  mkh  compute matrix k-eff by hole number      no         mka  compute matrix k-eff by array number    no ***
***                                                                                                             ***
***  ckh  compute cofactor k-eff by hole number    no         cka  compute cofactor k-eff by array number  no ***
***                                                                                                             ***
***  fmh  print fiss prod matrix by hole number    no         fma  print fiss prod matrix by array number  no ***
***                                                                                                             ***
***  hhl  collect matrix by highest hole level     no         hal  collect matrix by highest array level   no ***
***                                                                                                             ***
***  amx  print all mixed cross sections           no         far  print fis. and abs. by region           no ***
***                                                                                                             ***
***  xs1  print 1-d mixture x-sections             no         pax  print xsec-albedo correlation tables    no ***
***                                                                                                             ***
***  xs2  print 2-d mixture x-sections             no         pwt  print weight average array              no ***
***                                                                                                             ***
***  xap  print mixture angles & probabilities     no         pgm  print input geometry                    no ***
***                                                                                                             ***
***  pki  print fission spectrum                   no         bug  print debug information                 no ***
***                                                                                                             ***
***  p1d  print extra 1-d cross sections           no         trk  print tracking information              no ***
***                                                                                                             ***
***                                                                                                             ***
*******************************************************************************************************************
*******************************************************************************************************************
********************************************************    *******************************************************
                              parameter input completed

                   ........    0 io's were used reading the parameter data       ........

                    *************** data reading completed ***************
```

```
************************************************************************************************************************
***                                                                                                                  ***
***                             uf6 homogeneous infinite array of cylinders h/u=0                                    ***
***                                                                                                                  ***
************************************************************************************************************************
************************************************************************************************************************
***                                                                                                                  ***
***          unit                                               volume                                               ***
***         number                data set name                  name        unit function                           ***
***         ------                -------------                  ----        -------------                           ***
***                                                                                                                  ***
***      xsc  14                     ft14f001                                mixed cross sections                    ***
***                                                                                                                  ***
***      alb  79                     ft79f001                                input albedos                           ***
***                                                                                                                  ***
***      wts  80                     ft80f001                                input weights                           ***
***                                                                                                                  ***
***      skt  16                                                             write scratch data                      ***
***                                                                                                                  ***
***      bin  95                     ft95f001                                binary input data                       ***
***                                                                                                                  ***
***      rst  95                     ft95f001                                read restart data                       ***
***                                                                                                                  ***
***      lib   4                     ft04f001                                input ampx working library              ***
***                                                                                                                  ***
***            8                     ft08f001                                input data direct access                ***
***                                                                                                                  ***
***            9                                                             super grouped direct access             ***
***                                                                                                                  ***
***           10                                                             xsec mixing direct access               ***
***                                                                                                                  ***
************************************************************************************************************************
                        ........    0 io's were used preparing input data    ........
```

uf6 homogeneous infinite array of cylinders h/u=0
mixing table

number of scattering angles = 2
cross section message threshold =3.0E-05

entry	mixture	nuclide	density
1	1	92235	4.21729E-04
2	1	92238	7.87847E-03
3	1	9019	4.98012E-02
4	2	6012	3.92503E-03
5	2	26000	8.34982E-02
6	3	1001	6.67514E-11
7	3	8016	3.33757E-11

cross sections read from the ampx working library on unit 4

1001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 10/12/89
6012	CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 10/12/89
8016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 10/12/89
9019	FLUORINE	ENDF/B-IV MAT 1277	UPDATED 10/12/89
26000	IRON	ENDF/B-IV MAT 1192	UPDATED 10/12/89
92235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 10/12/89
92238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 10/12/89

..... 0 io's were used mixing cross-sections .....
..... 0 io's were used preparing the cross sections .....

```
*****************************************************************************************************
***                                                                                               ***
***          uf6 homogeneous infinite array of cylinders n/u=0                                    ***
***                                                                                               ***
*****************************************************************************************************
*****************************************************************************************************
***                                                                                               ***
***                                ****** additional information ******                           ***
***                                                                                               ***
***  number of energy groups                27       use lattice geometry                   no  ***
***                                                                                               ***
***  no. of fission spectrum source group    1       global array number                     0  ***
***                                                                                               ***
***  no. of scattering angles in xsecs       2       number of units in the global x dir.    0  ***
***                                                                                               ***
***  entries/neutron in the neutron bank    16       number of units in the global y dir.    0  ***
***                                                                                               ***
***  entries/neutron in the fission bank     9       number of units in the global z dir.    0  ***
***                                                                                               ***
***  number of mixtures used                 3       use a global reflector                 yes  ***
***                                                                                               ***
***  number of bias id's used                1       use nested holes                        no  ***
***                                                                                               ***
***  number of differential albedos used     0       number of holes                         0  ***
***                                                                                               ***
***  total input geometry regions            3       maximum hole nesting level              0  ***
***                                                                                               ***
***  number of geometry regions used         3       use nested arrays                       no  ***
***                                                                                               ***
***  largest geometry unit number            1       number of arrays used                   0  ***
***                                                                                               ***
***  largest array number                    1       maximum array nesting level             0  ***
***                                                                                               ***
***                                                                                               ***
***  +x boundary condition            mirror         -x boundary condition                mirror  ***
***                                                                                               ***
***  +y boundary condition            mirror         -y boundary condition                mirror  ***
***                                                                                               ***
***  +z boundary condition            mirror         -z boundary condition                mirror  ***
***                                                                                               ***
*****************************************************************************************************
```

```
*********************************************************************************************
***                                                                                       ***
***          uf6 homogeneous infinite array of cylinders h/u=0                            ***
***                                                                                       ***
*********************************************************************************************
*********************************************************************************************
***                                                                                       ***
***                    ****** space and supergroup information ******                     ***
***                                                                                       ***
***       100000 words is the total space available.                                      ***
***                                                                                       ***
***         8707 words were used for non-supergroup storage.                              ***
***                                                                                       ***
***        91293 words of storage are available for supergrouped data.                    ***
***                                                                                       ***
***        99878 words of storage are available for constructing the supergroups.         ***
***                                                                                       ***
***        91233 words of storage are available to each supergroup.                       ***
***                                                                                       ***
***          446 words are needed for the largest group.                                  ***
***                                                                                       ***
***         9369 words of storage is sufficient to run this problem.                      ***
***                                                                                       ***
***        13727 words of storage will allow the problem to run with one supergroup.      ***
***                                                                                       ***
***        13984 words of storage will be used to run this problem.                       ***
***                                                                                       ***
*********************************************************************************************
*********************************************************************************************
***                                                                                       ***
***                    starting      ending       xsec       albedo      total          ***
***   supergroup        group         group       length      length      length         ***
***                                                                                       ***
***                                                                                       ***
***          1            1            27          943           0         4960           ***
***                                                                                       ***
*********************************************************************************************
            ........   0 io's were used in supergrouping    ........
            ........   0 io's were used loading the data    ........
```

uf6 homogeneous infinite array of cylinders h/u=0

region	media num	bias id	geometry description for those units utilized in this problem

********** global **********

----- unit 1 -----

one uf6 cylinder

1 cylinder	1	1	radius = 36.830	+z = 95.250	-z = -95.250	centerline is at	x = 0.00000	y = 0.00000				
2 cylinder	2	1	radius = 38.100	+z = 96.520	-z = -96.520	centerline is at	x = 0.00000	y = 0.00000				
3 cuboid	3	1	+x = 53.340	-x = -53.340	+y = 53.340	-y = -53.340	+z = 111.76	-z = -111.76				

uf6 homogeneous infinite array of cylinders h/u=0
volumes for those units utilized in this problem

unit	region	geometry region	volume	cumulative volume
1	1	1	8.11799E+05 cm**3	8.11799E+05 cm**3
	2	2	6.85346E+04 cm**3	8.80333E+05 cm**3
	3	3	1.66346E+06 cm**3	2.54380E+06 cm**3

unit	uses	region	mixture	total volume
1	1	1	1	8.11799E+05 cm**3
		2	2	6.85346E+04 cm**3
		3	3	1.66346E+06 cm**3

total mixture volumes

mixture	total volume
1	8.11799E+05 cm**3
2	6.85346E+04 cm**3
3	1.66346E+06 cm**3

****
***
*** biasing information
***
*** a default weight of 0.500 will be used for all bias id's.
***
****

..... 0 io's were used in keno-v before tracking .....
..... 0.24683 minutes were used processing data. .....

volume fraction of fissile material in the core= 0.31913E+00
start type 0 was used.
the neutrons were started uniformly throughout the entire volume defined by the outermost geometry card.
0.00967 minutes were required for starting. total elapsed time is 0.25600 minutes.

uf6 homogeneous infinite array of cylinders h/u=0

generation	generation k-effective	elapsed time minutes	average k-effective	avg k-eff deviation	matrix k-effective	matrix k-eff deviation
keno message number k5-132		warning....only	247 independent fission points were generated			
1	6.79992E-01	3.74333E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	247 independent fission points were generated			
2	6.89587E-01	4.88500E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	244 independent fission points were generated			
3	6.70711E-01	6.03167E-01	6.70711E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	7.15087E-01	7.29333E-01	6.92899E-01	2.21882E-02	0.00000E+00	0.00000E+00
5	7.05507E-01	8.55833E-01	6.97101E-01	1.34821E-02	0.00000E+00	0.00000E+00
6	7.12218E-01	9.82833E-01	7.00881E-01	1.02550E-02	0.00000E+00	0.00000E+00
7	7.04191E-01	1.10850E+00	7.01543E-01	7.97104E-03	0.00000E+00	0.00000E+00
8	7.03036E-01	1.23117E+00	7.01792E-01	6.51308E-03	0.00000E+00	0.00000E+00
9	7.13680E-01	1.35817E+00	7.03490E-01	5.76062E-03	0.00000E+00	0.00000E+00
10	6.48787E-01	1.47817E+00	6.96652E-01	8.46431E-03	0.00000E+00	0.00000E+00
11	6.71611E-01	1.60167E+00	6.93870E-01	7.96649E-03	0.00000E+00	0.00000E+00
12	6.89676E-01	1.72250E+00	6.93450E-01	7.13778E-03	0.00000E+00	0.00000E+00
13	6.92361E-01	1.85067E+00	6.93351E-01	6.45712E-03	0.00000E+00	0.00000E+00
14	7.11204E-01	1.97700E+00	6.94839E-01	6.07936E-03	0.00000E+00	0.00000E+00
15	6.95965E-01	2.10050E+00	6.94926E-01	5.59287E-03	0.00000E+00	0.00000E+00
16	7.13361E-01	2.22600E+00	6.96242E-01	5.34280E-03	0.00000E+00	0.00000E+00
17	6.68321E-01	2.34950E+00	6.94381E-01	5.31078E-03	0.00000E+00	0.00000E+00
18	6.80780E-01	2.47133E+00	6.93531E-01	5.03999E-03	0.00000E+00	0.00000E+00
19	6.99084E-01	2.59667E+00	6.93858E-01	4.74550E-03	0.00000E+00	0.00000E+00
20	6.87424E-01	2.72033E+00	6.93500E-01	4.48836E-03	0.00000E+00	0.00000E+00
21	6.87761E-01	2.84567E+00	6.93198E-01	4.25629E-03	0.00000E+00	0.00000E+00
22	7.04643E-01	2.96950E+00	6.93770E-01	4.07822E-03	0.00000E+00	0.00000E+00
23	6.65159E-01	3.09483E+00	6.92408E-01	4.11147E-03	0.00000E+00	0.00000E+00
24	6.97053E-01	3.21650E+00	6.92619E-01	3.92582E-03	0.00000E+00	0.00000E+00
25	6.80928E-01	3.34000E+00	6.92111E-01	3.78553E-03	0.00000E+00	0.00000E+00
26	7.00141E-01	3.46383E+00	6.92445E-01	3.63978E-03	0.00000E+00	0.00000E+00
27	6.59464E-01	3.58533E+00	6.91126E-01	3.73210E-03	0.00000E+00	0.00000E+00
28	6.86888E-01	3.70550E+00	6.90963E-01	3.58939E-03	0.00000E+00	0.00000E+00
29	6.83777E-01	3.82700E+00	6.90697E-01	3.46413E-03	0.00000E+00	0.00000E+00
30	6.83038E-01	3.95167E+00	6.90423E-01	3.34931E-03	0.00000E+00	0.00000E+00
31	6.89332E-01	4.07250E+00	6.90386E-01	3.23197E-03	0.00000E+00	0.00000E+00
32	6.84595E-01	4.19783E+00	6.90193E-01	3.12834E-03	0.00000E+00	0.00000E+00
33	6.90852E-01	4.32517E+00	6.90214E-01	3.02582E-03	0.00000E+00	0.00000E+00
34	6.85021E-01	4.44683E+00	6.90052E-01	2.93422E-03	0.00000E+00	0.00000E+00
35	6.60204E-01	4.56683E+00	6.89147E-01	2.98429E-03	0.00000E+00	0.00000E+00
36	6.42363E-01	4.68950E+00	6.87771E-01	3.20554E-03	0.00000E+00	0.00000E+00
37	6.98126E-01	4.81117E+00	6.88067E-01	3.12663E-03	0.00000E+00	0.00000E+00
38	7.05101E-01	4.94033E+00	6.88540E-01	3.07516E-03	0.00000E+00	0.00000E+00
39	6.70904E-01	5.06467E+00	6.88064E-01	3.02864E-03	0.00000E+00	0.00000E+00
40	6.88566E-01	5.18833E+00	6.88077E-01	2.94789E-03	0.00000E+00	0.00000E+00
41	6.93512E-01	5.31117E+00	6.88216E-01	2.87468E-03	0.00000E+00	0.00000E+00
42	6.64659E-01	5.43467E+00	6.87627E-01	2.86312E-03	0.00000E+00	0.00000E+00
43	6.66765E-01	5.55550E+00	6.87118E-01	2.83840E-03	0.00000E+00	0.00000E+00
44	6.83943E-01	5.68167E+00	6.87043E-01	2.77103E-03	0.00000E+00	0.00000E+00
45	7.07501E-01	5.80817E+00	6.87519E-01	2.74733E-03	0.00000E+00	0.00000E+00
46	6.83201E-01	5.93350E+00	6.87420E-01	2.68595E-03	0.00000E+00	0.00000E+00
47	6.73928E-01	6.05250E+00	6.87121E-01	2.64265E-03	0.00000E+00	0.00000E+00
48	7.12971E-01	6.17600E+00	6.87683E-01	2.64496E-03	0.00000E+00	0.00000E+00
49	6.96865E-01	6.29683E+00	6.87878E-01	2.59543E-03	0.00000E+00	0.00000E+00
50	7.21542E-01	6.42517E+00	6.88579E-01	2.63580E-03	0.00000E+00	0.00000E+00
51	6.79943E-01	6.54783E+00	6.88403E-01	2.58746E-03	0.00000E+00	0.00000E+00
52	6.86868E-01	6.67133E+00	6.88372E-01	2.53537E-03	0.00000E+00	0.00000E+00
53	7.08722E-01	6.79867E+00	6.88771E-01	2.51699E-03	0.00000E+00	0.00000E+00
54	7.25698E-01	6.92133E+00	6.89481E-01	2.56824E-03	0.00000E+00	0.00000E+00
55	6.95791E-01	7.04483E+00	6.89601E-01	2.52213E-03	0.00000E+00	0.00000E+00
56	7.34888E-01	7.17017E+00	6.90439E-01	2.61321E-03	0.00000E+00	0.00000E+00
57	6.73193E-01	7.29567E+00	6.90126E-01	2.58435E-03	0.00000E+00	0.00000E+00
58	6.82146E-01	7.42017E+00	6.89983E-01	2.54178E-03	0.00000E+00	0.00000E+00
59	6.80797E-01	7.54567E+00	6.89822E-01	2.50199E-03	0.00000E+00	0.00000E+00
60	6.91801E-01	7.66650E+00	6.89856E-01	2.45871E-03	0.00000E+00	0.00000E+00
61	7.10811E-01	7.79000E+00	6.90211E-01	2.44263E-03	0.00000E+00	0.00000E+00
62	6.98257E-01	7.91717E+00	6.90345E-01	2.40532E-03	0.00000E+00	0.00000E+00
63	6.93301E-01	8.04000E+00	6.90394E-01	2.36606E-03	0.00000E+00	0.00000E+00
64	6.98421E-01	8.16450E+00	6.90523E-01	2.33118E-03	0.00000E+00	0.00000E+00
65	6.76522E-01	8.28800E+00	6.90301E-01	2.30462E-03	0.00000E+00	0.00000E+00
66	6.65118E-01	8.40783E+00	6.89908E-01	2.30220E-03	0.00000E+00	0.00000E+00

67	6.66108E-01	8.53167E+00	6.89541E-01	2.29589E-03	0.00000E+00	0.00000E+00
68	6.86960E-01	8.65967E+00	6.89502E-01	2.26117E-03	0.00000E+00	0.00000E+00
69	6.92228E-01	8.77967E+00	6.89543E-01	2.22754E-03	0.00000E+00	0.00000E+00
70	6.81115E-01	8.90217E+00	6.89419E-01	2.19803E-03	0.00000E+00	0.00000E+00
71	6.89355E-01	9.02583E+00	6.89418E-01	2.16594E-03	0.00000E+00	0.00000E+00
72	6.71245E-01	9.14867E+00	6.89159E-01	2.15051E-03	0.00000E+00	0.00000E+00
73	7.03402E-01	9.27483E+00	6.89359E-01	2.12947E-03	0.00000E+00	0.00000E+00
74	6.98954E-01	9.39933E+00	6.89492E-01	2.10391E-03	0.00000E+00	0.00000E+00
75	6.98473E-01	9.52400E+00	6.89615E-01	2.07854E-03	0.00000E+00	0.00000E+00
76	6.91377E-01	9.64567E+00	6.89639E-01	2.05039E-03	0.00000E+00	0.00000E+00
77	6.64923E-01	9.77017E+00	6.89310E-01	2.04954E-03	0.00000E+00	0.00000E+00
78	7.07045E-01	9.89367E+00	6.89543E-01	2.03581E-03	0.00000E+00	0.00000E+00
79	7.03977E-01	1.00228E+01	6.89730E-01	2.01792E-03	0.00000E+00	0.00000E+00
80	6.76356E-01	1.01463E+01	6.89559E-01	1.99925E-03	0.00000E+00	0.00000E+00
81	6.67481E-01	1.02698E+01	6.89280E-01	1.99347E-03	0.00000E+00	0.00000E+00
82	6.88129E-01	1.03963E+01	6.89265E-01	1.96844E-03	0.00000E+00	0.00000E+00
83	6.92003E-01	1.05198E+01	6.89299E-01	1.94428E-03	0.00000E+00	0.00000E+00
84	6.88124E-01	1.06433E+01	6.89285E-01	1.92048E-03	0.00000E+00	0.00000E+00
85	6.79442E-01	1.07615E+01	6.89166E-01	1.90090E-03	0.00000E+00	0.00000E+00
86	6.92505E-01	1.08858E+01	6.89206E-01	1.87856E-03	0.00000E+00	0.00000E+00
87	6.76900E-01	1.10022E+01	6.89061E-01	1.86196E-03	0.00000E+00	0.00000E+00
88	6.81653E-01	1.11275E+01	6.88975E-01	1.84220E-03	0.00000E+00	0.00000E+00
89	6.87477E-01	1.12502E+01	6.88958E-01	1.82098E-03	0.00000E+00	0.00000E+00
90	6.76888E-01	1.13757E+01	6.88820E-01	1.80539E-03	0.00000E+00	0.00000E+00
91	6.92245E-01	1.14965E+01	6.88859E-01	1.78540E-03	0.00000E+00	0.00000E+00
92	6.97569E-01	1.16202E+01	6.88956E-01	1.76810E-03	0.00000E+00	0.00000E+00
93	7.26402E-01	1.17437E+01	6.89367E-01	1.79634E-03	0.00000E+00	0.00000E+00
94	6.81923E-01	1.18710E+01	6.89280E-01	1.77885E-03	0.00000E+00	0.00000E+00
95	6.74478E-01	1.19937E+01	6.89121E-01	1.76680E-03	0.00000E+00	0.00000E+00
96	6.86019E-01	1.21180E+01	6.89088E-01	1.74822E-03	0.00000E+00	0.00000E+00
97	6.82648E-01	1.22430E+01	6.89020E-01	1.73105E-03	0.00000E+00	0.00000E+00
98	6.81044E-01	1.23627E+01	6.88937E-01	1.71493E-03	0.00000E+00	0.00000E+00
99	7.12177E-01	1.24870E+01	6.89176E-01	1.71399E-03	0.00000E+00	0.00000E+00
100	6.70481E-01	1.26043E+01	6.88986E-01	1.70710E-03	0.00000E+00	0.00000E+00
101	6.69304E-01	1.27207E+01	6.88787E-01	1.70143E-03	0.00000E+00	0.00000E+00
102	6.85274E-01	1.28452E+01	6.88752E-01	1.68469E-03	0.00000E+00	0.00000E+00
103	7.07871E-01	1.29687E+01	6.88941E-01	1.67864E-03	0.00000E+00	0.00000E+00

keno message number k5-123 execution terminated due to completion of the specified number of generations.

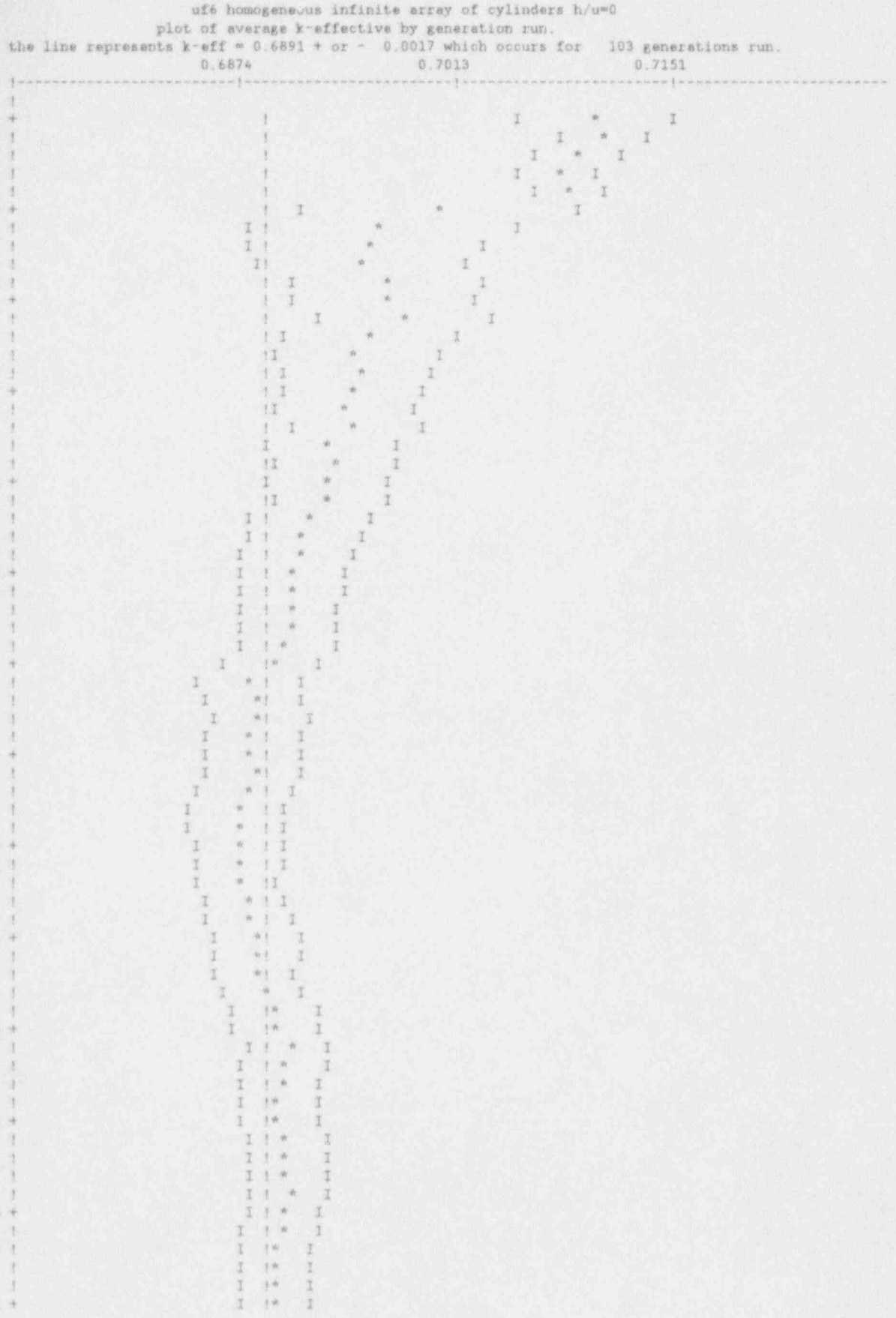
uf6 homogeneous infinite array of cylinders h/u=0

lifetime = 6.54585E-06 + or - 9.27770E-08 generation time = 4.79810E-06 + or - 1.22467E-07

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
3	0.68912	+ or - 0.00169	0.68744 to 0.69081	0.68575 to 0.69249	0.68407 to 0.69418	30000
4	0.68886	+ or - 0.00168	0.68718 to 0.69054	0.68550 to 0.69222	0.68382 to 0.69391	29700
5	0.68869	+ or - 0.00169	0.68700 to 0.69038	0.68531 to 0.69207	0.68362 to 0.69376	29400
6	0.68845	+ or - 0.00169	0.68676 to 0.69014	0.68507 to 0.69183	0.68338 to 0.69352	29100
7	0.68828	+ or - 0.00170	0.68658 to 0.68998	0.68488 to 0.69168	0.68318 to 0.69338	28800
8	0.68813	+ or - 0.00171	0.68642 to 0.68984	0.68471 to 0.69155	0.68300 to 0.69326	28500
9	0.68786	+ or - 0.00171	0.68615 to 0.68956	0.68444 to 0.69127	0.68274 to 0.69298	28200
10	0.68828	+ or - 0.00167	0.68661 to 0.68995	0.68493 to 0.69162	0.68326 to 0.69330	27900
11	0.68846	+ or - 0.00168	0.68678 to 0.69014	0.68510 to 0.69182	0.68342 to 0.69350	27600
12	0.68845	+ or - 0.00170	0.68675 to 0.69014	0.68505 to 0.69184	0.68335 to 0.69354	27300
17	0.68799	+ or - 0.00174	0.68626 to 0.68973	0.68452 to 0.69146	0.68279 to 0.69320	25800
22	0.68775	+ or - 0.00182	0.68592 to 0.68957	0.68410 to 0.69140	0.68228 to 0.69322	24300
27	0.68822	+ or - 0.00187	0.68635 to 0.69009	0.68448 to 0.69196	0.68261 to 0.69383	22800
32	0.68841	+ or - 0.00200	0.68641 to 0.69041	0.68441 to 0.69241	0.68241 to 0.69441	21300
37	0.68940	+ or - 0.00198	0.68743 to 0.69138	0.68545 to 0.69336	0.68347 to 0.69534	19800
42	0.68980	+ or - 0.00206	0.68774 to 0.69186	0.68568 to 0.69393	0.68362 to 0.69599	18300
47	0.69040	+ or - 0.00216	0.68824 to 0.69256	0.68608 to 0.69472	0.68393 to 0.69688	16800
52	0.68950	+ or - 0.00223	0.68727 to 0.69173	0.68504 to 0.69396	0.68281 to 0.69619	15300
57	0.68752	+ or - 0.00202	0.68550 to 0.68955	0.68348 to 0.69157	0.68146 to 0.69359	13800
62	0.68689	+ or - 0.00217	0.68472 to 0.68905	0.68256 to 0.69122	0.68039 to 0.69338	12300
67	0.68786	+ or - 0.00227	0.68559 to 0.69012	0.68333 to 0.69239	0.68106 to 0.69465	10800
72	0.68845	+ or - 0.00256	0.68589 to 0.69101	0.68332 to 0.69358	0.68076 to 0.69614	9300
77	0.68788	+ or - 0.00280	0.68507 to 0.69068	0.68227 to 0.69348	0.67947 to 0.69629	7800
82	0.68771	+ or - 0.00306	0.68465 to 0.69077	0.68159 to 0.69382	0.67853 to 0.69688	6300
87	0.68830	+ or - 0.00393	0.68438 to 0.69223	0.68045 to 0.69615	0.67653 to 0.70008	4800
92	0.68882	+ or - 0.00558	0.68324 to 0.69440	0.67767 to 0.69997	0.67209 to 0.70555	3300

uf6 homogeneous infinite array of cylinders h/u=0

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
97	0.68769	+ or - 0.00751	0.68018 to 0.69520	0.67268 to 0.70271	0.66517 to 0.71022	1800


uf6 homogeneous infinite array of cylinders h/u=0
plot of average k-effective by generation run.
the line represents k-eff = 0.6891 + or - 0.0017 which occurs for 103 generations run.
0.6874
0.7013
0.7151
5
10
15
20
25
30
35
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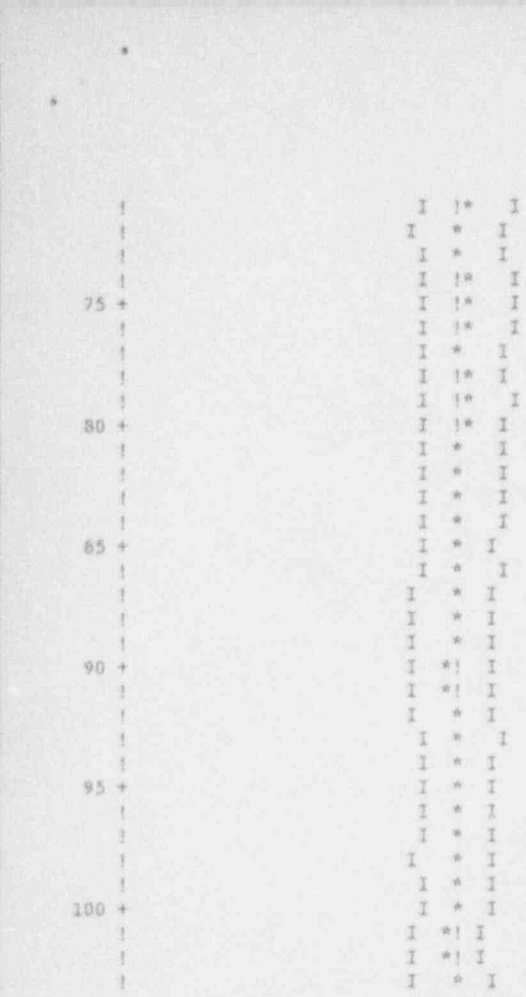
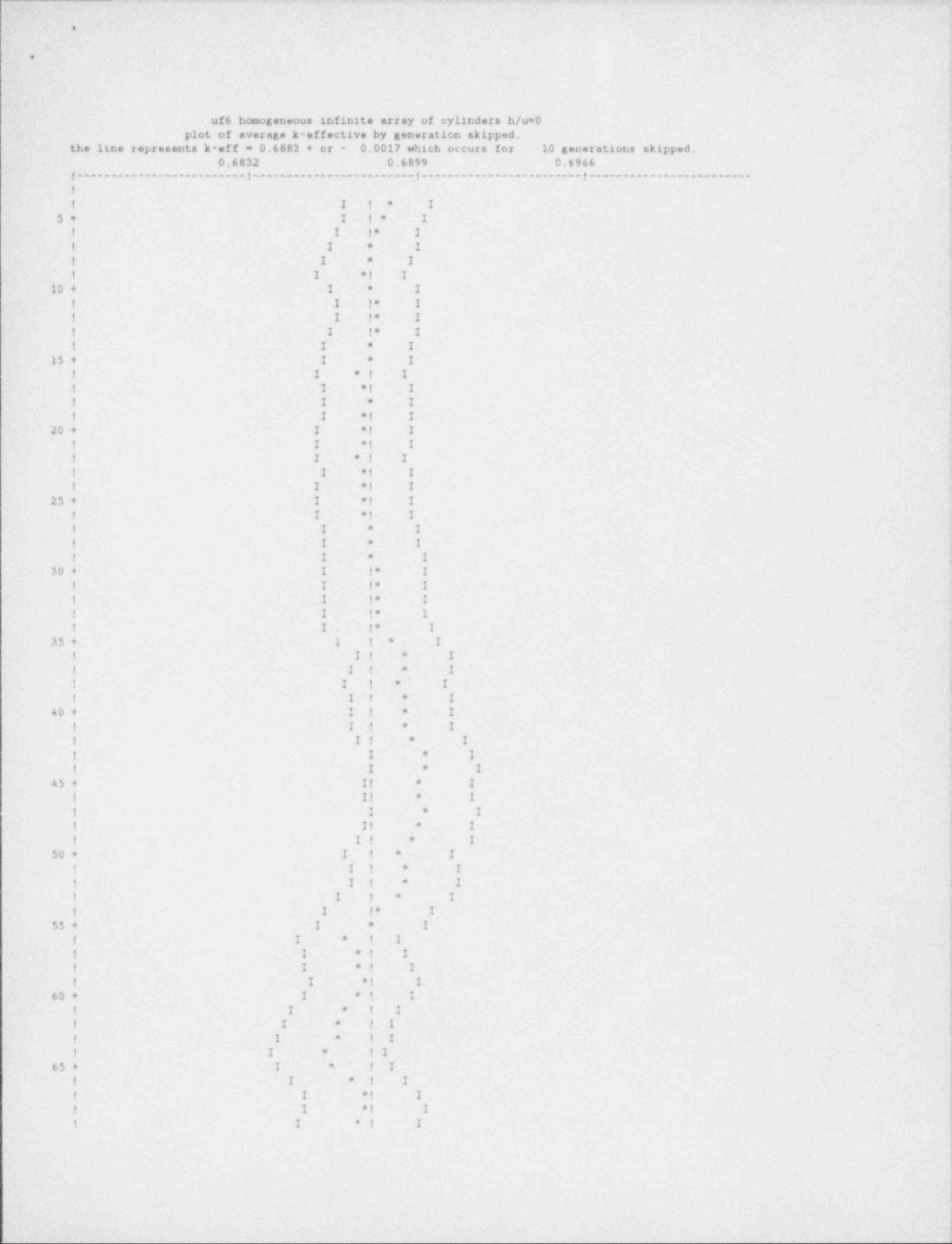
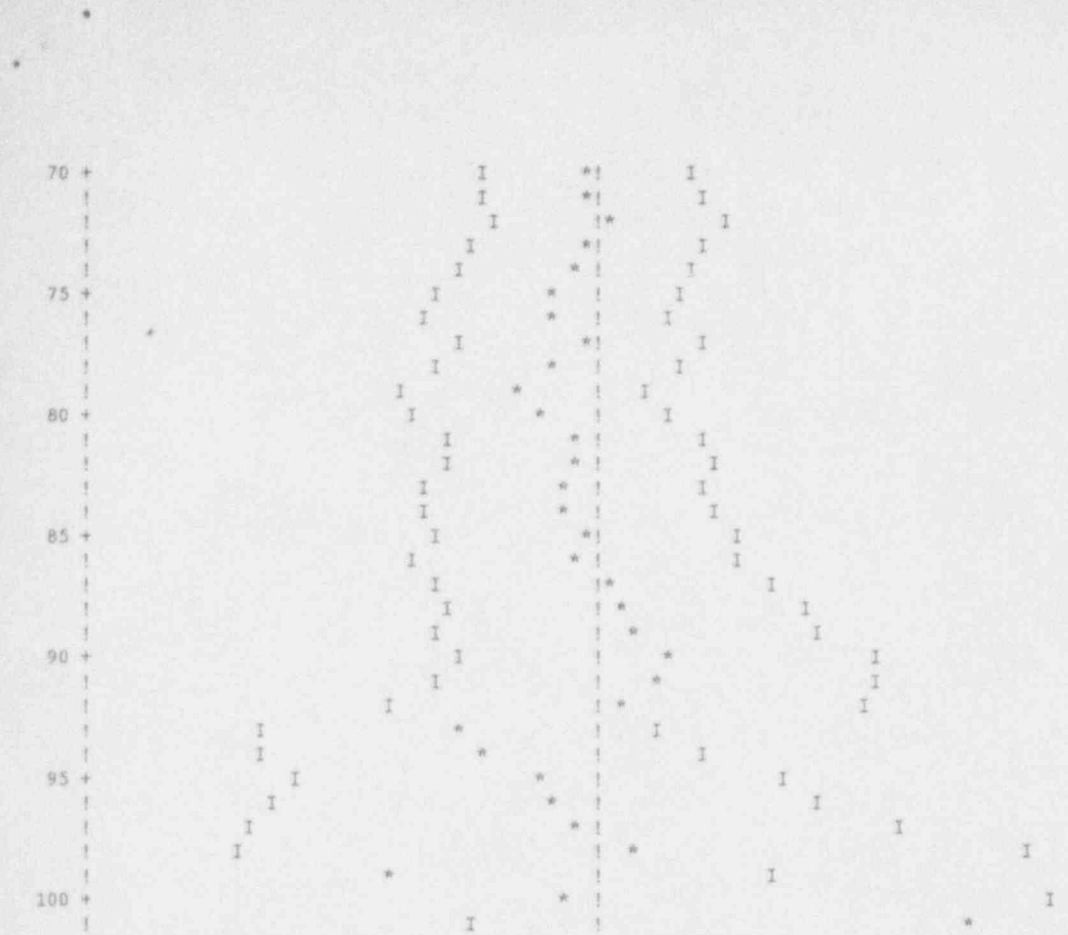
45
50
55
60
65
70


75
80
85
90
95
100


uf6 homogeneous infinite array of cylinders h/u=0
plot of average k-effective by generation skipped.
the line represents k-eff = 0.6883 + or - 0.0017 which occurs for 10 generations skipped.
0.6832
0.6899
0.6966
5
10
15
20
25
30
35
40
45
50
55
60
65



uf6 homogeneous infinite array of cylinders h/u=0

skipping 3 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0111			7.64094E-03	3.9502	4.30718E-03	3.9335	0.00000E+00	0.0000
2	0.0619			4.26361E-02	1.4942	2.50287E-02	1.4873	0.00000E+00	0.0000
3	0.0785			5.40751E-02	1.0858	2.17345E-02	1.0855	0.00000E+00	0.0000
4	0.0397			2.73868E-02	1.1372	1.25189E-02	1.1350	0.00000E+00	0.0000
5	0.0194			1.33928E-02	0.9801	1.09642E-02	0.9763	0.00000E+00	0.0000
6	0.0165			1.13697E-02	0.6042	1.37650E-02	0.6135	0.00000E+00	0.0000
7	0.0338			2.32731E-02	0.5381	3.01241E-02	0.5389	0.00000E+00	0.0000
8	0.1403			9.66737E-02	0.4363	2.05757E-01	0.4328	0.00000E+00	0.0000
9	0.1717			1.18352E-01	0.3908	2.77311E-01	0.3904	0.00000E+00	0.0000
10	0.1622			1.11748E-01	0.6097	1.76431E-01	0.5917	0.00000E+00	0.0000
11	0.1912			1.31771E-01	0.8048	1.56926E-01	0.8023	0.00000E+00	0.0000
12	0.0528			3.64146E-02	1.7361	4.20805E-02	1.7249	0.00000E+00	0.0000
13	0.0159			1.09295E-02	2.9753	1.50670E-02	2.9523	0.00000E+00	0.0000
14	0.0026			1.79935E-03	6.3605	4.13609E-03	6.3202	0.00000E+00	0.0000
15	0.0005			3.25856E-04	11.9452	3.90052E-04	10.8859	0.00000E+00	0.0000
16	0.0002			1.48636E-04	12.7902	1.47130E-04	12.6927	0.00000E+00	0.0000
17	0.0003			2.11899E-04	17.8889	1.49772E-04	17.6576	0.00000E+00	0.0000
18	0.0003			2.06086E-04	19.1873	1.26746E-04	18.3550	0.00000E+00	0.0000
19	0.0002			1.52165E-04	17.6340	9.37136E-05	16.6755	0.00000E+00	0.0000
20	0.0005			3.43275E-04	25.0237	2.08989E-04	23.5957	0.00000E+00	0.0000
21	0.0002			1.17814E-04	53.7091	6.63137E-05	51.5579	0.00000E+00	0.0000
22	0.0002			1.05573E-04	63.4739	6.63621E-05	56.9945	0.00000E+00	0.0000
23	0.0001			4.29204E-05	73.3257	2.51756E-05	70.2239	0.00000E+00	0.0000
24	0.0000			6.13944E-06	100.0000	3.21529E-06	100.0000	0.00000E+00	0.0000
25	0.0000			0.00000E+00	0.0000	0.00000E+00	0.0000	0.00000E+00	0.0000
26	0.0000			0.00000E+00	0.0000	0.00000E+00	0.0000	0.00000E+00	0.0000
27	0.0000			0.00000E+00	0.0000	0.00000E+00	0.0000	0.00000E+00	0.0000
system total =				6.89123E-01	0.2446	9.97428E-01	0.1877	0.00000E+00	0.0000

elapsed time 12.98050 minutes

uf6 homogeneous infinite array of cylinders h/u=0

frequency for generations 4 to 103

```
0.6388 to 0.6619     ****
0.6619 to 0.6850     ************************************
0.6850 to 0.7081     ************************************************
0.7081 to 0.7312     ************
0.7312 to 0.7543     *
```

frequency for generations 29 to 103

```
0.6388 to 0.6619     **
0.6619 to 0.6850     *********************************
0.6850 to 0.7081     *********************************
0.7081 to 0.7312     *******
0.7312 to 0.7543     *
```

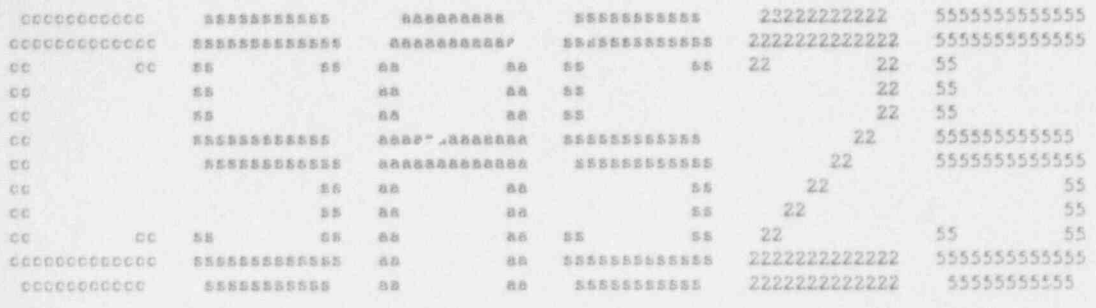
frequency for generations 54 to 103

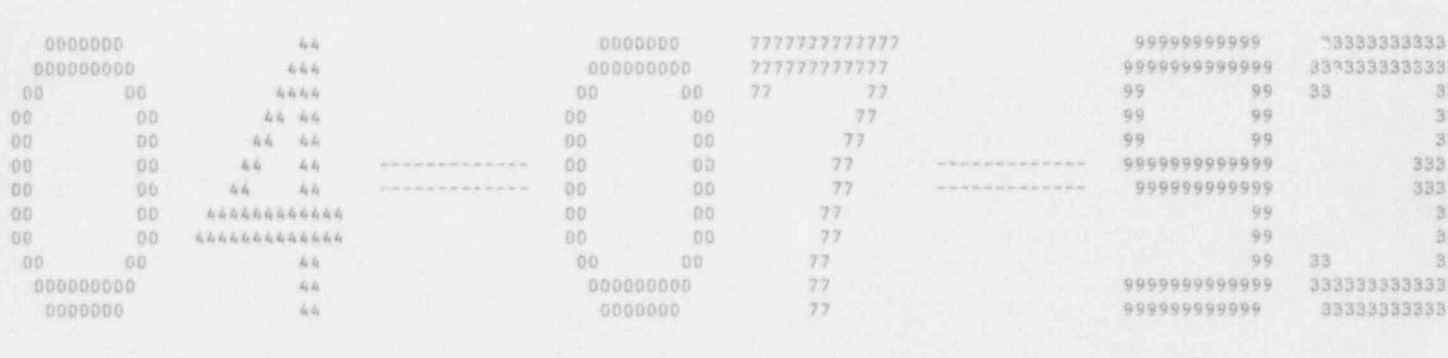
```
0.6388 to 0.6619
0.6619 to 0.6850     **********************
0.6850 to 0.7081     ************************
0.7081 to 0.7312     ****
0.7312 to 0.7543     *
```

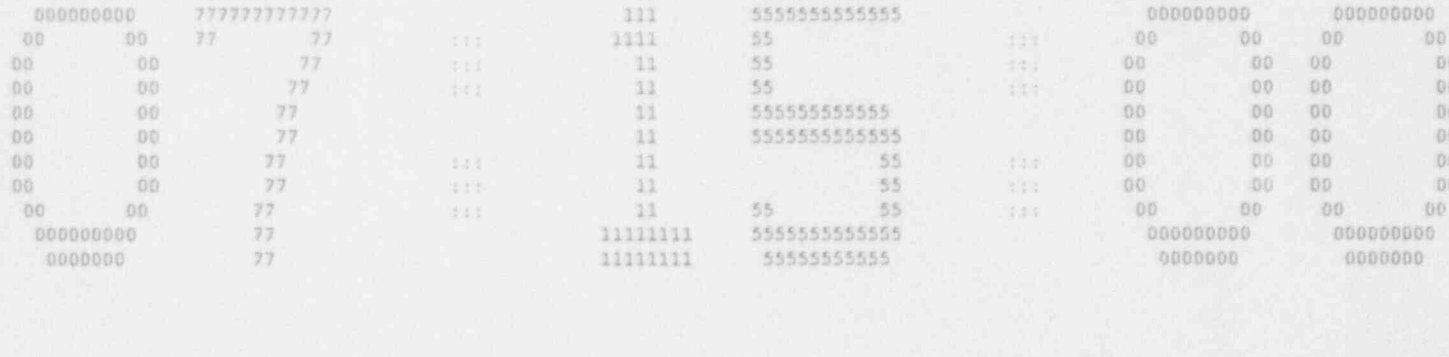
frequency for generations 79 to 103

```
0.6388 to 0.6619
0.6619 to 0.6850     ************
0.6850 to 0.7081     ***********
0.7081 to 0.7312     **
0.7312 to 0.7543
```

congratulations! you have successfully traversed the perilous path through keno v in 12.98050 minutes







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*****                                                                       *****
*********************************************************************************
*********************************************************************************
*****                                                                       *****
*****                                                                       *****
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*****                                                                       *****
*****       creation date:  08/09/91                                        *****
*****                                                                       *****
*****             library:  scale-4 libraries                               *****
*****                                                                       *****
*****                                                                       *****
*****             jobname:  uf6incyl                                        *****
*****                                                                       *****
*****   date of execution:  04-07-93                                        *****
*****                                                                       *****
*****   time of execution:  07:15:00                                        *****
*****                                                                       *****
*****                                                                       *****
*********************************************************************************
*********************************************************************************
*********************************************************************************
```

C4DATA - INEL IBMPC-386 (Extended) Configuration Release 1.00

```
uf6 cylinders infinite array                              uf6incyl.cjw

**** problem parameters ****

lib 27groupndf4  library
mxx             3 mixtures
msc             3 composition specifications
izm             1 material zones
ge  infhommedium geometry
more            0 0/1 do not read/read optional parameter data
msln            0 fuel solutions

**** problem composition description ****

sc  uf6           standard composition
mx              1 mixture no.
vf         1.0000 volume fraction
roth       4.8500 theoretical density
temp        293.0 deg kelvin
           92235   5.02%
           92238  94.98%
end

sc  carbonsteel  standard composition
mx              2 mixture no.
vf         1.0000 volume fraction
roth       7.8212 theoretical density
end

sc  h2o           standard composition
mx              3 mixture no.
vf         0.0000 volume fraction
roth       0.9982 theoretical density
end

**** problem geometry ****

**** infinite homogeneous medium ****
mfuel           1 mixture no. of the infinite homogeneous medium
```

```
*** uf6 cylinders infinite array uf6incyl.cjw ***

********** data library information **********

unit number | data set name | volume name | unit function
89 | ft89f001 | | standard composition library
82 | ft82f001 | | cross section library
11 | ft11f001 | | short cross section library

standard composition library data

unit number : 89
dataset name : ft89f001
library title: scale-4 standard composition library
379 tandard compositions, 326 nuclides
10 elements with variable isotopic distrbutions.
creation date: 7/11/91

cross section library data

unit number : 82
dataset name : ft82f001
library title: SCALE 4 - 27 NEUTRON GROUP CRITICALITY SAFETY LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89
LAST UPDATED 10/12/89
L.M.PETRIE ORNL

..... 0 io's were used before reading keno v data .....
..... 0 io's were used reading the keno v parameter data .....

********** data reading completed **********
..... 0 io's were used preparing the keno v input data .....
..... 0 io's were used loading the keno v data .....
..... 0 io's were used loading the data .....
..... 0 io's were used checking the keno v geometry data .....
***** restart data has been written on unit 95 *****
..... 0 io's were used writing the keno v - csas data .....
..... 0 io's were used processing csas input data .....

control module csas25 is complete.

Run with Aug 91 IBM-PC 486 (Extended) on 04/07/93 at 07:29:47

The input deck follows:
```

```
********************************************************************************
#CSAS25
UF6 CYLINDERS INFINITE ARRAY                                  UF6INCY1.CJW
27GROUPNDF4                INFHOMMEDIUM
UF6          1  1.0 293  92235 5.02  92238 94.98  END
CARBONSTEEL  2  1.0  END
H2O          3  0.000000001  END
END COMP
UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0
READ PARM  RUN=YES PLT=NO TME=150 END PARM
READ GEOM
GLOBAL UNIT  1
COM='ONE UF6 CYLINDER'
CYLINDER   1  1  36.83  2P95.25
CYLINDER   2  1  38.10  2P96.52
CUBOID     3  1  4P53.34  2P111.76
END GEOM
READ BNDS  ALL=MIRROR  END BNDS
READ PLOT
TTL='X - Y  SLICE AT Z = 0.0'
PLT=NO PIC=MIXTURE XUL=-45 YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
UAX=1 VAX=0 WAX=0 UDN=0 VDN=-1 WDN=0 NAX=130
NCH='VUCW' END
END PLOT
END DATA
END
********************************************************************************
```

```
      primary module access and input record ( scale driver - 10/31/90 - 14:00 )
module CSAS25   will be called
  UF6 CYLINDERS INFINITE ARRAY                              UF6INCY1.CJW
  27GROUPNDF4                  INFHOMMEDIUM
  UF6          1  1.0 293  92235 5.02  92238 94.98  END
  CARBONSTEEL  2  1.0  END
  H2O          3  0.000000001  END
  END COMP
  UF6 HOMOGENEOUS INFINITE ARRAY OF CYLINDERS H/U=0
  READ PARM  RUN=YES PLT=NO TME=150 END PARM
  READ GEOM
  GLOBAL UNIT  1
  COM='ONE UF6 CYLINDER'
  CYLINDER   1  1  36.83  2P95.25
  CYLINDER   2  1  38.10  2P96.52
  CUBOID     3  1  4P53.34  2P111.76
  END GEOM
  READ BNDS  ALL=MIRROR  END BNDS
  READ PLOT
  TTL='X - Y  SLICE AT Z = 0.0'
  PLT=NO PIC=MIXTURE XUL=  ' YUL=45 ZUL=0 XLR=45 YLR=-45 ZLR=0
  UAX=1 VAX=0 WAX=0 UDN=0 ,   -' WDN=0 NAX=130
  NCH='VUCW' END
  END PLOT
  END DATA
secondary module o0o008   has been called.
module o0o008   is finished.
secondary module o0o002   has been called.
module o0o002   is finished.
secondary module o0o009   has been called.
module o0o009   is finished.
module csas25   is finished.
```