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6.6 Appendix

This appendix contains computer input/output for the analyses presented in Section 6.4.

**6.6.1**      **PWR Fuel Assemblies**

This section contains abbreviated output files from the most reactive normal condition and accident condition moderator density variation cases.

Figure 6.6.1-1 CSAS Input/Output for NAC-LWT with PWR Fuel – 3.7% Enrichment –  
Most Reactive Normal Condition Configuration

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT ANALYSIS: Exxon 15x15(W) ASSEMBLY: NO WATER IN GAP
L7GROUPHDF4 LATTICECELL
UO2 1 0.95 293.0 92235 3.7 92238 96.3 END
ZR 2 1.0 293.0 END
H2O 3 1.000 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.0 293.0 END
H2O 8 1.0E-20 293.0 END
H2O 9 1.0E-20 293.0 END
END COMP
SQUAREPITCH 1.4300 0.9056 1 3 1.0770 2 0.9246 9 END
LWT ANALYSIS: Exxon 15x15(W) ASSEMBLY: NO WATER IN GAP
READ PARAM RUN=YES PLT=NO TME=5000 GEN=303 NPC=1000 END PARAM
READ GEOM
UNIT 1
COM='FUEL PIN CELL - WITH H2O'
CYLINDER 1 1 0.4528 2P182.88
CYLINDER 9 1 0.4623 2P182.88
CYLINDER 2 1 0.5385 2P182.88
CUBOID 3 1 4P0.7150 2P182.88
UNIT 2
COM='WATER ROD CELL - WITH H2O'
CYLINDER 3 1 0.6477 2P182.88
CYLINDER 2 1 0.6909 2P182.88
CUBOID 3 1 4P0.7150 2P182.88
GLOBAL UNIT 9
ARRAY 1 -10.7250 -10.7250 -182.88
CUBOID 3 1 4P11.3157 2P182.88
CYLINDER 4 1 16.891 2P182.88
CYLINDER 3 1 16.9863 2P182.88
CYLINDER 5 1 18.8913 2P182.88
CYLINDER 6 1 33.4963 2P182.88
CYLINDER 5 1 36.5443 2P182.88
CYLINDER 7 1 49.2443 2P182.88
CYLINDER 5 1 49.8539 212.48 -192.16
CYLINDER 6 1 49.8539 212.48 -199.78
CYLINDER 5 1 49.8539 212.48 -208.67
CUBOID 8 1 4F81.0000 243.00 -240.00
END GEOM
READ ARRAY
ARA=1 NUX=15 NUZ=15 NUZ=1 FILL
30R1
2R1 2 2R1 2 3R1 2 2R1 2 2R1
7R1 2 7R1
4R1 2 5R1 2 4R1
2R1 2 9R1 2 2R1
15R1
3R1 2 3R1 2 3R1 2 3R1
15R1
2R1 2 9R1 2 2R1
4R1 2 5R1 2 4R1
7R1 2 7R1
2R1 2 2R1 2 3R1 2 2R1 2 2R1
30R1
END FILL
END ARRAY
READ BOUNDS ZFC=VAC YXF=VAC END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.32 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 13.68 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 593.36 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 612.37 (SECONDS).
```

```

CCCCCCCCC      SSSSSSSSSS      AAAAAAAAA      SSSSSSSSSS      2222222222      555555555555
CCCCCCCCCCCCC  SSSSSSSSSSSS    AAAAAAAAAAAA  SSSSSSSSSSSS  222222222222  555555555555
CC      CC      SS      SS      AA      AA      SS      SS      22      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SSSSSSSSSS  AAAAAAAAAAAA  SSSSSSSSSS      22      555555555555
CC      SSSSSSSSSS  AAAAAAAAAAAA  SSSSSSSSSS      22      555555555555
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      CC      SS      SS      AA      AA      SS      SS      22      55      55
CCCCCCCCCCCCC  SSSSSSSSSSSS  AA      AA      SSSSSSSSSSSS  222222222222  555555555555
CCCCCCCCC      SSSSSSSSSS      AA      AA      SSSSSSSSSS      222222222222  555555555555
    
```

```

SSSSSSSSSSS  CCCCCCCCCC      AAAAAAAAA      LL      EEEEEEEEEEE      PPPPPPPPPPP      CCCCCCCCCC
SSSSSSSSSSS  CCCCCCCCCC      AAAAAAAAAAAA  LL      EEEEEEEEEEE      PPPPPPPPPPP      CCCCCCCCCC
SS      SS      CC      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SSSSSSSSSSS  CC      AAAAAAAAAAAA  LL      EEEEEEEEE     -----      PPPPPPPPPPP      CC
SSSSSSSSSSS  CC      AAAAAAAAAAAA  LL      EEEEEEEEE     -----      PPPPPPPPPPP      CC
SS      CC      AA      AA      LL      EE      PP      CC
SS      CC      AA      AA      LL      EE      PP      CC
SS      SS      CC      CC      AA      AA      LL      EE      PP      PP      CC      CC
SSSSSSSSSSS  CCCCCCCCCC      AA      AA      LLLLLLLLLLLL  EEEEEEEEEEE      PP      CCCCCCCCCC
SSSSSSSSSSS  CCCCCCCCCC      AA      AA      LLLLLLLLLLLL  EEEEEEEEEEE      PP      CCCCCCCCCC
    
```

```

0000000      777777777777      //      2222222222      2222222222      //      9999999999      8888888888
000000000    777777777777      //      222222222222  222222222222  //      999999999999  888888888888
00      00      77      77      //      22      22      22      22      //      99      99      88      88
00      00      77      77      //      22      22      22      22      //      99      99      88      88
00      00      77      77      //      22      22      22      22      //      99      99      88      88
00      00      77      77      //      22      22      22      22      //      99      99      88      88
00      00      77      77      //      22      22      22      22      //      99      99      88      88
00      00      77      77      //      22      22      22      22      //      99      99      88      88
000000000    77      //      222222222222  222222222222  //      999999999999  888888888888
0000000      77      //      222222222222  222222222222  //      999999999999  888888888888
    
```

```

11      777777777777      0000000      44      3333333333      0000000
111     777777777777      000000000    444      333333333333  000000000
1111    77      77      :::      00      00      44      44      :::      33      33      00      00
11      77      77      :::      00      00      44      44      :::      33      00      00
11      77      77      :::      00      00      44      44      :::      333      00      00
11      77      77      :::      00      00      44      44      :::      333      00      00
11      77      77      :::      00      00      444444444444  :::      33      00      00
11      77      77      :::      00      00      444444444444  :::      33      00      00
11      77      77      :::      00      00      44      44      :::      33      00      00
11111111  77      000000000    44      333333333333  000000000
11111111  77      00000000    44      333333333333  00000000
    
```



LWT ANALYSIS: EXXON 15X15 (W) ASSEMBLY; NO WATER IN GAP

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LTB 27GPOUPNDF4 LIBRARY  
 MX 9 MIXTURES  
 MSC 9 COMPOSITION SPECIFICATIONS  
 IZM 4 MATERIAL ZONES  
 GE LATTICECELL GEOMETRY  
 MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
 MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
 MX 1 MIXTURE NO.  
 VF 0.9500 VOLUME FRACTION  
 ROTH 10.9600 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 92000 1.00 ATOM/MOLECULE  
 92235 3.700 WT%  
 92238 96.300 WT%  
 8016 2.00 ATOMS/MOLECULE

END

SC ZR STANDARD COMPOSITION  
 MX 2 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 6.4900 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 40000 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
 MX 3 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
 MX 4 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 2.7020 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 13027 1.00 ATOM/MOLECULE

END

SC SS304 STANDARD COMPOSITION  
 MX 5 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 7.9200 THEORETICAL DENSITY  
 NEL 4 NO. ELEMENTS  
 ICP 0 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 24304 19.000 WT%  
 25055 2.000 WT%  
 26304 69.500 WT%  
 28304 9.500 WT%

END

SC PB STANDARD COMPOSITION  
 MX 6 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 11.3440 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 82000 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
 MX 7 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION

```
MX      8 MIXTURE NO.  
VF      0.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL      2 NO. ELEMENTS  
ICP      1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001 2.00 ATOMS/MOLECULE  
        8016 1.00 ATOM/MOLECULE  
END
```

```
SC H2O   STANDARD COMPOSITION  
MX      9 MIXTURE NO.  
VF      0.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL      2 NO. ELEMENTS  
ICP      1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001 2.00 ATOMS/MOLECULE  
        8016 1.00 ATOM/MOLECULE  
END
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP SQUAREPITCH CELL TYPE  
PITCH    1.4300 CM CENTER TO CENTER SPACING  
FUELOD   0.9056 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL     1 MIXTURE NO. OF FUEL  
MMOD      3 MIXTURE NO. OF MODERATOR  
CLADOD   1.0770 CM CLAD OUTER DIAMETER  
MCLAD     2 MIXTURE NO. OF CLAD  
GAPOD    0.9246 CM GAP OUTER DIAMETER  
MGAP      9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```



```

.....
***
***          LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; NO WATER IN GAP
***
.....
***          ***** DATA LIBRARY INFORMATION *****
***
***          UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION
***          NUMBER          -----          NAME          -----
***          -----          -----          -----          -----
***          89          G:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***          82          G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***          11          D:\PROJECTS\BU85-C-1\pwrfin02\15NX1M\FT11F00          SHORT CROSS SECTION LIBRARY
***          90          D:\PROJECTS\BU85-C-1\pwrfin02\15NX1M\FT90F00          INPUT DATA DIRECT ACCESS
***
.....
***
***          STANDARD COMPOSITION LIBRARY DATA
***          -----
***
***          UNIT NUMBER          : 89
***          DATASET NAME          : G:\scale43\DATALIB\FT89F001
***          LIBRARY TITLE          : SCALE-4 STANDARD COMPOSITION LIBRARY
***          637 STANDARD COMPOSITIONS, 490 NUCLIDES
***          90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***          CREATION DATE          : 6/30/95
***
***          CROSS SECTION LIBRARY DATA
***          -----
***
***          UNIT NUMBER          : 82
***          DATASET NAME          : G:\scale43\DATALIB\FT82F001
***          LIBRARY TITLE          : SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***          BASED ON ENDF-B VERSION 4 DATA
***          COMPILED FOR NRC          1/27/89
***          LAST UPDATED
***          L.M.PETRIE          - ORNL
***
***          08/12/94
***
.....

```

```

..... 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.

```





```
.....  
***  
***                               LWT ANALYSIS; EXXON 15X15(W) ASSEMBLY; NO WATER IN GAP                               ***  
***                               .....                               ***  
***                               NUMERIC PARAMETERS                               ***  
***                               .....                               ***  
***  
*** TME          MAXIMUM PROBLEM TIME (MIN)          *****          ***  
***  
*** TBA          TIME PER GENERATION (MIN)          0.50          ***  
***  
*** GEN          NUMBER OF GENERATIONS          303          ***  
***  
*** NPG          NUMBER PER GENERATION          1000          ***  
***  
*** HSK          NUMBER OF GENERATIONS TO BE SKIPPED          3          ***  
***  
*** BEG          BEGINNING GENERATION NUMBER          1          ***  
***  
*** RES          GENERATIONS BETWEEN CHECKPOINTS          0          ***  
***  
*** X1D          NUMBER OF EXTRA 1-D CROSS SECTIONS          1          ***  
***  
*** NBK          NEUTRON BANK SIZE          1025          ***  
***  
*** XNB          EXTRA POSITIONS IN NEUTRON BANK          0          ***  
***  
*** NFB          FISSION BANK SIZE          1000          ***  
***  
*** 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          BB827100001          ***  
***  
*** 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          ***  
***  
.....
```





LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; NO WATER IN GAP

MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD = 3.0E-05

MIXTURE =	1	DENSITY (G/CC) =	10.412			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
1008016	4.64601E-02	1.19493E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED
08/12/94								
1092235	8.70095E-04	3.26161E-02	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261		UPDATED
08/12/94								
1092238	2.23600E-02	8.48901E-01	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262		UPDATED
08/12/94								
MIXTURE =	2	DENSITY (G/CC) =	6.4900			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
2040000	4.28457E-02	1.00000E+00	40000	91.2196	ZIRCONIUM	ENDF/B-IV MAT 7141		UPDATED
08/12/94								
MIXTURE =	3	DENSITY (G/CC) =	0.99817			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
3001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED
08/12/94								
3008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED
08/12/94								
MIXTURE =	4	DENSITY (G/CC) =	2.7020			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
4013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)			UPDATED
08/12/94								
MIXTURE =	5	DENSITY (G/CC) =	7.9200			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
5024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'			UPDATED
08/12/94								
5025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197		UPDATED
08/12/94								
5026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'			UPDATED
08/12/94								
5028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'			UPDATED
08/12/94								
MIXTURE =	6	DENSITY (G/CC) =	11.344			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
6082000	3.29690E-02	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K			UPDATED
08/12/94								
MIXTURE =	7	DENSITY (G/CC) =	0.99817			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
7001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED
08/12/94								
7008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED
08/12/94								
MIXTURE =	8	DENSITY (G/CC) =	0.99817E-20			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
8001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED
08/12/94								
8008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED
08/12/94								
MIXTURE =	9	DENSITY (G/CC) =	0.99817E-20			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
9001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED
08/12/94								
9008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED
08/12/94								

KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 3 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 7 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 8 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 9 WERE CORRECTED FOR BAD MOMENTS.

1-D CROSS SECTION ARRAY ID NUMBERS  
 1 2002 1452 27 18 1018  
 ..... 0 10'S WERE USED PREPARING THE CROSS SECTIONS .....

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***          LWT ANALYSIS: EXXON 15X15(W) ASSEMBLY; NO WATER IN GAP          ***
***
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***
***          ***** ADDITIONAL INFORMATION *****          ***
***
*** NUMBER OF ENERGY GROUPS           27      USE LATTICE GEOMETRY           YES ***
***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1      GLOBAL ARRAY NUMBER           1 ***
***
*** NO. OF SCATTERING ANGLES IN XSECS   2      NUMBER OF UNITS IN THE GLOBAL X DIR. 15 ***
***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 16     NUMBER OF UNITS IN THE GLOBAL Y DIR. 15 ***
***
*** ENTRIES/NEUTRON IN THE FISSION BANK  9     NUMBER OF UNITS IN THE GLOBAL Z DIR.  1 ***
***
*** NUMBER OF MIXTURES USED             9      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        19     MAXIMUM HOLE NESTING LEVEL      0 ***
***
*** NUMBER OF GEOMETRY REGIONS USED     19     USE NESTED ARRAYS              NO  ***
***
*** LARGEST GEOMETRY UNIT NUMBER        9      NUMBER OF ARRAYS USED          1 ***
***
*** LARGEST ARRAY NUMBER                1      MAXIMUM ARRAY NESTING LEVEL    1 ***
***
***
*** +X BOUNDARY CONDITION                VAC    -X BOUNDARY CONDITION          VAC ***
***
*** +Y BOUNDARY CONDITION                VAC    -Y BOUNDARY CONDITION          VAC ***
***
*** +Z BOUNDARY CONDITION                VAC    -Z BOUNDARY CONDITION          VAC ***
***
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LWT ANALYSIS; EXXON 15X15(W) ASSEMBLY; NO WATER IN GAP

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 1 -----								
FUEL PIN CELL - WITH H2O								
1	CYLINDER	1	1	RADIUS = 0.45280	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2	CYLINDER	9	1	RADIUS = 0.46230	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3	CYLINDER	2	1	RADIUS = 0.53850	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4	CUBOID	3	1	+X = 0.71500	-X = -0.71500	+Y = 0.71500	-Y = -0.71500 +Z = 182.88 -Z = -182.88	
----- UNIT 2 -----								
WATER ROD CELL - WITH H2O								
1	CYLINDER	3	1	RADIUS = 0.64770	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2	CYLINDER	2	1	RADIUS = 0.69090	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3	CUBOID	3	1	+X = 0.71500	-X = -0.71500	+Y = 0.71500	-Y = -0.71500 +Z = 182.88 -Z = -182.88	
***** GLOBAL *****								
----- UNIT 9 EXTERNAL TO LATTICE 1 -----								
1	ARRAY NUMBER	1		+X = 10.725	-X = -10.725	+Y = 10.725	-Y = -10.725 +Z = 182.88 -Z = -182.88	
2	CUBOID	3	1	+X = 11.316	-X = -11.316	+Y = 11.316	-Y = -11.316 +Z = 182.88 -Z = -182.88	
3	CYLINDER	4	1	RADIUS = 16.891	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4	CYLINDER	3	1	RADIUS = 16.986	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
5	CYLINDER	5	1	RADIUS = 18.891	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
6	CYLINDER	6	1	RADIUS = 33.496	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
7	CYLINDER	5	1	RADIUS = 36.544	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
8	CYLINDER	7	1	RADIUS = 49.244	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
9	CYLINDER	5	1	RADIUS = 49.854	+Z = 212.48	-Z = -192.16	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
10	CYLINDER	6	1	RADIUS = 49.854	+Z = 212.48	-Z = -199.78	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
11	CYLINDER	5	1	RADIUS = 49.854	+Z = 212.48	-Z = -208.67	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
12	CUBOID	8	1	+X = 81.000	-X = -81.000	+Y = 81.000	-Y = -81.000 +Z = 243.00 -Z = -240.00	

LWT ANALYSIS: EXXON 15X15(W) ASSEMBLY: NO WATER IN GAP

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 15 LEFT TO RIGHT Y ROW 1 TO 15 BOTTOM TO TOP

```
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 1 2 1 1 2 1 1
1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1
1 1 1 1 2 1 1 1 1 1 1 2 1 1 1 1
1 1 2 1 1 1 1 1 1 1 1 1 2 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 2 1 1 1 1 2 1 1 1 2 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 1 1 1 1 1 1 1 2 1 1
1 1 1 1 2 1 1 1 1 1 2 1 1 1 1 1
1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 1 2 1 1 2 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```



LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; NO WATER IN GAP

GENERATION KENO MESSAGE NUMBER K5-132	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES WARNING... ONLY	AVERAGE K-EFFECTIVE 987 INDEPENDENT	AVG K-EFF DEVIATION FISSION POINTS WERE	MATRIX K-EFFECTIVE GENERATED	MATRIX K-EFF DEVIATION
1	8.94813E-01	1.53823E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	8.81756E-01	1.87667E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.26407E-01	2.13667E-01	9.26407E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.47962E-01	2.52667E-01	9.37184E-01	1.07775E-02	0.00000E+00	0.00000E+00
5	9.44398E-01	2.84667E-01	9.39588E-01	6.67085E-03	0.00000E+00	0.00000E+00
6	9.57348E-01	3.16667E-01	9.44028E-01	6.47781E-03	0.00000E+00	0.00000E+00
7	9.06890E-01	3.50667E-01	9.37001E-01	8.63509E-03	0.00000E+00	0.00000E+00
8	9.21987E-01	3.80833E-01	9.34499E-01	7.48138E-03	0.00000E+00	0.00000E+00
9	9.25118E-01	4.12000E-01	9.33158E-01	6.46338E-03	0.00000E+00	0.00000E+00
10	9.55106E-01	4.44000E-01	9.35902E-01	6.23361E-03	0.00000E+00	0.00000E+00
11	9.07018E-01	4.77833E-01	9.32693E-01	6.36572E-03	0.00000E+00	0.00000E+00
12	9.39932E-01	5.10833E-01	9.33416E-01	5.73951E-03	0.00000E+00	0.00000E+00
13	9.50831E-01	5.42833E-01	9.35000E-01	5.42759E-03	0.00000E+00	0.00000E+00
14	9.66727E-01	5.75833E-01	9.37644E-01	5.61601E-03	0.00000E+00	0.00000E+00
15	9.31262E-01	6.07833E-01	9.37153E-01	5.18925E-03	0.00000E+00	0.00000E+00
16	9.19301E-01	6.39000E-01	9.35878E-01	4.97064E-03	0.00000E+00	0.00000E+00
17	9.05264E-01	6.72833E-01	9.33837E-01	5.05748E-03	0.00000E+00	0.00000E+00
18	9.66305E-01	7.04000E-01	9.35866E-01	5.14771E-03	0.00000E+00	0.00000E+00
19	9.19402E-01	7.35167E-01	9.34897E-01	4.93146E-03	0.00000E+00	0.00000E+00
20	9.26002E-01	7.67167E-01	9.34403E-01	4.67562E-03	0.00000E+00	0.00000E+00
21	9.12766E-01	7.98333E-01	9.33264E-01	4.56695E-03	0.00000E+00	0.00000E+00
22	9.45442E-01	8.28500E-01	9.33873E-01	4.37516E-03	0.00000E+00	0.00000E+00
23	9.38969E-01	8.57833E-01	9.34116E-01	4.16868E-03	0.00000E+00	0.00000E+00
24	9.52939E-01	8.88833E-01	9.34972E-01	4.06573E-03	0.00000E+00	0.00000E+00
25	9.21769E-01	9.19167E-01	9.34398E-01	3.92711E-03	0.00000E+00	0.00000E+00
26	8.98143E-01	9.52000E-01	9.32887E-01	4.05203E-03	0.00000E+00	0.00000E+00
27	9.47410E-01	9.81333E-01	9.33468E-01	3.92974E-03	0.00000E+00	0.00000E+00
28	8.74141E-01	1.01517E+00	9.31186E-01	4.41152E-03	0.00000E+00	0.00000E+00
29	9.01779E-01	1.04900E+00	9.30097E-01	4.38248E-03	0.00000E+00	0.00000E+00
30	9.57997E-01	1.08200E+00	9.31093E-01	4.33903E-03	0.00000E+00	0.00000E+00
31	9.34656E-01	1.11400E+00	9.31216E-01	4.18854E-03	0.00000E+00	0.00000E+00
32	8.76054E-01	1.14700E+00	9.29377E-01	4.44469E-03	0.00000E+00	0.00000E+00
33	9.15205E-01	1.17900E+00	9.28920E-01	4.32317E-03	0.00000E+00	0.00000E+00
34	9.46478E-01	1.21117E+00	9.29469E-01	4.22168E-03	0.00000E+00	0.00000E+00
35	9.16337E-01	1.24317E+00	9.29071E-01	4.11107E-03	0.00000E+00	0.00000E+00
36	9.25952E-01	1.27517E+00	9.28979E-01	3.98938E-03	0.00000E+00	0.00000E+00
37	9.18173E-01	1.30633E+00	9.28671E-01	3.88601E-03	0.00000E+00	0.00000E+00
38	8.87881E-01	1.33750E+00	9.27537E-01	3.94282E-03	0.00000E+00	0.00000E+00
39	9.43313E-01	1.36950E+00	9.27964E-01	3.85841E-03	0.00000E+00	0.00000E+00
40	9.03753E-01	1.40250E+00	9.27327E-01	3.80916E-03	0.00000E+00	0.00000E+00
41	9.28225E-01	1.43533E+00	9.27250E-01	3.71028E-03	0.00000E+00	0.00000E+00
42	9.87952E-01	1.46750E+00	9.28865E-01	3.92087E-03	0.00000E+00	0.00000E+00
43	9.16508E-01	1.50133E+00	9.28563E-01	3.83590E-03	0.00000E+00	0.00000E+00
44	9.29004E-01	1.53433E+00	9.28574E-01	3.74347E-03	0.00000E+00	0.00000E+00
45	9.22795E-01	1.56533E+00	9.28440E-01	3.65785E-03	0.00000E+00	0.00000E+00
46	8.95947E-01	1.60017E+00	9.27701E-01	3.64925E-03	0.00000E+00	0.00000E+00
47	9.60195E-01	1.63033E+00	9.28423E-01	3.63958E-03	0.00000E+00	0.00000E+00
48	9.23892E-01	1.66333E+00	9.28325E-01	3.56094E-03	0.00000E+00	0.00000E+00
49	9.09483E-01	1.69633E+00	9.27924E-01	3.50734E-03	0.00000E+00	0.00000E+00
50	8.85010E-01	1.72833E+00	9.27030E-01	3.54798E-03	0.00000E+00	0.00000E+00
51	9.38381E-01	1.76133E+00	9.27261E-01	3.48253E-03	0.00000E+00	0.00000E+00
52	9.41845E-01	1.79517E+00	9.27553E-01	3.42462E-03	0.00000E+00	0.00000E+00
53	9.46666E-01	1.82633E+00	9.27928E-01	3.37765E-03	0.00000E+00	0.00000E+00
54	9.24769E-01	1.85917E+00	9.27867E-01	3.31262E-03	0.00000E+00	0.00000E+00
55	9.41126E-01	1.89317E+00	9.28117E-01	3.25913E-03	0.00000E+00	0.00000E+00
56	9.17286E-01	1.92517E+00	9.28917E-01	3.29660E-03	0.00000E+00	0.00000E+00
57	9.32230E-01	1.95717E+00	9.28977E-01	3.23667E-03	0.00000E+00	0.00000E+00
58	9.08528E-01	1.99100E+00	9.28612E-01	3.19925E-03	0.00000E+00	0.00000E+00
59	9.67088E-01	2.02133E+00	9.29287E-01	3.21430E-03	0.00000E+00	0.00000E+00
60	9.16362E-01	2.05233E+00	9.29064E-01	3.16625E-03	0.00000E+00	0.00000E+00
61	9.21463E-01	2.08633E+00	9.28935E-01	3.11479E-03	0.00000E+00	0.00000E+00
62	9.52391E-01	2.11917E+00	9.29326E-01	3.08728E-03	0.00000E+00	0.00000E+00
63	9.43213E-01	2.15033E+00	9.29554E-01	3.04477E-03	0.00000E+00	0.00000E+00
64	9.49338E-01	2.18233E+00	9.29873E-01	3.01221E-03	0.00000E+00	0.00000E+00
65	9.37709E-01	2.21533E+00	9.29997E-01	2.96662E-03	0.00000E+00	0.00000E+00
66	9.33550E-01	2.24833E+00	9.30053E-01	2.92043E-03	0.00000E+00	0.00000E+00
67	9.78257E-01	2.28033E+00	9.30794E-01	2.96925E-03	0.00000E+00	0.00000E+00
68	8.92296E-01	2.31417E+00	9.30211E-01	2.98153E-03	0.00000E+00	0.00000E+00
69	9.03144E-01	2.34533E+00	9.29807E-01	2.96435E-03	0.00000E+00	0.00000E+00
70	9.37593E-01	2.37550E+00	9.29922E-01	2.92267E-03	0.00000E+00	0.00000E+00
71	9.27195E-01	2.40750E+00	9.29882E-01	2.88027E-03	0.00000E+00	0.00000E+00
72	9.34762E-01	2.44150E+00	9.29952E-01	2.83969E-03	0.00000E+00	0.00000E+00
73	9.19989E-01	2.47250E+00	9.29811E-01	2.80292E-03	0.00000E+00	0.00000E+00
74	9.33397E-01	2.50650E+00	9.29861E-01	2.76416E-03	0.00000E+00	0.00000E+00
75	9.10163E-01	2.53850E+00	9.29591E-01	2.73936E-03	0.00000E+00	0.00000E+00
76	9.32267E-01	2.57050E+00	9.29628E-01	2.70233E-03	0.00000E+00	0.00000E+00
77	9.26710E-01	2.60250E+00	9.29598E-01	2.66634E-03	0.00000E+00	0.00000E+00
78	8.98230E-01	2.63550E+00	9.29177E-01	2.66297E-03	0.00000E+00	0.00000E+00
79	9.35670E-01	2.66750E+00	9.29262E-01	2.62951E-03	0.00000E+00	0.00000E+00
80	9.33596E-01	2.69967E+00	9.29317E-01	2.59618E-03	0.00000E+00	0.00000E+00
81	9.48769E-01	2.72983E+00	9.29563E-01	2.57490E-03	0.00000E+00	0.00000E+00
82	9.39203E-01	2.76183E+00	9.29684E-01	2.54537E-03	0.00000E+00	0.00000E+00
83	9.28844E-01	2.79200E+00	9.29674E-01	2.51377E-03	0.00000E+00	0.00000E+00
84	8.94824E-01	2.82317E+00	9.29249E-01	2.51903E-03	0.00000E+00	0.00000E+00
85	9.06282E-01	2.85517E+00	9.28996E-01	2.50129E-03	0.00000E+00	0.00000E+00
86	9.15407E-01	2.88917E+00	9.28834E-01	2.47662E-03	0.00000E+00	0.00000E+00
87	9.93412E-01	2.92017E+00	9.29594E-01	2.56252E-03	0.00000E+00	0.00000E+00
88	9.42819E-01	2.95400E+00	9.29748E-01	2.53721E-03	0.00000E+00	0.00000E+00
89	9.39362E-01	2.98517E+00	9.29858E-01	2.51031E-03	0.00000E+00	0.00000E+00
90	9.64034E-01	3.01633E+00	9.30247E-01	2.51183E-03	0.00000E+00	0.00000E+00

91	9.41603E-01	3.04933E+00	9.30374E-01	2.48672E-03	0.00000E+00	0.00000E+00
92	9.26417E-01	3.08217E+00	9.30330E-01	2.45933E-03	0.00000E+00	0.00000E+00
93	9.39822E-01	3.11433E+00	9.30434E-01	2.43439E-03	0.00000E+00	0.00000E+00
94	9.41933E-01	3.14633E+00	9.30559E-01	2.41102E-03	0.00000E+00	0.00000E+00
95	9.08772E-01	3.17833E+00	9.30325E-01	2.39644E-03	0.00000E+00	0.00000E+00
96	9.68022E-01	3.20667E+00	9.30726E-01	2.40448E-03	0.00000E+00	0.00000E+00
97	9.63263E-01	3.23700E+00	9.31069E-01	2.40357E-03	0.00000E+00	0.00000E+00
98	9.49781E-01	3.26983E+00	9.31264E-01	2.38637E-03	0.00000E+00	0.00000E+00
99	8.80497E-01	3.30383E+00	9.30740E-01	2.41894E-03	0.00000E+00	0.00000E+00
100	9.29169E-01	3.33583E+00	9.30724E-01	2.39418E-03	0.00000E+00	0.00000E+00
101	9.14967E-01	3.36883E+00	9.30565E-01	2.37521E-03	0.00000E+00	0.00000E+00
102	9.58820E-01	3.40083E+00	9.30848E-01	2.36826E-03	0.00000E+00	0.00000E+00
103	9.43701E-01	3.43383E+00	9.30975E-01	2.34814E-03	0.00000E+00	0.00000E+00
104	9.40429E-01	3.46583E+00	9.31068E-01	2.32685E-03	0.00000E+00	0.00000E+00
105	9.08479E-01	3.49883E+00	9.30848E-01	2.31457E-03	0.00000E+00	0.00000E+00
106	8.98098E-01	3.53167E+00	9.30533E-01	2.31375E-03	0.00000E+00	0.00000E+00
107	9.19000E-01	3.56100E+00	9.30423E-01	2.29424E-03	0.00000E+00	0.00000E+00
108	9.46591E-01	3.59400E+00	9.30576E-01	2.27760E-03	0.00000E+00	0.00000E+00
109	9.09390E-01	3.62517E+00	9.30378E-01	2.26489E-03	0.00000E+00	0.00000E+00
110	9.05182E-01	3.65533E+00	9.30145E-01	2.25591E-03	0.00000E+00	0.00000E+00
111	9.27537E-01	3.68550E+00	9.30121E-01	2.23525E-03	0.00000E+00	0.00000E+00
112	9.22314E-01	3.71850E+00	9.30050E-01	2.21597E-03	0.00000E+00	0.00000E+00
113	9.10178E-01	3.75133E+00	9.29871E-01	2.20320E-03	0.00000E+00	0.00000E+00
114	9.28726E-01	3.78433E+00	9.29861E-01	2.18347E-03	0.00000E+00	0.00000E+00
115	9.26631E-01	3.81733E+00	9.29832E-01	2.16425E-03	0.00000E+00	0.00000E+00
116	9.21527E-01	3.85033E+00	9.29759E-01	2.14641E-03	0.00000E+00	0.00000E+00
117	9.45762E-01	3.88317E+00	9.29898E-01	2.13221E-03	0.00000E+00	0.00000E+00
118	9.52413E-01	3.91433E+00	9.30092E-01	2.12265E-03	0.00000E+00	0.00000E+00
119	9.15698E-01	3.94817E+00	9.29969E-01	2.10802E-03	0.00000E+00	0.00000E+00
120	9.03018E-01	3.97933E+00	9.29741E-01	2.10252E-03	0.00000E+00	0.00000E+00
121	9.42731E-01	4.01050E+00	9.29850E-01	2.08763E-03	0.00000E+00	0.00000E+00
122	9.28797E-01	4.04067E+00	9.29841E-01	2.07018E-03	0.00000E+00	0.00000E+00
123	8.99805E-01	4.07267E+00	9.29593E-01	2.06795E-03	0.00000E+00	0.00000E+00
124	9.50440E-01	4.10383E+00	9.29764E-01	2.05804E-03	0.00000E+00	0.00000E+00
125	9.34668E-01	4.13583E+00	9.29804E-01	2.04163E-03	0.00000E+00	0.00000E+00
126	9.35066E-01	4.16700E+00	9.29846E-01	2.02554E-03	0.00000E+00	0.00000E+00
127	9.12199E-01	4.20083E+00	9.29705E-01	2.01422E-03	0.00000E+00	0.00000E+00
128	9.04448E-01	4.23300E+00	9.29505E-01	2.00820E-03	0.00000E+00	0.00000E+00
129	9.19795E-01	4.26583E+00	9.29428E-01	1.99380E-03	0.00000E+00	0.00000E+00
130	9.34935E-01	4.29700E+00	9.29471E-01	1.97863E-03	0.00000E+00	0.00000E+00
131	9.75830E-01	4.33000E+00	9.29831E-01	1.99585E-03	0.00000E+00	0.00000E+00
132	9.55577E-01	4.36300E+00	9.30029E-01	1.99031E-03	0.00000E+00	0.00000E+00
133	9.51182E-01	4.39317E+00	9.30190E-01	1.98165E-03	0.00000E+00	0.00000E+00
134	9.32807E-01	4.42433E+00	9.30210E-01	1.96688E-03	0.00000E+00	0.00000E+00
135	9.24365E-01	4.45533E+00	9.30166E-01	1.95233E-03	0.00000E+00	0.00000E+00
136	9.97090E-01	4.48633E+00	9.29919E-01	1.95337E-03	0.00000E+00	0.00000E+00
137	9.25851E-01	4.52317E+00	9.29889E-01	1.93908E-03	0.00000E+00	0.00000E+00
138	9.04873E-01	4.55783E+00	9.29705E-01	1.93354E-03	0.00000E+00	0.00000E+00
139	9.46926E-01	4.59083E+00	9.29831E-01	1.92348E-03	0.00000E+00	0.00000E+00
140	9.14020E-01	4.62283E+00	9.29716E-01	1.91293E-03	0.00000E+00	0.00000E+00
141	9.23100E-01	4.65583E+00	9.29669E-01	1.89971E-03	0.00000E+00	0.00000E+00
142	9.62653E-01	4.68700E+00	9.29904E-01	1.90075E-03	0.00000E+00	0.00000E+00
143	9.30360E-01	4.72083E+00	9.29907E-01	1.88723E-03	0.00000E+00	0.00000E+00
144	9.26224E-01	4.75200E+00	9.29881E-01	1.87407E-03	0.00000E+00	0.00000E+00
145	9.54848E-01	4.78317E+00	9.30056E-01	1.86909E-03	0.00000E+00	0.00000E+00
146	8.96790E-01	4.81517E+00	9.29825E-01	1.87039E-03	0.00000E+00	0.00000E+00
147	9.04833E-01	4.84817E+00	9.29653E-01	1.86542E-03	0.00000E+00	0.00000E+00
148	8.98946E-01	4.88200E+00	9.29442E-01	1.86450E-03	0.00000E+00	0.00000E+00
149	9.33294E-01	4.91400E+00	9.29469E-01	1.85196E-03	0.00000E+00	0.00000E+00
150	9.34657E-01	4.94700E+00	9.29504E-01	1.83974E-03	0.00000E+00	0.00000E+00
151	9.18472E-01	4.97983E+00	9.29430E-01	1.82885E-03	0.00000E+00	0.00000E+00
152	8.67052E-01	5.01467E+00	9.29014E-01	1.86360E-03	0.00000E+00	0.00000E+00
153	9.27600E-01	5.04483E+00	9.29004E-01	1.85124E-03	0.00000E+00	0.00000E+00
154	9.47229E-01	5.07783E+00	9.29124E-01	1.84293E-03	0.00000E+00	0.00000E+00
155	9.32962E-01	5.10900E+00	9.29149E-01	1.83102E-03	0.00000E+00	0.00000E+00
156	9.72611E-01	5.14017E+00	9.29432E-01	1.84085E-03	0.00000E+00	0.00000E+00
157	9.65798E-01	5.17033E+00	9.29666E-01	1.84392E-03	0.00000E+00	0.00000E+00
158	9.17370E-01	5.20233E+00	9.29587E-01	1.83376E-03	0.00000E+00	0.00000E+00
159	9.10247E-01	5.23617E+00	9.29464E-01	1.82620E-03	0.00000E+00	0.00000E+00
160	9.13379E-01	5.26917E+00	9.29362E-01	1.81746E-03	0.00000E+00	0.00000E+00
161	9.28367E-01	5.30117E+00	9.29356E-01	1.80600E-03	0.00000E+00	0.00000E+00
162	9.19275E-01	5.33700E+00	9.29293E-01	1.79579E-03	0.00000E+00	0.00000E+00
163	9.35844E-01	5.36900E+00	9.29334E-01	1.78506E-03	0.00000E+00	0.00000E+00
164	9.11599E-01	5.40200E+00	9.29224E-01	1.77738E-03	0.00000E+00	0.00000E+00
165	9.78200E-01	5.43217E+00	9.29525E-01	1.79182E-03	0.00000E+00	0.00000E+00
166	9.48222E-01	5.46333E+00	9.29639E-01	1.78450E-03	0.00000E+00	0.00000E+00
167	9.32245E-01	5.49433E+00	9.29655E-01	1.77372E-03	0.00000E+00	0.00000E+00
168	9.59548E-01	5.52650E+00	9.29835E-01	1.77218E-03	0.00000E+00	0.00000E+00
169	9.26540E-01	5.55483E+00	9.29815E-01	1.76165E-03	0.00000E+00	0.00000E+00
170	9.56491E-01	5.58317E+00	9.29974E-01	1.75831E-03	0.00000E+00	0.00000E+00
171	9.66214E-01	5.61517E+00	9.30188E-01	1.76098E-03	0.00000E+00	0.00000E+00
172	8.99076E-01	5.64817E+00	9.30005E-01	1.76014E-03	0.00000E+00	0.00000E+00
173	9.28426E-01	5.68017E+00	9.29996E-01	1.74984E-03	0.00000E+00	0.00000E+00
174	8.75995E-01	5.71417E+00	9.29682E-01	1.76774E-03	0.00000E+00	0.00000E+00
175	9.07432E-01	5.74983E+00	9.29553E-01	1.76219E-03	0.00000E+00	0.00000E+00
176	9.06518E-01	5.78267E+00	9.29421E-01	1.75703E-03	0.00000E+00	0.00000E+00
177	9.02496E-01	5.81750E+00	9.29267E-01	1.75372E-03	0.00000E+00	0.00000E+00
178	9.32729E-01	5.84950E+00	9.29287E-01	1.74384E-03	0.00000E+00	0.00000E+00
179	9.45110E-01	5.87983E+00	9.29376E-01	1.73626E-03	0.00000E+00	0.00000E+00
180	9.40149E-01	5.91083E+00	9.29437E-01	1.72754E-03	0.00000E+00	0.00000E+00
181	8.96099E-01	5.94200E+00	9.29250E-01	1.72793E-03	0.00000E+00	0.00000E+00
182	9.11153E-01	5.97317E+00	9.29150E-01	1.72124E-03	0.00000E+00	0.00000E+00
183	8.87411E-01	6.00617E+00	9.28919E-01	1.72717E-03	0.00000E+00	0.00000E+00
184	9.49590E-01	6.03817E+00	9.29033E-01	1.72140E-03	0.00000E+00	0.00000E+00
185	8.81613E-01	6.07117E+00	9.28774E-01	1.73147E-03	0.00000E+00	0.00000E+00

186	9.11404E-01	6.10500E+00	9.28679E-01	1.72462E-03	0.00000E+00	0.00000E+00
187	9.02526E-01	6.13993E+00	9.28538E-01	1.72109E-03	0.00000E+00	0.00000E+00
188	9.31905E-01	6.17183E+00	9.28556E-01	1.71191E-03	0.00000E+00	0.00000E+00
189	9.08840E-01	6.20493E+00	9.28451E-01	1.70599E-03	0.00000E+00	0.00000E+00
190	9.42424E-01	6.23583E+00	9.28525E-01	1.69520E-03	0.00000E+00	0.00000E+00
191	9.30895E-01	6.26700E+00	9.28537E-01	1.68955E-03	0.00000E+00	0.00000E+00
192	9.48939E-01	6.29900E+00	9.28645E-01	1.68406E-03	0.00000E+00	0.00000E+00
193	9.08979E-01	6.33100E+00	9.28542E-01	1.67838E-03	0.00000E+00	0.00000E+00
194	9.15399E-01	6.36217E+00	9.28473E-01	1.67102E-03	0.00000E+00	0.00000E+00
195	9.47854E-01	6.39233E+00	9.28574E-01	1.66537E-03	0.00000E+00	0.00000E+00
196	9.42632E-01	6.42350E+00	9.28646E-01	1.65835E-03	0.00000E+00	0.00000E+00
197	9.91985E-01	6.45733E+00	9.28458E-01	1.66050E-03	0.00000E+00	0.00000E+00
198	9.18838E-01	6.49033E+00	9.28409E-01	1.65273E-03	0.00000E+00	0.00000E+00
199	9.75930E-01	6.52050E+00	9.28650E-01	1.66192E-03	0.00000E+00	0.00000E+00
200	9.16611E-01	6.55267E+00	9.28590E-01	1.65463E-03	0.00000E+00	0.00000E+00
201	8.98135E-01	6.58550E+00	9.28437E-01	1.65339E-03	0.00000E+00	0.00000E+00
202	9.50982E-01	6.61850E+00	9.28549E-01	1.64896E-03	0.00000E+00	0.00000E+00
203	9.12632E-01	6.65150E+00	9.28470E-01	1.64246E-03	0.00000E+00	0.00000E+00
204	9.43946E-01	6.68350E+00	9.28547E-01	1.63629E-03	0.00000E+00	0.00000E+00
205	9.34774E-01	6.71550E+00	9.28577E-01	1.62849E-03	0.00000E+00	0.00000E+00
206	8.96601E-01	6.74667E+00	9.28421E-01	1.62806E-03	0.00000E+00	0.00000E+00
207	9.29265E-01	6.77783E+00	9.28425E-01	1.62010E-03	0.00000E+00	0.00000E+00
208	9.12953E-01	6.80983E+00	9.28350E-01	1.61396E-03	0.00000E+00	0.00000E+00
209	9.25468E-01	6.84283E+00	9.28336E-01	1.60621E-03	0.00000E+00	0.00000E+00
210	9.23886E-01	6.87667E+00	9.28314E-01	1.59861E-03	0.00000E+00	0.00000E+00
211	9.47202E-01	6.90783E+00	9.28405E-01	1.59351E-03	0.00000E+00	0.00000E+00
212	9.95862E-01	6.93900E+00	9.28726E-01	1.61811E-03	0.00000E+00	0.00000E+00
213	9.76294E-01	6.97183E+00	9.28951E-01	1.62612E-03	0.00000E+00	0.00000E+00
214	9.04657E-01	7.00567E+00	9.28837E-01	1.62249E-03	0.00000E+00	0.00000E+00
215	8.92376E-01	7.03783E+00	9.28666E-01	1.62390E-03	0.00000E+00	0.00000E+00
216	9.49883E-01	7.06983E+00	9.28765E-01	1.61933E-03	0.00000E+00	0.00000E+00
217	9.32266E-01	7.10000E+00	9.28781E-01	1.61186E-03	0.00000E+00	0.00000E+00
218	9.11619E-01	7.13300E+00	9.28702E-01	1.60635E-03	0.00000E+00	0.00000E+00
219	9.71129E-01	7.16417E+00	9.28897E-01	1.61084E-03	0.00000E+00	0.00000E+00
220	9.10902E-01	7.19617E+00	9.28815E-01	1.60556E-03	0.00000E+00	0.00000E+00
221	9.48981E-01	7.22817E+00	9.28907E-01	1.60086E-03	0.00000E+00	0.00000E+00
222	9.19034E-01	7.26117E+00	9.28862E-01	1.59420E-03	0.00000E+00	0.00000E+00
223	9.28355E-01	7.29317E+00	9.28860E-01	1.58697E-03	0.00000E+00	0.00000E+00
224	9.28464E-01	7.32700E+00	9.28858E-01	1.57981E-03	0.00000E+00	0.00000E+00
225	9.44280E-01	7.35917E+00	9.28927E-01	1.57423E-03	0.00000E+00	0.00000E+00
226	9.11169E-01	7.39300E+00	9.28848E-01	1.56919E-03	0.00000E+00	0.00000E+00
227	8.98061E-01	7.42600E+00	9.28711E-01	1.56818E-03	0.00000E+00	0.00000E+00
228	9.34595E-01	7.45700E+00	9.28737E-01	1.56144E-03	0.00000E+00	0.00000E+00
229	9.01249E-01	7.48817E+00	9.28616E-01	1.55926E-03	0.00000E+00	0.00000E+00
230	9.00532E-01	7.51933E+00	9.28493E-01	1.55728E-03	0.00000E+00	0.00000E+00
231	9.65530E-01	7.54950E+00	9.28654E-01	1.55888E-03	0.00000E+00	0.00000E+00
232	9.05497E-01	7.58250E+00	9.28554E-01	1.55535E-03	0.00000E+00	0.00000E+00
233	9.32295E-01	7.61550E+00	9.28570E-01	1.54868E-03	0.00000E+00	0.00000E+00
234	9.39394E-01	7.64750E+00	9.28616E-01	1.54270E-03	0.00000E+00	0.00000E+00
235	9.24179E-01	7.68133E+00	9.28597E-01	1.53618E-03	0.00000E+00	0.00000E+00
236	9.00026E-01	7.71433E+00	9.28475E-01	1.53447E-03	0.00000E+00	0.00000E+00
237	9.26802E-01	7.74717E+00	9.28468E-01	1.52794E-03	0.00000E+00	0.00000E+00
238	9.10312E-01	7.78117E+00	9.28391E-01	1.52340E-03	0.00000E+00	0.00000E+00
239	9.25053E-01	7.81500E+00	9.28377E-01	1.51702E-03	0.00000E+00	0.00000E+00
240	9.51164E-01	7.84700E+00	9.28473E-01	1.51367E-03	0.00000E+00	0.00000E+00
241	9.42666E-01	7.87717E+00	9.28532E-01	1.50849E-03	0.00000E+00	0.00000E+00
242	9.56394E-01	7.91017E+00	9.28648E-01	1.50667E-03	0.00000E+00	0.00000E+00
243	9.17748E-01	7.94317E+00	9.28603E-01	1.50109E-03	0.00000E+00	0.00000E+00
244	9.51436E-01	7.97517E+00	9.28698E-01	1.49785E-03	0.00000E+00	0.00000E+00
245	9.64962E-01	8.00633E+00	9.28847E-01	1.49912E-03	0.00000E+00	0.00000E+00
246	8.98459E-01	8.04017E+00	9.28722E-01	1.49814E-03	0.00000E+00	0.00000E+00
247	9.54002E-01	8.07217E+00	9.28825E-01	1.49558E-03	0.00000E+00	0.00000E+00
248	9.21445E-01	8.10433E+00	9.28797E-01	1.48975E-03	0.00000E+00	0.00000E+00
249	9.16143E-01	8.13717E+00	9.28746E-01	1.48459E-03	0.00000E+00	0.00000E+00
250	9.25566E-01	8.16933E+00	9.28733E-01	1.47865E-03	0.00000E+00	0.00000E+00
251	9.48658E-01	8.20133E+00	9.28813E-01	1.47487E-03	0.00000E+00	0.00000E+00
252	9.34766E-01	8.23333E+00	9.28837E-01	1.46915E-03	0.00000E+00	0.00000E+00
253	9.68129E-01	8.26450E+00	9.28994E-01	1.47164E-03	0.00000E+00	0.00000E+00
254	8.64140E-01	8.29467E+00	9.28736E-01	1.48821E-03	0.00000E+00	0.00000E+00
255	8.96829E-01	8.32667E+00	9.28610E-01	1.48767E-03	0.00000E+00	0.00000E+00
256	9.27779E-01	8.35967E+00	9.28607E-01	1.48180E-03	0.00000E+00	0.00000E+00
257	9.35282E-01	8.39167E+00	9.28633E-01	1.47621E-03	0.00000E+00	0.00000E+00
258	9.36664E-01	8.42550E+00	9.28665E-01	1.47077E-03	0.00000E+00	0.00000E+00
259	9.21719E-01	8.45667E+00	9.28638E-01	1.46528E-03	0.00000E+00	0.00000E+00
260	9.18450E-01	8.48967E+00	9.28598E-01	1.46013E-03	0.00000E+00	0.00000E+00
261	9.36405E-01	8.52267E+00	9.28628E-01	1.45479E-03	0.00000E+00	0.00000E+00
262	9.22285E-01	8.55550E+00	9.28640E-01	1.44939E-03	0.00000E+00	0.00000E+00
263	8.93737E-01	8.58667E+00	9.28470E-01	1.44999E-03	0.00000E+00	0.00000E+00
264	9.65537E-01	8.61867E+00	9.28612E-01	1.45136E-03	0.00000E+00	0.00000E+00
265	9.45569E-01	8.64900E+00	9.28676E-01	1.44727E-03	0.00000E+00	0.00000E+00
266	9.37357E-01	8.68183E+00	9.28709E-01	1.44215E-03	0.00000E+00	0.00000E+00
267	9.23928E-01	8.71583E+00	9.28691E-01	1.43681E-03	0.00000E+00	0.00000E+00
268	8.63376E-01	8.74967E+00	9.28445E-01	1.45231E-03	0.00000E+00	0.00000E+00
269	9.47296E-01	8.78167E+00	9.28516E-01	1.44858E-03	0.00000E+00	0.00000E+00
270	9.61230E-01	8.81367E+00	9.28638E-01	1.44832E-03	0.00000E+00	0.00000E+00
271	9.03438E-01	8.84667E+00	9.28544E-01	1.44596E-03	0.00000E+00	0.00000E+00
272	9.29466E-01	8.87967E+00	9.28548E-01	1.44060E-03	0.00000E+00	0.00000E+00
273	9.12897E-01	8.91167E+00	9.28490E-01	1.43644E-03	0.00000E+00	0.00000E+00
274	9.22394E-01	8.94550E+00	9.28468E-01	1.43132E-03	0.00000E+00	0.00000E+00
275	9.33945E-01	8.97667E+00	9.28488E-01	1.42621E-03	0.00000E+00	0.00000E+00
276	9.18429E-01	9.00600E+00	9.28451E-01	1.42147E-03	0.00000E+00	0.00000E+00
277	9.11184E-01	9.03617E+00	9.28388E-01	1.41768E-03	0.00000E+00	0.00000E+00
278	9.44100E-01	9.07000E+00	9.28445E-01	1.41368E-03	0.00000E+00	0.00000E+00
279	9.31465E-01	9.10583E+00	9.28456E-01	1.40861E-03	0.00000E+00	0.00000E+00
280	9.47174E-01	9.13783E+00	9.28523E-01	1.40515E-03	0.00000E+00	0.00000E+00

281	9.35082E-01	9.16983E+00	9.28547E-01	1.40030E-03	0.00000E+00	0.00000E+00
282	9.27815E-01	9.20183E+00	9.28544E-01	1.39530E-03	0.00000E+00	0.00000E+00
283	9.31773E-01	9.23567E+00	9.28556E-01	1.39037E-03	0.00000E+00	0.00000E+00
284	9.16095E-01	9.26867E+00	9.28512E-01	1.38613E-03	0.00000E+00	0.00000E+00
285	9.84640E-01	9.30067E+00	9.28710E-01	1.39539E-03	0.00000E+00	0.00000E+00
286	9.25277E-01	9.33100E+00	9.28698E-01	1.39052E-03	0.00000E+00	0.00000E+00
287	9.09745E-01	9.36300E+00	9.28631E-01	1.38723E-03	0.00000E+00	0.00000E+00
288	9.57832E-01	9.39600E+00	9.28733E-01	1.38614E-03	0.00000E+00	0.00000E+00
289	9.24622E-01	9.42700E+00	9.28719E-01	1.38137E-03	0.00000E+00	0.00000E+00
290	9.97633E-01	9.46100E+00	9.28611E-01	1.38079E-03	0.00000E+00	0.00000E+00
291	9.12205E-01	9.49383E+00	9.28554E-01	1.37718E-03	0.00000E+00	0.00000E+00
292	9.76897E-01	9.52500E+00	9.28721E-01	1.38251E-03	0.00000E+00	0.00000E+00
293	9.34423E-01	9.55800E+00	9.28741E-01	1.37789E-03	0.00000E+00	0.00000E+00
294	9.58806E-01	9.58900E+00	9.28844E-01	1.37702E-03	0.00000E+00	0.00000E+00
295	8.90681E-01	9.62200E+00	9.28713E-01	1.37848E-03	0.00000E+00	0.00000E+00
296	8.85455E-01	9.65500E+00	9.28566E-01	1.38164E-03	0.00000E+00	0.00000E+00
297	9.45813E-01	9.68800E+00	9.28625E-01	1.37819E-03	0.00000E+00	0.00000E+00
298	9.52040E-01	9.71817E+00	9.28704E-01	1.37580E-03	0.00000E+00	0.00000E+00
299	9.51573E-01	9.74833E+00	9.28781E-01	1.37332E-03	0.00000E+00	0.00000E+00
300	9.49305E-01	9.78033E+00	9.28850E-01	1.37043E-03	0.00000E+00	0.00000E+00
301	9.08119E-01	9.81150E+00	9.28780E-01	1.36760E-03	0.00000E+00	0.00000E+00
302	9.20235E-01	9.84450E+00	9.28752E-01	1.36333E-03	0.00000E+00	0.00000E+00
303	9.30871E-01	9.87467E+00	9.28759E-01	1.35881E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.



LWT ANALYSIS: EXXON 15X15 (W) ASSEMBLY; NO WATER IN GAP

LIFETIME = 9.73114E-05 + OR - 2.94167E-07      GENERATION TIME = 3.71858E-05 + OR - 9.05456E-08  
 NU BAR = 2.43684E+00 + OR - 1.00493E-04      AVERAGE FISSION GROUP = 2.24236E+01 + OR - 5.68246E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.68092E-01 + OR - 8.11249E-04

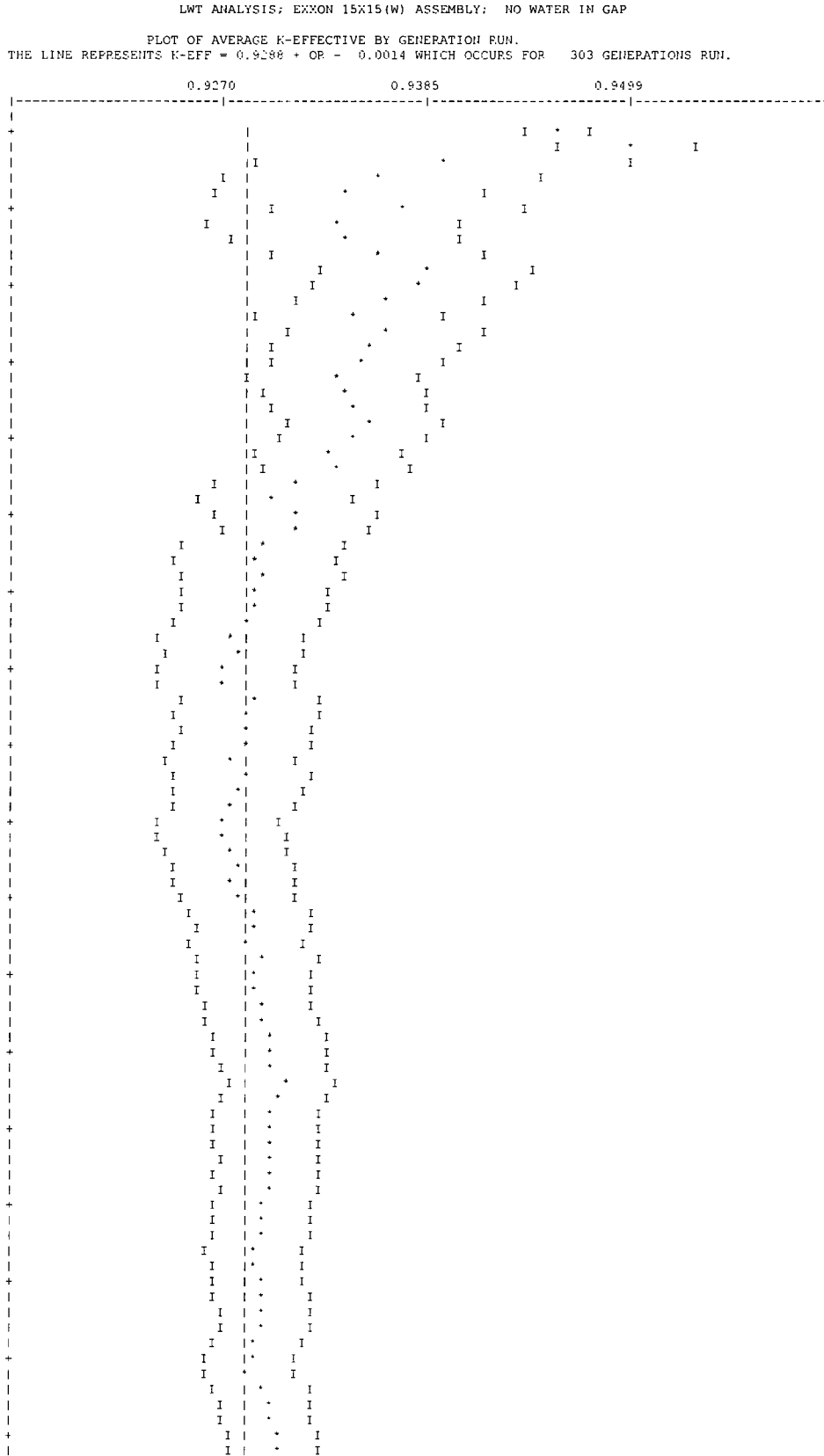
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
3	0.92877	+ OR - 0.00136	0.92740 TO 0.93013	0.92604 TO 0.93149	0.92468 TO 0.93286	300000
4	0.92870	+ OR - 0.00137	0.92734 TO 0.93007	0.92597 TO 0.93144	0.92460 TO 0.93280	299000
5	0.92865	+ OR - 0.00137	0.92728 TO 0.93002	0.92591 TO 0.93139	0.92454 TO 0.93276	298000
6	0.92855	+ OR - 0.00137	0.92718 TO 0.92992	0.92581 TO 0.93130	0.92444 TO 0.93267	297000
7	0.92862	+ OR - 0.00137	0.92725 TO 0.92999	0.92587 TO 0.93137	0.92450 TO 0.93274	296000
8	0.92864	+ OR - 0.00138	0.92726 TO 0.93002	0.92588 TO 0.93140	0.92451 TO 0.93278	295000
9	0.92865	+ OR - 0.00138	0.92727 TO 0.93004	0.92589 TO 0.93142	0.92450 TO 0.93280	294000
10	0.92856	+ OR - 0.00139	0.92718 TO 0.92995	0.92579 TO 0.93133	0.92441 TO 0.93272	293000
11	0.92864	+ OR - 0.00139	0.92725 TO 0.93003	0.92586 TO 0.93141	0.92447 TO 0.93280	292000
12	0.92860	+ OR - 0.00139	0.92721 TO 0.92999	0.92581 TO 0.93138	0.92442 TO 0.93278	291000
17	0.92849	+ OR - 0.00141	0.92709 TO 0.92990	0.92568 TO 0.93130	0.92428 TO 0.93271	286000
22	0.92839	+ OR - 0.00142	0.92697 TO 0.92982	0.92555 TO 0.93124	0.92413 TO 0.93266	281000
27	0.92833	+ OR - 0.00144	0.92689 TO 0.92977	0.92546 TO 0.93121	0.92402 TO 0.93265	276000
32	0.92869	+ OR - 0.00143	0.92726 TO 0.93012	0.92583 TO 0.93155	0.92440 TO 0.93298	271000
37	0.92877	+ OR - 0.00145	0.92732 TO 0.93022	0.92587 TO 0.93168	0.92441 TO 0.93313	266000
42	0.92874	+ OR - 0.00145	0.92729 TO 0.93019	0.92584 TO 0.93164	0.92439 TO 0.93309	261000
47	0.92882	+ OR - 0.00147	0.92735 TO 0.93028	0.92588 TO 0.93175	0.92442 TO 0.93322	256000
52	0.92900	+ OR - 0.00148	0.92752 TO 0.93048	0.92603 TO 0.93196	0.92455 TO 0.93345	251000
57	0.92871	+ OR - 0.00150	0.92721 TO 0.93021	0.92571 TO 0.93171	0.92421 TO 0.93321	246000
62	0.92862	+ OR - 0.00152	0.92710 TO 0.93013	0.92559 TO 0.93165	0.92407 TO 0.93317	241000
67	0.92820	+ OR - 0.00153	0.92667 TO 0.92973	0.92514 TO 0.93126	0.92361 TO 0.93279	236000
72	0.92840	+ OR - 0.00155	0.92685 TO 0.92995	0.92530 TO 0.93150	0.92375 TO 0.93305	231000
77	0.92848	+ OR - 0.00158	0.92690 TO 0.93007	0.92532 TO 0.93165	0.92374 TO 0.93323	226000
82	0.92842	+ OR - 0.00161	0.92682 TO 0.93003	0.92521 TO 0.93164	0.92360 TO 0.93325	221000
87	0.92843	+ OR - 0.00161	0.92682 TO 0.93004	0.92522 TO 0.93164	0.92361 TO 0.93325	216000
92	0.92809	+ OR - 0.00163	0.92646 TO 0.92972	0.92483 TO 0.93135	0.92319 TO 0.93298	211000

LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; NO WATER IN GAP

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	0.92769	+ OR - 0.00165	0.92605 TO 0.92934	0.92440 TO 0.93099	0.92276 TO 0.93263	206000
102	0.92772	+ OR - 0.00166	0.92606 TO 0.92938	0.92440 TO 0.93104	0.92274 TO 0.93269	201000
107	0.92787	+ OR - 0.00169	0.92618 TO 0.92955	0.92449 TO 0.93124	0.92281 TO 0.93293	196000
112	0.92802	+ OR - 0.00172	0.92629 TO 0.92974	0.92457 TO 0.93146	0.92285 TO 0.93318	191000
117	0.92805	+ OR - 0.00176	0.92629 TO 0.92982	0.92453 TO 0.93158	0.92277 TO 0.93334	186000
122	0.92804	+ OR - 0.00180	0.92624 TO 0.92984	0.92445 TO 0.93164	0.92265 TO 0.93343	181000
127	0.92809	+ OR - 0.00183	0.92625 TO 0.92992	0.92442 TO 0.93176	0.92258 TO 0.93359	176000
132	0.92779	+ OR - 0.00185	0.92594 TO 0.92965	0.92409 TO 0.93150	0.92223 TO 0.93336	171000
137	0.92784	+ OR - 0.00190	0.92594 TO 0.92974	0.92405 TO 0.93163	0.92215 TO 0.93353	166000
142	0.92776	+ OR - 0.00193	0.92583 TO 0.92969	0.92390 TO 0.93163	0.92197 TO 0.93356	161000
147	0.92793	+ OR - 0.00197	0.92596 TO 0.92990	0.92399 TO 0.93187	0.92202 TO 0.93384	156000
152	0.92851	+ OR - 0.00198	0.92652 TO 0.93049	0.92454 TO 0.93247	0.92256 TO 0.93446	151000
157	0.92780	+ OR - 0.00201	0.92579 TO 0.92980	0.92378 TO 0.93181	0.92177 TO 0.93382	146000
162	0.92815	+ OR - 0.00207	0.92608 TO 0.93022	0.92401 TO 0.93229	0.92194 TO 0.93436	141000
167	0.92767	+ OR - 0.00210	0.92557 TO 0.92978	0.92346 TO 0.93188	0.92136 TO 0.93399	136000
172	0.92714	+ OR - 0.00213	0.92501 TO 0.92927	0.92289 TO 0.93140	0.92076 TO 0.93353	131000
177	0.92805	+ OR - 0.00215	0.92590 TO 0.93021	0.92375 TO 0.93236	0.92160 TO 0.93451	126000
182	0.92818	+ OR - 0.00221	0.92596 TO 0.93039	0.92375 TO 0.93261	0.92153 TO 0.93482	121000
187	0.92911	+ OR - 0.00222	0.92689 TO 0.93133	0.92467 TO 0.93356	0.92244 TO 0.93578	116000
192	0.92895	+ OR - 0.00231	0.92665 TO 0.93126	0.92434 TO 0.93356	0.92204 TO 0.93587	111000
197	0.92931	+ OR - 0.00237	0.92694 TO 0.93168	0.92458 TO 0.93405	0.92221 TO 0.93641	106000
202	0.92917	+ OR - 0.00241	0.92677 TO 0.93158	0.92436 TO 0.93399	0.92196 TO 0.93638	101000
207	0.92947	+ OR - 0.00250	0.92697 TO 0.93197	0.92448 TO 0.93447	0.92198 TO 0.93697	96000
212	0.92883	+ OR - 0.00252	0.92632 TO 0.93135	0.92380 TO 0.93387	0.92129 TO 0.93636	91000
217	0.92870	+ OR - 0.00254	0.92616 TO 0.93124	0.92362 TO 0.93379	0.92108 TO 0.93633	86000
222	0.92848	+ OR - 0.00261	0.92587 TO 0.93109	0.92325 TO 0.93371	0.92064 TO 0.93632	81000
227	0.92890	+ OR - 0.00274	0.92616 TO 0.93164	0.92342 TO 0.93438	0.92068 TO 0.93712	76000

LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; NO WATER IN GAP

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
232	0.92942	+ OR - 0.00281	0.92661 TO 0.93224	0.92380 TO 0.93505	0.92099 TO 0.93786	71000
237	0.92979	+ OR - 0.00299	0.92681 TO 0.93278	0.92382 TO 0.93577	0.92084 TO 0.93875	66000
242	0.92919	+ OR - 0.00316	0.92604 TO 0.93235	0.92288 TO 0.93551	0.91972 TO 0.93867	61000
247	0.92847	+ OR - 0.00327	0.92519 TO 0.93174	0.92192 TO 0.93502	0.91865 TO 0.93829	56000
252	0.92838	+ OR - 0.00356	0.92481 TO 0.93194	0.92125 TO 0.93550	0.91769 TO 0.93906	51000
257	0.92946	+ OR - 0.00351	0.92594 TO 0.93297	0.92243 TO 0.93648	0.91892 TO 0.94000	46000
262	0.92974	+ OR - 0.00392	0.92582 TO 0.93366	0.92190 TO 0.93759	0.91798 TO 0.94151	41000
267	0.92926	+ OR - 0.00421	0.92505 TO 0.93347	0.92085 TO 0.93767	0.91664 TO 0.94198	36000
272	0.93060	+ OR - 0.00413	0.92647 TO 0.93473	0.92233 TO 0.93886	0.91820 TO 0.94299	31000
277	0.93268	+ OR - 0.00478	0.92780 TO 0.93746	0.92312 TO 0.94224	0.91834 TO 0.94702	26000
282	0.93162	+ OR - 0.00587	0.92575 TO 0.93749	0.91989 TO 0.94335	0.91402 TO 0.94922	21000
287	0.93103	+ OR - 0.00673	0.92430 TO 0.93776	0.91757 TO 0.94450	0.91083 TO 0.95123	16000
292	0.92976	+ OR - 0.00770	0.92205 TO 0.93746	0.91435 TO 0.94516	0.90665 TO 0.95287	11000
297	0.93536	+ OR - 0.00759	0.92777 TO 0.94294	0.92018 TO 0.95053	0.91260 TO 0.95812	6000







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	I	*	I
	I	*	I
	I	*	I
285 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
290 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
295 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
300 +	I	*	I
	I	*	I
	I	*	I
	I	*	I

LWT ANALYSIS; EXXOH 15X15 (W) ASSEMBLY; NO WATER IN GAP

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0045			4.13525E-03	2.1624	2.31474E-03	1.6942	1.16131E-04	17.4208
2	0.0184			1.70563E-02	0.6777	8.53945E-03	0.5701	3.24894E-04	9.2849
3	0.0203			1.88901E-02	0.5923	7.85394E-03	0.5710	6.72946E-04	6.9707
4	0.0085			7.89259E-03	0.7446	3.77855E-03	0.7149	3.66621E-04	9.1531
5	0.0027			2.50503E-03	0.5824	2.63470E-03	0.5120	7.00533E-04	7.3109
6	0.0024			2.18471E-03	0.4558	4.37485E-03	0.3727	1.49246E-03	4.9447
7	0.0023			2.16286E-03	0.4659	4.93271E-03	0.3755	1.74377E-03	4.3704
8	0.0023			2.17357E-03	0.5027	7.35496E-03	0.4059	7.33592E-04	6.1702
9	0.0032			2.94449E-03	0.5013	1.14341E-02	0.4011	3.78803E-04	8.7840
10	0.0068			6.27675E-03	0.5048	1.73735E-02	0.4335	3.43542E-04	9.0743
11	0.0142			1.32020E-02	0.4807	2.83683E-02	0.3962	3.93503E-04	8.8978
12	0.0186			1.73191E-02	0.5908	3.00757E-02	0.5258	2.80550E-04	10.6990
13	0.0173			1.60818E-02	0.6608	3.00656E-02	0.5610	2.75200E-04	9.6225
14	0.0136			1.26222E-02	0.6139	4.26237E-02	0.5164	2.48169E-04	11.1716
15	0.0030			2.82311E-03	1.0771	8.92172E-03	0.7964	1.17966E-04	16.4384
16	0.0021			1.90622E-03	1.3681	5.33009E-03	0.8758	6.21348E-05	21.6067
17	0.0031			2.90625E-03	1.8577	3.68193E-03	1.1582	5.40723E-05	23.9178
18	0.0042			3.89564E-03	1.9751	3.87745E-03	1.1947	3.15613E-05	36.6593
19	0.0052			4.80254E-03	1.4571	6.07032E-03	0.8868	3.98236E-05	26.8273
20	0.0218			2.02349E-02	0.7613	2.39932E-02	0.6156	1.81114E-04	12.7240
21	0.0120			1.11287E-02	1.2990	1.05616E-02	0.8876	7.94104E-05	18.5923
22	0.0287			2.66463E-02	0.8876	2.42407E-02	0.6724	1.87182E-04	10.7523
23	0.1052			9.77197E-02	0.4944	9.31371E-02	0.3247	1.46447E-03	3.6272
24	0.2112			1.96132E-01	0.3421	1.86364E-01	0.2154	2.87278E-03	2.4320
25	0.1808			1.67964E-01	0.3689	1.59086E-01	0.2113	1.91103E-03	2.9220
26	0.2176			2.02106E-01	0.3731	1.94026E-01	0.2287	1.55253E-03	2.9482
27	0.0700			6.50546E-02	0.6649	6.47251E-02	0.4115	2.30984E-04	7.4502
SYSTEM TOTAL =				9.28767E-01	0.1468	9.85739E-01	0.0516	1.68558E-02	1.1296
ELAPSED TIME				9.87833 MINUTES					
RANDOM NUMBER=				79596BFA0823					



LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; NO WATER IN GAP

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                                FREQUENCY FOR GENERATIONS   4 TO 303
0.8560 TO 0.8686    ***
0.8686 TO 0.8813    ****
0.8813 TO 0.8939    *****
0.8939 TO 0.9066    *****
0.9066 TO 0.9192    *****
0.9192 TO 0.9319    *****
0.9319 TO 0.9445    *****
0.9445 TO 0.9572    *****
0.9572 TO 0.9698    *****
0.9698 TO 0.9825    *****
0.9825 TO 0.9951    ***
0.9951 TO 1.0078    *
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                                FREQUENCY FOR GENERATIONS  79 TO 303
0.8560 TO 0.8686    ***
0.8686 TO 0.8813    **
0.8813 TO 0.8939    *****
0.8939 TO 0.9066    *****
0.9066 TO 0.9192    *****
0.9192 TO 0.9319    *****
0.9319 TO 0.9445    *****
0.9445 TO 0.9572    *****
0.9572 TO 0.9698    *****
0.9698 TO 0.9825    *****
0.9825 TO 0.9951    **
0.9951 TO 1.0078    *
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                                FREQUENCY FOR GENERATIONS 154 TO 303
0.8560 TO 0.8686    **
0.8686 TO 0.8813    *
0.8813 TO 0.8939    *****
0.8939 TO 0.9066    *****
0.9066 TO 0.9192    *****
0.9192 TO 0.9319    *****
0.9319 TO 0.9445    *****
0.9445 TO 0.9572    *****
0.9572 TO 0.9698    *****
0.9698 TO 0.9825    *****
0.9825 TO 0.9951    *
0.9951 TO 1.0078    *
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                                FREQUENCY FOR GENERATIONS 229 TO 303
0.8560 TO 0.8686    **
0.8686 TO 0.8813    *
0.8813 TO 0.8939    ***
0.8939 TO 0.9066    *****
0.9066 TO 0.9192    *****
0.9192 TO 0.9319    *****
0.9319 TO 0.9445    *****
0.9445 TO 0.9572    *****
0.9572 TO 0.9698    *****
0.9698 TO 0.9825    *
0.9825 TO 0.9951    *
0.9951 TO 1.0078
```

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 9.87833 MINUTES  
.....  
\*

**Figure 6.6.1-2 CSAS Input/Output for NAC-LWT with PWR Fuel – 3.7% Enrichment –  
Most Reactive Accident Condition Configuration**

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT ANALYSIS: Exxon 15x15(W) ASSEMBLY: WATER IN GAP
27GROUPHDF4 LATTICECELL
UO2 1 0.95 293.0 92235 3.7 92238 96.3 END
ZR 2 1.0 293.0 END
H2O 3 1.0 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 EHD
FB 6 1.0 293.0 EHD
H2O 7 1.000 293.0 END
H2O 8 1.000 293.0 END
H2O 9 1.0 293.0 END
END COMP
SQUAREPITCH 1.4300 0.9056 1 3 1.0770 2 0.9246 9 END
LWT ANALYSIS: Exxon 15x15(W) ASSEMBLY: WATER IN GAP
READ PARAM RUN=YES PLT=NO TME=5000 GEN=303 RND=1D NPG=1000 END PARAM
READ GEOM
UNIT 1
COM='FUEL FIN CELL - WITH H2O'
CYLINDER 1 1 0.4528 2P182.88
CYLINDER 9 1 0.4623 2P182.88
CYLINDER 2 1 0.5385 2P182.88
CUBOID 3 1 4P0.7150 2P182.88
UNIT 2
COM='WATER ROD CELL - WITH H2O'
CYLINDER 3 1 0.6477 2P182.88
CYLINDER 2 1 0.6909 2P182.88
CUBOID 3 1 4P0.7150 2P182.88
GLOBAL UNIT 9
ARRAY 1 -10.7250 -10.7250 -182.88
CUBOID 3 1 4P11.3157 2P182.88
CYLINDER 4 1 16.891 2P182.88
CYLINDER 3 1 16.9863 2P182.88
CYLINDER 5 1 18.8913 2P182.88
CYLINDER 6 1 33.4963 2P182.88
CYLINDER 5 1 36.5443 2P182.88
CYLINDER 7 1 49.2443 2P182.88
CYLINDER 5 1 49.8539 212.48 -192.16
CYLINDER 6 1 49.8539 212.48 -199.78
CYLINDER 5 1 49.8539 212.48 -208.67
CUBOID 8 1 4P91.0000 243.00 -240.00
END GEOM
READ ARRAY
ARA=1 NUX=15 NUZ=1 FILL
30R1
2R1 2 2R1 2 3R1 2 2R1 2 2R1
7R1 2 7R1
4R1 2 5R1 2 4R1
2R1 2 9R1 2 2R1
15R1
3R1 2 3R1 2 3R1 2 3R1
15R1
2R1 2 9R1 2 2R1
4R1 2 5R1 2 4R1
7R1 2 7R1
2R1 2 2R1 2 3R1 2 2R1 2 2R1
30R1
END FILL
END ARRAY
READ BOUNDS ZPC=VAC YXF=VAC END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.44 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 5.27 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 317.91 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 325.16 (SECONDS).

```

```

CCCCCCCCC      SSSSSSSSS      AAAAAAAAA      SSSSSSSSS      222222222      55555555555
CCCCCCCCCCCCC  SSSSSSSSSSS    AAAAAAAAAAA    SSSSSSSSSSS    22222222222  5555555555555
CC              SS              SS              AA              AA              SS              SS              22              22              55
CC              SS              SS              AA              AA              SS              SS              22              22              55
CC              SS              SS              AA              AA              SS              SS              22              22              55
CC              SSSSSSSSSSS    AAAAAAAAAAA    SSSSSSSSSSS    22              22              55555555555
CC              SSSSSSSSSSS    AAAAAAAAAAA    SSSSSSSSSSS    22              22              55555555555
CC              SS              AA              AA              SS              SS              22              22              55
CC              SS              SS              AA              AA              SS              SS              22              22              55
CC              SS              SS              AA              AA              SS              SS              22              22              55
CCCCCCCCCCCCC  SSSSSSSSSSS    AA              AA              SSSSSSSSSSS    22222222222  5555555555555
CCCCCCCCCCCCC  SSSSSSSSSSS    AA              AA              SSSSSSSSSSS    22222222222  55555555555
    
```

```

SSSSSSSSSS    CCCCCCCCCC      AAAAAAAAA      LL              EEEEEEEEEEE      PPPPPPPPPPP      CCCCCCCCCC
SSSSSSSSSSSS  CCCCCCCCCCCCC  AAAAAAAAAAA    LL              EEEEEEEEEEE      PPPPPPPPPPP      CCCCCCCCCCCCC
SS              SS              CC              AA              AA              LL              EE              EE              PP              PP              CC              CC
SS              CC              CC              AA              AA              LL              EE              EE              PP              PP              CC              CC
SS              CC              CC              AA              AA              LL              EE              EE              PP              PP              CC              CC
SSSSSSSSSSSS  CC              AAAAAAAAAAA    LL              EEEEEEEEE       -----      FPPPPPPPPPP      CC
SSSSSSSSSSSS  CC              AAAAAAAAAAA    LL              EEEEEEEEE       -----      FPPPPPPPPPP      CC
SS              SS              AA              AA              LL              EE              EE              PP              PP              CC              CC
SS              SS              CC              AA              AA              LL              EE              EE              PP              PP              CC              CC
SS              SS              CC              AA              AA              LL              EE              EE              PP              PP              CC              CC
SSSSSSSSSSSS  CCCCCCCCCCCCC  AA              AA              LLLLLLLLLLLLL  EEEEEEEEEEE      FPP              CCCCCCCCCCCCC
SSSSSSSSSSSS  CCCCCCCCCCCCC  AA              AA              LLLLLLLLLLLLL  EEEEEEEEEEE      FP              CCCCCCCCCC
    
```

```

0000000      77777777777      //      3333333333      11      //      9999999999      88888888888
000000000    77777777777      //      33333333333    111      //      99999999999    8888888888888
00           00           77           77           //      33           33           1111      //      99           99           88           88
00           00           77           77           //      33           33           11           //      99           99           88           88
00           00           77           77           //      333          33          11           //      99          99           88           88
00           00           77           77           //      333          33          11           //      99          99           88           88
00           00           77           77           //      33           33           11           //      99          99           88           88
00           00           77           77           //      33           33           11           //      99          99           88           88
00           00           77           77           //      33           33           11           //      99          99           88           88
000000000    77           //      33333333333    11111111      //      99999999999    88888888888
0000000      77           //      33333333333    11111111      //      99999999999    88888888888
    
```

```

22222222222      11              11              11              55555555555      55555555555
2222222222222    111              111              111              5555555555555  5555555555555
22              22              1111             :::              1111             1111             :::              55              55
22              22              11              :::              11              11              :::              55              55
22              22              11              :::              11              11              :::              55              55
22              22              11              :::              11              11              :::              55555555555  55555555555
22              22              11              :::              11              11              :::              55555555555  55555555555
22              22              11              :::              11              11              :::              55              55
22              22              11              :::              11              11              :::              55              55
22              22              11              :::              11              11              :::              55              55
2222222222222    11111111      11111111      11111111      5555555555555  5555555555555
2222222222222    11111111      11111111      11111111      5555555555555  5555555555555
    
```



LWT ANALYSIS; EXXON 15X15(W) ASSEMBLY; WATER IN GAP

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
 MX 9 MIXTURES  
 MSC 9 COMPOSITION SPECIFICATIONS  
 IZM 4 MATERIAL ZONES  
 GE LATTICECELL GEOMETRY  
 MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
 MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
 MX 1 MIXTURE NO.  
 VF 0.9500 VOLUME FRACTION  
 ROTH 10.9600 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 92000 1.00 ATOM/MOLECULE  
 92235 3.700 WT%  
 92238 96.300 WT%  
 8016 2.00 ATOMS/MOLECULE  
 END

SC ZR STANDARD COMPOSITION  
 MX 2 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 6.4900 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 40000 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 3 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC AL STANDARD COMPOSITION  
 MX 4 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 2.7020 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 13027 1.00 ATOM/MOLECULE  
 END

SC SS304 STANDARD COMPOSITION  
 MX 5 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 7.9200 THEORETICAL DENSITY  
 NEL 4 NO. ELEMENTS  
 ICP 0 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 24304 19.000 WT%  
 25055 2.000 WT%  
 26304 69.500 WT%  
 28304 9.500 WT%  
 END

SC PB STANDARD COMPOSITION  
 MX 6 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 11.3440 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 82000 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 7 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION

```
MX      8 MIXTURE NO.  
VF      1.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL     2 NO. ELEMENTS  
ICP     1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001 2.00 ATOMS/MOLECULE  
        8016 1.00 ATOM/MOLECULE  
END
```

```
SC H2O   STANDARD COMPOSITION  
MX      9 MIXTURE NO.  
VF      1.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL     2 NO. ELEMENTS  
ICP     1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001 2.00 ATOMS/MOLECULE  
        8016 1.00 ATOM/MOLECULE  
END
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP SQUAREPITCH CELL TYPE  
PITCH   1.4300 CM CENTER TO CENTER SPACING  
FUELOD  0.9056 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL   1 MIXTURE NO. OF FUEL  
MMOD    3 MIXTURE NO. OF MODERATOR  
CLADOD  1.0770 CM CLAD OUTER DIAMETER  
MCLAD   2 MIXTURE NO. OF CLAD  
GAPOD   0.9246 CM GAP OUTER DIAMETER  
MGAP    9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```

```

.....
***
***                               LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP
***
.....
***                               ***** DATA LIBRARY INFORMATION *****
***
***                               UNIT NUMBER          DATA SET NAME          VOLUME          UNIT FUNCTION
***                               -----          -
***                               89          G:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***                               82          G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***                               11          C:\mev-pwr\REERUNS\15HX2MDA\FT11F001          SHORT CROSS SECTION LIBRARY
***                               90          C:\mev-pwr\REERUNS\15HX2MDA\FT90F001          INPUT DATA DIRECT ACCESS
***
.....
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER      : 89
***                               DATASET NAME    : G:\scale43\DATALIB\FT89F001
***                               LIBRARY TITLE  : SCALE-4 STANDARD COMPOSITION LIBRARY
***                                               637 STANDARD COMPOSITIONS, 490 NUCLIDES
***                                               90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***                               CREATION DATE  : 6/30/95
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER      : 82
***                               DATASET NAME    : G:\scale43\DATALIB\FT82F001
***                               LIBRARY TITLE  : SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***                                               BASED ON ENDF-B VERSION 4 DATA
***                                               COMPILED FOR NRC      1/27/89
***                                               LAST UPDATED
***                                               L.M.PETRIE - ORNL
***                                               08/12/94
***
.....

```

```

..... 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 PPREPARING 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.

```

KK      KK  EEEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEEE  NNH     NN  000000000000     VV      VV
KK      KK  EE             NNH     NN  00      00     VV      VV
KK      KK  EE             NN  NN  00      00     VV      VV
KK      KK  EE             NN  NN  00      00     VV      VV
KKKKKKKK  EEEEEEEEEEEE  NN  NN  00      00     -----  VV      VV
KKKKKKKK  EEEEEEEEEEEE  NN  NN  00      00     -----  VV      VV
KK      KK  EE             NN  NN  00      00     VV      VV
KK      KK  EE             NN  NN  00      00     VV      VV
KK      KK  EE             NN  NN  00      00     VV      VV
KK      KK  EEEEEEEEEEEE  NN      NN  000000000000     VVV
KK      KK  EEEEEEEEEEEE  NN      NN  0000000000      V
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SSSSSSSSSS  CC      AA      AA      LL      EEEEEEEEEEEE  PPPPPPPPPPP  CC
SSSSSSSSSS  CC      AA      AA      LL      EEEEEEEEEEEE  PPPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE             PP      CC
SS      SS  CC      AA      AA  LL      EE             PP      CC
SS      SS  CC      AA      AA  LL      EE             PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

00000000  7777777777  //  3333333333  11  //  9999999999  8888888888
00000000  7777777777  //  333333333333  111  //  999999999999  888888888888
00      00  77      77  //  33      33  1111  //  99      99  88      88
00      00  77      77  //  33      33  11      //  99      99  88      88
00      00  77      77  //  33      33  11      //  99      99  88      88
00      00  77      77  //  333     333  11      //  999999999999  888888888888
00      00  77      77  //  333     333  11      //  999999999999  888888888888
00      00  77      77  //  33      33  11      //  99      99  88      88
00      00  77      77  //  33      33  11      //  99      99  88      88
00      00  77      77  //  33      33  11      //  99      99  88      88
00000000  77      //  333333333333  11111111  //  999999999999  888888888888
00000000  77      //  333333333333  11111111  //  999999999999  888888888888
    
```

```

2222222222  11  //  11  //  2222222222  00000000  2222222222
2222222222  111  //  111  //  222222222222  0000000000  222222222222
22      22  1111  //  1111  //  22      22  //  00      00  22      22
22      22  11      //  11      //  22      22  //  00      00  22      22
22      22  11      //  11      //  22      22  //  00      00  22      22
22      22  11      //  11      //  22      22  //  00      00  22      22
22      22  11      //  11      //  22      22  //  00      00  22      22
22      22  11      //  11      //  22      22  //  00      00  22      22
22      22  11      //  11      //  22      22  //  00      00  22      22
222222222222  11111111  //  11111111  //  222222222222  00000000  222222222222
222222222222  11111111  //  11111111  //  222222222222  00000000  222222222222
    
```



```
.....
***
***                               LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP
***
*****          HUMERIC PARAMETERS          *****
***
***      TME      MAXIMUM PROBLEM TIME (MIN)      *****
***
***      TBA      TIME PER GENERATION (MIN)      0.50
***
***      GEN      NUMBER OF GENERATIONS      303
***
***      NPG      NUMBER PER GENERATION      1000
***
***      NSK      NUMBER OF GENERATIONS TO BE SKIPPED      3
***
***      BEG      BEGINNING GENERATION NUMBER      1
***
***      RES      GENERATIONS BETWEEN CHECKPOINTS      0
***
***      X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS      1
***
***      NBK      NEUTRON BANK SIZE      1025
***
***      XNB      EXTRA POSITIONS IN NEUTRON BANK      0
***
***      NFB      FISSION BANK SIZE      1000
***
***      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      1D
***
***      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
***
.....
```

```

.....
LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP
.....
***** 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 YES ***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO ***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO PWT PRINT WEIGHT AVERAGE ARRAY NO ***
*** PKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO ***
*** PID PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO ***
*** TRK PRINT TRACKING INFORMATION NO ***
.....

```

PARAMETER INPUT COMPLETED

..... 0 IO'S WERE USED READING THE PARAMETER DATA .....

\*\*\*\*\* DATA READING COMPLETED \*\*\*\*\*

```

.....
LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP
.....
***** ADDITIONAL INFORMATION *****
.....
*** NUMBER OF ENERGY GROUPS 27 USE LATTICE GEOMETRY YES ***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1 GLOBAL ARRAY NUMBER 1 ***
*** NO. OF SCATTERING ANGLES IN XSECS 2 NUMBER OF UNITS IN THE GLOBAL X DIR. 15 ***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 16 NUMBER OF UNITS IN THE GLOBAL Y DIR. 15 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK 9 NUMBER OF UNITS IN THE GLOBAL Z DIR. 1 ***
*** NUMBER OF MIXTURES USED 9 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 19 MAXIMUM HOLE NESTING LEVEL 0 ***
*** NUMBER OF GEOMETRY REGIONS USED 19 USE NESTED ARRAYS NO ***
*** LARGEST GEOMETRY UNIT NUMBER 9 NUMBER OF ARRAYS USED 1 ***
*** LARGEST ARRAY NUMBER 1 MAXIMUM ARRAY NESTING LEVEL 1 ***
*** +X BOUNDARY CONDITION VAC -X BOUNDARY CONDITION VAC ***
*** +Y BOUNDARY CONDITION VAC -Y BOUNDARY CONDITION VAC ***
*** +Z BOUNDARY CONDITION VAC -Z BOUNDARY CONDITION VAC ***
.....

```

```
.....
***
***          LWT ANALYSIS: EXXON 15X15 (W) ASSEMBLY:  WATER IN GAP
***
.....
***          ***** SPACE AND SUPERGROUP INFORMATION *****
***
*** 100000 WORDS IS THE TOTAL SPACE AVAILABLE.
***
*** 28389 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
***
*** 71611 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
***
*** 99759 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
***
*** 71551 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
***
*** 1172 WORDS ARE NEEDED FOR THE LARGEST GROUP.
***
*** 29777 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
***
*** 41991 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
***
*** 42144 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.
***
.....
***
***          SUPERGROUP      STARTING  ENDING  XSEC   ALBEDO   TOTAL
***          SUPERGROUP      GROUP   GROUP   LENGTH  LENGTH   LENGTH
***
***          1                1       27     2697     0       13542
***
.....
***          .....  0 IO'S WERE USED IN SUPERGROUPING  .....
***          .....  0 IO'S WERE USED LOADING THE DATA  .....
```

LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP

GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION				
----- UNIT 1 -----							
FUEL PIN CELL - WITH H2O							
1	CYLINDER	1 1	RADIUS = 0.45280	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2	CYLINDER	9 1	RADIUS = 0.46230	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3	CYLINDER	2 1	RADIUS = 0.53850	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4	CUBOID	3 1	+X = 0.71500	-X = -0.71500	+Y = 0.71500	-Y = -0.71500 +Z = 182.88 -Z = -182.88	

----- UNIT 2 -----						
WATER ROD CELL - WITH H2O						
1	CYLINDER	3 1	RADIUS = 0.64770	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000
2	CYLINDER	2 1	RADIUS = 0.69090	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000
3	CUBOID	3 1	+X = 0.71500	-X = -0.71500	+Y = 0.71500	-Y = -0.71500 +Z = 182.88 -Z = -182.88

***** GLOBAL *****						
----- UNIT 9 EXTERNAL TO LATTICE 1 -----						
1	ARRAY NUMBER	1	+X = 10.725	-X = -10.725	+Y = 10.725	-Y = -10.725 +Z = 182.88 -Z = -182.88
2	CUBOID	3 1	+X = 11.316	-X = -11.316	+Y = 11.316	-Y = -11.316 +Z = 182.88 -Z = -182.88
3	CYLINDER	4 1	RADIUS = 16.891	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000
4	CYLINDER	3 1	RADIUS = 16.986	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000
5	CYLINDER	5 1	RADIUS = 18.891	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000
6	CYLINDER	6 1	RADIUS = 33.496	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000
7	CYLINDER	5 1	RADIUS = 36.544	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000
8	CYLINDER	7 1	RADIUS = 49.244	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000 Y = 0.00000
9	CYLINDER	5 1	RADIUS = 49.854	+Z = 212.48	-Z = -192.16	CENTERLINE IS AT X = 0.00000 Y = 0.00000
10	CYLINDER	6 1	RADIUS = 49.854	+Z = 212.48	-Z = -199.78	CENTERLINE IS AT X = 0.00000 Y = 0.00000
11	CYLINDER	5 1	RADIUS = 49.854	+Z = 212.48	-Z = -208.67	CENTERLINE IS AT X = 0.00000 Y = 0.00000
12	CUBOID	8 1	+X = 81.000	-X = -81.000	+Y = 81.000	-Y = -81.000 +Z = 243.00 -Z = -240.00

LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 15 LEFT TO RIGHT Y ROW 1 TO 15 BOTTOM TO TOP

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1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 1 2 1 1 2 1 1 1
1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1
1 1 1 1 2 1 1 1 1 1 2 1 1 1 1 1
1 1 2 1 1 1 1 1 1 1 1 1 2 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 2 1 1 1 2 1 1 1 2 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 1 1 1 1 1 1 1 2 1 1 1
1 1 1 1 2 1 1 1 1 1 2 1 1 1 1 1
1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 1 2 1 1 2 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

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**NAC-LWT Cask SAR  
Revision 43**

**January 2015**

LWT ANALYSIS; EXXON 15X15(W) ASSEMBLY; WATER IN GAP

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
1	9.01758E-01	7.60000E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 WARNING...ONLY 997 INDEPENDENT FISSION POINTS WEPE GENERATED						
2	9.43422E-01	9.35000E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.50011E-01	1.11667E-01	9.50011E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.23268E-01	1.29167E-01	9.36639E-01	1.33713E-02	0.00000E+00	0.00000E+00
5	9.41541E-01	1.47500E-01	9.38273E-01	7.89095E-03	0.00000E+00	0.00000E+00
6	9.48674E-01	1.64000E-01	9.40874E-01	6.15584E-03	0.00000E+00	0.00000E+00
7	9.40843E-01	1.80333E-01	9.40867E-01	4.76829E-03	0.00000E+00	0.00000E+00
8	9.73009E-01	1.96833E-01	9.46224E-01	6.62232E-03	0.00000E+00	0.00000E+00
9	9.23107E-01	2.13333E-01	9.42922E-01	6.49858E-03	0.00000E+00	0.00000E+00
10	9.40767E-01	2.30667E-01	9.42653E-01	5.63438E-03	0.00000E+00	0.00000E+00
11	9.89496E-01	2.47167E-01	9.47857E-01	7.19592E-03	0.00000E+00	0.00000E+00
12	9.23595E-01	2.65000E-01	9.45431E-01	6.87834E-03	0.00000E+00	0.00000E+00
13	9.06062E-01	2.83000E-01	9.41852E-01	7.17767E-03	0.00000E+00	0.00000E+00
14	9.44836E-01	2.99333E-01	9.42101E-01	6.55700E-03	0.00000E+00	0.00000E+00
15	9.41754E-01	3.15833E-01	9.42074E-01	6.03162E-03	0.00000E+00	0.00000E+00
16	9.56168E-01	3.33333E-01	9.43081E-01	5.67421E-03	0.00000E+00	0.00000E+00
17	9.41557E-01	3.49833E-01	9.42979E-01	5.28338E-03	0.00000E+00	0.00000E+00
18	9.48574E-01	3.65333E-01	9.43329E-01	4.95450E-03	0.00000E+00	0.00000E+00
19	9.99072E-01	3.82667E-01	9.40726E-01	5.33259E-03	0.00000E+00	0.00000E+00
20	9.79909E-01	4.00167E-01	9.42902E-01	5.47865E-03	0.00000E+00	0.00000E+00
21	9.20847E-01	4.17500E-01	9.41742E-01	5.31070E-03	0.00000E+00	0.00000E+00
22	9.31596E-01	4.34000E-01	9.41234E-01	5.06365E-03	0.00000E+00	0.00000E+00
23	9.03910E-01	4.52333E-01	9.39457E-01	5.13397E-03	0.00000E+00	0.00000E+00
24	9.37084E-01	4.69667E-01	9.39349E-01	4.89624E-03	0.00000E+00	0.00000E+00
25	9.44135E-01	4.86167E-01	9.39557E-01	4.68314E-03	0.00000E+00	0.00000E+00
26	9.19049E-01	5.03500E-01	9.38703E-01	4.56447E-03	0.00000E+00	0.00000E+00
27	9.19408E-01	5.20000E-01	9.37931E-01	4.44559E-03	0.00000E+00	0.00000E+00
28	9.51081E-01	5.36500E-01	9.38437E-01	4.30102E-03	0.00000E+00	0.00000E+00
29	9.50371E-01	5.53833E-01	9.38879E-01	4.16220E-03	0.00000E+00	0.00000E+00
30	9.27492E-01	5.71333E-01	9.38472E-01	4.03136E-03	0.00000E+00	0.00000E+00
31	9.31326E-01	5.87833E-01	9.38226E-01	3.89766E-03	0.00000E+00	0.00000E+00
32	9.40426E-01	6.04167E-01	9.38299E-01	3.76621E-03	0.00000E+00	0.00000E+00
33	9.51578E-01	6.21667E-01	9.38727E-01	3.66780E-03	0.00000E+00	0.00000E+00
34	9.23158E-01	6.38167E-01	9.38241E-01	3.58450E-03	0.00000E+00	0.00000E+00
35	9.28308E-01	6.55500E-01	9.37940E-01	3.48720E-03	0.00000E+00	0.00000E+00
36	9.40023E-01	6.72000E-01	9.38001E-01	3.38364E-03	0.00000E+00	0.00000E+00
37	9.32004E-01	6.89333E-01	9.37830E-01	3.29000E-03	0.00000E+00	0.00000E+00
38	9.15507E-01	7.05833E-01	9.37210E-01	3.25688E-03	0.00000E+00	0.00000E+00
39	9.96861E-01	7.22333E-01	9.36119E-01	3.35009E-03	0.00000E+00	0.00000E+00
40	9.34545E-01	7.39667E-01	9.36078E-01	3.26100E-03	0.00000E+00	0.00000E+00
41	9.73308E-01	7.56167E-01	9.37032E-01	3.31663E-03	0.00000E+00	0.00000E+00
42	9.19912E-01	7.73667E-01	9.36604E-01	3.26087E-03	0.00000E+00	0.00000E+00
43	9.11551E-01	7.90000E-01	9.35993E-01	3.23851E-03	0.00000E+00	0.00000E+00
44	9.79666E-01	8.06500E-01	9.37033E-01	3.23713E-03	0.00000E+00	0.00000E+00
45	9.39856E-01	8.24833E-01	9.37099E-01	3.24949E-03	0.00000E+00	0.00000E+00
46	9.26522E-01	8.42333E-01	9.36858E-01	3.18387E-03	0.00000E+00	0.00000E+00
47	9.81390E-01	8.58667E-01	9.37848E-01	3.26585E-03	0.00000E+00	0.00000E+00
48	9.42622E-01	8.76167E-01	9.37974E-01	3.19654E-03	0.00000E+00	0.00000E+00
49	9.47915E-01	8.91667E-01	9.38185E-01	3.13493E-03	0.00000E+00	0.00000E+00
50	9.04536E-01	9.09000E-01	9.37485E-01	3.14774E-03	0.00000E+00	0.00000E+00
51	9.24459E-01	9.26500E-01	9.37219E-01	3.09427E-03	0.00000E+00	0.00000E+00
52	9.18151E-01	9.43833E-01	9.36838E-01	3.05565E-03	0.00000E+00	0.00000E+00
53	9.48855E-01	9.61333E-01	9.37074E-01	3.00439E-03	0.00000E+00	0.00000E+00
54	9.03575E-01	9.78667E-01	9.36429E-01	3.01565E-03	0.00000E+00	0.00000E+00
55	9.55673E-01	9.96000E-01	9.36792E-01	2.98041E-03	0.00000E+00	0.00000E+00
56	9.17601E-01	1.01250E+00	9.36437E-01	2.94621E-03	0.00000E+00	0.00000E+00
57	9.68348E-01	1.02900E+00	9.37017E-01	2.94977E-03	0.00000E+00	0.00000E+00
58	9.04699E-01	1.04733E+00	9.36440E-01	2.95355E-03	0.00000E+00	0.00000E+00
59	9.35986E-01	1.06383E+00	9.36432E-01	2.90128E-03	0.00000E+00	0.00000E+00
60	9.48324E-01	1.08033E+00	9.36637E-01	2.85818E-03	0.00000E+00	0.00000E+00
61	9.40586E-01	1.09787E+00	9.36704E-01	2.81012E-03	0.00000E+00	0.00000E+00
62	9.24890E-01	1.11417E+00	9.36507E-01	2.76989E-03	0.00000E+00	0.00000E+00
63	9.09367E-01	1.13150E+00	9.36062E-01	2.76020E-03	0.00000E+00	0.00000E+00
64	9.86454E-01	1.14900E+00	9.35423E-01	2.78946E-03	0.00000E+00	0.00000E+00
65	9.22110E-01	1.16633E+00	9.35212E-01	2.75295E-03	0.00000E+00	0.00000E+00
66	9.99260E-01	1.18183E+00	9.36213E-01	2.88849E-03	0.00000E+00	0.00000E+00
67	9.50733E-01	1.19933E+00	9.36436E-01	2.85247E-03	0.00000E+00	0.00000E+00
68	9.22057E-01	1.21567E+00	9.36218E-01	2.81735E-03	0.00000E+00	0.00000E+00
69	9.53002E-01	1.23217E+00	9.36469E-01	2.78627E-03	0.00000E+00	0.00000E+00
70	9.28308E-01	1.24967E+00	9.36349E-01	2.74761E-03	0.00000E+00	0.00000E+00
71	9.15457E-01	1.26700E+00	9.36047E-01	2.72431E-03	0.00000E+00	0.00000E+00
72	9.36924E-01	1.28350E+00	9.35974E-01	2.68610E-03	0.00000E+00	0.00000E+00
73	9.11776E-01	1.30083E+00	9.35633E-01	2.66884E-03	0.00000E+00	0.00000E+00
74	9.38164E-01	1.31733E+00	9.35668E-01	2.63273E-03	0.00000E+00	0.00000E+00
75	9.43395E-01	1.33483E+00	9.35774E-01	2.59857E-03	0.00000E+00	0.00000E+00
76	9.15137E-01	1.35217E+00	9.35495E-01	2.57834E-03	0.00000E+00	0.00000E+00
77	9.59855E-01	1.36950E+00	9.35820E-01	2.56439E-03	0.00000E+00	0.00000E+00
78	9.05825E-01	1.38700E+00	9.35425E-01	2.56101E-03	0.00000E+00	0.00000E+00
79	9.08305E-01	1.40333E+00	9.35073E-01	2.55195E-03	0.00000E+00	0.00000E+00
80	9.29653E-01	1.42063E+00	9.35003E-01	2.51998E-03	0.00000E+00	0.00000E+00
81	9.37316E-01	1.43817E+00	9.35033E-01	2.48805E-03	0.00000E+00	0.00000E+00
82	9.36897E-01	1.45467E+00	9.35056E-01	2.45687E-03	0.00000E+00	0.00000E+00
83	9.28661E-01	1.47200E+00	9.34977E-01	2.42762E-03	0.00000E+00	0.00000E+00
84	9.54221E-01	1.48950E+00	9.35212E-01	2.40929E-03	0.00000E+00	0.00000E+00
85	9.31478E-01	1.50600E+00	9.35167E-01	2.38051E-03	0.00000E+00	0.00000E+00
86	9.29477E-01	1.52333E+00	9.35095E-01	2.35297E-03	0.00000E+00	0.00000E+00
87	9.74410E-01	1.53983E+00	9.35562E-01	2.37068E-03	0.00000E+00	0.00000E+00
88	9.35244E-01	1.55817E+00	9.35558E-01	2.34295E-03	0.00000E+00	0.00000E+00
89	9.23112E-01	1.57467E+00	9.35415E-01	2.32028E-03	0.00000E+00	0.00000E+00
90	9.44556E-01	1.59200E+00	9.35519E-01	2.29611E-03	0.00000E+00	0.00000E+00

91	9.26875E-01	1.60933E+00	9.35423E-01	2.27219E-03	0.00000E+00	0.00000E+00
92	8.84113E-01	1.62683E+00	9.34835E-01	2.21801E-03	0.00000E+00	0.00000E+00
93	9.48189E-01	1.64233E+00	9.34999E-01	2.29707E-03	0.00000E+00	0.00000E+00
94	9.47857E-01	1.65967E+00	9.35139E-01	2.27626E-03	0.00000E+00	0.00000E+00
95	9.29615E-01	1.67717E+00	9.35083E-01	2.25236E-03	0.00000E+00	0.00000E+00
96	9.34510E-01	1.69550E+00	9.35077E-01	2.22827E-03	0.00000E+00	0.00000E+00
97	9.39685E-01	1.71183E+00	9.35125E-01	2.20523E-03	0.00000E+00	0.00000E+00
98	9.19399E-01	1.72933E+00	9.34962E-01	2.16828E-03	0.00000E+00	0.00000E+00
99	9.33830E-01	1.74667E+00	9.34950E-01	2.16563E-03	0.00000E+00	0.00000E+00
100	9.84360E-01	1.76233E+00	9.35454E-01	2.20192E-03	0.00000E+00	0.00000E+00
101	9.20610E-01	1.77967E+00	9.35304E-01	2.18471E-03	0.00000E+00	0.00000E+00
102	9.33212E-01	1.79700E+00	9.35283E-01	2.16286E-03	0.00000E+00	0.00000E+00
103	9.34488E-01	1.81450E+00	9.35275E-01	2.14135E-03	0.00000E+00	0.00000E+00
104	9.40229E-01	1.83083E+00	9.35324E-01	2.12081E-03	0.00000E+00	0.00000E+00
105	9.43811E-01	1.84733E+00	9.35406E-01	2.10173E-03	0.00000E+00	0.00000E+00
106	9.16527E-01	1.86383E+00	9.35225E-01	2.08933E-03	0.00000E+00	0.00000E+00
107	9.06519E-01	1.88133E+00	9.34951E-01	2.08731E-03	0.00000E+00	0.00000E+00
108	9.13204E-01	1.89767E+00	9.34746E-01	2.07766E-03	0.00000E+00	0.00000E+00
109	9.63474E-01	1.91417E+00	9.35015E-01	2.07561E-03	0.00000E+00	0.00000E+00
110	9.54392E-01	1.93167E+00	9.35194E-01	2.06412E-03	0.00000E+00	0.00000E+00
111	9.53435E-01	1.94817E+00	9.35361E-01	2.05193E-03	0.00000E+00	0.00000E+00
112	9.23131E-01	1.96450E+00	9.35250E-01	2.03623E-03	0.00000E+00	0.00000E+00
113	9.75856E-01	1.98100E+00	9.35616E-01	2.05069E-03	0.00000E+00	0.00000E+00
114	9.73856E-01	1.99750E+00	9.35957E-01	2.06078E-03	0.00000E+00	0.00000E+00
115	8.72786E-01	2.01583E+00	9.35398E-01	2.11759E-03	0.00000E+00	0.00000E+00
116	8.97897E-01	2.03317E+00	9.35069E-01	2.12455E-03	0.00000E+00	0.00000E+00
117	9.40812E-01	2.04967E+00	9.35119E-01	2.10659E-03	0.00000E+00	0.00000E+00
118	9.06429E-01	2.06717E+00	9.34672E-01	2.10234E-03	0.00000E+00	0.00000E+00
119	9.14217E-01	2.08450E+00	9.34696E-01	2.09235E-03	0.00000E+00	0.00000E+00
120	9.17762E-01	2.10183E+00	9.34552E-01	2.07950E-03	0.00000E+00	0.00000E+00
121	9.95103E-01	2.11833E+00	9.35061E-01	2.12381E-03	0.00000E+00	0.00000E+00
122	8.92628E-01	2.13483E+00	9.34707E-01	2.13552E-03	0.00000E+00	0.00000E+00
123	9.38176E-01	2.15133E+00	9.34736E-01	2.11798E-03	0.00000E+00	0.00000E+00
124	8.97548E-01	2.16867E+00	9.34431E-01	2.12256E-03	0.00000E+00	0.00000E+00
125	9.13047E-01	2.18617E+00	9.34257E-01	2.11240E-03	0.00000E+00	0.00000E+00
126	9.36527E-01	2.20250E+00	9.34276E-01	2.09537E-03	0.00000E+00	0.00000E+00
127	9.32372E-01	2.21900E+00	9.34260E-01	2.07860E-03	0.00000E+00	0.00000E+00
128	9.08977E-01	2.23650E+00	9.34060E-01	2.07177E-03	0.00000E+00	0.00000E+00
129	9.05814E-01	2.25383E+00	9.33837E-01	2.06739E-03	0.00000E+00	0.00000E+00
130	9.36365E-01	2.27117E+00	9.33857E-01	2.05127E-03	0.00000E+00	0.00000E+00
131	9.69187E-01	2.28867E+00	9.34131E-01	2.05365E-03	0.00000E+00	0.00000E+00
132	9.18397E-01	2.30600E+00	9.34010E-01	2.04139E-03	0.00000E+00	0.00000E+00
133	9.35649E-01	2.32333E+00	9.34022E-01	2.02578E-03	0.00000E+00	0.00000E+00
134	9.05045E-01	2.34083E+00	9.33803E-01	2.02233E-03	0.00000E+00	0.00000E+00
135	9.19642E-01	2.35917E+00	9.33696E-01	2.00989E-03	0.00000E+00	0.00000E+00
136	9.26498E-01	2.37650E+00	9.33643E-01	1.99555E-03	0.00000E+00	0.00000E+00
137	9.15749E-01	2.39383E+00	9.33510E-01	1.98515E-03	0.00000E+00	0.00000E+00
138	9.01954E-01	2.41033E+00	9.33278E-01	1.98411E-03	0.00000E+00	0.00000E+00
139	9.46567E-01	2.42683E+00	9.33275E-01	1.97196E-03	0.00000E+00	0.00000E+00
140	9.19810E-01	2.44417E+00	9.33277E-01	1.96009E-03	0.00000E+00	0.00000E+00
141	9.14692E-01	2.46167E+00	9.33143E-01	1.95052E-03	0.00000E+00	0.00000E+00
142	9.31690E-01	2.47900E+00	9.33133E-01	1.93657E-03	0.00000E+00	0.00000E+00
143	8.87356E-01	2.49733E+00	9.32808E-01	1.95000E-03	0.00000E+00	0.00000E+00
144	9.08196E-01	2.51467E+00	9.32635E-01	1.94396E-03	0.00000E+00	0.00000E+00
145	9.18122E-01	2.53117E+00	9.32533E-01	1.93298E-03	0.00000E+00	0.00000E+00
146	9.17517E-01	2.54767E+00	9.32429E-01	1.92234E-03	0.00000E+00	0.00000E+00
147	9.39000E-01	2.56417E+00	9.32474E-01	1.90958E-03	0.00000E+00	0.00000E+00
148	9.15950E-01	2.58150E+00	9.32361E-01	1.89993E-03	0.00000E+00	0.00000E+00
149	9.45130E-01	2.59800E+00	9.32448E-01	1.88886E-03	0.00000E+00	0.00000E+00
150	9.41785E-01	2.61450E+00	9.32511E-01	1.87711E-03	0.00000E+00	0.00000E+00
151	8.95929E-01	2.63183E+00	9.32266E-01	1.88057E-03	0.00000E+00	0.00000E+00
152	9.44531E-01	2.64933E+00	9.32347E-01	1.86578E-03	0.00000E+00	0.00000E+00
153	9.26586E-01	2.66583E+00	9.32309E-01	1.85775E-03	0.00000E+00	0.00000E+00
154	9.69541E-01	2.68317E+00	9.32554E-01	1.86167E-03	0.00000E+00	0.00000E+00
155	9.20252E-01	2.70050E+00	9.32474E-01	1.85121E-03	0.00000E+00	0.00000E+00
156	9.26564E-01	2.71800E+00	9.32435E-01	1.83955E-03	0.00000E+00	0.00000E+00
157	9.91752E-01	2.73533E+00	9.32318E-01	1.86728E-03	0.00000E+00	0.00000E+00
158	8.83350E-01	2.75267E+00	9.32501E-01	1.88217E-03	0.00000E+00	0.00000E+00
159	9.14138E-01	2.77017E+00	9.32384E-01	1.87380E-03	0.00000E+00	0.00000E+00
160	9.39314E-01	2.78667E+00	9.32428E-01	1.86242E-03	0.00000E+00	0.00000E+00
161	9.38305E-01	2.80400E+00	9.32465E-01	1.85104E-03	0.00000E+00	0.00000E+00
162	9.10987E-01	2.82050E+00	9.32331E-01	1.84432E-03	0.00000E+00	0.00000E+00
163	9.44044E-01	2.83783E+00	9.32403E-01	1.83428E-03	0.00000E+00	0.00000E+00
164	9.28029E-01	2.85433E+00	9.32376E-01	1.82312E-03	0.00000E+00	0.00000E+00
165	9.21940E-01	2.87167E+00	9.32312E-01	1.81303E-03	0.00000E+00	0.00000E+00
166	9.29656E-01	2.88817E+00	9.32296E-01	1.80201E-03	0.00000E+00	0.00000E+00
167	9.23887E-01	2.90467E+00	9.32245E-01	1.79178E-03	0.00000E+00	0.00000E+00
168	9.32727E-01	2.92117E+00	9.32248E-01	1.78096E-03	0.00000E+00	0.00000E+00
169	9.35740E-01	2.93850E+00	9.32269E-01	1.77039E-03	0.00000E+00	0.00000E+00
170	9.18509E-01	2.95600E+00	9.32187E-01	1.76172E-03	0.00000E+00	0.00000E+00
171	9.48287E-01	2.97250E+00	9.32282E-01	1.75386E-03	0.00000E+00	0.00000E+00
172	9.36651E-01	2.98900E+00	9.32308E-01	1.74370E-03	0.00000E+00	0.00000E+00
173	9.41403E-01	3.00533E+00	9.32361E-01	1.73429E-03	0.00000E+00	0.00000E+00
174	9.14841E-01	3.02263E+00	9.32259E-01	1.72719E-03	0.00000E+00	0.00000E+00
175	8.86355E-01	3.04117E+00	9.31994E-01	1.73755E-03	0.00000E+00	0.00000E+00
176	9.04627E-01	3.05850E+00	9.31837E-01	1.73468E-03	0.00000E+00	0.00000E+00
177	9.43446E-01	3.07500E+00	9.31903E-01	1.72601E-03	0.00000E+00	0.00000E+00
178	9.25594E-01	3.09233E+00	9.31967E-01	1.71655E-03	0.00000E+00	0.00000E+00
179	9.77007E-01	3.10800E+00	9.32122E-01	1.72577E-03	0.00000E+00	0.00000E+00
180	9.50983E-01	3.12533E+00	9.32222E-01	1.71932E-03	0.00000E+00	0.00000E+00
181	9.23091E-01	3.14267E+00	9.32177E-01	1.71045E-03	0.00000E+00	0.00000E+00
182	9.16612E-01	3.15917E+00	9.32091E-01	1.70312E-03	0.00000E+00	0.00000E+00
183	9.52241E-01	3.17750E+00	9.32202E-01	1.69734E-03	0.00000E+00	0.00000E+00
184	9.27574E-01	3.19400E+00	9.32177E-01	1.68816E-03	0.00000E+00	0.00000E+00
185	9.09302E-01	3.21233E+00	9.32052E-01	1.68357E-03	0.00000E+00	0.00000E+00

186	9.13016E-01	3.22883E+00	9.31848E-01	1.67759E-03	0.00000E+00	0.00000E+00
187	9.29239E-01	3.24617E+00	9.31933E-01	1.66856E-03	0.00000E+00	0.00000E+00
188	9.30232E-01	3.26267E+00	9.31924E-01	1.65959E-03	0.00000E+00	0.00000E+00
189	9.23889E-01	3.28000E+00	9.31881E-01	1.65125E-03	0.00000E+00	0.00000E+00
190	9.26294E-01	3.29650E+00	9.31852E-01	1.64271E-03	0.00000E+00	0.00000E+00
191	9.25582E-01	3.31483E+00	9.31818E-01	1.63434E-03	0.00000E+00	0.00000E+00
192	9.18807E-01	3.33317E+00	9.31750E-01	1.62715E-03	0.00000E+00	0.00000E+00
193	9.09692E-01	3.34967E+00	9.31634E-01	1.62273E-03	0.00000E+00	0.00000E+00
194	9.16176E-01	3.36600E+00	9.31554E-01	1.61626E-03	0.00000E+00	0.00000E+00
195	9.17106E-01	3.38350E+00	9.31479E-01	1.60960E-03	0.00000E+00	0.00000E+00
196	9.06240E-01	3.40083E+00	9.31349E-01	1.60656E-03	0.00000E+00	0.00000E+00
197	9.31866E-01	3.41833E+00	9.31352E-01	1.59830E-03	0.00000E+00	0.00000E+00
198	8.98806E-01	3.43567E+00	9.31186E-01	1.59877E-03	0.00000E+00	0.00000E+00
199	9.67376E-01	3.45217E+00	9.31369E-01	1.60121E-03	0.00000E+00	0.00000E+00
200	9.21816E-01	3.46950E+00	9.31321E-01	1.59383E-03	0.00000E+00	0.00000E+00
201	9.65537E-01	3.48600E+00	9.31493E-01	1.59510E-03	0.00000E+00	0.00000E+00
202	9.04126E-01	3.50333E+00	9.31356E-01	1.59299E-03	0.00000E+00	0.00000E+00
203	9.42746E-01	3.52083E+00	9.31413E-01	1.58606E-03	0.00000E+00	0.00000E+00
204	9.06986E-01	3.53817E+00	9.31292E-01	1.58281E-03	0.00000E+00	0.00000E+00
205	9.05345E-01	3.55467E+00	9.31164E-01	1.58018E-03	0.00000E+00	0.00000E+00
206	9.33457E-01	3.57117E+00	9.31175E-01	1.57245E-03	0.00000E+00	0.00000E+00
207	9.60506E-01	3.58850E+00	9.31318E-01	1.57129E-03	0.00000E+00	0.00000E+00
208	9.13098E-01	3.60600E+00	9.31230E-01	1.56614E-03	0.00000E+00	0.00000E+00
209	9.03316E-01	3.62417E+00	9.31095E-01	1.56438E-03	0.00000E+00	0.00000E+00
210	8.96795E-01	3.64167E+00	9.30930E-01	1.56555E-03	0.00000E+00	0.00000E+00
211	9.35330E-01	3.65817E+00	9.30951E-01	1.55818E-03	0.00000E+00	0.00000E+00
212	9.01380E-01	3.67633E+00	9.30810E-01	1.55713E-03	0.00000E+00	0.00000E+00
213	9.01621E-01	3.69383E+00	9.30672E-01	1.55589E-03	0.00000E+00	0.00000E+00
214	9.76733E-01	3.72317E+00	9.30889E-01	1.56370E-03	0.00000E+00	0.00000E+00
215	9.31450E-01	3.73950E+00	9.30892E-01	1.55635E-03	0.00000E+00	0.00000E+00
216	9.24359E-01	3.75700E+00	9.30861E-01	1.54936E-03	0.00000E+00	0.00000E+00
217	9.59918E-01	3.77433E+00	9.30997E-01	1.54807E-03	0.00000E+00	0.00000E+00
218	9.34758E-01	3.79350E+00	9.31014E-01	1.54098E-03	0.00000E+00	0.00000E+00
219	9.03956E-01	3.81183E+00	9.30890E-01	1.53893E-03	0.00000E+00	0.00000E+00
220	9.28886E-01	3.82833E+00	9.30880E-01	1.53188E-03	0.00000E+00	0.00000E+00
221	9.28484E-01	3.84667E+00	9.30870E-01	1.52491E-03	0.00000E+00	0.00000E+00
222	9.26410E-01	3.86400E+00	9.30849E-01	1.51810E-03	0.00000E+00	0.00000E+00
223	9.59803E-01	3.88150E+00	9.30980E-01	1.51688E-03	0.00000E+00	0.00000E+00
224	9.54579E-01	3.89983E+00	9.31087E-01	1.51377E-03	0.00000E+00	0.00000E+00
225	9.05585E-01	3.91900E+00	9.30972E-01	1.51130E-03	0.00000E+00	0.00000E+00
226	9.45070E-01	3.93733E+00	9.31035E-01	1.50585E-03	0.00000E+00	0.00000E+00
227	9.37493E-01	3.95383E+00	9.31064E-01	1.49942E-03	0.00000E+00	0.00000E+00
228	9.48382E-01	3.97217E+00	9.31140E-01	1.49474E-03	0.00000E+00	0.00000E+00
229	9.40329E-01	3.98850E+00	9.31181E-01	1.48869E-03	0.00000E+00	0.00000E+00
230	9.48385E-01	4.00683E+00	9.31256E-01	1.48406E-03	0.00000E+00	0.00000E+00
231	8.89040E-01	4.02433E+00	9.31072E-01	1.48903E-03	0.00000E+00	0.00000E+00
232	9.65909E-01	4.04167E+00	9.31224E-01	1.49025E-03	0.00000E+00	0.00000E+00
233	9.74599E-01	4.05900E+00	9.31411E-01	1.49562E-03	0.00000E+00	0.00000E+00
234	9.16760E-01	4.07733E+00	9.31348E-01	1.49050E-03	0.00000E+00	0.00000E+00
235	9.30789E-01	4.09383E+00	9.31346E-01	1.48409E-03	0.00000E+00	0.00000E+00
236	9.20432E-01	4.11117E+00	9.31299E-01	1.47847E-03	0.00000E+00	0.00000E+00
237	9.26650E-01	4.12867E+00	9.31279E-01	1.47230E-03	0.00000E+00	0.00000E+00
238	9.93530E-01	4.14517E+00	9.31543E-01	1.48959E-03	0.00000E+00	0.00000E+00
239	9.42901E-01	4.16333E+00	9.31591E-01	1.48406E-03	0.00000E+00	0.00000E+00
240	9.49539E-01	4.18083E+00	9.31666E-01	1.47974E-03	0.00000E+00	0.00000E+00
241	9.51291E-01	4.19917E+00	9.31748E-01	1.47582E-03	0.00000E+00	0.00000E+00
242	9.35034E-01	4.21650E+00	9.31762E-01	1.46972E-03	0.00000E+00	0.00000E+00
243	9.55411E-01	4.23300E+00	9.31860E-01	1.46690E-03	0.00000E+00	0.00000E+00
244	9.26882E-01	4.25033E+00	9.31840E-01	1.46097E-03	0.00000E+00	0.00000E+00
245	9.25955E-01	4.26783E+00	9.31816E-01	1.45514E-03	0.00000E+00	0.00000E+00
246	9.41014E-01	4.28417E+00	9.31853E-01	1.44966E-03	0.00000E+00	0.00000E+00
247	9.19919E-01	4.30067E+00	9.31805E-01	1.44455E-03	0.00000E+00	0.00000E+00
248	8.96194E-01	4.31900E+00	9.31660E-01	1.44593E-03	0.00000E+00	0.00000E+00
249	9.52413E-01	4.33650E+00	9.31744E-01	1.44251E-03	0.00000E+00	0.00000E+00
250	9.43548E-01	4.35383E+00	9.31791E-01	1.43747E-03	0.00000E+00	0.00000E+00
251	9.10655E-01	4.37300E+00	9.31707E-01	1.43420E-03	0.00000E+00	0.00000E+00
252	9.59810E-01	4.39050E+00	9.31819E-01	1.43287E-03	0.00000E+00	0.00000E+00
253	9.16570E-01	4.40783E+00	9.31758E-01	1.42844E-03	0.00000E+00	0.00000E+00
254	9.18358E-01	4.42517E+00	9.31705E-01	1.42376E-03	0.00000E+00	0.00000E+00
255	9.50095E-01	4.44167E+00	9.31778E-01	1.41998E-03	0.00000E+00	0.00000E+00
256	9.46913E-01	4.45917E+00	9.31837E-01	1.41563E-03	0.00000E+00	0.00000E+00
257	9.48633E-01	4.47833E+00	9.31903E-01	1.41161E-03	0.00000E+00	0.00000E+00
258	9.16091E-01	4.49667E+00	9.31841E-01	1.40744E-03	0.00000E+00	0.00000E+00
259	9.46780E-01	4.51767E+00	9.31900E-01	1.40316E-03	0.00000E+00	0.00000E+00
260	9.01064E-01	4.54233E+00	9.31780E-01	1.40281E-03	0.00000E+00	0.00000E+00
261	9.46954E-01	4.56250E+00	9.31839E-01	1.39861E-03	0.00000E+00	0.00000E+00
262	9.66209E-01	4.58000E+00	9.31971E-01	1.39948E-03	0.00000E+00	0.00000E+00
263	9.09969E-01	4.59817E+00	9.31887E-01	1.39665E-03	0.00000E+00	0.00000E+00
264	9.35793E-01	4.61467E+00	9.31901E-01	1.39139E-03	0.00000E+00	0.00000E+00
265	9.45468E-01	4.63217E+00	9.31953E-01	1.38705E-03	0.00000E+00	0.00000E+00
266	9.62098E-01	4.64950E+00	9.32067E-01	1.38650E-03	0.00000E+00	0.00000E+00
267	9.17831E-01	4.66683E+00	9.32013E-01	1.38230E-03	0.00000E+00	0.00000E+00
268	9.31604E-01	4.68433E+00	9.32012E-01	1.37709E-03	0.00000E+00	0.00000E+00
269	9.39430E-01	4.70350E+00	9.32040E-01	1.37221E-03	0.00000E+00	0.00000E+00
270	9.49882E-01	4.72000E+00	9.32106E-01	1.36870E-03	0.00000E+00	0.00000E+00
271	9.26082E-01	4.73917E+00	9.32084E-01	1.36378E-03	0.00000E+00	0.00000E+00
272	9.22410E-01	4.75667E+00	9.32048E-01	1.35920E-03	0.00000E+00	0.00000E+00
273	9.24674E-01	4.77317E+00	9.32021E-01	1.35444E-03	0.00000E+00	0.00000E+00
274	9.41151E-01	4.79050E+00	9.32054E-01	1.34987E-03	0.00000E+00	0.00000E+00
275	9.58979E-01	4.80700E+00	9.32153E-01	1.34853E-03	0.00000E+00	0.00000E+00
276	9.37074E-01	4.82433E+00	9.32171E-01	1.34372E-03	0.00000E+00	0.00000E+00
277	9.14275E-01	4.84167E+00	9.32106E-01	1.34040E-03	0.00000E+00	0.00000E+00
278	9.58754E-01	4.85733E+00	9.32202E-01	1.33902E-03	0.00000E+00	0.00000E+00
279	9.03889E-01	4.87567E+00	9.32100E-01	1.33809E-03	0.00000E+00	0.00000E+00
280	9.38855E-01	4.89300E+00	9.32125E-01	1.33349E-03	0.00000E+00	0.00000E+00



281	9.43298E-01	4.91217E+00	9.32165E-01	1.32931E-03	0.00000E+00	0.00000E+00
282	9.20021E-01	4.93233E+00	9.32121E-01	1.32526E-03	0.00000E+00	0.00000E+00
283	9.26751E-01	4.95067E+00	9.32102E-01	1.32067E-03	0.00000E+00	0.00000E+00
284	9.00211E-01	4.96900E+00	9.31989E-01	1.32083E-03	0.00000E+00	0.00000E+00
285	9.01443E-01	4.98633E+00	9.31881E-01	1.32057E-03	0.00000E+00	0.00000E+00
286	9.01616E-01	5.00283E+00	9.31774E-01	1.32022E-03	0.00000E+00	0.00000E+00
287	9.41979E-01	5.02033E+00	9.31810E-01	1.31607E-03	0.00000E+00	0.00000E+00
288	9.35863E-01	5.03767E+00	9.31824E-01	1.31154E-03	0.00000E+00	0.00000E+00
289	9.11547E-01	5.05600E+00	9.31754E-01	1.30887E-03	0.00000E+00	0.00000E+00
290	9.29271E-01	5.07250E+00	9.31745E-01	1.30434E-03	0.00000E+00	0.00000E+00
291	9.58920E-01	5.08883E+00	9.31839E-01	1.30322E-03	0.00000E+00	0.00000E+00
292	9.66201E-01	5.10533E+00	9.31958E-01	1.30411E-03	0.00000E+00	0.00000E+00
293	9.26759E-01	5.12367E+00	9.31940E-01	1.29975E-03	0.00000E+00	0.00000E+00
294	9.08628E-01	5.14017E+00	9.31860E-01	1.29774E-03	0.00000E+00	0.00000E+00
295	9.30354E-01	5.15667E+00	9.31855E-01	1.29332E-03	0.00000E+00	0.00000E+00
296	9.45246E-01	5.17400E+00	9.31900E-01	1.28972E-03	0.00000E+00	0.00000E+00
297	8.99599E-01	5.19150E+00	9.31791E-01	1.28999E-03	0.00000E+00	0.00000E+00
298	9.42083E-01	5.20883E+00	9.31826E-01	1.28610E-03	0.00000E+00	0.00000E+00
299	9.31882E-01	5.22533E+00	9.31826E-01	1.28176E-03	0.00000E+00	0.00000E+00
300	9.31684E-01	5.24367E+00	9.31825E-01	1.27745E-03	0.00000E+00	0.00000E+00
301	9.54073E-01	5.26017E+00	9.31900E-01	1.27534E-03	0.00000E+00	0.00000E+00
302	9.46381E-01	5.27833E+00	9.31948E-01	1.27200E-03	0.00000E+00	0.00000E+00
303	9.56835E-01	5.29400E+00	9.32031E-01	1.27046E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP

LIFETIME = 1.01160E-04 + OR - 3.16687E-07      GENERATION TIME = 3.72912E-05 + OR - 9.47620E-08  
 NU BAR = 2.43654E+00 + OR - 9.54075E-05      AVERAGE FISSION GROUP = 2.24639E+01 + OR - 5.71557E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.62849E-01 + OR - 7.87513E-04

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	0.93197	+ OR - 0.00127	0.93070 TO 0.93324	0.92942 TO 0.93452	0.92815 TO 0.93579	300000
4	0.93200	+ OR - 0.00128	0.93072 TO 0.93328	0.92945 TO 0.93455	0.92817 TO 0.93583	299000
5	0.93197	+ OR - 0.00128	0.93069 TO 0.93325	0.92941 TO 0.93453	0.92812 TO 0.93581	298000
6	0.93191	+ OR - 0.00128	0.93063 TO 0.93320	0.92934 TO 0.93448	0.92806 TO 0.93576	297000
7	0.93188	+ OR - 0.00129	0.93059 TO 0.93317	0.92931 TO 0.93446	0.92802 TO 0.93575	296000
8	0.93174	+ OR - 0.00128	0.93046 TO 0.93303	0.92917 TO 0.93431	0.92789 TO 0.93560	295000
9	0.93177	+ OR - 0.00129	0.93048 TO 0.93306	0.92919 TO 0.93435	0.92790 TO 0.93564	294000
10	0.93174	+ OR - 0.00129	0.93045 TO 0.93303	0.92915 TO 0.93433	0.92786 TO 0.93562	293000
11	0.93154	+ OR - 0.00128	0.93026 TO 0.93283	0.92898 TO 0.93411	0.92770 TO 0.93539	292000
12	0.93157	+ OR - 0.00129	0.93028 TO 0.93286	0.92900 TO 0.93414	0.92771 TO 0.93543	291000
17	0.93146	+ OR - 0.00130	0.93016 TO 0.93276	0.92885 TO 0.93406	0.92755 TO 0.93536	286000
22	0.93136	+ OR - 0.00131	0.93007 TO 0.93268	0.92876 TO 0.93399	0.92746 TO 0.93529	281000
27	0.93150	+ OR - 0.00132	0.93017 TO 0.93282	0.92885 TO 0.93414	0.92753 TO 0.93547	276000
32	0.93134	+ OR - 0.00134	0.92999 TO 0.93268	0.92865 TO 0.93402	0.92731 TO 0.93537	271000
37	0.93127	+ OR - 0.00137	0.92990 TO 0.93263	0.92854 TO 0.93400	0.92717 TO 0.93537	266000
42	0.93133	+ OR - 0.00137	0.92996 TO 0.93270	0.92858 TO 0.93408	0.92721 TO 0.93545	261000
47	0.93101	+ OR - 0.00137	0.92964 TO 0.93238	0.92826 TO 0.93375	0.92689 TO 0.93512	256000
52	0.93107	+ OR - 0.00139	0.92968 TO 0.93246	0.92829 TO 0.93386	0.92690 TO 0.93525	251000
57	0.93092	+ OR - 0.00140	0.92952 TO 0.93232	0.92811 TO 0.93372	0.92671 TO 0.93512	246000
62	0.93092	+ OR - 0.00142	0.92949 TO 0.93234	0.92807 TO 0.93376	0.92665 TO 0.93518	241000
67	0.93082	+ OR - 0.00141	0.92941 TO 0.93223	0.92800 TO 0.93364	0.92659 TO 0.93505	236000
72	0.93084	+ OR - 0.00144	0.92940 TO 0.93227	0.92796 TO 0.93371	0.92653 TO 0.93514	231000
77	0.93077	+ OR - 0.00146	0.92932 TO 0.93223	0.92786 TO 0.93369	0.92640 TO 0.93514	226000
82	0.93094	+ OR - 0.00148	0.92945 TO 0.93242	0.92797 TO 0.93390	0.92649 TO 0.93538	221000
87	0.93064	+ OR - 0.00150	0.92914 TO 0.93214	0.92765 TO 0.93364	0.92615 TO 0.93513	216000
92	0.93083	+ OR - 0.00151	0.92931 TO 0.93234	0.92780 TO 0.93386	0.92628 TO 0.93537	211000

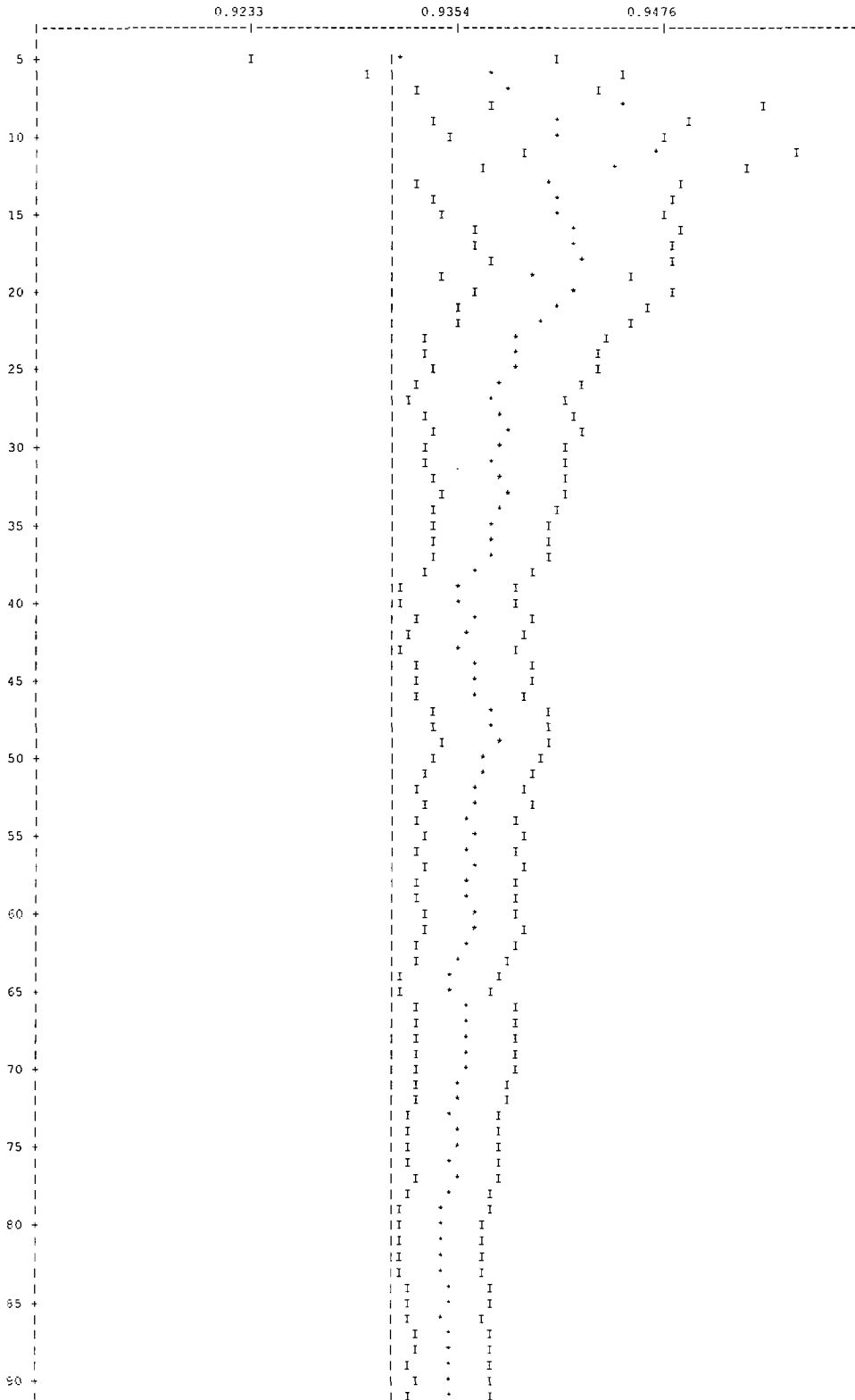
LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP

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	0.93060	+ OR - 0.00155	0.92906 TO 0.93215	0.92751 TO 0.93370	0.92596 TO 0.93524	206000
102	0.93041	+ OR - 0.00156	0.92885 TO 0.93197	0.92729 TO 0.93353	0.92573 TO 0.93509	201000
107	0.93047	+ OR - 0.00159	0.92887 TO 0.93206	0.92728 TO 0.93365	0.92569 TO 0.93524	196000
112	0.93018	+ OR - 0.00161	0.92857 TO 0.93179	0.92695 TO 0.93340	0.92534 TO 0.93501	191000
117	0.93012	+ OR - 0.00158	0.92854 TO 0.93170	0.92696 TO 0.93328	0.92538 TO 0.93486	186000
122	0.93026	+ OR - 0.00156	0.92870 TO 0.93182	0.92714 TO 0.93337	0.92558 TO 0.93493	181000
127	0.93045	+ OR - 0.00159	0.92886 TO 0.93204	0.92727 TO 0.93362	0.92568 TO 0.93521	176000
132	0.93053	+ OR - 0.00161	0.92892 TO 0.93213	0.92731 TO 0.93374	0.92571 TO 0.93534	171000
137	0.93083	+ OR - 0.00164	0.92918 TO 0.93247	0.92754 TO 0.93411	0.92590 TO 0.93576	166000
142	0.93107	+ OR - 0.00168	0.92940 TO 0.93275	0.92772 TO 0.93443	0.92604 TO 0.93610	161000
147	0.93162	+ OR - 0.00170	0.92992 TO 0.93331	0.92823 TO 0.93501	0.92653 TO 0.93671	156000
152	0.93172	+ OR - 0.00173	0.92999 TO 0.93344	0.92826 TO 0.93517	0.92653 TO 0.93690	151000
157	0.93120	+ OR - 0.00172	0.92948 TO 0.93291	0.92776 TO 0.93463	0.92605 TO 0.93634	146000
162	0.93169	+ OR - 0.00173	0.92996 TO 0.93342	0.92823 TO 0.93515	0.92650 TO 0.93699	141000
167	0.93177	+ OR - 0.00179	0.92998 TO 0.93356	0.92819 TO 0.93535	0.92640 TO 0.93714	136000
172	0.93167	+ OR - 0.00185	0.92982 TO 0.93352	0.92797 TO 0.93537	0.92612 TO 0.93722	131000
177	0.93221	+ OR - 0.00187	0.93034 TO 0.93408	0.92847 TO 0.93595	0.92660 TO 0.93782	126000
182	0.93194	+ OR - 0.00190	0.93004 TO 0.93384	0.92815 TO 0.93574	0.92625 TO 0.93763	121000
187	0.93219	+ OR - 0.00195	0.93023 TO 0.93414	0.92828 TO 0.93610	0.92632 TO 0.93805	116000
192	0.93251	+ OR - 0.00204	0.93048 TO 0.93455	0.92844 TO 0.93658	0.92640 TO 0.93862	111000
197	0.93328	+ OR - 0.00210	0.93118 TO 0.93538	0.92909 TO 0.93747	0.92699 TO 0.93957	106000
202	0.93337	+ OR - 0.00210	0.93127 TO 0.93547	0.92917 TO 0.93756	0.92707 TO 0.93966	101000
207	0.93355	+ OR - 0.00215	0.93140 TO 0.93570	0.92925 TO 0.93785	0.92710 TO 0.94000	96000
212	0.93485	+ OR - 0.00216	0.93268 TO 0.93701	0.93052 TO 0.93917	0.92836 TO 0.94133	91000
217	0.93462	+ OR - 0.00218	0.93244 TO 0.93679	0.93026 TO 0.93897	0.92808 TO 0.94115	86000
222	0.93524	+ OR - 0.00228	0.93296 TO 0.93752	0.93069 TO 0.93979	0.92841 TO 0.94207	81000
227	0.93489	+ OR - 0.00235	0.93254 TO 0.93725	0.93018 TO 0.93960	0.92783 TO 0.94196	76000

LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP							
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	
232	0.93465	+ OR - 0.00238	0.93227 TO 0.93703	0.92989 TO 0.93940	0.92751 TO 0.94178	71000	
237	0.93471	+ OR - 0.00246	0.93225 TO 0.93717	0.92979 TO 0.93962	0.92733 TO 0.94208	66000	
242	0.93309	+ OR - 0.00244	0.93065 TO 0.93553	0.92821 TO 0.93796	0.92577 TO 0.94040	61000	
247	0.93302	+ OR - 0.00261	0.93041 TO 0.93563	0.92781 TO 0.93824	0.92520 TO 0.94084	56000	
252	0.93307	+ OR - 0.00265	0.93042 TO 0.93572	0.92777 TO 0.93836	0.92513 TO 0.94101	51000	
257	0.93274	+ OR - 0.00284	0.92990 TO 0.93558	0.92706 TO 0.93841	0.92423 TO 0.94125	46000	
262	0.93241	+ OR - 0.00291	0.92950 TO 0.93532	0.92660 TO 0.93822	0.92369 TO 0.94113	41000	
267	0.93216	+ OR - 0.00310	0.92906 TO 0.93525	0.92597 TO 0.93835	0.92287 TO 0.94144	36000	
272	0.93188	+ OR - 0.00353	0.92835 TO 0.93541	0.92483 TO 0.93894	0.92130 TO 0.94246	31000	
277	0.93124	+ OR - 0.00399	0.92724 TO 0.93523	0.92325 TO 0.93922	0.91926 TO 0.94321	26000	
282	0.93083	+ OR - 0.00450	0.92632 TO 0.93533	0.92182 TO 0.93983	0.91732 TO 0.94433	21000	
287	0.93596	+ OR - 0.00470	0.93126 TO 0.94066	0.92656 TO 0.94536	0.92186 TO 0.95005	16000	
292	0.93396	+ OR - 0.00537	0.92859 TO 0.93933	0.92322 TO 0.94470	0.91785 TO 0.95007	11000	
297	0.94382	+ OR - 0.00437	0.93945 TO 0.94820	0.93508 TO 0.95257	0.93070 TO 0.95694	6000	

LWT ANALYSIS: EXXON 15X15 (W) ASSEMBLY; WATER IN GAP

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS K-EFF = 0.9320 + OR - 0.0013 WHICH OCCURS FOR 303 GENERATIONS RUN.











LWT ANALYSIS; EXXON 15X15 (W) ASSEMBLY; WATER IN GAP

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0044			4.12382E-03	2.2144	2.31596E-03	1.7429	9.65822E-06	57.6063
2	0.0180			1.67539E-02	0.6733	8.40488E-03	0.5753	0.00000E+00	0.0000
3	0.0200			1.86620E-02	0.5834	7.76219E-03	0.5667	0.00000E+00	0.0000
4	0.0084			7.85246E-03	0.7543	3.75926E-03	0.7213	0.00000E+00	0.0000
5	0.0026			2.42704E-03	0.5530	2.56147E-03	0.4791	0.00000E+00	0.0000
6	0.0023			2.15423E-03	0.4075	4.32427E-03	0.3424	0.00000E+00	0.0000
7	0.0023			2.11604E-03	0.4532	4.86679E-03	0.3862	0.00000E+00	0.0000
8	0.0023			2.14614E-03	0.5016	7.24848E-03	0.4245	0.00000E+00	0.0000
9	0.0031			2.89714E-03	0.5196	1.12585E-02	0.4242	0.00000E+00	0.0000
10	0.0067			6.25759E-03	0.5651	1.73420E-02	0.4456	0.00000E+00	0.0000
11	0.0140			1.30250E-02	0.5315	2.80004E-02	0.4400	0.00000E+00	0.0000
12	0.0184			1.71878E-02	0.6059	2.98291E-02	0.5484	0.00000E+00	0.0000
13	0.0170			1.58165E-02	0.6547	2.97315E-02	0.5618	0.00000E+00	0.0000
14	0.0134			1.25289E-02	0.6097	4.23690E-02	0.5109	0.00000E+00	0.0000
15	0.0030			2.76823E-03	1.0342	8.78912E-03	0.8033	0.00000E+00	0.0000
16	0.0021			1.92938E-03	1.3874	5.29241E-03	0.8411	0.00000E+00	0.0000
17	0.0032			2.97248E-03	1.6548	3.72679E-03	1.1017	0.00000E+00	0.0000
18	0.0042			3.95071E-03	1.9001	3.84560E-03	1.2468	0.00000E+00	0.0000
19	0.0051			4.79233E-03	1.3874	6.01308E-03	0.8243	0.00000E+00	0.0000
20	0.0216			2.01376E-02	0.8603	2.36640E-02	0.5959	0.00000E+00	0.0000
21	0.0119			1.10782E-02	1.2904	1.04705E-02	0.9036	0.00000E+00	0.0000
22	0.0289			2.69181E-02	0.9346	2.43475E-02	0.6607	0.00000E+00	0.0000
23	0.1036			9.65919E-02	0.4601	9.35088E-02	0.3275	0.00000E+00	0.0000
24	0.2115			1.97140E-01	0.3347	1.90608E-01	0.1993	0.00000E+00	0.0000
25	0.1819			1.69493E-01	0.3884	1.63260E-01	0.2228	8.62906E-07	100.0000
26	0.2191			2.04213E-01	0.3709	2.00778E-01	0.2291	1.58655E-06	100.0000
27	0.0709			6.60369E-02	0.6982	6.74562E-02	0.4170	0.00000E+00	0.0000
SYSTEM TOTAL =				9.31971E-01	0.1366	1.00153E+00	0.0446	1.21076E-05	48.1945

ELAPSED TIME 5.29483 MINUTES

RANDOM NUMBER= 9A242D7225

LWT ANALYSIS; EXXON 15X15(W) ASSEMBLY; WATER IN GAP

```
                                FREQUENCY FOR GENERATIONS    4 TO 303
0.8694 TO 0.8820      *
0.8820 TO 0.8947      *****
0.8947 TO 0.9073      *****
0.9073 TO 0.9200      *****
0.9200 TO 0.9326      *****
0.9326 TO 0.9453      *****
0.9453 TO 0.9579      *****
0.9579 TO 0.9706      *****
0.9706 TO 0.9832      *****
0.9832 TO 0.9959      *****
0.9959 TO 1.0085      *
```

```
                                FREQUENCY FOR GENERATIONS    79 TO 303
0.8694 TO 0.8820      *
0.8820 TO 0.8947      *****
0.8947 TO 0.9073      *****
0.9073 TO 0.9200      *****
0.9200 TO 0.9326      *****
0.9326 TO 0.9453      *****
0.9453 TO 0.9579      *****
0.9579 TO 0.9706      *****
0.9706 TO 0.9832      *****
0.9832 TO 0.9959      *****
0.9959 TO 1.0085      *
```

```
                                FREQUENCY FOR GENERATIONS   154 TO 303
0.8694 TO 0.8820      ***
0.8820 TO 0.8947      *****
0.8947 TO 0.9073      *****
0.9073 TO 0.9200      *****
0.9200 TO 0.9326      *****
0.9326 TO 0.9453      *****
0.9453 TO 0.9579      *****
0.9579 TO 0.9706      *****
0.9706 TO 0.9832      ***
0.9832 TO 0.9959      **
0.9959 TO 1.0085      *
```

```
                                FREQUENCY FOR GENERATIONS   229 TO 303
0.8694 TO 0.8820      *
0.8820 TO 0.8947      *****
0.8947 TO 0.9073      *****
0.9073 TO 0.9200      *****
0.9200 TO 0.9326      *****
0.9326 TO 0.9453      *****
0.9453 TO 0.9579      *****
0.9579 TO 0.9706      *****
0.9706 TO 0.9832      *
0.9832 TO 0.9959      *
0.9959 TO 1.0085      *
```

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.....
*
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 5.29483 MINUTES
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*
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Figure 6.6.1-3 CSAS Input/Output for NAC-LWT with PWR Fuel – 3.5% Enrichment –  
Most Reactive Normal Condition Configuration

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT ANALYSIS: W17x17 OFA ASSEMBLY; NO WATER IN GAP
17GROUPHDF4 LATTICECELL
UO2 1 0.95 293.0 92235 3.5 92238 96.5 END
ZR 2 1.0 293.0 END
H2O 3 1.000 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.0 293.0 END
H2O 8 1.0E-20 293.0 END
H2O 9 1.0E-20 293.0 END
END COMP
SQUAREPITCH 1.2598 0.7844 1 3 0.9144 2 0.8002 9 END
LWT ANALYSIS: W17x17 OFA ASSEMBLY; NO WATER IN GAP
READ PARAM RUN=YES PLT=NO TME=5000 GEN=303 RND= NPG=1000 END PARAM
READ GEOM
UNIT 1
COM='FUEL PIN CELL - WITH H2O'
CYLINDER 1 1 0.3922 2P182.88
CYLINDER 9 1 0.4001 2P182.88
CYLINDER 2 1 0.4572 2P182.88
CUBOID 3 1 4P0.6299 2P182.88
UNIT 2
COM='WATER ROD CELL - WITH H2O'
CYLINDER 3 1 0.5715 2P182.88
CYLINDER 2 1 0.6121 2P182.88
CUBOID 3 1 4P0.6299 2P182.88
GLOBAL UNIT 9
ARRAY 1 -10.7083 -10.7083 -182.88
CUBOID 3 1 4P11.2776 2P182.88
CYLINDER 4 1 16.891 2P182.88
CYLINDER 3 1 16.9863 2P182.88
CYLINDER 5 1 18.8913 2P182.88
CYLINDER 6 1 33.4963 2P182.88
CYLINDER 5 1 36.5443 2P182.88
CYLINDER 7 1 49.2443 2P182.88
CYLINDER 5 1 49.8539 212.48 -192.16
CYLINDER 6 1 49.8539 212.48 -199.78
CYLINDER 5 1 49.8539 212.48 -208.67
CUBOID 8 1 4P81.0000 243.00 -240.00
END GEOM
READ ARRAY
ARA=1 NUX=17 NUY=17 NUZ=1 FILL
          34R1
          5R1 2 2R1 2 2R1 2 5R1
          3R1 2 9R1 2 3R1
          17R1
2R1 2 2R1 2 2R1 2 2R1 2 2R1 2 2R1
          34R1
2R1 2 2R1 2 2R1 2 2R1 2 2R1 2 2R1
          34R1
2R1 2 2R1 2 2R1 2 2R1 2 2R1 2 2R1
          17R1
          3R1 2 9R1 2 3R1
          5R1 2 2R1 2 2P1 2 5R1
          34R1
END FILL
END ARRAY
READ BOUNDS ZFC=VAC YXF=VAC END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.26 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 13.24 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 607.64 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 626.15 (SECONDS).
```

```

CCCCCCCCC      SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  555555555555
CCCCCCCCCCCCC  SSSSSSSSSSS AAAAAAAAAA  SSSSSSSSSSS 22222222222  555555555555
CC      CC      SS      SS  AA      AA  SS      SS  22      22  55
CC      SS      AA      AA  SS      SS      22      55
CC      SS      AA      AA  SS      SS      22      55
CC      SSSSSSSSSS AAAAAAAAAA  SSSSSSSSSS      22  555555555555
CC      SSSSSSSSSS AAAAAAAAAA  SSSSSSSSSS      22  555555555555
CC      SS      AA      AA  SS      SS      22      55
CC      SS      AA      AA  SS      SS      22      55
CC      CC      SS      SS  AA      AA  SS      SS  22      55      55
CCCCCCCCCCCCC  SSSSSSSSSSS AA      AA  SSSSSSSSSSS 22222222222  555555555555
CCCCCCCCC      SSSSSSSSSS  AA      AA  SSSSSSSSSS 22222222222  55555555555
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE      PP      PP  CC      CC
SS      CC      AA      AA  LL      EE      PP      PP  CC      CC
SS      CC      AA      AA  LL      EE      PP      PP  CC      CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE  -----  PPPPPPPPPP  CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE  -----  PPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE      PP      CC
SS      SS  CC      AA      AA  LL      EE      PP      CC
SS      SS  CC      AA      AA  LL      EE      PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CC      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

0000000  7777777777  //  222222222  333333333  //  999999999  888888888
00000000  7777777777  //  22222222222  33333333333  //  99999999999  88888888888
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99999999999  88888888888
00      00  77      77  //  22      22  33      33  //  99999999999  88888888888
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
000000000  77      //  22222222222  33333333333  //  99999999999  88888888888
0000000  77      //  22222222222  33333333333  //  99999999999  88888888888
    
```

```

0000000  999999999  222222222  777777777  11  66666666666
00000000  99999999999  22222222222  77777777777  111  6666666666666
00      00  99      99  :::  22      22  77      77  :::  1111  66
00      00  99      99  :::  22      22  77      77  :::  11  66
00      00  99      99  :::  22      22  77      77  :::  11  66
00      00  99999999999  22      77      11  66666666666
00      00  99999999999  22      77      11  6666666666666
00      00  99      99  :::  22      77      11  66      66
00      00  99      99  :::  22      77      11  66      66
00      00  99      99  :::  22      77      11  66      66
000000000  99999999999  22222222222  77      11111111  6666666666666
0000000  99999999999  22222222222  77      11111111  666666666666
    
```

```
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  FPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  FPPPPPPPPPP  CCCCCCCCCC
SS  SS  CC  CC  AA  AA  LL  EE  PP  FF  CC  CC
SS  CC  AA  AA  LL  EE  PP  FF  CC  CC
SS  CC  AA  AA  LL  EE  PP  FF  CC  CC
SSSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEEE  FPPPPPPPPPP  CC
SSSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEEE  FPPPPPPPPPP  CC
SS  CC  AA  AA  LL  EE  PP  CC  CC
SS  CC  AA  AA  LL  EE  PP  CC  CC
SSSSSSSSSS  CCCCCCCCCC  AA  AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA  AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP  CCCCCCCCCC
```

```
.....
.....
*****
          PROGRAM VERIFICATION INFORMATION
*****
          CODE SYSTEM:  SCALE-PC VERSION:  4.3
*****
.....
          PROGRAM:  CSAS
*****
          CREATION DATE:  03/08/96
*****
          VOLUME:  ENG
*****
          LIBRARY:  G:\SCALE43\WIN_NT\EXE
*****
          PRODUCTION CODE:  CSAS
*****
          VERSION:  3.1
*****
          JOBNAME:  SCALE-PC
*****
          DATE OF EXECUTION:  07/23/98
*****
          TIME OF EXECUTION:  09:27:16
*****
.....
.....
```

LWT ANALYSIS; W17X17 OFA ASSEMBLY; NO WATER IN GAP

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPHDF4 LIBRARY  
MXX 9 MIXTURES  
MSC 9 COMPOSITION SPECIFICATIONS  
IZM 4 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.9500 VOLUME FRACTION  
ROTH 10.9600 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 3.500 WT%  
92238 96.500 WT%  
8016 2.00 ATOMS/MOLECULE  
END

SC ZR STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 6.4900 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
40000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC AL STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE  
END

SC SS304 STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%  
END

SC PB STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION

```
MX          8 MIXTURE NO.  
VF          0.0000 VOLUME FRACTION  
ROTH       0.9982 THEORETICAL DENSITY  
NEL        2 NO. ELEMENTS  
ICP        1 0/1 MIXTURE/COMPOUND  
TEMP       293.0 DEG KELVIN  
          1001      2.00 ATOMS/MOLECULE  
          8016      1.00 ATOM/MOLECULE
```

END

```
SC H2O      STANDARD COMPOSITION  
MX          9 MIXTURE NO.  
VF          0.0000 VOLUME FRACTION  
ROTH       0.9982 THEORETICAL DENSITY  
NEL        2 NO. ELEMENTS  
ICP        1 0/1 MIXTURE/COMPOUND  
TEMP       293.0 DEG KELVIN  
          1001      2.00 ATOMS/MOLECULE  
          8016      1.00 ATOM/MOLECULE
```

END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP SQUAREPITCH CELL TYPE  
PITCH      1.2598 CM CENTER TO CENTER SPACING  
FUELOD     0.7844 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL      1 MIXTURE NO. OF FUEL  
MMOD       3 MIXTURE NO. OF MODERATOR  
CLADOD     0.9144 CM CLAD OUTER DIAMETER  
MCLAD      2 MIXTURE NO. OF CLAD  
GAPOD      0.8002 CM GAP OUTER DIAMETER  
MGAP       9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```





```

KK      KK  EEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEE  NNN     NN  000000000000     VV      VV
KK      KK  EE           JNNN    NN  00      00      VV      VV
KK      KK  EE           NN  NN   NN  00      00      VV      VV
KK      KK  EE           NN  NN   NN  00      00      VV      VV
KK      KK  EE           NN  NN   NN  00      00      VV      VV
KKKKKKK  EEEEEEEEE   NN     NN  NN  00      00      -----  VV      VV
KKKKKKK  EEEEEEEEE   NN     NN  NN  00      00      -----  VV      VV
KK      KK  EE           NN     NN  NN  00      00      VV      VV
KK      KK  EE           NN     NN  NN  00      00      VV      VV
KK      KK  EE           NN     NN  NN  00      00      VV      VV
KK      KK  EE           NN     NN  NN  00      00      VV      VV
KK      KK  EEEEEEEEEEE  NN     NN  000000000000     VVV     VV
KK      KK  EEEEEEEEEEE  NN     NN  0000000000      V

```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSSSS  CCCCCCCCCCCC  AAAAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPPPP  CCCCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      CC  AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSSSS  CC           AAAAAAAAAAAAA  LL      EEEEEEEEE   -----  PPPPPPPPPPPPP  CC
SSSSSSSSSSSS  CC           AAAAAAAAAAAAA  LL      EEEEEEEEE   -----  PPPPPPPPPPPPP  CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSSSS  CCCCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      PP  CCCCCCCCCCCC
SSSSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      PP  CCCCCCCCCC

```

```

0000000  777777777777  //  2222222222  3333333333  //  9999999999  8888888888
000000000  77777777777  //  222222222222  333333333333  //  999999999999  888888888888
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
000000000  77      77  //  222222222222  333333333333  //  999999999999  888888888888
0000000  77      77  //  222222222222  333333333333  //  999999999999  888888888888

```

```

0000000  9999999999  2222222222  7777777777  3333333333  3333333333
000000000  999999999999  222222222222  77777777777  333333333333  333333333333
00      00  99      99  :::  22      22  77      77  :::  33      33  33      33
00      00  99      99  :::  22      22  77      77  :::  33      33  33      33
00      00  99      99  :::  22      22  77      77  :::  33      33  33      33
00      00  999999999999  22      22  77      77  :::  33      33  333      333
00      00  999999999999  22      22  77      77  :::  333      333  333      333
00      00  99      99  :::  22      22  77      77  :::  33      33  33      33
00      00  99      99  :::  22      22  77      77  :::  33      33  33      33
00      00  99      99  :::  22      22  77      77  :::  33      33  33      33
000000000  999999999999  222222222222  77      77  :::  33      33  333333333333  333333333333
0000000  999999999999  222222222222  77      77  :::  333333333333  333333333333

```



```

.....
***
***           LWT ANALYSIS; W17X17 OFA ASSEMBLY; NO WATER IN GAP
***
.....
***           ***** NUMERIC PARAMETERS *****
***
***           TME           MAXIMUM PROBLEM TIME (MIN)           *****
***
***           TBA           TIME PER GENERATION (MIN)           0.50
***
***           GEN           NUMBER OF GENERATIONS           303
***
***           NPG           NUMBER PER GENERATION           1000
***
***           NSK           NUMBER OF GENERATIONS TO BE SKIPPED           3
***
***           BEG           BEGINNING GENERATION NUMBER           1
***
***           RES           GENERATIONS BETWEEN CHECKPOINTS           0
***
***           X1D           NUMBER OF EXTRA 1-D CROSS SECTIONS           1
***
***           NBK           NEUTRON BANK SIZE           1025
***
***           XNB           EXTRA POSITIONS IN NEUTRON BANK           0
***
***           NFB           FISSION BANK SIZE           1000
***
***           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           BB827100001
***
***           NBB           NUMBER OF D.A. BLOCKS ON UNIT 8           200
***
***           NL8           LENGTH OF D.A. BLOCKS ON UNIT 8           512
***
***           ALJ           MODE OF CALCULATION           FORWARD
***
***           INPUT DATA WRITTEN ON RESTART UNIT           NO
***
***           BINARY DATA INTERFACE           YES
***
.....

```

```
.....  
LWT ANALYSIS; W17X17 OFA ASSEMBLY; NO WATER IN GAP  
.....  
***** LOGICAL PARAMETERS *****  
.....  
*** RUN EXECUTE PROBLEM AFTER CHECKING DATA YES PLT PLOT PICTURE MAP(S) NO ***  
*** FLX COMPUTE FLUX NO FDH COMPUTE FISSION DENSITIES NO ***  
*** SMU COMPUTE AVG UNIT SELF-MULTIPLICATION NO NUB COMPUTE NU-BAR & AVG FISSION GROUP YES ***  
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO ***  
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***  
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO PWT PRINT WEIGHT AVERAGE ARRAY NO ***  
*** PKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO ***  
*** P1D PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO ***  
*** TRK PRINT TRACKING INFORMATION NO ***  
.....  
PARAMETER INPUT COMPLETED  
.....
```

```
..... 0 IO'S WERE USED READING THE PARAMETER DATA .....  
***** DATA READING COMPLETED *****
```

```

.....
***
***           LWT ANALYSIS: W17X17 OFA ASSEMBLY: NO WATER IN GAP
***
.....
***
***           ***** ADDITIONAL INFORMATION *****
***
*** NUMBER OF ENERGY GROUPS           27      USE LATTICE GEOMETRY           YES ***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1      GLOBAL ARRAY NUMBER           1 ***
*** NO. OF SCATTERING ANGLES IN XSECS   2      NUMBER OF UNITS IN THE GLOBAL X DIR. 17 ***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 16     NUMBER OF UNITS IN THE GLOBAL Y DIR. 17 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK  9      NUMBER OF UNITS IN THE GLOBAL Z DIR.  1 ***
*** NUMBER OF MIXTURES USED             9      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        19     MAXIMUM HOLE NESTING LEVEL      0 ***
*** NUMBER OF GEOMETRY REGIONS USED     19     USE NESTED ARRAYS               NO  ***
*** LARGEST GEOMETRY UNIT NUMBER         9      NUMBER OF ARRAYS USED           1 ***
*** LARGEST ARRAY NUMBER                 1      MAXIMUM ARRAY NESTING LEVEL     1 ***
***
*** +X BOUNDARY CONDITION                VAC    -X BOUNDARY CONDITION          VAC ***
*** +Y BOUNDARY CONDITION                VAC    -Y BOUNDARY CONDITION          VAC ***
*** +Z BOUNDARY CONDITION                VAC    -Z BOUNDARY CONDITION          VAC ***
.....

```



LWT ANALYSIS; W17X17 OFA ASSEMBLY; NO WATER IN GAP

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
							----- UNIT 1 -----	
FUEL PIN CELL - WITH H2O								
1	CYLINDER	1	1	RADIUS = 0.39220	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2	CYLINDER	9	1	RADIUS = 0.40010	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CYLINDER	2	1	RADIUS = 0.45720	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4	CUBOID	3	1	+X = 0.62990	-X = -0.62990	+Y = 0.62990	-Y = -0.62990	+Z = 182.88 -Z = -182.88
							----- UNIT 2 -----	
WATER ROD CELL - WITH H2O								
1	CYLINDER	3	1	RADIUS = 0.57150	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2	CYLINDER	2	1	RADIUS = 0.61210	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CUBOID	3	1	+X = 0.62990	-X = -0.62990	+Y = 0.62990	-Y = -0.62990	+Z = 182.88 -Z = -182.88
							***** GLOBAL *****	
							----- UNIT 9 EXTERNAL TO LATTICE 1 -----	
1	ARRAY NUMBER	1		+X = 10.708	-X = -10.708	+Y = 10.708	-Y = -10.708	+Z = 182.88 -Z = -182.88
2	CUBOID	3	1	+X = 11.278	-X = -11.278	+Y = 11.278	-Y = -11.278	+Z = 182.88 -Z = -182.88
3	CYLINDER	4	1	RADIUS = 16.891	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4	CYLINDER	3	1	RADIUS = 16.986	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5	CYLINDER	5	1	RADIUS = 18.891	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
6	CYLINDER	6	1	RADIUS = 33.496	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
7	CYLINDER	5	1	RADIUS = 36.544	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
8	CYLINDER	7	1	RADIUS = 49.244	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000
9	CYLINDER	5	1	RADIUS = 49.854	+Z = 212.48	-Z = -192.16	CENTERLINE IS AT X = 0.00000	Y = 0.00000
10	CYLINDER	6	1	RADIUS = 49.854	+Z = 212.48	-Z = -199.78	CENTERLINE IS AT X = 0.00000	Y = 0.00000
11	CYLINDER	5	1	RADIUS = 49.854	+Z = 212.48	-Z = -208.67	CENTERLINE IS AT X = 0.00000	Y = 0.00000
12	CUBOID	8	1	+X = 81.000	-X = -81.000	+Y = 81.000	-Y = -81.000	+Z = 243.00 -Z = -240.00

LWT ANALYSIS: W17X17 OFA ASSEMBLY; NO WATER IN GAP

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 17 LEFT TO RIGHT Y ROW 1 TO 17 BOTTOM TO TOP

```
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 2 1 1 2 1 1 2 1 1 1 1 1
1 1 1 2 1 1 1 1 1 1 1 1 1 2 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 2 1 1 1 1 1 1 1 1 1 2 1 1 1
1 1 1 1 1 2 1 1 2 1 1 2 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```





LWT ANALYSIS: W17X17 OFA ASSEMBLY; NO WATER IN GAP

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	965	INDEPENDENT	FISSION POINTS WERE GENERATED		
1	8.85686E-01	1.53833E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.38214E-01	1.88667E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	994	INDEPENDENT	FISSION POINTS WERE GENERATED		
3	9.13529E-01	2.21500E-01	9.13529E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.01018E-01	2.54500E-01	9.07274E-01	6.25521E-03	0.00000E+00	0.00000E+00
5	9.02144E-01	2.86500E-01	9.05564E-01	3.99573E-03	0.00000E+00	0.00000E+00
6	8.92090E-01	3.20333E-01	8.99695E-01	6.51315E-03	0.00000E+00	0.00000E+00
7	9.06539E-01	3.57000E-01	9.01064E-01	5.22744E-03	0.00000E+00	0.00000E+00
8	9.56216E-01	3.90833E-01	9.10256E-01	1.01345E-02	0.00000E+00	0.00000E+00
9	9.36446E-01	4.30333E-01	9.13997E-01	9.34672E-03	0.00000E+00	0.00000E+00
10	8.87858E-01	4.62333E-01	9.10730E-01	8.72908E-03	0.00000E+00	0.00000E+00
11	8.91353E-01	4.97167E-01	9.08577E-01	7.99371E-03	0.00000E+00	0.00000E+00
12	9.34083E-01	5.35500E-01	9.11128E-01	7.59111E-03	0.00000E+00	0.00000E+00
13	9.54576E-01	5.67500E-01	9.15078E-01	7.92145E-03	0.00000E+00	0.00000E+00
14	8.96471E-01	6.01500E-01	9.13527E-01	7.39563E-03	0.00000E+00	0.00000E+00
15	9.28672E-01	6.34333E-01	9.14692E-01	6.90202E-03	0.00000E+00	0.00000E+00
16	9.41564E-01	6.68333E-01	9.16611E-01	6.67208E-03	0.00000E+00	0.00000E+00
17	9.01900E-01	6.99333E-01	9.15631E-01	6.28831E-03	0.00000E+00	0.00000E+00
18	9.69297E-01	7.32333E-01	9.18985E-01	6.77129E-03	0.00000E+00	0.00000E+00
19	9.56127E-01	7.67167E-01	9.21170E-01	6.72530E-03	0.00000E+00	0.00000E+00
20	9.01176E-01	7.99167E-01	9.20059E-01	6.43723E-03	0.00000E+00	0.00000E+00
21	8.94538E-01	8.32167E-01	9.18716E-01	6.23540E-03	0.00000E+00	0.00000E+00
22	9.29596E-01	8.63333E-01	9.19260E-01	5.94038E-03	0.00000E+00	0.00000E+00
23	9.16368E-01	8.98000E-01	9.19122E-01	5.65211E-03	0.00000E+00	0.00000E+00
24	9.97989E-01	9.29167E-01	9.22707E-01	6.47252E-03	0.00000E+00	0.00000E+00
25	9.36630E-01	9.63000E-01	9.23312E-01	6.21426E-03	0.00000E+00	0.00000E+00
26	9.17401E-01	9.96833E-01	9.23066E-01	5.95480E-03	0.00000E+00	0.00000E+00
27	9.49137E-01	1.02800E+00	9.24109E-01	5.80606E-03	0.00000E+00	0.00000E+00
28	8.87709E-01	1.06183E+00	9.22709E-01	5.75128E-03	0.00000E+00	0.00000E+00
29	9.19245E-01	1.09400E+00	9.22581E-01	5.53565E-03	0.00000E+00	0.00000E+00
30	9.30737E-01	1.12783E+00	9.22872E-01	5.34224E-03	0.00000E+00	0.00000E+00
31	9.54481E-01	1.15983E+00	9.23962E-01	5.26871E-03	0.00000E+00	0.00000E+00
32	9.12407E-01	1.19100E+00	9.23577E-01	5.10461E-03	0.00000E+00	0.00000E+00
33	9.19944E-01	1.22217E+00	9.23459E-01	4.93859E-03	0.00000E+00	0.00000E+00
34	9.27206E-01	1.25500E+00	9.23577E-01	4.78320E-03	0.00000E+00	0.00000E+00
35	9.05590E-01	1.28983E+00	9.23031E-01	4.66792E-03	0.00000E+00	0.00000E+00
36	9.50760E-01	1.32283E+00	9.23847E-01	4.60140E-03	0.00000E+00	0.00000E+00
37	9.34740E-01	1.35583E+00	9.24158E-01	4.47882E-03	0.00000E+00	0.00000E+00
38	9.25213E-01	1.38783E+00	9.24188E-01	4.35273E-03	0.00000E+00	0.00000E+00
39	9.61123E-01	1.41983E+00	9.25186E-01	4.34956E-03	0.00000E+00	0.00000E+00
40	9.42560E-01	1.45367E+00	9.25643E-01	4.25817E-03	0.00000E+00	0.00000E+00
41	9.96787E-01	1.48750E+00	9.24903E-01	4.21302E-03	0.00000E+00	0.00000E+00
42	9.39391E-01	1.51783E+00	9.25265E-01	4.12229E-03	0.00000E+00	0.00000E+00
43	9.50404E-01	1.54883E+00	9.25878E-01	4.06697E-03	0.00000E+00	0.00000E+00
44	9.24725E-01	1.58163E+00	9.25851E-01	3.96906E-03	0.00000E+00	0.00000E+00
45	9.17061E-01	1.61483E+00	9.25647E-01	3.88104E-03	0.00000E+00	0.00000E+00
46	9.32333E-01	1.64683E+00	9.25799E-01	3.79485E-03	0.00000E+00	0.00000E+00
47	9.06479E-01	1.68067E+00	9.25369E-01	3.73433E-03	0.00000E+00	0.00000E+00
48	9.19627E-01	1.71467E+00	9.25244E-01	3.65437E-03	0.00000E+00	0.00000E+00
49	9.41650E-01	1.74750E+00	9.25593E-01	3.59277E-03	0.00000E+00	0.00000E+00
50	9.05315E-01	1.78050E+00	9.25171E-01	3.54241E-03	0.00000E+00	0.00000E+00
51	9.27366E-01	1.81433E+00	9.25216E-01	3.46965E-03	0.00000E+00	0.00000E+00
52	9.08010E-01	1.84550E+00	9.24872E-01	3.41692E-03	0.00000E+00	0.00000E+00
53	9.37532E-01	1.87750E+00	9.25120E-01	3.35844E-03	0.00000E+00	0.00000E+00
54	9.45465E-01	1.90967E+00	9.25511E-01	3.31638E-03	0.00000E+00	0.00000E+00
55	9.10189E-01	1.94350E+00	9.25222E-01	3.26603E-03	0.00000E+00	0.00000E+00
56	9.17433E-01	1.97733E+00	9.25078E-01	3.20822E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	977	INDEPENDENT	FISSION POINTS WERE GENERATED		
57	8.41913E-01	2.01033E+00	9.23566E-01	3.49354E-03	0.00000E+00	0.00000E+00
58	8.95416E-01	2.04417E+00	9.23063E-01	3.46722E-03	0.00000E+00	0.00000E+00
59	9.47758E-01	2.07617E+00	9.23496E-01	3.43325E-03	0.00000E+00	0.00000E+00
60	9.14889E-01	2.10817E+00	9.23348E-01	3.37679E-03	0.00000E+00	0.00000E+00
61	8.97825E-01	2.14117E+00	9.22915E-01	3.34714E-03	0.00000E+00	0.00000E+00
62	9.65730E-01	2.17133E+00	9.23629E-01	3.36736E-03	0.00000E+00	0.00000E+00
63	8.85004E-01	2.20433E+00	9.22995E-01	3.37169E-03	0.00000E+00	0.00000E+00
64	9.52399E-01	2.23817E+00	9.23470E-01	3.35059E-03	0.00000E+00	0.00000E+00
65	9.38262E-01	2.27117E+00	9.23720E-01	3.30649E-03	0.00000E+00	0.00000E+00
66	9.14343E-01	2.30417E+00	9.23574E-01	3.25772E-03	0.00000E+00	0.00000E+00
67	9.17100E-01	2.33717E+00	9.23474E-01	3.20875E-03	0.00000E+00	0.00000E+00
68	9.73007E-01	2.37000E+00	9.24225E-01	3.24766E-03	0.00000E+00	0.00000E+00
69	9.19364E-01	2.40483E+00	9.24152E-01	3.19965E-03	0.00000E+00	0.00000E+00
70	8.97601E-01	2.43600E+00	9.23762E-01	3.17633E-03	0.00000E+00	0.00000E+00
71	8.99201E-01	2.46983E+00	9.23406E-01	3.15014E-03	0.00000E+00	0.00000E+00
72	9.23122E-01	2.50000E+00	9.23402E-01	3.10481E-03	0.00000E+00	0.00000E+00
73	9.11981E-01	2.53200E+00	9.23241E-01	3.06499E-03	0.00000E+00	0.00000E+00
74	8.98014E-01	2.56500E+00	9.22890E-01	3.04237E-03	0.00000E+00	0.00000E+00
75	9.35208E-01	2.59700E+00	9.23059E-01	3.00514E-03	0.00000E+00	0.00000E+00
76	9.23685E-01	2.63100E+00	9.23068E-01	2.96426E-03	0.00000E+00	0.00000E+00
77	9.58306E-01	2.66300E+00	9.23551E-01	2.96424E-03	0.00000E+00	0.00000E+00
78	9.58641E-01	2.69500E+00	9.24026E-01	2.96327E-03	0.00000E+00	0.00000E+00
79	9.56868E-01	2.72617E+00	9.24453E-01	2.95547E-03	0.00000E+00	0.00000E+00
80	9.55849E-01	2.76000E+00	9.24855E-01	2.94497E-03	0.00000E+00	0.00000E+00
81	9.42287E-01	2.79383E+00	9.25076E-01	2.91581E-03	0.00000E+00	0.00000E+00
82	9.36740E-01	2.82417E+00	9.25222E-01	2.98282E-03	0.00000E+00	0.00000E+00
83	8.96816E-01	2.85700E+00	9.24871E-01	2.86853E-03	0.00000E+00	0.00000E+00
84	9.14175E-01	2.89000E+00	9.24741E-01	2.83633E-03	0.00000E+00	0.00000E+00
85	9.53858E-01	2.92200E+00	9.25091E-01	2.82382E-03	0.00000E+00	0.00000E+00
86	9.32691E-01	2.95500E+00	9.25182E-01	2.79147E-03	0.00000E+00	0.00000E+00
87	9.41861E-01	2.98800E+00	9.25378E-01	2.76541E-03	0.00000E+00	0.00000E+00
88	9.17970E-01	3.02083E+00	9.25292E-01	2.73442E-03	0.00000E+00	0.00000E+00

89	9.41289E-01	3.05383E+00	9.25476E-01	2.70905E-03	0.00000E+00	0.00000E+00
90	9.23612E-01	3.08767E+00	9.25455E-01	2.67817E-03	0.00000E+00	0.00000E+00
91	9.08846E-01	3.12067E+00	9.25268E-01	2.65448E-03	0.00000E+00	0.00000E+00
92	9.13348E-01	3.15267E+00	9.25136E-01	2.62816E-03	0.00000E+00	0.00000E+00
93	9.28301E-01	3.18567E+00	9.25170E-01	2.59935E-03	0.00000E+00	0.00000E+00
94	9.60296E-01	3.21867E+00	9.25552E-01	2.59914E-03	0.00000E+00	0.00000E+00
95	9.14216E-01	3.25167E+00	9.25430E-01	2.57392E-03	0.00000E+00	0.00000E+00
96	8.75089E-01	3.28550E+00	9.24895E-01	2.60210E-03	0.00000E+00	0.00000E+00
97	9.35398E-01	3.31850E+00	9.25005E-01	2.57694E-03	0.00000E+00	0.00000E+00
98	9.06488E-01	3.35050E+00	9.24812E-01	2.55724E-03	0.00000E+00	0.00000E+00
99	8.97848E-01	3.38433E+00	9.24534E-01	2.54596E-03	0.00000E+00	0.00000E+00
100	8.98266E-01	3.41733E+00	9.24266E-01	2.53406E-03	0.00000E+00	0.00000E+00
101	8.94082E-01	3.44933E+00	9.23962E-01	2.52680E-03	0.00000E+00	0.00000E+00
102	9.34591E-01	3.48233E+00	9.24068E-01	2.50366E-03	0.00000E+00	0.00000E+00
103	9.31607E-01	3.51433E+00	9.24142E-01	2.47987E-03	0.00000E+00	0.00000E+00
104	9.31387E-01	3.54633E+00	9.24214E-01	2.45647E-03	0.00000E+00	0.00000E+00
105	9.45878E-01	3.57833E+00	9.24424E-01	2.44158E-03	0.00000E+00	0.00000E+00
106	9.24709E-01	3.61133E+00	9.24427E-01	2.41799E-03	0.00000E+00	0.00000E+00
107	9.39009E-01	3.64433E+00	9.24565E-01	2.39887E-03	0.00000E+00	0.00000E+00
108	9.45330E-01	3.67733E+00	9.24761E-01	2.38419E-03	0.00000E+00	0.00000E+00
109	9.65529E-01	3.70933E+00	9.25142E-01	2.39234E-03	0.00000E+00	0.00000E+00
110	9.34481E-01	3.74233E+00	9.25229E-01	2.37166E-03	0.00000E+00	0.00000E+00
111	9.40742E-01	3.77517E+00	9.25371E-01	2.35411E-03	0.00000E+00	0.00000E+00
112	9.68989E-01	3.80817E+00	9.25768E-01	2.36608E-03	0.00000E+00	0.00000E+00
113	9.21929E-01	3.84200E+00	9.25733E-01	2.34492E-03	0.00000E+00	0.00000E+00
114	9.46170E-01	3.87500E+00	9.25916E-01	2.33104E-03	0.00000E+00	0.00000E+00
115	9.22961E-01	3.90883E+00	9.25889E-01	2.31047E-03	0.00000E+00	0.00000E+00
116	9.65666E-01	3.94367E+00	9.26238E-01	2.31654E-03	0.00000E+00	0.00000E+00
117	9.21870E-01	3.97567E+00	9.26200E-01	2.29662E-03	0.00000E+00	0.00000E+00
118	9.01764E-01	4.00767E+00	9.25990E-01	2.28646E-03	0.00000E+00	0.00000E+00
119	9.07249E-01	4.04167E+00	9.25830E-01	2.27249E-03	0.00000E+00	0.00000E+00
120	9.81145E-01	4.07267E+00	9.26298E-01	2.30139E-03	0.00000E+00	0.00000E+00
121	9.44074E-01	4.10383E+00	9.26448E-01	2.28685E-03	0.00000E+00	0.00000E+00
122	9.21559E-01	4.13317E+00	9.26407E-01	2.26808E-03	0.00000E+00	0.00000E+00
123	9.20260E-01	4.16517E+00	9.26356E-01	2.24983E-03	0.00000E+00	0.00000E+00
124	9.19285E-01	4.20000E+00	9.26298E-01	2.23207E-03	0.00000E+00	0.00000E+00
125	9.16275E-01	4.23300E+00	9.26217E-01	2.21535E-03	0.00000E+00	0.00000E+00
126	8.91448E-01	4.26500E+00	9.25936E-01	2.21523E-03	0.00000E+00	0.00000E+00
127	9.26114E-01	4.29983E+00	9.25938E-01	2.19743E-03	0.00000E+00	0.00000E+00
128	9.12693E-01	4.33367E+00	9.25833E-01	2.18246E-03	0.00000E+00	0.00000E+00
129	9.60210E-01	4.36483E+00	9.26103E-01	2.18206E-03	0.00000E+00	0.00000E+00
130	9.29697E-01	4.39767E+00	9.26131E-01	2.16513E-03	0.00000E+00	0.00000E+00
131	9.42543E-01	4.43167E+00	9.26259E-01	2.15204E-03	0.00000E+00	0.00000E+00
132	9.16525E-01	4.46550E+00	9.26184E-01	2.13673E-03	0.00000E+00	0.00000E+00
133	8.96387E-01	4.49833E+00	9.25956E-01	2.13253E-03	0.00000E+00	0.00000E+00
134	9.54271E-01	4.53233E+00	9.26171E-01	2.12715E-03	0.00000E+00	0.00000E+00
135	9.38826E-01	4.56333E+00	9.26266E-01	2.11324E-03	0.00000E+00	0.00000E+00
136	9.33384E-01	4.59633E+00	9.26319E-01	2.09808E-03	0.00000E+00	0.00000E+00
137	9.04157E-01	4.63117E+00	9.26155E-01	2.08894E-03	0.00000E+00	0.00000E+00
138	9.50015E-01	4.66233E+00	9.26330E-01	2.08094E-03	0.00000E+00	0.00000E+00
139	9.66112E-01	4.69433E+00	9.26621E-01	2.08600E-03	0.00000E+00	0.00000E+00
140	9.26934E-01	4.72817E+00	9.26623E-01	2.07083E-03	0.00000E+00	0.00000E+00
141	9.02740E-01	4.76483E+00	9.26451E-01	2.06305E-03	0.00000E+00	0.00000E+00
142	9.24085E-01	4.79867E+00	9.26434E-01	2.04833E-03	0.00000E+00	0.00000E+00
143	9.55953E-01	4.83067E+00	9.26644E-01	2.04450E-03	0.00000E+00	0.00000E+00
144	9.38778E-01	4.86450E+00	9.26729E-01	2.03184E-03	0.00000E+00	0.00000E+00
145	9.28669E-01	4.89650E+00	9.26743E-01	2.01763E-03	0.00000E+00	0.00000E+00
146	9.21329E-01	4.93050E+00	9.26705E-01	2.00392E-02	0.00000E+00	0.00000E+00
147	9.10886E-01	4.96350E+00	9.26596E-01	1.99304E-03	0.00000E+00	0.00000E+00
148	9.24269E-01	4.99633E+00	9.26580E-01	1.97941E-03	0.00000E+00	0.00000E+00
149	9.03222E-01	5.03117E+00	9.26421E-01	1.97231E-03	0.00000E+00	0.00000E+00
150	8.95189E-01	5.06417E+00	9.26210E-01	1.97027E-03	0.00000E+00	0.00000E+00
151	9.48128E-01	5.09717E+00	9.26357E-01	1.96252E-03	0.00000E+00	0.00000E+00
152	9.08228E-01	5.13100E+00	9.26236E-01	1.95314E-03	0.00000E+00	0.00000E+00
153	9.18349E-01	5.16667E+00	9.26184E-01	1.94087E-03	0.00000E+00	0.00000E+00
154	9.52513E-01	5.19783E+00	9.26357E-01	1.93582E-03	0.00000E+00	0.00000E+00
155	9.26765E-01	5.22983E+00	9.26360E-01	1.92313E-03	0.00000E+00	0.00000E+00
156	9.22425E-01	5.26183E+00	9.26334E-01	1.91077E-03	0.00000E+00	0.00000E+00
157	9.50244E-01	5.29383E+00	9.26489E-01	1.90466E-03	0.00000E+00	0.00000E+00
158	9.34982E-01	5.32783E+00	9.26543E-01	1.89319E-03	0.00000E+00	0.00000E+00
159	9.46343E-01	5.36067E+00	9.26669E-01	1.88532E-03	0.00000E+00	0.00000E+00
160	9.24231E-01	5.39467E+00	9.26654E-01	1.87341E-03	0.00000E+00	0.00000E+00
161	9.26075E-01	5.42750E+00	9.26650E-01	1.86160E-03	0.00000E+00	0.00000E+00
162	9.16128E-01	5.46233E+00	9.26584E-01	1.85109E-03	0.00000E+00	0.00000E+00
163	9.29609E-01	5.49433E+00	9.26604E-01	1.83967E-03	0.00000E+00	0.00000E+00
164	9.31262E-01	5.52733E+00	9.26633E-01	1.82850E-03	0.00000E+00	0.00000E+00
165	9.29190E-01	5.56117E+00	9.26649E-01	1.81732E-03	0.00000E+00	0.00000E+00
166	9.36944E-01	5.59417E+00	9.26712E-01	1.80729E-03	0.00000E+00	0.00000E+00
167	9.17540E-01	5.62800E+00	9.26656E-01	1.79717E-03	0.00000E+00	0.00000E+00
168	9.04166E-01	5.66183E+00	9.26521E-01	1.79144E-03	0.00000E+00	0.00000E+00
169	9.59455E-01	5.69483E+00	9.26718E-01	1.79157E-03	0.00000E+00	0.00000E+00
170	9.67619E-01	5.72867E+00	9.26961E-01	1.79743E-03	0.00000E+00	0.00000E+00
171	9.32381E-01	5.75983E+00	9.26993E-01	1.78705E-03	0.00000E+00	0.00000E+00
172	9.39258E-01	5.79100E+00	9.27065E-01	1.77798E-03	0.00000E+00	0.00000E+00
173	8.62756E-01	5.82400E+00	9.26899E-01	1.80711E-03	0.00000E+00	0.00000E+00
174	9.38090E-01	5.85867E+00	9.26756E-01	1.79780E-03	0.00000E+00	0.00000E+00
175	9.00613E-01	5.89267E+00	9.26605E-01	1.79375E-03	0.00000E+00	0.00000E+00
176	9.19542E-01	5.92650E+00	9.26564E-01	1.78388E-03	0.00000E+00	0.00000E+00
177	9.04231E-01	5.96033E+00	9.26436E-01	1.77824E-03	0.00000E+00	0.00000E+00
178	9.17689E-01	5.99333E+00	9.26387E-01	1.76880E-03	0.00000E+00	0.00000E+00
179	9.26085E-01	6.02817E+00	9.26385E-01	1.75878E-03	0.00000E+00	0.00000E+00
180	9.10857E-01	6.06100E+00	9.26298E-01	1.75105E-03	0.00000E+00	0.00000E+00
181	9.43644E-01	6.09483E+00	9.26395E-01	1.74393E-03	0.00000E+00	0.00000E+00
182	8.47673E-01	6.13067E+00	9.25957E-01	1.78851E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-132

WARNING... ONLY

997 INDEPENDENT FISSION POINTS WERE GENERATED

183	9.38183E-01	6.16350E+00	9.26025E-01	1.77989E-03	0.00000E+00	0.00000E+00
184	9.90666E-01	6.19650E+00	9.25831E-01	1.78071E-03	0.00000E+00	0.00000E+00
185	9.35330E-01	6.22950E+00	9.25882E-01	1.77171E-03	0.00000E+00	0.00000E+00
186	9.26899E-01	6.26333E+00	9.25888E-01	1.76207E-03	0.00000E+00	0.00000E+00
187	9.23684E-01	6.29533E+00	9.25876E-01	1.75256E-03	0.00000E+00	0.00000E+00
188	9.10842E-01	6.32833E+00	9.25795E-01	1.74498E-03	0.00000E+00	0.00000E+00
189	9.37209E-01	6.35950E+00	9.25856E-01	1.73670E-03	0.00000E+00	0.00000E+00
190	9.50270E-01	6.39150E+00	9.25986E-01	1.73231E-03	0.00000E+00	0.00000E+00
191	9.52251E-01	6.42533E+00	9.26125E-01	1.72871E-03	0.00000E+00	0.00000E+00
192	9.25949E-01	6.45833E+00	9.26124E-01	1.71959E-03	0.00000E+00	0.00000E+00
193	9.42037E-01	6.49033E+00	9.26207E-01	1.71259E-03	0.00000E+00	0.00000E+00
194	9.51804E-01	6.52233E+00	9.26341E-01	1.70886E-03	0.00000E+00	0.00000E+00
195	9.25686E-01	6.55633E+00	9.26337E-01	1.69998E-03	0.00000E+00	0.00000E+00
196	9.32754E-01	6.58833E+00	9.26370E-01	1.69152E-03	0.00000E+00	0.00000E+00
197	9.07192E-01	6.62217E+00	9.26272E-01	1.68570E-03	0.00000E+00	0.00000E+00
198	9.25103E-01	6.65600E+00	9.26266E-01	1.67708E-03	0.00000E+00	0.00000E+00
199	9.27047E-01	6.68817E+00	9.26270E-01	1.66855E-03	0.00000E+00	0.00000E+00
200	9.45517E-01	6.71917E+00	9.26367E-01	1.66295E-03	0.00000E+00	0.00000E+00
201	9.42746E-01	6.75400E+00	9.26450E-01	1.65662E-03	0.00000E+00	0.00000E+00
202	9.31617E-01	6.78517E+00	9.26475E-01	1.64852E-03	0.00000E+00	0.00000E+00
203	9.67107E-01	6.82000E+00	9.26678E-01	1.65270E-03	0.00000E+00	0.00000E+00
204	9.59893E-01	6.85200E+00	9.26842E-01	1.65270E-03	0.00000E+00	0.00000E+00
205	9.58868E-01	6.88500E+00	9.27000E-01	1.65209E-03	0.00000E+00	0.00000E+00
206	9.21028E-01	6.91967E+00	9.26971E-01	1.64423E-03	0.00000E+00	0.00000E+00
207	9.17286E-01	6.95267E+00	9.26923E-01	1.63687E-03	0.00000E+00	0.00000E+00
208	8.93367E-01	6.98650E+00	9.26760E-01	1.63703E-03	0.00000E+00	0.00000E+00
209	9.42777E-01	7.02033E+00	9.26838E-01	1.63094E-03	0.00000E+00	0.00000E+00
210	9.26255E-01	7.05433E+00	9.26835E-01	1.62308E-03	0.00000E+00	0.00000E+00
211	9.45864E-01	7.08717E+00	9.26926E-01	1.61786E-03	0.00000E+00	0.00000E+00
212	9.35674E-01	7.11933E+00	9.26968E-01	1.61068E-03	0.00000E+00	0.00000E+00
213	9.47448E-01	7.15217E+00	9.27065E-01	1.60596E-03	0.00000E+00	0.00000E+00
214	9.81191E-01	7.18517E+00	9.27320E-01	1.61863E-03	0.00000E+00	0.00000E+00
215	9.12594E-01	7.22000E+00	9.27251E-01	1.61250E-03	0.00000E+00	0.00000E+00
216	9.36204E-01	7.25017E+00	9.27293E-01	1.60549E-03	0.00000E+00	0.00000E+00
217	9.40146E-01	7.28133E+00	9.27353E-01	1.59912E-03	0.00000E+00	0.00000E+00
218	8.81631E-01	7.31983E+00	9.27141E-01	1.60572E-03	0.00000E+00	0.00000E+00
219	9.11088E-01	7.35267E+00	9.27067E-01	1.60001E-03	0.00000E+00	0.00000E+00
220	9.41373E-01	7.38567E+00	9.27132E-01	1.59401E-03	0.00000E+00	0.00000E+00
221	9.70273E-01	7.41867E+00	9.27329E-01	1.59889E-03	0.00000E+00	0.00000E+00
222	8.98617E-01	7.45250E+00	9.27199E-01	1.59695E-03	0.00000E+00	0.00000E+00
223	9.34582E-01	7.48450E+00	9.27232E-01	1.59006E-03	0.00000E+00	0.00000E+00
224	8.82409E-01	7.51833E+00	9.27030E-01	1.59570E-03	0.00000E+00	0.00000E+00
225	9.25143E-01	7.55233E+00	9.27022E-01	1.58855E-03	0.00000E+00	0.00000E+00
226	9.50005E-01	7.58333E+00	9.27125E-01	1.58477E-03	0.00000E+00	0.00000E+00
227	9.19263E-01	7.61633E+00	9.27090E-01	1.57810E-03	0.00000E+00	0.00000E+00
228	9.81226E-01	7.64833E+00	9.27329E-01	1.58926E-03	0.00000E+00	0.00000E+00
229	9.42088E-01	7.68233E+00	9.27394E-01	1.58358E-03	0.00000E+00	0.00000E+00
230	9.20421E-01	7.71433E+00	9.27364E-01	1.57691E-03	0.00000E+00	0.00000E+00
231	9.10318E-01	7.74733E+00	9.27289E-01	1.57177E-03	0.00000E+00	0.00000E+00
232	9.16055E-01	7.77933E+00	9.27240E-01	1.56569E-03	0.00000E+00	0.00000E+00
233	9.80212E-01	7.81133E+00	9.27470E-01	1.57567E-03	0.00000E+00	0.00000E+00
234	9.62820E-01	7.84333E+00	9.27622E-01	1.57625E-03	0.00000E+00	0.00000E+00
235	9.27678E-01	7.87900E+00	9.27622E-01	1.56947E-03	0.00000E+00	0.00000E+00
236	9.67358E-01	7.91300E+00	9.27792E-01	1.57194E-03	0.00000E+00	0.00000E+00
237	9.01526E-01	7.94583E+00	9.27680E-01	1.56923E-03	0.00000E+00	0.00000E+00
238	9.58282E-01	7.97800E+00	9.27810E-01	1.56793E-03	0.00000E+00	0.00000E+00
239	9.18623E-01	8.01183E+00	9.27771E-01	1.56179E-03	0.00000E+00	0.00000E+00
240	9.52132E-01	8.04200E+00	9.27874E-01	1.55857E-03	0.00000E+00	0.00000E+00
241	9.09282E-01	8.07583E+00	9.27796E-01	1.55399E-03	0.00000E+00	0.00000E+00
242	9.65912E-01	8.10700E+00	9.27955E-01	1.55563E-03	0.00000E+00	0.00000E+00
243	8.83765E-01	8.13900E+00	9.27771E-01	1.55997E-03	0.00000E+00	0.00000E+00
244	9.07330E-01	8.17300E+00	9.27687E-01	1.55581E-03	0.00000E+00	0.00000E+00
245	9.47471E-01	8.20500E+00	9.27768E-01	1.55153E-03	0.00000E+00	0.00000E+00
246	9.34985E-01	8.23700E+00	9.27798E-01	1.54544E-03	0.00000E+00	0.00000E+00
247	9.30121E-01	8.27083E+00	9.27807E-01	1.53915E-03	0.00000E+00	0.00000E+00
248	9.37416E-01	8.30300E+00	9.27846E-01	1.53338E-03	0.00000E+00	0.00000E+00
249	9.22009E-01	8.33583E+00	9.27823E-01	1.52734E-03	0.00000E+00	0.00000E+00
250	9.18967E-01	8.36967E+00	9.27787E-01	1.52159E-03	0.00000E+00	0.00000E+00
251	9.02685E-01	8.40267E+00	9.27686E-01	1.51881E-03	0.00000E+00	0.00000E+00
252	9.26316E-01	8.43467E+00	9.27681E-01	1.51274E-03	0.00000E+00	0.00000E+00
253	9.74284E-01	8.46767E+00	9.27866E-01	1.51809E-03	0.00000E+00	0.00000E+00
254	9.37892E-01	8.49967E+00	9.27906E-01	1.51258E-03	0.00000E+00	0.00000E+00
255	9.47611E-01	8.53183E+00	9.27984E-01	1.50860E-03	0.00000E+00	0.00000E+00
256	9.15238E-01	8.56383E+00	9.27934E-01	1.50349E-03	0.00000E+00	0.00000E+00
257	9.14173E-01	8.59767E+00	9.27880E-01	1.49855E-03	0.00000E+00	0.00000E+00
258	9.56068E-01	8.63067E+00	9.27990E-01	1.49674E-03	0.00000E+00	0.00000E+00
259	9.15185E-01	8.66367E+00	9.27940E-01	1.49174E-03	0.00000E+00	0.00000E+00
260	9.26990E-01	8.69650E+00	9.27936E-01	1.48595E-03	0.00000E+00	0.00000E+00
261	9.43962E-01	8.72950E+00	9.27998E-01	1.48150E-03	0.00000E+00	0.00000E+00
262	9.26172E-01	8.76250E+00	9.27991E-01	1.47580E-03	0.00000E+00	0.00000E+00
263	9.46401E-01	8.79533E+00	9.28062E-01	1.47183E-03	0.00000E+00	0.00000E+00
264	9.55709E-01	8.82933E+00	9.28167E-01	1.46999E-03	0.00000E+00	0.00000E+00
265	9.28681E-01	8.86217E+00	9.28169E-01	1.46439E-03	0.00000E+00	0.00000E+00
266	9.23084E-01	8.89517E+00	9.28188E-01	1.45896E-03	0.00000E+00	0.00000E+00
267	9.04980E-01	8.92900E+00	9.28100E-01	1.45608E-03	0.00000E+00	0.00000E+00
268	9.23533E-01	8.96200E+00	9.28116E-01	1.45068E-03	0.00000E+00	0.00000E+00
269	9.39166E-01	8.99500E+00	9.28158E-01	1.44583E-03	0.00000E+00	0.00000E+00
270	9.32928E-01	9.02617E+00	9.28176E-01	1.44053E-03	0.00000E+00	0.00000E+00
271	8.93832E-01	9.06000E+00	9.28048E-01	1.44084E-03	0.00000E+00	0.00000E+00
272	9.38845E-01	9.09300E+00	9.28088E-01	1.43605E-03	0.00000E+00	0.00000E+00
273	9.41662E-01	9.12500E+00	9.28138E-01	1.43161E-03	0.00000E+00	0.00000E+00
274	8.94413E-01	9.15883E+00	9.28014E-01	1.43172E-03	0.00000E+00	0.00000E+00
275	9.33043E-01	9.19083E+00	9.28032E-01	1.42659E-03	0.00000E+00	0.00000E+00
276	9.65242E-01	9.22200E+00	9.28168E-01	1.42784E-03	0.00000E+00	0.00000E+00
277	9.15540E-01	9.25683E+00	9.28122E-01	1.42338E-03	0.00000E+00	0.00000E+00

278	9.55975E-01	9.28967E+00	9.28223E-01	1.42180E-03	0.00000E+00	0.00000E+00
279	9.17744E-01	9.32267E+00	9.28185E-01	1.41716E-03	0.00000E+00	0.00000E+00
280	8.97664E-01	9.35467E+00	9.28076E-01	1.41632E-03	0.00000E+00	0.00000E+00
281	9.03312E-01	9.38767E+00	9.27987E-01	1.41402E-03	0.00000E+00	0.00000E+00
282	9.23108E-01	9.42067E+00	9.27969E-01	1.40907E-03	0.00000E+00	0.00000E+00
283	9.40724E-01	9.45367E+00	9.28015E-01	1.40478E-03	0.00000E+00	0.00000E+00
284	9.30739E-01	9.48650E+00	9.28024E-01	1.39982E-03	0.00000E+00	0.00000E+00
285	8.82695E-01	9.51950E+00	9.27864E-01	1.40403E-03	0.00000E+00	0.00000E+00
286	9.34289E-01	9.55333E+00	9.27887E-01	1.39926E-03	0.00000E+00	0.00000E+00
287	9.39833E-01	9.58633E+00	9.27929E-01	1.39498E-03	0.00000E+00	0.00000E+00
288	9.81553E-01	9.61833E+00	9.28116E-01	1.40268E-03	0.00000E+00	0.00000E+00
289	8.93769E-01	9.65233E+00	9.27997E-01	1.40290E-03	0.00000E+00	0.00000E+00
290	9.20555E-01	9.68617E+00	9.27971E-01	1.39826E-03	0.00000E+00	0.00000E+00
291	9.42749E-01	9.72000E+00	9.28022E-01	1.39435E-03	0.00000E+00	0.00000E+00
292	8.99384E-01	9.75383E+00	9.27923E-01	1.39303E-03	0.00000E+00	0.00000E+00
293	9.30678E-01	9.78683E+00	9.27933E-01	1.38827E-03	0.00000E+00	0.00000E+00
294	9.11641E-01	9.82067E+00	9.27877E-01	1.38463E-03	0.00000E+00	0.00000E+00
295	9.18919E-01	9.85267E+00	9.27846E-01	1.38024E-03	0.00000E+00	0.00000E+00
296	8.89102E-01	9.88667E+00	9.27714E-01	1.38183E-03	0.00000E+00	0.00000E+00
297	9.07237E-01	9.91767E+00	9.27645E-01	1.37888E-03	0.00000E+00	0.00000E+00
298	9.27070E-01	9.94983E+00	9.27643E-01	1.37422E-03	0.00000E+00	0.00000E+00
299	9.10371E-01	9.98267E+00	9.27585E-01	1.37082E-03	0.00000E+00	0.00000E+00
300	9.32232E-01	1.00167E+01	9.27601E-01	1.36630E-03	0.00000E+00	0.00000E+00
301	9.37152E-01	1.00495E+01	9.27633E-01	1.36209E-03	0.00000E+00	0.00000E+00
302	8.94576E-01	1.00825E+01	9.27522E-01	1.36201E-03	0.00000E+00	0.00000E+00
303	9.23771E-01	1.01163E+01	9.27510E-01	1.35754E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

LWT ANALYSIS; W17X17 OFA ASSEMBLY; NO WATER IN GAP

LIFETIME = 9.74486E-05 + OR - 2.73865E-07      GENERATION TIME = 3.83859E-05 + OR - 8.46030E-06  
 NU BAR = 2.43589E+00 + OR - 9.63558E-05      AVERAGE FISSION GROUP = 2.26257E+01 + OR - 5.66318E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.43638E-01 + OR - 6.80425E-04

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	0.92756	+ OR - 0.00136	0.92620 TO 0.92892	0.92483 TO 0.93028	0.92347 TO 0.93164	300000
4	0.92765	+ OR - 0.00136	0.92628 TO 0.92901	0.92492 TO 0.93037	0.92356 TO 0.93173	299000
5	0.92773	+ OR - 0.00136	0.92637 TO 0.92910	0.92500 TO 0.93046	0.92364 TO 0.93183	298000
6	0.92788	+ OR - 0.00136	0.92652 TO 0.92925	0.92516 TO 0.93061	0.92380 TO 0.93197	297000
7	0.92796	+ OR - 0.00136	0.92659 TO 0.92932	0.92523 TO 0.93068	0.92387 TO 0.93205	296000
8	0.92786	+ OR - 0.00136	0.92650 TO 0.92923	0.92513 TO 0.93059	0.92377 TO 0.93195	295000
9	0.92783	+ OR - 0.00137	0.92646 TO 0.92920	0.92509 TO 0.93057	0.92372 TO 0.93194	294000
10	0.92797	+ OR - 0.00137	0.92660 TO 0.92933	0.92523 TO 0.93070	0.92387 TO 0.93207	293000
11	0.92809	+ OR - 0.00137	0.92673 TO 0.92946	0.92536 TO 0.93082	0.92400 TO 0.93219	292000
12	0.92807	+ OR - 0.00137	0.92670 TO 0.92944	0.92533 TO 0.93081	0.92396 TO 0.93218	291000
17	0.92813	+ OR - 0.00138	0.92675 TO 0.92952	0.92537 TO 0.93090	0.92398 TO 0.93228	286000
22	0.92810	+ OR - 0.00139	0.92671 TO 0.92949	0.92532 TO 0.93087	0.92393 TO 0.93226	281000
27	0.92782	+ OR - 0.00139	0.92643 TO 0.92920	0.92505 TO 0.93059	0.92366 TO 0.93198	276000
32	0.92795	+ OR - 0.00140	0.92655 TO 0.92934	0.92515 TO 0.93074	0.92375 TO 0.93214	271000
37	0.92795	+ OR - 0.00142	0.92653 TO 0.92937	0.92511 TO 0.93079	0.92369 TO 0.93221	266000
42	0.92785	+ OR - 0.00143	0.92642 TO 0.92929	0.92498 TO 0.93072	0.92355 TO 0.93216	261000
47	0.92789	+ OR - 0.00146	0.92643 TO 0.92934	0.92497 TO 0.93080	0.92352 TO 0.93226	256000
52	0.92804	+ OR - 0.00148	0.92656 TO 0.92952	0.92508 TO 0.93089	0.92360 TO 0.93247	251000
57	0.92839	+ OR - 0.00146	0.92693 TO 0.92986	0.92546 TO 0.93132	0.92400 TO 0.93278	246000
62	0.92848	+ OR - 0.00147	0.92701 TO 0.92995	0.92553 TO 0.93142	0.92406 TO 0.93289	241000
67	0.92862	+ OR - 0.00148	0.92714 TO 0.93011	0.92565 TO 0.93159	0.92417 TO 0.93308	236000
72	0.92875	+ OR - 0.00149	0.92726 TO 0.93025	0.92577 TO 0.93174	0.92428 TO 0.93323	231000
77	0.92882	+ OR - 0.00151	0.92731 TO 0.93033	0.92580 TO 0.93185	0.92429 TO 0.93336	226000
82	0.92834	+ OR - 0.00153	0.92681 TO 0.92987	0.92528 TO 0.93139	0.92376 TO 0.93292	221000
87	0.92835	+ OR - 0.00155	0.92680 TO 0.92990	0.92525 TO 0.93144	0.92371 TO 0.93299	216000
92	0.92852	+ OR - 0.00158	0.92694 TO 0.93010	0.92537 TO 0.93168	0.92379 TO 0.93326	211000

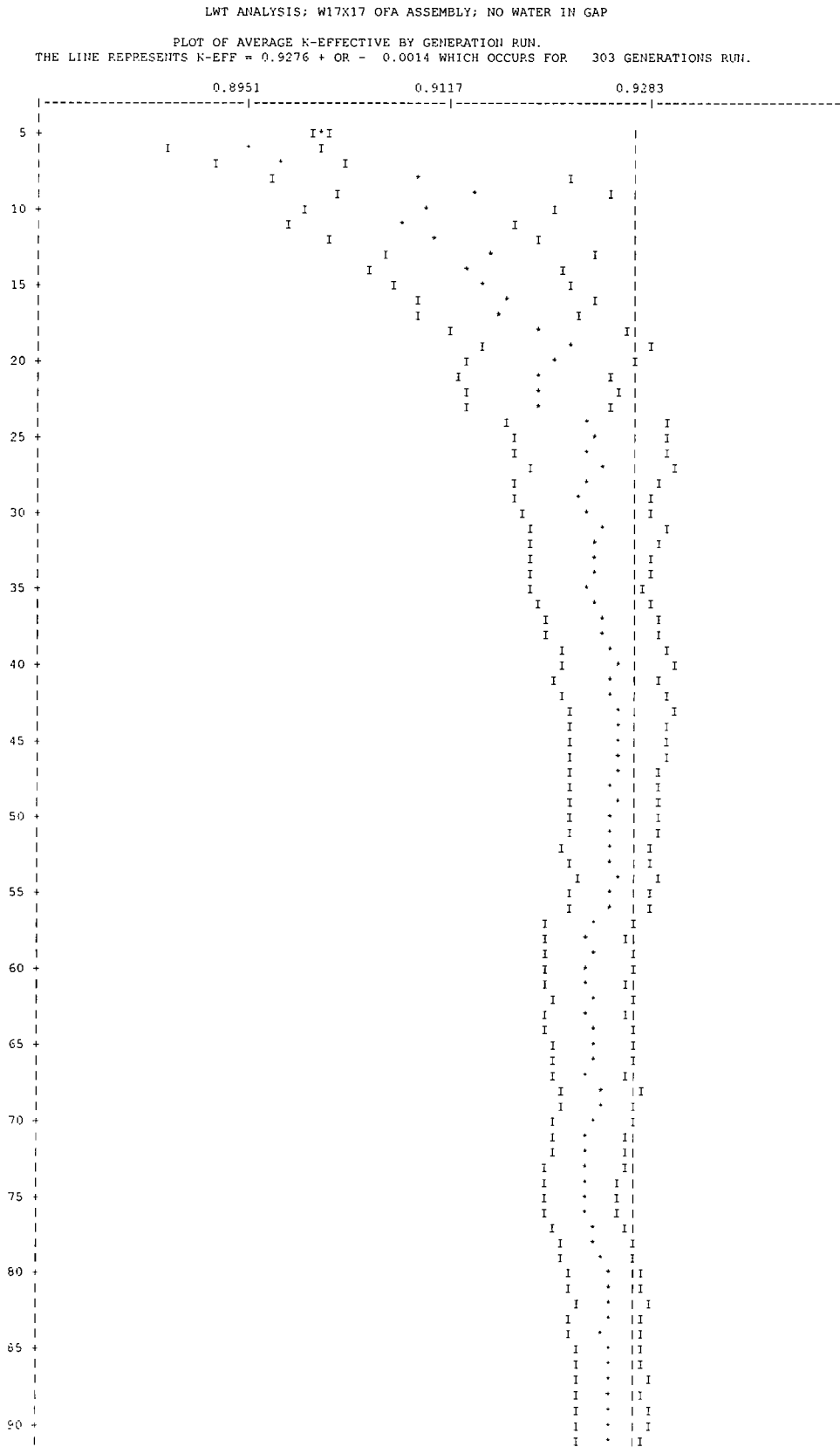
LWT ANALYSIS: W17X17 OFA ASSEMBLY: NO WATER IN GAP

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	0.92867	+ OR -	0.00159	0.92708 TO	0.93025	0.92549 TO	0.93184	0.92391 TO	0.93342	206000
102	0.92922	+ OR -	0.00160	0.92763 TO	0.93082	0.92603 TO	0.93242	0.92443 TO	0.93401	201000
107	0.92909	+ OR -	0.00164	0.92745 TO	0.93072	0.92582 TO	0.93236	0.92418 TO	0.93399	196000
112	0.92851	+ OR -	0.00165	0.92686 TO	0.93016	0.92521 TO	0.93181	0.92356 TO	0.93346	191000
117	0.92832	+ OR -	0.00168	0.92664 TO	0.93000	0.92496 TO	0.93168	0.92328 TO	0.93336	186000
122	0.92824	+ OR -	0.00169	0.92655 TO	0.92993	0.92487 TO	0.93162	0.92318 TO	0.93330	181000
127	0.92863	+ OR -	0.00172	0.92691 TO	0.93035	0.92519 TO	0.93207	0.92347 TO	0.93378	176000
132	0.92852	+ OR -	0.00175	0.92676 TO	0.93027	0.92501 TO	0.93203	0.92326 TO	0.93378	171000
137	0.92861	+ OR -	0.00178	0.92683 TO	0.93039	0.92505 TO	0.93218	0.92326 TO	0.93396	166000
142	0.92845	+ OR -	0.00181	0.92663 TO	0.93026	0.92482 TO	0.93207	0.92301 TO	0.93388	161000
147	0.92836	+ OR -	0.00186	0.92650 TO	0.93022	0.92465 TO	0.93207	0.92279 TO	0.93393	156000
152	0.92878	+ OR -	0.00189	0.92689 TO	0.93066	0.92500 TO	0.93255	0.92311 TO	0.93444	151000
157	0.92859	+ OR -	0.00194	0.92666 TO	0.93053	0.92472 TO	0.93247	0.92278 TO	0.93441	146000
162	0.92856	+ OR -	0.00200	0.92656 TO	0.93056	0.92456 TO	0.93256	0.92256 TO	0.93456	141000
167	0.92855	+ OR -	0.00207	0.92648 TO	0.93062	0.92440 TO	0.93269	0.92233 TO	0.93476	136000
172	0.92809	+ OR -	0.00211	0.92598 TO	0.93019	0.92388 TO	0.93230	0.92177 TO	0.93440	131000
177	0.92900	+ OR -	0.00210	0.92690 TO	0.93110	0.92480 TO	0.93321	0.92269 TO	0.93531	126000
182	0.92982	+ OR -	0.00207	0.92775 TO	0.93189	0.92568 TO	0.93396	0.92361 TO	0.93603	121000
187	0.93012	+ OR -	0.00213	0.92798 TO	0.93225	0.92585 TO	0.93438	0.92372 TO	0.93651	116000
192	0.92988	+ OR -	0.00220	0.92768 TO	0.93208	0.92548 TO	0.93429	0.92327 TO	0.93649	111000
197	0.92979	+ OR -	0.00228	0.92750 TO	0.93207	0.92522 TO	0.93436	0.92293 TO	0.93664	106000
202	0.92956	+ OR -	0.00239	0.92717 TO	0.93195	0.92478 TO	0.93434	0.92239 TO	0.93672	101000
207	0.92876	+ OR -	0.00244	0.92633 TO	0.93120	0.92389 TO	0.93364	0.92145 TO	0.93607	96000
212	0.92876	+ OR -	0.00253	0.92623 TO	0.93129	0.92371 TO	0.93382	0.92118 TO	0.93635	91000
217	0.92790	+ OR -	0.00258	0.92532 TO	0.93049	0.92274 TO	0.93307	0.92016 TO	0.93565	86000
222	0.92835	+ OR -	0.00259	0.92576 TO	0.93094	0.92318 TO	0.93353	0.92059 TO	0.93612	81000
227	0.92875	+ OR -	0.00267	0.92608 TO	0.93143	0.92341 TO	0.93410	0.92073 TO	0.93677	76000

LWT ANALYSIS; W17X17 OFA ASSEMBLY; NO WATER IN GAP

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
232	0.92838	+ OR - 0.00274	0.92565 TO 0.93112	0.92291 TO 0.93386	0.92017 TO 0.93659	71000
237	0.92690	+ OR - 0.00269	0.92422 TO 0.92959	0.92153 TO 0.93228	0.91884 TO 0.93496	66000
242	0.92576	+ OR - 0.00273	0.92303 TO 0.92850	0.92029 TO 0.93123	0.91756 TO 0.93396	61000
247	0.92621	+ OR - 0.00283	0.92338 TO 0.92904	0.92055 TO 0.93187	0.91772 TO 0.93470	56000
252	0.92667	+ OR - 0.00306	0.92361 TO 0.92974	0.92055 TO 0.93280	0.91749 TO 0.93586	51000
257	0.92546	+ OR - 0.00316	0.92229 TO 0.92862	0.91913 TO 0.93179	0.91597 TO 0.93495	46000
262	0.92446	+ OR - 0.00343	0.92103 TO 0.92789	0.91760 TO 0.93132	0.91416 TO 0.93475	41000
267	0.92316	+ OR - 0.00371	0.91946 TO 0.92687	0.91575 TO 0.93058	0.91204 TO 0.93429	36000
272	0.92248	+ OR - 0.00412	0.91836 TO 0.92659	0.91424 TO 0.93071	0.91013 TO 0.93483	31000
277	0.92103	+ OR - 0.00440	0.91664 TO 0.92543	0.91224 TO 0.92983	0.90785 TO 0.93422	26000
282	0.92139	+ OR - 0.00499	0.91639 TO 0.92638	0.91140 TO 0.93137	0.90641 TO 0.93636	21000
287	0.92005	+ OR - 0.00576	0.91429 TO 0.92581	0.90853 TO 0.93157	0.90276 TO 0.93734	16000
292	0.91662	+ OR - 0.00469	0.91193 TO 0.92131	0.90723 TO 0.92600	0.90254 TO 0.93070	11000
297	0.92086	+ OR - 0.00644	0.91443 TO 0.92730	0.90799 TO 0.93373	0.90155 TO 0.94017	6000











LWT ANALYSIS; W17X17 OFA ASSEMBLY; NO WATER IN GAP

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0041			3.82159E-03	2.2285	2.23872E-03	1.6019	1.15365E-04	17.5402
2	0.0176			1.62875E-02	0.6788	8.22928E-03	0.5887	2.90700E-04	10.4431
3	0.0195			1.81087E-02	0.5982	7.53114E-03	0.5755	6.30226E-04	6.7848
4	0.0080			7.43364E-03	0.7828	3.56477E-03	0.7521	3.81020E-04	9.1521
5	0.0025			2.29030E-03	0.5584	2.46799E-03	0.4834	5.72032E-04	7.7086
6	0.0021			1.92991E-03	0.4310	4.08883E-03	0.3825	1.56084E-03	4.7185
7	0.0020			1.89655E-03	0.4214	4.61079E-03	0.3581	1.76478E-03	4.2262
8	0.0021			1.94380E-03	0.5120	6.93673E-03	0.4313	8.11684E-04	6.1129
9	0.0028			2.63948E-03	0.5738	1.08006E-02	0.4894	4.31467E-04	8.9926
10	0.0062			5.70684E-03	0.5540	1.67942E-02	0.4655	4.62936E-04	7.9790
11	0.0129			1.19819E-02	0.5434	2.73418E-02	0.4594	4.15735E-04	8.2827
12	0.0169			1.57150E-02	0.5901	2.90498E-02	0.5221	2.65027E-04	10.9580
13	0.0161			1.49765E-02	0.7211	2.96920E-02	0.6243	2.26158E-04	11.3033
14	0.0127			1.17814E-02	0.6073	4.24296E-02	0.5074	2.55644E-04	11.0784
15	0.0027			2.53721E-03	1.0023	8.66856E-03	0.7845	1.32182E-04	15.6621
16	0.0019			1.75894E-03	1.3997	5.16861E-03	0.9238	6.54276E-05	20.1921
17	0.0029			2.66520E-03	1.8406	3.52185E-03	1.0888	4.77522E-05	24.4371
18	0.0039			3.58287E-03	1.8401	3.66608E-03	1.1653	3.29000E-05	29.7861
19	0.0048			4.46800E-03	1.3701	5.84850E-03	0.8953	5.72788E-05	22.5666
20	0.0202			1.87404E-02	0.8243	2.29555E-02	0.5788	1.84537E-04	12.2584
21	0.0111			1.02892E-02	1.2914	1.00103E-02	0.8827	5.76837E-05	23.1358
22	0.0270			2.50763E-02	0.8781	2.31897E-02	0.6229	1.56659E-04	11.8902
23	0.1015			9.41627E-02	0.4969	9.15781E-02	0.3251	1.41312E-03	3.5432
24	0.2107			1.95465E-01	0.3094	1.86579E-01	0.2124	2.86114E-03	2.3289
25	0.1843			1.70920E-01	0.3838	1.61167E-01	0.2326	1.77367E-03	3.1578
26	0.2272			2.10732E-01	0.3707	1.99426E-01	0.2299	1.38539E-03	3.3467
27	0.0762			7.06463E-02	0.6653	6.77221E-02	0.3877	1.95343E-04	8.6185
SYSTEM TOTAL =				9.27557E-01	0.1468	9.85278E-01	0.0469	1.65467E-02	1.1479

ELAPSED TIME 10.11817 MINUTES

RANDOM NUMBER= 3F140C717467

LWT ANALYSIS; W17X17 OFA ASSEMBLY; NO WATER IN GAP

```
                                FREQUENCY FOR GENERATIONS    4 TO 303
0.8396 TO 0.8523    **
0.8523 TO 0.8649    *
0.8649 TO 0.8776    *
0.8776 TO 0.8902    *****
0.8902 TO 0.9028    *****
0.9028 TO 0.9155    *****
0.9155 TO 0.9281    *****
0.9281 TO 0.9408    *****
0.9408 TO 0.9534    *****
0.9534 TO 0.9661    *****
0.9661 TO 0.9787    *****
0.9787 TO 0.9914    *****
0.9914 TO 1.0040    *
```

```
                                FREQUENCY FOR GENERATIONS    79 TO 303
0.8396 TO 0.8523    *
0.8523 TO 0.8649    *
0.8649 TO 0.8776    *
0.8776 TO 0.8902    *****
0.8902 TO 0.9028    *****
0.9028 TO 0.9155    *****
0.9155 TO 0.9281    *****
0.9281 TO 0.9408    *****
0.9408 TO 0.9534    *****
0.9534 TO 0.9661    *****
0.9661 TO 0.9787    *****
0.9787 TO 0.9914    *****
0.9914 TO 1.0040
```

```
                                FREQUENCY FOR GENERATIONS   154 TO 303
0.8396 TO 0.8523    *
0.8523 TO 0.8649    *
0.8649 TO 0.8776
0.8776 TO 0.8902    *****
0.8902 TO 0.9028    *****
0.9028 TO 0.9155    *****
0.9155 TO 0.9281    *****
0.9281 TO 0.9408    *****
0.9408 TO 0.9534    *****
0.9534 TO 0.9661    *****
0.9661 TO 0.9787    *****
0.9787 TO 0.9914    *****
0.9914 TO 1.0040
```

```
                                FREQUENCY FOR GENERATIONS   229 TO 303
0.8396 TO 0.8523
0.8523 TO 0.8649
0.8649 TO 0.8776
0.8776 TO 0.8902    ***
0.8902 TO 0.9028    *****
0.9028 TO 0.9155    *****
0.9155 TO 0.9281    *****
0.9281 TO 0.9408    *****
0.9408 TO 0.9534    *****
0.9534 TO 0.9661    *****
0.9661 TO 0.9787    **
0.9787 TO 0.9914    **
0.9914 TO 1.0040
```

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.....
*
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVEPSED THE PERILOUS PATH THROUGH KENO V IN 10.11817 MINUTES
.....
*
```

Figure 6.6.1-4 CSAS Input/Output for NAC-LWT with PWR Fuel – 3.5% Enrichment – Most Reactive Accident Condition Configuration

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP
27GROUPHPF4 LATTICECELL
UO2 1 0.95 293.0 92235 3.5 92238 96.5 END
ZR 2 1.0 293.0 END
H2O 3 1.0 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.000 293.0 END
H2O 8 1.000 293.0 END
H2O 9 1.0 293.0 END
END COMP
SQUAREPITCH 1.2598 0.7844 1 3 0.9144 2 0.8002 9 END
LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP
READ PARAM RUN=YES FLT=NO TME=5000 GEN=303 NPG=1000 END PARAM
READ GEOM
UNIT 1
COM='FUEL PIN CELL - WITH H2O'
CYLINDER 1 1 0.3922 2P182.88
CYLINDER 9 1 0.4001 2P182.88
CYLINDER 2 1 0.4572 2P182.88
CUBOID 3 1 4P0.6299 2P182.88
UNIT 2
COM='WATER ROD CELL - WITH H2O'
CYLINDER 3 1 0.5715 2P182.88
CYLINDER 2 1 0.6121 2P182.88
CUBOID 3 1 4P0.6299 2P182.88
GLOBAL UNIT 9
ARRAY 1 -10.7083 -10.7083 -182.88
CUBOID 3 1 4P11.2776 2P182.88
CYLINDER 4 1 16.891 2P182.88
CYLINDER 3 1 16.9863 2P182.88
CYLINDER 5 1 18.8913 2P182.88
CYLINDER 6 1 33.4963 2P182.88
CYLINDER 5 1 36.5443 2P182.88
CYLINDER 7 1 49.2443 2P182.88
CYLINDER 5 1 49.8539 212.48 -192.16
CYLINDER 6 1 49.8539 212.48 -199.78
CYLINDER 5 1 49.8539 212.48 -206.67
CUBOID 8 1 4P81.0000 243.00 -240.00
END GEOM
READ ARRAY
ARA=1 NUX=17 NUY=17 NUZ=1 FILL
          34R1
          5R1 2 2R1 2 2R1 2 5R1
          3R1 2 9R1 2 3R1
          17R1
2R1 2 2R1 2 2R1 2 2R1 2 2R1 2 2R1
          34R1
2R1 2 2R1 2 2R1 2 2R1 2 2R1 2 2R1
          34R1
2R1 2 2R1 2 2R1 2 2R1 2 2R1 2 2R1
          17R1
          3R1 2 9R1 2 3R1
          5R1 2 2R1 2 2R1 2 5R1
          34R1
END FILL
END ARRAY
READ BOUNDS ZFC=VAC YXF=VAC END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.32 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 13.07 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 622.14 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 641.09 (SECONDS).

```





```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPFPPPPPPF  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPFPPPPPPF  CCCCCCCCCC
SS   SS  CC   CC  AA   AA  LL  EE  PP   PP  CC   CC
SS   CC  CC   CC  AA   AA  LL  EE  PP   PP  CC   CC
SS   CC  AA   AA  LL  EE  PP   PP  CC   CC
SSSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEEE  -----  PPFPPPPPPF  CC
SSSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEEE  -----  PPFPPPPPPF  CC
SS   SS  CC   CC  AA   AA  LL  EE  PP   PP  CC   CC
SS   SS  CC   CC  AA   AA  LL  EE  PP   PP  CC   CC
SSSSSSSSSS  CCCCCCCCCC  AA   AA  LLLLLLLLLL  EEEEEEEEEEEE  PP   PP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA   AA  LLLLLLLLLL  EEEEEEEEEEEE  PP   PP  CCCCCCCCCC
    
```

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.....
.....
.....
PROGRAM VERIFICATION INFORMATION
.....
CODE SYSTEM:  SCALE-PC VERSION:  4.3
.....
.....
PROGRAM:  CSAS
.....
CREATION DATE:  03/08/96
.....
VOLUME:  ENG
.....
LIBRARY:  G:\SCALE43\WIN_NT\EXE
.....
.....
PRODUCTION CODE:  CSAS
.....
VERSION:  3.1
.....
JOBNAME:  SCALE-PC
.....
DATE OF EXECUTION:  07/23/98
.....
TIME OF EXECUTION:  03:11:03
.....
.....
.....
    
```

LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNF4 LIBRARY  
MX 9 MIXTURES  
MSC 9 COMPOSITION SPECIFICATIONS  
IZM 4 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.9500 VOLUME FRACTION  
ROTH 10.9600 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 3.500 WT%  
92238 96.500 WT%  
8016 2.00 ATOMS/MOLECULE  
END

SC ZR STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 6.4900 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
40000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC AL STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE  
END

SC SS304 STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%  
END

SC PB STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION

```
MX      8 MIXTURE NO.  
VF      1.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL     2 NO. ELEMENTS  
ICP     1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001 2.00 ATOMS/MOLECULE  
        8016 1.00 ATOM/MOLECULE
```

END

```
SC H2O          STANDARD COMPOSITION  
MX      9 MIXTURE NO.  
VF      1.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL     2 NO. ELEMENTS  
ICP     1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001 2.00 ATOMS/MOLECULE  
        8016 1.00 ATOM/MOLECULE
```

END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP SQUAREPITCH CELL TYPE  
PITCH    1.2598 CM CENTER TO CENTER SPACING  
FUELOD   0.7844 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL    1 MIXTURE NO. OF FUEL  
MMOD     3 MIXTURE NO. OF MODERATOR  
CLADOD   0.9144 CM CLAD OUTER DIAMETER  
MCLAD    2 MIXTURE NO. OF CLAD  
GAFOD    0.8002 CM GAP OUTER DIAMETER  
MGAP     9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```

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.....
***
***                               LWT ANALYSIS: W17X17 OFA ASSEMBLY; WATER IN GAP
***
.....
***
***                               ***** DATA LIBRARY INFORMATION *****
***
***   UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION
***   NUMBER        DATA SET NAME          NAME            -----
***   -----
***   89            G:\scale43\DATA LIB\FT89F001          STANDARD COMPOSITION LIBRARY
***   82            G:\scale43\DATA LIB\FT82F001          CROSS SECTION LIBRARY
***   11            D:\PROJECTS\BU85-C-1\pwrfin02\17HX2M\FT11F00    SHORT CROSS SECTION LIBRARY
***   90            D:\PROJECTS\BU85-C-1\pwrfin02\17HX2M\FT90F00    INPUT DATA DIRECT ACCESS
***
.....
***
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
***   UNIT NUMBER   : 89
***
***   DATASET NAME  : G:\scale43\DATA LIB\FT89F001
***
***   LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
***                   637 STANDARD COMPOSITIONS, 490 NUCLIDES
***                   90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***   CREATION DATE: 6/30/95
***
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
***   UNIT NUMBER   : 82
***
***   DATASET NAME  : G:\scale43\DATA LIB\FT82F001
***
***   LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***                   BASED ON ENDF-B VERSION 4 DATA
***                   COMPILED FOR NRC    1/27/89
***                   LAST UPDATED
***                   L.M.PETRIE - ORNL
***
***                   08/12/94
***
.....

```

```

..... 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.

```

KK      KK  EEEEEEEEEEE  NN      NN  0000000000  VV      VV
KK      KK  EEEEEEEEEEE  NNN     NN  000000000000  VV      VV
KK      KK  EE           NNNN    NN  00      00  VV      VV
KK      KK  EE           NN NN   NN  00      00  VV      VV
KK      KK  EE           NN NN   NN  00      00  VV      VV
KKKKKKK  EEEEEEEEEEE  NN NN   NN  00      00  ----- VV      VV
KKKKKKK  EEEEEEEEEEE  NN NN   NN  00      00  ----- VV      VV
KK      KK  EE           NN NN   NN  00      00  VV      VV
KK      KK  EE           NN NN   NN  00      00  VV      VV
KK      KK  EE           NN NN   NN  00      00  VV      VV
KK      KK  EEEEEEEEEEE  NN      NN  000000000000  VVV     VV
FK      FK  EEEEEEEEEEE  NN      NN  0000000000  V       V
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      CC  CC      AA      AA  LL      EE           PP      PP  CC      CC
SS      CC  CC      AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEEEE  ----- PPPPPPPPPPP  CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEEEE  ----- FPPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE           PP      CC      CC
SS      SS  CC      AA      AA  LL      EE           PP      CC      CC
SS      SS  CC      AA      AA  LL      EE           PP      CC      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

0000000  77777777777  //  2222222222  3333333333  //  9999999999  8888888888
00000000  77777777777  //  22222222222  33333333333  //  99999999999  88888888888
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00      00  77      77  //  22      22  33      33  //  99      99  88      88
00000000  77      //  22222222222  33333333333  //  99999999999  88888888888
0000000  77      //  22222222222  3333333333  //  99999999999  8888888888
    
```

```

0000000  3333333333  11      11  2222222222  11
00000000  33333333333  111     111  22222222222  111
00      00  33      33  :::  1111    1111  :::  22      22  1111
00      00  33      33  :::  11      11  :::  22      22  11
00      00  33      33  :::  11      11  :::  22      22  11
00      00  33      33  :::  11      11  :::  22      22  11
00      00  33      33  :::  11      11  :::  22      22  11
00      00  33      33  :::  11      11  :::  22      22  11
00      00  33      33  :::  11      11  :::  22      22  11
00000000  33333333333  11111111  11111111  22222222222  11111111
0000000  3333333333  11111111  11111111  22222222222  11111111
    
```

```
.....
***
***                               LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP
***
.....
***                               *****
***                               NUMERIC PARAMETERS
***                               *****
***
***      TME      MAXIMUM PROBLEM TIME (MIN)      *****
***
***      TBA      TIME PER GENERATION (MIN)      0.50
***
***      GEN      NUMBER OF GENERATIONS      303
***
***      NPG      NUMBER PER GENERATION      1000
***
***      NSK      NUMBER OF GENERATIONS TO BE SKIPPED      3
***
***      BEG      BEGINNING GENERATION NUMBER      1
***
***      RES      GENERATIONS BETWEEN CHECKPOINTS      0
***
***      X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS      1
***
***      NBK      NEUTRON BANK SIZE      1025
***
***      XNB      EXTRA POSITIONS IN NEUTRON BANK      0
***
***      NFB      FISSION BANK SIZE      1000
***
***      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      BB827100001
***
***      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
***
.....
```



```
.....  
***  
***          LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP          ***  
***  
.....  
***  
***          ***** ADDITIONAL INFORMATION *****          ***  
***  
*** NUMBER OF ENERGY GROUPS          27          USE LATTICE GEOMETRY          YES ***  
***  
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1          GLOBAL ARRAY NUMBER          1 ***  
***  
*** NO. OF SCATTERING ANGLES IN XSECS  2          NUMBER OF UNITS IN THE GLOBAL X DIR.  17 ***  
***  
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 16          NUMBER OF UNITS IN THE GLOBAL Y DIR.  17 ***  
***  
*** ENTRIES/NEUTRON IN THE FISSION BANK  9          NUMBER OF UNITS IN THE GLOBAL Z DIR.   1 ***  
***  
*** NUMBER OF MIXTURES USED            9          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       19          MAXIMUM HOLE NESTING LEVEL      0 ***  
***  
*** NUMBER OF GEOMETRY REGIONS USED     19          USE NESTED ARRAYS              NO ***  
***  
*** LARGEST GEOMETRY UNIT NUMBER        9          NUMBER OF ARRAYS USED          1 ***  
***  
*** LARGEST ARRAY NUMBER                1          MAXIMUM ARRAY NESTING LEVEL    1 ***  
***  
***  
*** +X BOUNDARY CONDITION                VAC          -X BOUNDARY CONDITION          VAC ***  
***  
*** +Y BOUNDARY CONDITION                VAC          -Y BOUNDARY CONDITION          VAC ***  
***  
*** +Z BOUNDARY CONDITION                VAC          -Z BOUNDARY CONDITION          VAC ***  
***  
.....
```



```
.....
***
***          LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP
***
.....
***          ***** SPACE AND SUPERGROUP INFORMATION *****
***
*** 100000 WORDS IS THE TOTAL SPACE AVAILABLE.
***
*** 28457 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
***
*** 71543 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
***
*** 99759 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
***
*** 71483 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
***
*** 1172 WORDS ARE NEEDED FOR THE LARGEST GROUP.
***
*** 29845 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
***
*** 42059 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
***
*** 42144 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.
***
.....
***
***          STARTING      ENDING      %SEC      ALBEDO      TOTAL
***          SUPERGROUP   GROUP      LENGTH    LENGTH      LENGTH
***
***          1             1          27         2697         0         13542
***
.....
***          ..... 0 IO'S WERE USED IN SUPERGROUPING .....
***          ..... 0 IO'S WERE USED LOADING THE DATA .....
***
```

LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 1 -----								
FUEL PIN CELL - WITH H2O								
1	CYLINDER	1 1	RADIUS = 0.39220	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
2	CYLINDER	9 1	RADIUS = 0.40010	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3	CYLINDER	2 1	RADIUS = 0.45720	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4	CUBOID	3 1	+X = 0.62990	-X = -0.62990	+Y = 0.62990	-Y = -0.62990	+Z = 182.88 -Z = -182.88	
----- UNIT 2 -----								
WATER ROD CELL - WITH H2O								
1	CYLINDER	3 1	RADIUS = 0.57150	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
2	CYLINDER	2 1	RADIUS = 0.61210	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3	CUBOID	3 1	+X = 0.62990	-X = -0.62990	+Y = 0.62990	-Y = -0.62990	+Z = 182.88 -Z = -182.88	
***** GLOBAL *****								
----- UNIT 9 EXTERNAL TO LATTICE 1 -----								
1	ARRAY NUMBER	1	+X = 10.708	-X = -10.708	+Y = 10.708	-Y = -10.708	+Z = 182.88 -Z = -182.88	
2	CUBOID	3 1	+X = 11.278	-X = -11.278	+Y = 11.278	-Y = -11.278	+Z = 182.88 -Z = -182.88	
3	CYLINDER	4 1	RADIUS = 16.891	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4	CYLINDER	3 1	RADIUS = 16.986	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
5	CYLINDER	5 1	RADIUS = 18.891	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
6	CYLINDER	6 1	RADIUS = 32.496	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
7	CYLINDER	5 1	RADIUS = 36.544	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
8	CYLINDER	7 1	RADIUS = 49.244	+Z = 182.88	-Z = -182.88	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
9	CYLINDER	5 1	RADIUS = 49.854	+Z = 212.48	-Z = -192.16	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
10	CYLINDER	6 1	RADIUS = 49.854	+Z = 212.48	-Z = -199.78	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
11	CYLINDER	5 1	RADIUS = 49.854	+Z = 212.48	-Z = -208.67	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
12	CUBOID	8 1	+X = 81.000	-X = -81.000	+Y = 81.000	-Y = -81.000	+Z = 243.00 -Z = -240.00	

LWT ANALYSIS: W17X17 OFA ASSEMBLY: WATER IN GAP

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 17 LEFT TO RIGHT Y ROW 1 TO 17 BOTTOM TO TOP

```
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 2 1 1 2 1 1 2 1 1 1 1 1
1 1 1 2 1 1 1 1 1 1 1 1 1 2 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 2 1 1 1 1 1 1 1 1 1 2 1 1 1
1 1 1 1 1 2 1 1 2 1 1 2 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```



LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
1	9.51010E-01	1.56500E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.40984E-01	1.90500E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.54190E-01	2.22500E-01	9.54190E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.40285E-01	2.57167E-01	9.47237E-01	6.95261E-03	0.00000E+00	0.00000E+00
5	9.16672E-01	2.91167E-01	9.37049E-01	1.09506E-02	0.00000E+00	0.00000E+00
6	9.40452E-01	3.25000E-01	9.37900E-01	7.78983E-03	0.00000E+00	0.00000E+00
7	9.34813E-01	3.58833E-01	9.37282E-01	6.06547E-03	0.00000E+00	0.00000E+00
8	9.30026E-01	3.92667E-01	9.36073E-01	5.09798E-03	0.00000E+00	0.00000E+00
9	9.38348E-01	4.26667E-01	9.36398E-01	4.32082E-03	0.00000E+00	0.00000E+00
10	8.92032E-01	4.62333E-01	9.30852E-01	6.69006E-03	0.00000E+00	0.00000E+00
11	9.11582E-01	4.95333E-01	9.28711E-01	6.27656E-03	0.00000E+00	0.00000E+00
12	9.15588E-01	5.30000E-01	9.27399E-01	5.76527E-03	0.00000E+00	0.00000E+00
13	9.52711E-01	5.63000E-01	9.29700E-01	5.69999E-03	0.00000E+00	0.00000E+00
14	9.35256E-01	5.96833E-01	9.30171E-01	5.22468E-03	0.00000E+00	0.00000E+00
15	9.37142E-01	6.29833E-01	9.30707E-01	4.63580E-03	0.00000E+00	0.00000E+00
16	9.37905E-01	6.64667E-01	9.31222E-01	4.50651E-03	0.00000E+00	0.00000E+00
17	9.29604E-01	6.97500E-01	9.31114E-01	4.19672E-03	0.00000E+00	0.00000E+00
18	9.20469E-01	7.30500E-01	9.30448E-01	3.98165E-03	0.00000E+00	0.00000E+00
19	9.29994E-01	7.63500E-01	9.30422E-01	3.74020E-03	0.00000E+00	0.00000E+00
20	9.46117E-01	7.97333E-01	9.31294E-01	3.63250E-03	0.00000E+00	0.00000E+00
21	9.12522E-01	8.32167E-01	9.30306E-01	3.57523E-03	0.00000E+00	0.00000E+00
22	9.43921E-01	8.66000E-01	9.30986E-01	3.45941E-03	0.00000E+00	0.00000E+00
23	9.57911E-01	8.99833E-01	9.32269E-01	3.53151E-03	0.00000E+00	0.00000E+00
24	8.94522E-01	9.33667E-01	9.30553E-01	3.77910E-03	0.00000E+00	0.00000E+00
25	9.25850E-01	9.69500E-01	9.30348E-01	3.61684E-03	0.00000E+00	0.00000E+00
26	9.11203E-01	1.00333E+00	9.29555E-01	3.55262E-03	0.00000E+00	0.00000E+00
27	9.20195E-01	1.03717E+00	9.29180E-01	3.42806E-03	0.00000E+00	0.00000E+00
28	9.35677E-01	1.07100E+00	9.29430E-01	3.30303E-03	0.00000E+00	0.00000E+00
29	9.32110E-01	1.10583E+00	9.29530E-01	3.17990E-03	0.00000E+00	0.00000E+00
30	9.16956E-01	1.13967E+00	9.29080E-01	3.09695E-03	0.00000E+00	0.00000E+00
31	9.18142E-01	1.17550E+00	9.28703E-01	3.01196E-03	0.00000E+00	0.00000E+00
32	9.52791E-01	1.20933E+00	9.29506E-01	3.01858E-03	0.00000E+00	0.00000E+00
33	9.20900E-01	1.24400E+00	9.29229E-01	2.93275E-03	0.00000E+00	0.00000E+00
34	9.29466E-01	1.27800E+00	9.29236E-01	2.83963E-03	0.00000E+00	0.00000E+00
35	9.66663E-01	1.31267E+00	9.30370E-01	2.97677E-03	0.00000E+00	0.00000E+00
36	9.38891E-01	1.34567E+00	9.30621E-01	2.89874E-03	0.00000E+00	0.00000E+00
37	9.03279E-01	1.37867E+00	9.29840E-01	2.92110E-03	0.00000E+00	0.00000E+00
38	9.28671E-01	1.41250E+00	9.29807E-01	2.83898E-03	0.00000E+00	0.00000E+00
39	9.62627E-01	1.44450E+00	9.30694E-01	2.90017E-03	0.00000E+00	0.00000E+00
40	8.95883E-01	1.48033E+00	9.29778E-01	2.96774E-03	0.00000E+00	0.00000E+00
41	9.06233E-01	1.51500E+00	9.29174E-01	2.95301E-03	0.00000E+00	0.00000E+00
42	9.15541E-01	1.54800E+00	9.28834E-01	2.89835E-03	0.00000E+00	0.00000E+00
43	9.72554E-01	1.58100E+00	9.29900E-01	3.02122E-03	0.00000E+00	0.00000E+00
44	9.38266E-01	1.61667E+00	9.30101E-01	2.95529E-03	0.00000E+00	0.00000E+00
45	9.32599E-01	1.65150E+00	9.30160E-01	2.86633E-03	0.00000E+00	0.00000E+00
46	9.88065E-01	1.68617E+00	9.31476E-01	3.11194E-03	0.00000E+00	0.00000E+00
47	9.33628E-01	1.72100E+00	9.31523E-01	3.04237E-03	0.00000E+00	0.00000E+00
48	9.52331E-01	1.75300E+00	9.31576E-01	3.00969E-03	0.00000E+00	0.00000E+00
49	9.32474E-01	1.78517E+00	9.31986E-01	2.94497E-03	0.00000E+00	0.00000E+00
50	9.19013E-01	1.81900E+00	9.31716E-01	2.89561E-03	0.00000E+00	0.00000E+00
51	9.64448E-01	1.85183E+00	9.32384E-01	2.91351E-03	0.00000E+00	0.00000E+00
52	9.41027E-01	1.88583E+00	9.32557E-01	2.85987E-03	0.00000E+00	0.00000E+00
53	9.11931E-01	1.92050E+00	9.32152E-01	2.83226E-03	0.00000E+00	0.00000E+00
54	9.08637E-01	1.95533E+00	9.31700E-01	2.81384E-03	0.00000E+00	0.00000E+00
55	9.47154E-01	1.98823E+00	9.31992E-01	2.77559E-03	0.00000E+00	0.00000E+00
56	9.20431E-01	2.02033E+00	9.31778E-01	2.73211E-03	0.00000E+00	0.00000E+00
57	9.27528E-01	2.05150E+00	9.31700E-01	2.68309E-03	0.00000E+00	0.00000E+00
58	9.16484E-01	2.08533E+00	9.31429E-01	2.64871E-03	0.00000E+00	0.00000E+00
59	8.86613E-01	2.11017E+00	9.30678E-01	2.70809E-03	0.00000E+00	0.00000E+00
60	9.62017E-01	2.15217E+00	9.31218E-01	2.71523E-03	0.00000E+00	0.00000E+00
61	9.47144E-01	2.18700E+00	9.31488E-01	2.68249E-03	0.00000E+00	0.00000E+00
62	9.04490E-01	2.22167E+00	9.31038E-01	2.67551E-03	0.00000E+00	0.00000E+00
63	9.40984E-01	2.25567E+00	9.31201E-01	2.63633E-03	0.00000E+00	0.00000E+00
64	9.52704E-01	2.28850E+00	9.31548E-01	2.61655E-03	0.00000E+00	0.00000E+00
65	9.07223E-01	2.32250E+00	9.31162E-01	2.60347E-03	0.00000E+00	0.00000E+00
66	9.30234E-01	2.35633E+00	9.31149E-01	2.56250E-03	0.00000E+00	0.00000E+00
67	9.25560E-01	2.39117E+00	9.31063E-01	2.52424E-03	0.00000E+00	0.00000E+00
68	9.66495E-01	2.42582E+00	9.31600E-01	2.54301E-03	0.00000E+00	0.00000E+00
69	9.41208E-01	2.45883E+00	9.31743E-01	2.50887E-03	0.00000E+00	0.00000E+00
70	9.33999E-01	2.49267E+00	9.31766E-01	2.47192E-03	0.00000E+00	0.00000E+00
71	9.71056E-01	2.52393E+00	9.32345E-01	2.50147E-03	0.00000E+00	0.00000E+00
72	8.88156E-01	2.55867E+00	9.31714E-01	2.54501E-03	0.00000E+00	0.00000E+00
73	9.80005E-01	2.59150E+00	9.32394E-01	2.59947E-03	0.00000E+00	0.00000E+00
74	9.13067E-01	2.62550E+00	9.32126E-01	2.57713E-03	0.00000E+00	0.00000E+00
75	9.70227E-01	2.65833E+00	9.32649E-01	2.59489E-03	0.00000E+00	0.00000E+00
76	9.31805E-01	2.69233E+00	9.32638E-01	2.55961E-03	0.00000E+00	0.00000E+00
77	9.52213E-01	2.72517E+00	9.32899E-01	2.53871E-03	0.00000E+00	0.00000E+00
78	9.47160E-01	2.75917E+00	9.33086E-01	2.51210E-03	0.00000E+00	0.00000E+00
79	8.93701E-01	2.79117E+00	9.32575E-01	2.53147E-03	0.00000E+00	0.00000E+00
80	9.47226E-01	2.82233E+00	9.32763E-01	2.50586E-03	0.00000E+00	0.00000E+00
81	9.48589E-01	2.85333E+00	9.32963E-01	2.48203E-03	0.00000E+00	0.00000E+00
82	9.25849E-01	2.88733E+00	9.32874E-01	2.45242E-03	0.00000E+00	0.00000E+00
83	9.01492E-01	2.92117E+00	9.32487E-01	2.45275E-03	0.00000E+00	0.00000E+00
84	9.20041E-01	2.95500E+00	9.32335E-01	2.42740E-03	0.00000E+00	0.00000E+00
85	8.82999E-01	2.98983E+00	9.31741E-01	2.47055E-03	0.00000E+00	0.00000E+00
86	9.23140E-01	3.02450E+00	9.31638E-01	2.44311E-03	0.00000E+00	0.00000E+00
87	9.43337E-01	3.05750E+00	9.31776E-01	2.41812E-03	0.00000E+00	0.00000E+00
88	9.28753E-01	3.09233E+00	9.31741E-01	2.39009E-03	0.00000E+00	0.00000E+00
89	9.25355E-01	3.12533E+00	9.31667E-01	2.36360E-03	0.00000E+00	0.00000E+00
90	9.33163E-01	3.15917E+00	9.31684E-01	2.33665E-03	0.00000E+00	0.00000E+00
91	9.25500E-01	3.19400E+00	9.31615E-01	2.31129E-03	0.00000E+00	0.00000E+00

92	9.17867E-01	3.22867E+00	9.31462E-01	2.29056E-03	0.00000E+00	0.00000E+00
93	9.65543E-01	3.26267E+00	9.31837E-01	2.29600E-03	0.00000E+00	0.00000E+00
94	9.29435E-01	3.29733E+00	9.31810E-01	2.27196E-03	0.00000E+00	0.00000E+00
95	9.05071E-01	3.32933E+00	9.31523E-01	2.26483E-03	0.00000E+00	0.00000E+00
96	9.28498E-01	3.36233E+00	9.31491E-01	2.24084E-03	0.00000E+00	0.00000E+00
97	9.20727E-01	3.39617E+00	9.31377E-01	2.22002E-03	0.00000E+00	0.00000E+00
98	9.03651E-01	3.43017E+00	9.31069E-01	2.21568E-03	0.00000E+00	0.00000E+00
99	9.74784E-01	3.46300E+00	9.31539E-01	2.23851E-03	0.00000E+00	0.00000E+00
100	9.78591E-01	3.49517E+00	9.32019E-01	2.26698E-03	0.00000E+00	0.00000E+00
101	9.62223E-01	3.52900E+00	9.32324E-01	2.26460E-03	0.00000E+00	0.00000E+00
102	9.36007E-01	3.56383E+00	9.32361E-01	2.24215E-03	0.00000E+00	0.00000E+00
103	9.34207E-01	3.59583E+00	9.32379E-01	2.21991E-03	0.00000E+00	0.00000E+00
104	9.19747E-01	3.62883E+00	9.32256E-01	2.20153E-03	0.00000E+00	0.00000E+00
105	9.53358E-01	3.66267E+00	9.32460E-01	2.18965E-03	0.00000E+00	0.00000E+00
106	9.26897E-01	3.69650E+00	9.32407E-01	2.16916E-03	0.00000E+00	0.00000E+00
107	9.08431E-01	3.72950E+00	9.32179E-01	2.16050E-03	0.00000E+00	0.00000E+00
108	8.99971E-01	3.76333E+00	9.31875E-01	2.16148E-03	0.00000E+00	0.00000E+00
109	9.16471E-01	3.79717E+00	9.31731E-01	2.14602E-03	0.00000E+00	0.00000E+00
110	9.29757E-01	3.83200E+00	9.31712E-01	2.12614E-03	0.00000E+00	0.00000E+00
111	9.33557E-01	3.86583E+00	9.31729E-01	2.10661E-03	0.00000E+00	0.00000E+00
112	9.11116E-01	3.90067E+00	9.31542E-01	2.09576E-03	0.00000E+00	0.00000E+00
113	9.66848E-01	3.93550E+00	9.31860E-01	2.10101E-03	0.00000E+00	0.00000E+00
114	9.52387E-01	3.96833E+00	9.32043E-01	2.09022E-03	0.00000E+00	0.00000E+00
115	9.36334E-01	4.00217E+00	9.32081E-01	2.07199E-03	0.00000E+00	0.00000E+00
116	9.24067E-01	4.03617E+00	9.32011E-01	2.05494E-03	0.00000E+00	0.00000E+00
117	9.10967E-01	4.07083E+00	9.31828E-01	2.04519E-03	0.00000E+00	0.00000E+00
118	9.57862E-01	4.10200E+00	9.32052E-01	2.03987E-03	0.00000E+00	0.00000E+00
119	9.24976E-01	4.13317E+00	9.31992E-01	2.02326E-03	0.00000E+00	0.00000E+00
120	9.72013E-01	4.16517E+00	9.32331E-01	2.03451E-03	0.00000E+00	0.00000E+00
121	9.31745E-01	4.19817E+00	9.32326E-01	2.01735E-03	0.00000E+00	0.00000E+00
122	9.64947E-01	4.23300E+00	9.32598E-01	2.01885E-03	0.00000E+00	0.00000E+00
123	9.49515E-01	4.26583E+00	9.32738E-01	2.00679E-03	0.00000E+00	0.00000E+00
124	9.21618E-01	4.30167E+00	9.32647E-01	1.99254E-03	0.00000E+00	0.00000E+00
125	9.35152E-01	4.33550E+00	9.32667E-01	1.97638E-03	0.00000E+00	0.00000E+00
126	9.32698E-01	4.37033E+00	9.32667E-01	1.96038E-03	0.00000E+00	0.00000E+00
127	9.38079E-01	4.40317E+00	9.32711E-01	1.94511E-03	0.00000E+00	0.00000E+00
128	9.67843E-01	4.43617E+00	9.32989E-01	1.94965E-03	0.00000E+00	0.00000E+00
129	9.30624E-01	4.46917E+00	9.32971E-01	1.93433E-03	0.00000E+00	0.00000E+00
130	9.48983E-01	4.50300E+00	9.33096E-01	1.92323E-03	0.00000E+00	0.00000E+00
131	9.73819E-01	4.53500E+00	9.33412E-01	1.93420E-03	0.00000E+00	0.00000E+00
132	9.23245E-01	4.56983E+00	9.33333E-01	1.92086E-03	0.00000E+00	0.00000E+00
133	8.78670E-01	4.60367E+00	9.32916E-01	1.95128E-03	0.00000E+00	0.00000E+00
134	9.46469E-01	4.63667E+00	9.33019E-01	1.93916E-03	0.00000E+00	0.00000E+00
135	9.56328E-01	4.66967E+00	9.33194E-01	1.93249E-03	0.00000E+00	0.00000E+00
136	9.65680E-01	4.69983E+00	9.33437E-01	1.93327E-03	0.00000E+00	0.00000E+00
137	9.39728E-01	4.73367E+00	9.33483E-01	1.91946E-03	0.00000E+00	0.00000E+00
138	9.42256E-01	4.76750E+00	9.33548E-01	1.90639E-03	0.00000E+00	0.00000E+00
139	9.55399E-01	4.80133E+00	9.33711E-01	1.89950E-03	0.00000E+00	0.00000E+00
140	9.20811E-01	4.83533E+00	9.33618E-01	1.88800E-03	0.00000E+00	0.00000E+00
141	9.49597E-01	4.87000E+00	9.33733E-01	1.87789E-03	0.00000E+00	0.00000E+00
142	9.24254E-01	4.90483E+00	9.33665E-01	1.86566E-03	0.00000E+00	0.00000E+00
143	9.63811E-01	4.93500E+00	9.33879E-01	1.86468E-03	0.00000E+00	0.00000E+00
144	9.43771E-01	4.97167E+00	9.33949E-01	1.85281E-03	0.00000E+00	0.00000E+00
145	8.98301E-01	5.00550E+00	9.33699E-01	1.85662E-03	0.00000E+00	0.00000E+00
146	9.22833E-01	5.03950E+00	9.33624E-01	1.84523E-03	0.00000E+00	0.00000E+00
147	9.24198E-01	5.07417E+00	9.33559E-01	1.83361E-03	0.00000E+00	0.00000E+00
148	9.26591E-01	5.10800E+00	9.33511E-01	1.82163E-03	0.00000E+00	0.00000E+00
149	9.14254E-01	5.14283E+00	9.33380E-01	1.81393E-03	0.00000E+00	0.00000E+00
150	8.93634E-01	5.17667E+00	9.33112E-01	1.82154E-03	0.00000E+00	0.00000E+00
151	9.31493E-01	5.21067E+00	9.33101E-01	1.80931E-03	0.00000E+00	0.00000E+00
152	9.41517E-01	5.24450E+00	9.33157E-01	1.79808E-03	0.00000E+00	0.00000E+00
153	9.18224E-01	5.27833E+00	9.33058E-01	1.78887E-03	0.00000E+00	0.00000E+00
154	9.42222E-01	5.31217E+00	9.33118E-01	1.77808E-03	0.00000E+00	0.00000E+00
155	9.02412E-01	5.34617E+00	9.32918E-01	1.77779E-03	0.00000E+00	0.00000E+00
156	9.16376E-01	5.38183E+00	9.32810E-01	1.76947E-03	0.00000E+00	0.00000E+00
157	9.57243E-01	5.41467E+00	9.32968E-01	1.76507E-03	0.00000E+00	0.00000E+00
158	9.95329E-01	5.45050E+00	9.32727E-01	1.77024E-03	0.00000E+00	0.00000E+00
159	9.40781E-01	5.48433E+00	9.32778E-01	1.75967E-03	0.00000E+00	0.00000E+00
160	9.48603E-01	5.51817E+00	9.32878E-01	1.75137E-03	0.00000E+00	0.00000E+00
161	9.90183E-01	5.55200E+00	9.33238E-01	1.77725E-03	0.00000E+00	0.00000E+00
162	9.11692E-01	5.58500E+00	9.33104E-01	1.77123E-03	0.00000E+00	0.00000E+00
163	9.36520E-01	5.61883E+00	9.33125E-01	1.76032E-03	0.00000E+00	0.00000E+00
164	9.47902E-01	5.65100E+00	9.33216E-01	1.75180E-03	0.00000E+00	0.00000E+00
165	9.23662E-01	5.68483E+00	9.33158E-01	1.74200E-03	0.00000E+00	0.00000E+00
166	9.40662E-01	5.71867E+00	9.33203E-01	1.73195E-03	0.00000E+00	0.00000E+00
167	9.12898E-01	5.75250E+00	9.33080E-01	1.72582E-03	0.00000E+00	0.00000E+00
168	9.41259E-01	5.78550E+00	9.33130E-01	1.71610E-03	0.00000E+00	0.00000E+00
169	9.74665E-01	5.81933E+00	9.33378E-01	1.72383E-03	0.00000E+00	0.00000E+00
170	9.36418E-01	5.85417E+00	9.33396E-01	1.71363E-03	0.00000E+00	0.00000E+00
171	9.54401E-01	5.88800E+00	9.33521E-01	1.70799E-03	0.00000E+00	0.00000E+00
172	9.46339E-01	5.91917E+00	9.33596E-01	1.69959E-03	0.00000E+00	0.00000E+00
173	9.44046E-01	5.95300E+00	9.33657E-01	1.69072E-03	0.00000E+00	0.00000E+00
174	9.51695E-01	5.98600E+00	9.33762E-01	1.68413E-03	0.00000E+00	0.00000E+00
175	9.21412E-01	6.01900E+00	9.33691E-01	1.67589E-03	0.00000E+00	0.00000E+00
176	9.24146E-01	6.05283E+00	9.33636E-01	1.66713E-03	0.00000E+00	0.00000E+00
177	9.08439E-01	6.08767E+00	9.33492E-01	1.66382E-03	0.00000E+00	0.00000E+00
178	9.67472E-01	6.11967E+00	9.33685E-01	1.66557E-03	0.00000E+00	0.00000E+00
179	9.40432E-01	6.15433E+00	9.33723E-01	1.65657E-03	0.00000E+00	0.00000E+00
180	9.47099E-01	6.18650E+00	9.33798E-01	1.64895E-03	0.00000E+00	0.00000E+00
181	9.12795E-01	6.22033E+00	9.33681E-01	1.64391E-03	0.00000E+00	0.00000E+00
182	9.25629E-01	6.25517E+00	9.33692E-01	1.63478E-03	0.00000E+00	0.00000E+00
183	9.31479E-01	6.28900E+00	9.33679E-01	1.62577E-03	0.00000E+00	0.00000E+00
184	9.04767E-01	6.32200E+00	9.33521E-01	1.62460E-03	0.00000E+00	0.00000E+00
185	9.63407E-01	6.35583E+00	9.33684E-01	1.62393E-03	0.00000E+00	0.00000E+00
186	9.32646E-01	6.38883E+00	9.33950E-01	1.63686E-03	0.00000E+00	0.00000E+00

187	9.07694E-01	6.42350E+00	9.33808E-01	1.63416E-03	0.00000E+00	0.00000E+00
188	9.34857E-01	6.45650E+00	9.33814E-01	1.62536E-03	0.00000E+00	0.00000E+00
189	9.51836E-01	6.49217E+00	9.33910E-01	1.61952E-03	0.00000E+00	0.00000E+00
190	9.14491E-01	6.52700E+00	9.33807E-01	1.61419E-03	0.00000E+00	0.00000E+00
191	9.31743E-01	6.56083E+00	9.33796E-01	1.60566E-03	0.00000E+00	0.00000E+00
192	9.40107E-01	6.59383E+00	9.33829E-01	1.59753E-03	0.00000E+00	0.00000E+00
193	9.12241E-01	6.62767E+00	9.33716E-01	1.59216E-03	0.00000E+00	0.00000E+00
194	9.48539E-01	6.65882E+00	9.33793E-01	1.58672E-03	0.00000E+00	0.00000E+00
195	9.31343E-01	6.69183E+00	9.33781E-01	1.57853E-03	0.00000E+00	0.00000E+00
196	9.43479E-01	6.72467E+00	9.33831E-01	1.57117E-03	0.00000E+00	0.00000E+00
197	9.58436E-01	6.75950E+00	9.33957E-01	1.56817E-03	0.00000E+00	0.00000E+00
198	9.06278E-01	6.79150E+00	9.33815E-01	1.56653E-03	0.00000E+00	0.00000E+00
199	8.92724E-01	6.82633E+00	9.33607E-01	1.57245E-03	0.00000E+00	0.00000E+00
200	9.34782E-01	6.86117E+00	9.33613E-01	1.56450E-03	0.00000E+00	0.00000E+00
201	9.59515E-01	6.89500E+00	9.33743E-01	1.56205E-03	0.00000E+00	0.00000E+00
202	9.35452E-01	6.92800E+00	9.33752E-01	1.55425E-03	0.00000E+00	0.00000E+00
203	9.13608E-01	6.96000E+00	9.33651E-01	1.54974E-03	0.00000E+00	0.00000E+00
204	9.24135E-01	6.99383E+00	9.33604E-01	1.54277E-03	0.00000E+00	0.00000E+00
205	9.55551E-01	7.02683E+00	9.33712E-01	1.53895E-03	0.00000E+00	0.00000E+00
206	9.06918E-01	7.06067E+00	9.33581E-01	1.53701E-03	0.00000E+00	0.00000E+00
207	9.42248E-01	7.09550E+00	9.33623E-01	1.53008E-03	0.00000E+00	0.00000E+00
208	9.20183E-01	7.12933E+00	9.33558E-01	1.52403E-03	0.00000E+00	0.00000E+00
209	9.43419E-01	7.16233E+00	9.33606E-01	1.51740E-03	0.00000E+00	0.00000E+00
210	9.41051E-01	7.19433E+00	9.33641E-01	1.51051E-03	0.00000E+00	0.00000E+00
211	9.42003E-01	7.22733E+00	9.33681E-01	1.50380E-03	0.00000E+00	0.00000E+00
212	8.90982E-01	7.26200E+00	9.33478E-01	1.51037E-03	0.00000E+00	0.00000E+00
213	9.57179E-01	7.29600E+00	9.33590E-01	1.50738E-03	0.00000E+00	0.00000E+00
214	9.10290E-01	7.33067E+00	9.33481E-01	1.50428E-03	0.00000E+00	0.00000E+00
215	8.84104E-01	7.36650E+00	9.33249E-01	1.51504E-03	0.00000E+00	0.00000E+00
216	9.50654E-01	7.40033E+00	9.33330E-01	1.51013E-03	0.00000E+00	0.00000E+00
217	9.26341E-01	7.43233E+00	9.33298E-01	1.50344E-03	0.00000E+00	0.00000E+00
218	9.29420E-01	7.46617E+00	9.33280E-01	1.49658E-03	0.00000E+00	0.00000E+00
219	9.03187E-01	7.50100E+00	9.33141E-01	1.49610E-03	0.00000E+00	0.00000E+00
220	9.51222E-01	7.53483E+00	9.33224E-01	1.49153E-03	0.00000E+00	0.00000E+00
221	9.23679E-01	7.56967E+00	9.33180E-01	1.48535E-03	0.00000E+00	0.00000E+00
222	9.27250E-01	7.60450E+00	9.33153E-01	1.47882E-03	0.00000E+00	0.00000E+00
223	9.37266E-01	7.63833E+00	9.33172E-01	1.47224E-03	0.00000E+00	0.00000E+00
224	9.58940E-01	7.67133E+00	9.33288E-01	1.47018E-03	0.00000E+00	0.00000E+00
225	9.28442E-01	7.70333E+00	9.33266E-01	1.46373E-03	0.00000E+00	0.00000E+00
226	9.13553E-01	7.73817E+00	9.33178E-01	1.45984E-03	0.00000E+00	0.00000E+00
227	8.91995E-01	7.77200E+00	9.32995E-01	1.46482E-03	0.00000E+00	0.00000E+00
228	9.01803E-01	7.80767E+00	9.32857E-01	1.46484E-03	0.00000E+00	0.00000E+00
229	9.60438E-01	7.84067E+00	9.32979E-01	1.46342E-03	0.00000E+00	0.00000E+00
230	8.93772E-01	7.87533E+00	9.32907E-01	1.46710E-03	0.00000E+00	0.00000E+00
231	9.66852E-01	7.90933E+00	9.32955E-01	1.46823E-03	0.00000E+00	0.00000E+00
232	9.74108E-01	7.94317E+00	9.33134E-01	1.47274E-03	0.00000E+00	0.00000E+00
233	8.89062E-01	7.97800E+00	9.32944E-01	1.47871E-03	0.00000E+00	0.00000E+00
234	9.62702E-01	8.01183E+00	9.33072E-01	1.47790E-03	0.00000E+00	0.00000E+00
235	9.06169E-01	8.04850E+00	9.32956E-01	1.47607E-03	0.00000E+00	0.00000E+00
236	9.11933E-01	8.08317E+00	9.32867E-01	1.47249E-03	0.00000E+00	0.00000E+00
237	9.44068E-01	8.11717E+00	9.32914E-01	1.46698E-03	0.00000E+00	0.00000E+00
238	9.47216E-01	8.15000E+00	9.32975E-01	1.46201E-03	0.00000E+00	0.00000E+00
239	9.52614E-01	8.18383E+00	9.32935E-01	1.45636E-03	0.00000E+00	0.00000E+00
240	9.52147E-01	8.21783E+00	9.33016E-01	1.45248E-03	0.00000E+00	0.00000E+00
241	8.93068E-01	8.25250E+00	9.32849E-01	1.45601E-03	0.00000E+00	0.00000E+00
242	9.16811E-01	8.28650E+00	9.32782E-01	1.45147E-03	0.00000E+00	0.00000E+00
243	9.29697E-01	8.32117E+00	9.32769E-01	1.44549E-03	0.00000E+00	0.00000E+00
244	9.16165E-01	8.35700E+00	9.32701E-01	1.44114E-03	0.00000E+00	0.00000E+00
245	9.04298E-01	8.39267E+00	9.32584E-01	1.43995E-03	0.00000E+00	0.00000E+00
246	9.53972E-01	8.42550E+00	9.32671E-01	1.43671E-03	0.00000E+00	0.00000E+00
247	9.35449E-01	8.45850E+00	9.32683E-01	1.43088E-03	0.00000E+00	0.00000E+00
248	9.66397E-01	8.49233E+00	9.32820E-01	1.43163E-03	0.00000E+00	0.00000E+00
249	9.77602E-01	8.52633E+00	9.33001E-01	1.43730E-03	0.00000E+00	0.00000E+00
250	9.53491E-01	8.56100E+00	9.33084E-01	1.43388E-03	0.00000E+00	0.00000E+00
251	9.53652E-01	8.59317E+00	9.33166E-01	1.43049E-03	0.00000E+00	0.00000E+00
252	9.10631E-01	8.62783E+00	9.33076E-01	1.42761E-03	0.00000E+00	0.00000E+00
253	9.66311E-01	8.66000E+00	9.33209E-01	1.42806E-03	0.00000E+00	0.00000E+00
254	9.30825E-01	8.69467E+00	9.33199E-01	1.42242E-03	0.00000E+00	0.00000E+00
255	9.67891E-01	8.72867E+00	9.33336E-01	1.42340E-03	0.00000E+00	0.00000E+00
256	9.07966E-01	8.76333E+00	9.33236E-01	1.42130E-03	0.00000E+00	0.00000E+00
257	9.23536E-01	8.79717E+00	9.33198E-01	1.41623E-03	0.00000E+00	0.00000E+00
258	9.50763E-01	8.82933E+00	9.33267E-01	1.41235E-03	0.00000E+00	0.00000E+00
259	9.16617E-01	8.86033E+00	9.33210E-01	1.40800E-03	0.00000E+00	0.00000E+00
260	9.42165E-01	8.89333E+00	9.33245E-01	1.40296E-03	0.00000E+00	0.00000E+00
261	9.04953E-01	8.92817E+00	9.33135E-01	1.40180E-03	0.00000E+00	0.00000E+00
262	9.38220E-01	8.96200E+00	9.33155E-01	1.39653E-03	0.00000E+00	0.00000E+00
263	9.04271E-01	8.99683E+00	9.33044E-01	1.39557E-03	0.00000E+00	0.00000E+00
264	8.98266E-01	9.03167E+00	9.32912E-01	1.39655E-03	0.00000E+00	0.00000E+00
265	9.55485E-01	9.06550E+00	9.32997E-01	1.39388E-03	0.00000E+00	0.00000E+00
266	9.33548E-01	9.09850E+00	9.32999E-01	1.38859E-03	0.00000E+00	0.00000E+00
267	9.56080E-01	9.13317E+00	9.33087E-01	1.38608E-03	0.00000E+00	0.00000E+00
268	9.39827E-01	9.16517E+00	9.33112E-01	1.38109E-03	0.00000E+00	0.00000E+00
269	9.21043E-01	9.19817E+00	9.33067E-01	1.37665E-03	0.00000E+00	0.00000E+00
270	9.05240E-01	9.23200E+00	9.32963E-01	1.37543E-03	0.00000E+00	0.00000E+00
271	9.35161E-01	9.26600E+00	9.32971E-01	1.37033E-03	0.00000E+00	0.00000E+00
272	9.58771E-01	9.29883E+00	9.33067E-01	1.36858E-03	0.00000E+00	0.00000E+00
273	9.37723E-01	9.33183E+00	9.33084E-01	1.36363E-03	0.00000E+00	0.00000E+00
274	9.11992E-01	9.36667E+00	9.33006E-01	1.36082E-03	0.00000E+00	0.00000E+00
275	9.03998E-01	9.40333E+00	9.32900E-01	1.35999E-03	0.00000E+00	0.00000E+00
276	9.23672E-01	9.43717E+00	9.32966E-01	1.35543E-03	0.00000E+00	0.00000E+00
277	9.59550E-01	9.47100E+00	9.32963E-01	1.35397E-03	0.00000E+00	0.00000E+00
278	9.42304E-01	9.50400E+00	9.32999E-01	1.34953E-03	0.00000E+00	0.00000E+00
279	9.58298E-01	9.53600E+00	9.33090E-01	1.34775E-03	0.00000E+00	0.00000E+00
280	9.68298E-01	9.56983E+00	9.33217E-01	1.34888E-03	0.00000E+00	0.00000E+00
281	9.54490E-01	9.60183E+00	9.33294E-01	1.34620E-03	0.00000E+00	0.00000E+00

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282	9.05657E-01	9.63667E+00	9.33195E-01	1.34501E-03	0.00000E+00	0.00000E+00
283	9.47219E-01	9.67050E+00	9.33245E-01	1.34115E-03	0.00000E+00	0.00000E+00
284	9.51373E-01	9.70450E+00	9.33309E-01	1.33793E-03	0.00000E+00	0.00000E+00
285	9.59679E-01	9.73733E+00	9.33402E-01	1.33644E-03	0.00000E+00	0.00000E+00
286	9.45263E-01	9.77133E+00	9.33444E-01	1.33238E-03	0.00000E+00	0.00000E+00
287	9.77649E-01	9.80417E+00	9.33599E-01	1.33673E-03	0.00000E+00	0.00000E+00
288	8.93935E-01	9.84083E+00	9.33460E-01	1.33925E-03	0.00000E+00	0.00000E+00
289	9.55230E-01	9.87383E+00	9.33536E-01	1.33673E-03	0.00000E+00	0.00000E+00
290	9.40062E-01	9.90767E+00	9.33599E-01	1.33227E-03	0.00000E+00	0.00000E+00
291	9.60614E-01	9.94150E+00	9.33653E-01	1.33095E-03	0.00000E+00	0.00000E+00
292	9.39502E-01	9.97633E+00	9.33673E-01	1.32650E-03	0.00000E+00	0.00000E+00
293	9.03937E-01	1.00112E+01	9.33571E-01	1.32588E-03	0.00000E+00	0.00000E+00
294	9.05696E-01	1.00458E+01	9.33475E-01	1.32478E-03	0.00000E+00	0.00000E+00
295	9.57129E-01	1.00770E+01	9.33556E-01	1.32271E-03	0.00000E+00	0.00000E+00
296	8.99288E-01	1.01118E+01	9.33439E-01	1.32335E-03	0.00000E+00	0.00000E+00
297	8.80477E-01	1.01465E+01	9.33260E-01	1.33102E-03	0.00000E+00	0.00000E+00
298	8.99152E-01	1.01805E+01	9.33145E-01	1.33151E-03	0.00000E+00	0.00000E+00
299	8.93755E-01	1.02162E+01	9.33012E-01	1.33363E-03	0.00000E+00	0.00000E+00
300	9.30119E-01	1.02518E+01	9.33002E-01	1.32918E-03	0.00000E+00	0.00000E+00
301	8.74132E-01	1.02875E+01	9.32805E-01	1.33928E-03	0.00000E+00	0.00000E+00
302	8.94503E-01	1.03215E+01	9.32678E-01	1.34090E-03	0.00000E+00	0.00000E+00
303	9.07105E-01	1.03553E+01	9.32593E-01	1.33914E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.



LWT ANALYSIS: W17X17 OFA ASSEMBLY; WATER IN GAP

LIFETIME = 1.00988E-04 + OR - 2.94947E-07      GENERATION TIME = 3.85312E-05 + OR - 8.81779E-08  
 NU BAR = 2.43572E+00 + OR - 9.65096E-05      AVERAGE FISSION GROUP = 2.26571E+01 + OR - 5.04111E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.40077E-01 + OR - 6.25718E-04

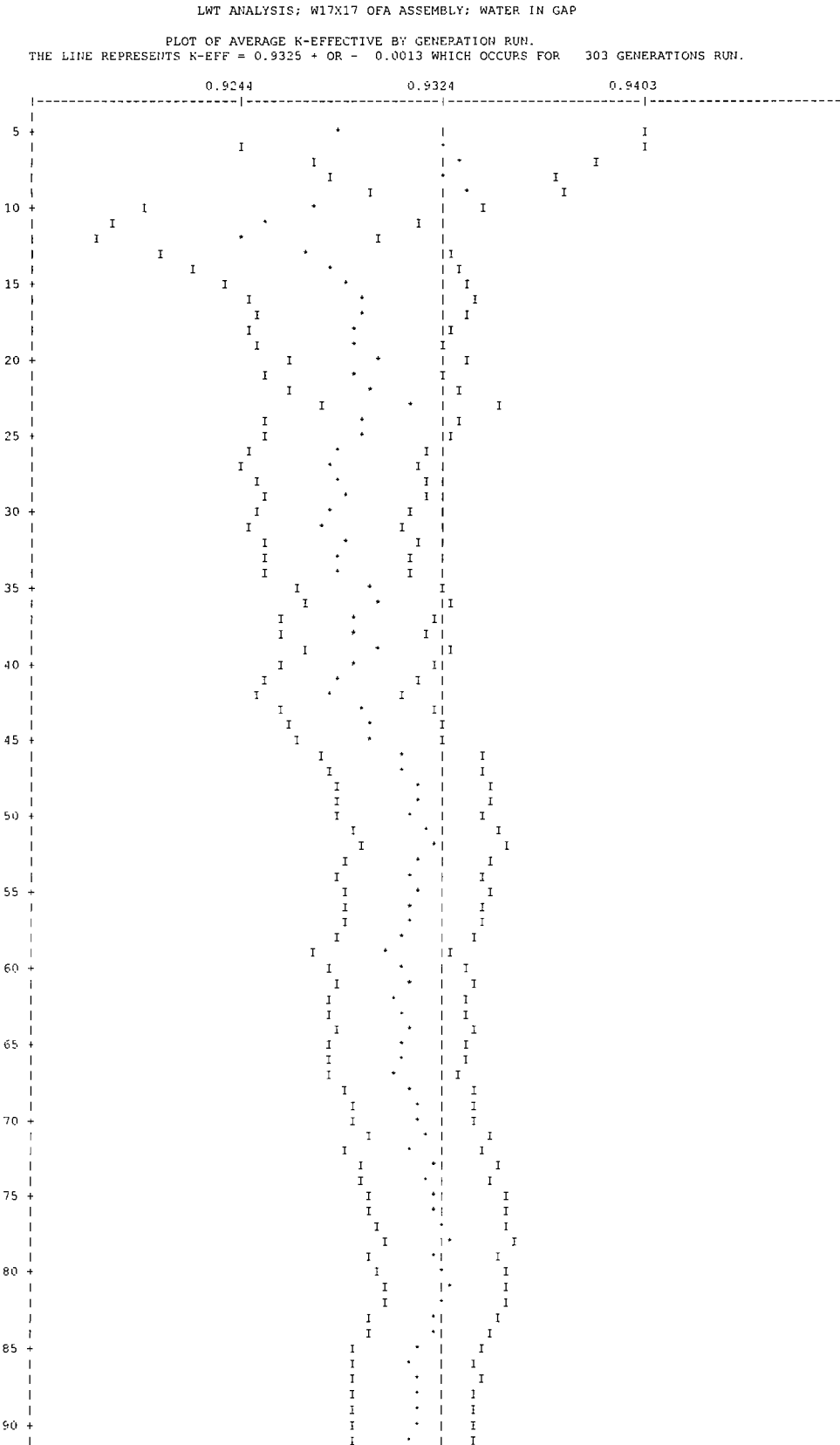
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
3	0.93252	+ OR - 0.00134	0.93118 TO 0.93386	0.92984 TO 0.93520	0.92850 TO 0.93655	300000
4	0.93249	+ OR - 0.00135	0.93115 TO 0.93384	0.92980 TO 0.93519	0.92846 TO 0.93653	299000
5	0.93255	+ OR - 0.00135	0.93120 TO 0.93390	0.92985 TO 0.93525	0.92850 TO 0.93660	298000
6	0.93252	+ OR - 0.00135	0.93117 TO 0.93387	0.92981 TO 0.93523	0.92846 TO 0.93659	297000
7	0.93251	+ OR - 0.00136	0.93116 TO 0.93387	0.92980 TO 0.93523	0.92844 TO 0.93659	296000
8	0.93252	+ OR - 0.00136	0.93116 TO 0.93388	0.92980 TO 0.93525	0.92843 TO 0.93661	295000
9	0.93250	+ OR - 0.00137	0.93113 TO 0.93387	0.92977 TO 0.93524	0.92840 TO 0.93660	294000
10	0.93264	+ OR - 0.00136	0.93128 TO 0.93401	0.92991 TO 0.93537	0.92855 TO 0.93674	293000
11	0.93271	+ OR - 0.00137	0.93134 TO 0.93408	0.92998 TO 0.93545	0.92861 TO 0.93682	292000
12	0.93277	+ OR - 0.00137	0.93140 TO 0.93414	0.93003 TO 0.93551	0.92866 TO 0.93688	291000
17	0.93267	+ OR - 0.00139	0.93128 TO 0.93406	0.92988 TO 0.93546	0.92849 TO 0.93685	286000
22	0.93271	+ OR - 0.00141	0.93129 TO 0.93412	0.92988 TO 0.93554	0.92846 TO 0.93695	281000
27	0.93290	+ OR - 0.00143	0.93147 TO 0.93433	0.93005 TO 0.93576	0.92862 TO 0.93718	276000
32	0.93293	+ OR - 0.00145	0.93148 TO 0.93438	0.93004 TO 0.93583	0.92859 TO 0.93728	271000
37	0.93295	+ OR - 0.00147	0.93149 TO 0.93442	0.93002 TO 0.93589	0.92856 TO 0.93735	266000
42	0.93317	+ OR - 0.00148	0.93169 TO 0.93465	0.93021 TO 0.93612	0.92874 TO 0.93760	261000
47	0.93278	+ OR - 0.00148	0.93130 TO 0.93426	0.92981 TO 0.93575	0.92833 TO 0.93723	256000
52	0.93260	+ OR - 0.00150	0.93110 TO 0.93410	0.92959 TO 0.93561	0.92809 TO 0.93711	251000
57	0.93279	+ OR - 0.00153	0.93127 TO 0.93432	0.92974 TO 0.93585	0.92821 TO 0.93737	246000
62	0.93298	+ OR - 0.00154	0.93144 TO 0.93452	0.92991 TO 0.93605	0.92837 TO 0.93759	241000
67	0.93301	+ OR - 0.00156	0.93145 TO 0.93458	0.92989 TO 0.93614	0.92833 TO 0.93770	236000
72	0.93286	+ OR - 0.00157	0.93129 TO 0.93443	0.92972 TO 0.93599	0.92816 TO 0.93756	231000
77	0.93249	+ OR - 0.00158	0.93092 TO 0.93407	0.92934 TO 0.93564	0.92777 TO 0.93722	226000
82	0.93249	+ OR - 0.00160	0.93089 TO 0.93409	0.92930 TO 0.93568	0.92770 TO 0.93728	221000
87	0.93291	+ OR - 0.00161	0.93131 TO 0.93452	0.92970 TO 0.93613	0.92809 TO 0.93774	216000
92	0.93307	+ OR - 0.00164	0.93143 TO 0.93472	0.92979 TO 0.93636	0.92814 TO 0.93801	211000

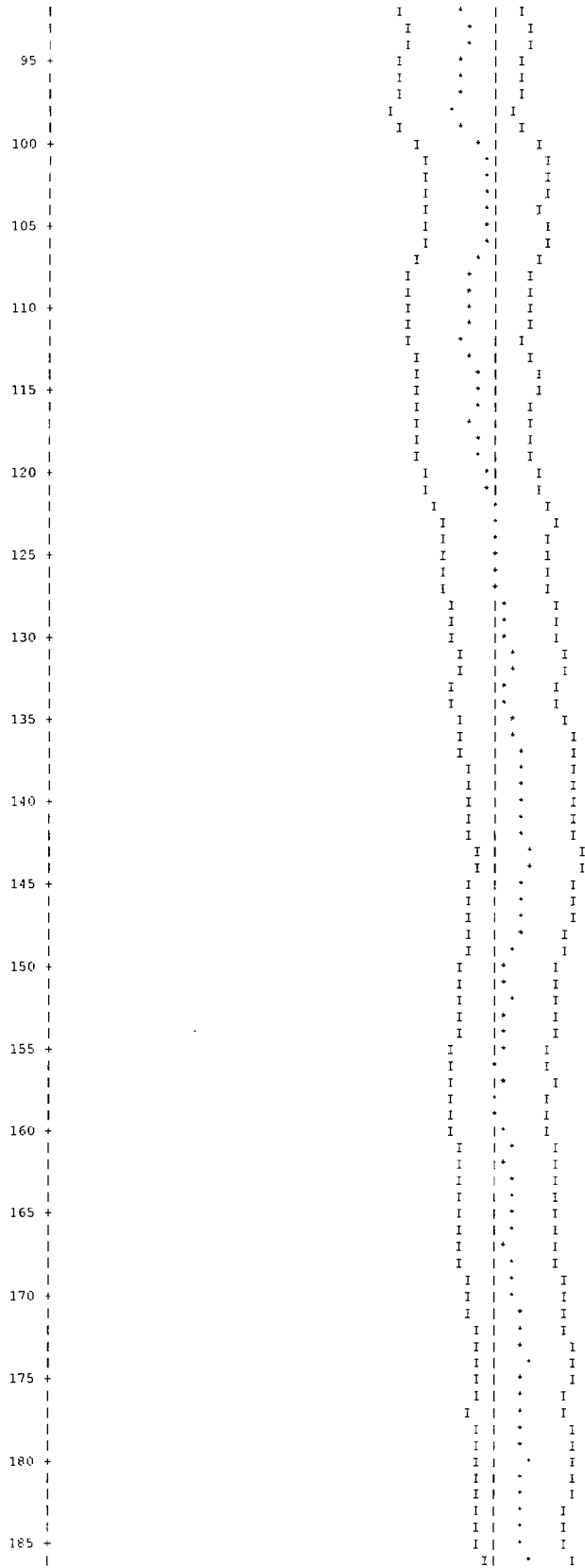
LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP

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	0.93315	+ OR - 0.00167	0.93148 TO 0.93482	0.92981 TO 0.93649	0.92814 TO 0.93816	206000
102	0.93271	+ OR - 0.00167	0.93104 TO 0.93438	0.92937 TO 0.93605	0.92770 TO 0.93772	201000
107	0.93281	+ OR - 0.00170	0.93111 TO 0.93452	0.92941 TO 0.93622	0.92770 TO 0.93793	196000
112	0.93320	+ OR - 0.00173	0.93146 TO 0.93493	0.92973 TO 0.93667	0.92800 TO 0.93840	191000
117	0.93307	+ OR - 0.00176	0.93130 TO 0.93483	0.92954 TO 0.93659	0.92778 TO 0.93836	186000
122	0.93259	+ OR - 0.00178	0.93080 TO 0.93437	0.92902 TO 0.93616	0.92724 TO 0.93794	181000
127	0.93251	+ OR - 0.00183	0.93068 TO 0.93434	0.92885 TO 0.93617	0.92702 TO 0.93800	176000
132	0.93203	+ OR - 0.00185	0.93018 TO 0.93388	0.92832 TO 0.93574	0.92647 TO 0.93759	171000
137	0.93187	+ OR - 0.00186	0.93001 TO 0.93373	0.92814 TO 0.93559	0.92628 TO 0.93746	166000
142	0.93166	+ OR - 0.00191	0.92975 TO 0.93357	0.92784 TO 0.93548	0.92593 TO 0.93739	161000
147	0.93169	+ OR - 0.00194	0.92975 TO 0.93364	0.92780 TO 0.93558	0.92586 TO 0.93753	156000
152	0.93203	+ OR - 0.00199	0.93004 TO 0.93402	0.92805 TO 0.93601	0.92607 TO 0.93800	151000
157	0.93219	+ OR - 0.00203	0.93016 TO 0.93423	0.92813 TO 0.93626	0.92609 TO 0.93829	146000
162	0.93201	+ OR - 0.00204	0.92997 TO 0.93405	0.92794 TO 0.93609	0.92590 TO 0.93813	141000
167	0.93200	+ OR - 0.00210	0.92990 TO 0.93410	0.92779 TO 0.93621	0.92569 TO 0.93831	136000
172	0.93129	+ OR - 0.00215	0.92914 TO 0.93344	0.92700 TO 0.93559	0.92485 TO 0.93773	131000
177	0.93134	+ OR - 0.00222	0.92913 TO 0.93356	0.92691 TO 0.93577	0.92470 TO 0.93799	126000
182	0.93096	+ OR - 0.00228	0.92868 TO 0.93323	0.92640 TO 0.93551	0.92413 TO 0.93779	121000
187	0.93065	+ OR - 0.00230	0.92836 TO 0.93295	0.92606 TO 0.93525	0.92377 TO 0.93754	116000
192	0.93048	+ OR - 0.00239	0.92809 TO 0.93286	0.92570 TO 0.93525	0.92332 TO 0.93763	111000
197	0.93008	+ OR - 0.00247	0.92761 TO 0.93255	0.92514 TO 0.93502	0.92267 TO 0.93749	106000
202	0.93030	+ OR - 0.00254	0.92776 TO 0.93283	0.92522 TO 0.93537	0.92269 TO 0.93791	101000
207	0.93039	+ OR - 0.00264	0.92776 TO 0.93303	0.92512 TO 0.93566	0.92249 TO 0.93830	96000
212	0.93055	+ OR - 0.00274	0.92781 TO 0.93328	0.92508 TO 0.93602	0.92234 TO 0.93875	91000
217	0.93083	+ OR - 0.00281	0.92802 TO 0.93364	0.92522 TO 0.93644	0.92241 TO 0.93925	86000
222	0.93107	+ OR - 0.00295	0.92812 TO 0.93402	0.92517 TO 0.93697	0.92223 TO 0.93991	81000
227	0.93140	+ OR - 0.00307	0.92833 TO 0.93447	0.92527 TO 0.93754	0.92220 TO 0.94060	76000

LWT ANALYSIS: W17X17 OFA ASSEMBLY: WATER IN GAP

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
232	0.93084	+ OR - 0.00309	0.92775 TO 0.93393	0.92466 TO 0.93701	0.92157 TO 0.94010	71000
237	0.93145	+ OR - 0.00318	0.92826 TO 0.93463	0.92508 TO 0.93792	0.92190 TO 0.94100	66000
242	0.93185	+ OR - 0.00335	0.92850 TO 0.93520	0.92515 TO 0.93855	0.92180 TO 0.94189	61000
247	0.93220	+ OR - 0.00358	0.92862 TO 0.93578	0.92503 TO 0.93936	0.92145 TO 0.94295	56000
252	0.93022	+ OR - 0.00369	0.92653 TO 0.93391	0.92284 TO 0.93760	0.91915 TO 0.94129	51000
257	0.92924	+ OR - 0.00390	0.92534 TO 0.93313	0.92144 TO 0.93703	0.91755 TO 0.94092	46000
262	0.92903	+ OR - 0.00428	0.92475 TO 0.93330	0.92047 TO 0.93758	0.91620 TO 0.94186	41000
267	0.92896	+ OR - 0.00463	0.92433 TO 0.93358	0.91970 TO 0.93821	0.91507 TO 0.94284	36000
272	0.92846	+ OR - 0.00522	0.92325 TO 0.93368	0.91803 TO 0.93890	0.91281 TO 0.94411	31000
277	0.92867	+ OR - 0.00600	0.92268 TO 0.93467	0.91668 TO 0.94066	0.91069 TO 0.94666	26000
282	0.92456	+ OR - 0.00675	0.91781 TO 0.93132	0.91106 TO 0.93807	0.90430 TO 0.94482	21000
287	0.91466	+ OR - 0.00703	0.90763 TO 0.92170	0.90060 TO 0.92873	0.89356 TO 0.93577	16000
292	0.90412	+ OR - 0.00688	0.89724 TO 0.91100	0.89036 TO 0.91787	0.88348 TO 0.92475	11000
297	0.89979	+ OR - 0.00752	0.89227 TO 0.90731	0.88475 TO 0.91483	0.87723 TO 0.92235	6000









LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0043			3.96333E-03	2.2101	2.32667E-03	1.5738	7.13220E-06	70.5924
2	0.0172			1.60748E-02	0.6729	9.15133E-03	0.5683	6.56993E-06	71.1810
3	0.0191			1.78139E-02	0.5962	7.42025E-03	0.5726	0.00000E+00	0.0000
4	0.0080			7.43939E-03	0.7686	3.56443E-03	0.7418	0.00000E+00	0.0000
5	0.0024			2.25833E-03	0.5724	2.43004E-03	0.5047	3.33836E-06	100.0000
6	0.0020			1.90579E-03	0.4378	4.02480E-03	0.3774	7.64047E-06	71.5891
7	0.0020			1.88267E-03	0.4394	4.57068E-03	0.3857	2.92771E-06	100.0000
8	0.0021			1.93315E-03	0.4678	6.88167E-03	0.3994	0.00000E+00	0.0000
9	0.0028			2.63764E-03	0.5077	1.07470E-02	0.4242	0.00000E+00	0.0000
10	0.0060			5.62159E-03	0.5638	1.65638E-02	0.4683	0.00000E+00	0.0000
11	0.0129			1.20234E-02	0.5301	2.72875E-02	0.4436	0.00000E+00	0.0000
12	0.0170			1.58775E-02	0.5790	2.92963E-02	0.5009	3.27701E-06	100.0000
13	0.0158			1.47503E-02	0.6289	2.92144E-02	0.5315	0.00000E+00	0.0000
14	0.0126			1.17142E-02	0.5393	4.22411E-02	0.4594	0.00000E+00	0.0000
15	0.0027			2.52808E-03	1.0582	8.58507E-03	0.8058	0.00000E+00	0.0000
16	0.0019			1.73386E-03	1.3526	5.11345E-03	0.9908	0.00000E+00	0.0000
17	0.0029			2.67751E-03	1.7290	3.51488E-03	1.0442	0.00000E+00	0.0000
18	0.0040			3.71272E-03	1.8852	3.72257E-03	1.2083	0.00000E+00	0.0000
19	0.0047			4.39970E-03	1.5321	5.76579E-03	0.9257	0.00000E+00	0.0000
20	0.0202			1.88134E-02	0.8208	2.28784E-02	0.6376	3.09353E-06	100.0000
21	0.0110			1.02323E-02	1.2799	1.00350E-02	0.8804	0.00000E+00	0.0000
22	0.0269			2.50706E-02	0.9306	2.32588E-02	0.6493	0.00000E+00	0.0000
23	0.1002			9.34293E-02	0.5043	9.17259E-02	0.3357	8.32955E-07	100.0000
24	0.2103			1.96081E-01	0.3276	1.90202E-01	0.2029	1.56009E-06	71.2983
25	0.1855			1.72976E-01	0.3897	1.65903E-01	0.2460	1.66667E-06	100.0000
26	0.2288			2.13321E-01	0.3454	2.05684E-01	0.2108	2.11603E-06	74.7173
27	0.0766			7.16497E-02	0.6616	7.04055E-02	0.3989	9.96604E-07	100.0000
SYSTEM TOTAL =				9.32521E-01	0.1439	1.00151E+00	0.0436	4.11515E-05	26.6621

ELAPSED TIME 10.35717 MINUTES

RANDOM NUMBER= 1EE413D01710



LWT ANALYSIS; W17X17 OFA ASSEMBLY; WATER IN GAP

```
                                FREQUENCY FOR GENERATIONS   4 TO 303
0.8692 TO 0.8818    ***
0.8818 TO 0.8945    *****
0.8945 TO 0.9071    *****
0.9071 TO 0.9198    *****
0.9198 TO 0.9324    *****
0.9324 TO 0.9451    *****
0.9451 TO 0.9577    *****
0.9577 TO 0.9704    *****
0.9704 TO 0.9830    *****
0.9830 TO 0.9957    **
```

```
                                FREQUENCY FOR GENERATIONS   79 TO 303
0.8692 TO 0.8818    ***
0.8818 TO 0.8945    *****
0.8945 TO 0.9071    *****
0.9071 TO 0.9198    *****
0.9198 TO 0.9324    *****
0.9324 TO 0.9451    *****
0.9451 TO 0.9577    *****
0.9577 TO 0.9704    *****
0.9704 TO 0.9830    *****
0.9830 TO 0.9957    *
```

```
                                FREQUENCY FOR GENERATIONS  154 TO 303
0.8692 TO 0.8818    **
0.8818 TO 0.8945    *****
0.8945 TO 0.9071    *****
0.9071 TO 0.9198    *****
0.9198 TO 0.9324    *****
0.9324 TO 0.9451    *****
0.9451 TO 0.9577    *****
0.9577 TO 0.9704    *****
0.9704 TO 0.9830    *****
0.9830 TO 0.9957    *
```

```
                                FREQUENCY FOR GENERATIONS  229 TO 303
0.8692 TO 0.8818    **
0.8818 TO 0.8945    *****
0.8945 TO 0.9071    *****
0.9071 TO 0.9198    *****
0.9198 TO 0.9324    *****
0.9324 TO 0.9451    *****
0.9451 TO 0.9577    *****
0.9577 TO 0.9704    *****
0.9704 TO 0.9830    *****
0.9830 TO 0.9957    **
```

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 10.35717 MINUTES  
.....  
\*

**6.6.2**      **BWR Fuel Assemblies**

This section contains abbreviated output files from the most reactive normal condition and accident condition moderator density variation cases.

Figure 6.6.2-1 CSAS Input/Output for NAC-LWT with BWR Fuel Assemblies – Most Reactive Normal Condition Configuration

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
NAC-LWT CASK MODEL; Exxon 9x9 - 2 Water Rods 80 MIL CHANNEL
27GROUPNDF4 LATTICECELL
UO2 1 0.95 293.0 92235 4.0 92238 96.0 END
ZIRCALLOY 2 1.0 293.0 END
H2O 3 1.0 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
FE 6 1.0 293.0 END
H2O 7 1.0 293.0 END
HCO 8 1.000 293.0 END
H2O 9 1.0E-20 293.0 END
END COMP
SQUAREPITCH 1.4529 0.9055 1 3 1.0770 2 0.9246 9 END
NAC-LWT CASK MODEL; Exxon 9x9 - 2 Water Rods 80 MIL CHANNEL
READ PARAM RUN=YES PLT=NO TME=5000 GEN=303 NPG=1000 END PARAM
READ GEOM
UNIT 1
COM='FUEL PIN CELL - WITH HCO'
CYLINDER 1 1 0.4528 2P10.0
CYLINDER 9 1 0.4623 2P10.0
CYLINDER 2 1 0.5385 2P10.0
CUBOID 3 1 4P0.7264 2P10.0
UNIT 2
COM='WATER ROD CELL - WITH H2O'
CYLINDER 3 1 0.4623 2P10.0
CYLINDER 2 1 0.5385 2P10.0
CUBOID 3 1 4P0.7264 2P10.0
UNIT 3
ARRAY 1 -6.5376 -6.5376 -10.0
CUBOID 3 1 4P6.7031 2P10.0
CUBOID 2 1 4P6.9063 2P10.0
CUBOID 3 1 4P7.3025 2P10.0
UNIT 4
ARRAY 1 -6.5376 -6.5376 -10.0
CUBOID 3 1 4P6.7031 2P10.0
CUBOID 2 1 4P6.9063 2P10.0
CUBOID 3 1 4P7.3025 2P10.0
UNIT 5
CYLINDER 4 1 16.8275 2P10.0
HOLE 3 -7.4613 0.0 0.0
HOLE 4 7.4613 0.0 0.0
CYLINDER 3 1 16.9863 2P10.0
CYLINDER 5 1 18.8913 2P10.0
CYLINDER 6 1 33.4963 2P10.0
CYLINDER 5 1 36.5443 2P10.0
CYLINDER 7 1 49.2443 2P10.0
CYLINDER 5 1 49.8539 2P10.0
GLOBAL UNIT 6
CYLINDER 8 1 696.00 2P10.0
HOLE 5 00.00 00.00 0.0
HOLE 5 00.00 243.80 0.0
HOLE 5 211.17 121.90 0.0
HOLE 5 211.17 -121.90 0.0
HOLE 5 00.00 -243.80 0.0
HOLE 5 -211.17 -121.90 0.0
HOLE 5 -211.17 121.90 0.0
HOLE 5 0.0 487.7 0.0
HOLE 5 211.2 365.8 0.0
HOLE 5 422.3 243.8 0.0
HOLE 5 422.3 0.0 0.0
HOLE 5 422.3 -243.8 0.0
HOLE 5 211.2 -365.8 0.0
HOLE 5 0.0 -487.7 0.0
HOLE 5 -211.2 -365.8 0.0
HOLE 5 -422.3 -243.88 0.0
HOLE 5 -422.3 0.0 0.0
HOLE 5 -422.3 243.8 0.0
HOLE 5 -211.2 365.8 0.0
HOLE 5 633.51 121.9 0.0
CUBOID 8 1 4P696.00 2P10.0
END GEOM
READ ARRAY
ARA=1 NUX=9 HUY=9 HUZ=1 FILL
36R1
4R1 2 4R1
5R1 2 3R1
27R1
END FILL
END ARRAY
READ BOUNDS ZFC=PER YXF=H2O END BOUNDS
END DATA

SECONDARY MODULE 000006 HAS BEEN CALLED.

MODULE 000006 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.61 (SECONDS).
```

SECONDARY MODULE 000002 HAS BEEN CALLED.  
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 5.98 (SECONDS).  
SECONDARY MODULE 000009 HAS BEEN CALLED.  
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 440.77 (SECONDS).  
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 448.85 (SECONDS).

```
CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  5555555555555
CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  5555555555555
CC          SS      SS  AA      AA  SS      SS  22      22  55      55
CC          SS      SS  AA      AA  SS      SS  22      22  55      55
CC          SS      SS  AA      AA  SS      SS  22      22  55      55
CC          SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  22      22  5555555555555
CC          SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  22      22  5555555555555
CC          SS      SS  AA      AA  SS      SS  22      22  55      55
CC          SS      SS  AA      AA  SS      SS  22      22  55      55
CC          SS      SS  AA      AA  SS      SS  22      22  55      55
CCCCCCCCC  SSSSSSSSS  AA      AA  SSSSSSSSS  222222222  5555555555555
CCCCCCCCC  SSSSSSSSS  AA      AA  SSSSSSSSS  222222222  5555555555555
```

```
SSSSSSSSSS  CCCCCCCCC  AAAAAAAAA  LL          EEEEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SSSSSSSSSS  CCCCCCCCC  AAAAAAAAA  LL          EEEEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SS          SS  CC      CC  AA      AA  LL          EE          PP          PP  CC      CC
SS          SS  CC      CC  AA      AA  LL          EE          PP          PP  CC      CC
SS          SS  CC      CC  AA      AA  LL          EE          PP          PP  CC      CC
SSSSSSSSSS  CC          AAAAAAAAA  LL          EEEEEEEEE  -----  PPPPPPPPP  CC
SSSSSSSSSS  CC          AAAAAAAAA  LL          EEEEEEEEE  -----  PPPPPPPPP  CC
SS          SS  CC      CC  AA      AA  LL          EE          PP          PP  CC      CC
SS          SS  CC      CC  AA      AA  LL          EE          PP          PP  CC      CC
SS          SS  CC      CC  AA      AA  LL          EE          PP          PP  CC      CC
SSSSSSSSSS  CCCCCCCCC  AA      AA  LLLLLLLLL  EEEEEEEEEEE  PP          CCCCCCCCC
SSSSSSSSSS  CCCCCCCCC  AA      AA  LLLLLLLLL  EEEEEEEEEEE  PP          CCCCCCCCC
```

```
0000000  7777777777  //          222222222  333333333  //          999999999  888888888
00000000  7777777777  //          222222222  333333333  //          999999999  888888888
00      00  77      77  //          22      22  33      33  //          99      99  88      88
00      00  77      77  //          22      22  33      33  //          99      99  88      88
00      00  77      77  //          22      22  33      33  //          99      99  88      88
00      00  77      77  //          22      22  33      33  //          999999999  888888888
00      00  77      77  //          22      22  33      33  //          999999999  888888888
00      00  77      77  //          22      22  33      33  //          99      99  88      88
00      00  77      77  //          22      22  33      33  //          99      99  88      88
00      00  77      77  //          22      22  33      33  //          99      99  88      88
00000000  77      77  //          222222222  333333333  //          999999999  888888888
0000000  77      77  //          222222222  333333333  //          999999999  888888888
```

```
222222222  11          11          222222222  333333333  333333333
222222222  111        111        222222222  333333333  333333333
22      22  1111      :::      1111      22      22  33      33  33      33
      22  11      11      11      22      22  33      33  33      33
      22  11      11      11      22      22  33      33  33      33
      22  11      11      11      22      22  33      33  33      33
      22  11      11      11      22      22  33      33  33      33
      22  11      11      11      22      22  33      33  33      33
      22  11      11      11      22      22  33      33  33      33
222222222  1111111  1111111  222222222  333333333  333333333
222222222  1111111  1111111  222222222  333333333  333333333
```



NAC-LWT CASK MODEL: EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
 MX 9 MIXTURES  
 MSC 9 COMPOSITION SPECIFICATIONS  
 IZM 4 MATERIAL ZONES  
 GE LATTICECELL GEOMETRY  
 MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
 MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
 MX 1 MIXTURE NO.  
 VF 0.9500 VOLUME FRACTION  
 ROTH 10.9600 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 92000 1.00 ATOM/MOLECULE  
 92235 4.000 WT%  
 92238 96.000 WT%  
 8016 2.00 ATOMS/MOLECULE  
 END

SC ZIRCALLOY STANDARD COMPOSITION  
 MX 2 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 6.5600 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 40302 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 3 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC AL STANDARD COMPOSITION  
 MX 4 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 2.7020 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 13027 1.00 ATOM/MOLECULE  
 END

SC SS304 STANDARD COMPOSITION  
 MX 5 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 7.9200 THEORETICAL DENSITY  
 NEL 4 NO. ELEMENTS  
 ICP 0 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 24304 19.000 WT%  
 25055 2.000 WT%  
 26304 69.500 WT%  
 28304 9.500 WT%  
 END

SC PB STANDARD COMPOSITION  
 MX 6 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 11.3440 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 82000 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 7 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION

```
MX          8 MIXTURE NO.  
VF          1.0000 VOLUME FRACTION  
ROTH        0.9982 THEORETICAL DENSITY  
NEL         2 NO. ELEMENTS  
ICP         1 0/1 MIXTURE/COMPOUND  
TEMP        293.0 DEG KELVIN  
           1001      2.00 ATOMS/MOLECULE  
           8016      1.00 ATOM/MOLECULE  
END
```

```
SC H2O      STANDARD COMPOSITION  
MX          9 MIXTURE NO.  
VF          0.0000 VOLUME FRACTION  
ROTH        0.9982 THEORETICAL DENSITY  
NEL         2 NO. ELEMENTS  
ICP         1 0/1 MIXTURE/COMPOUND  
TEMP        293.0 DEG KELVIN  
           1001      2.00 ATOMS/MOLECULE  
           8016      1.00 ATOM/MOLECULE  
END
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP SQUAREPITCH CELL TYPE  
PITCH       1.4529 CM CENTER TO CENTER SPACING  
FUELOD      0.9055 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL       1 MIXTURE NO. OF FUEL  
MMOD        3 MIXTURE NO. OF MODERATOR  
CLADOD      1.0770 CM CLAD OUTER DIAMETER  
MCLAD       2 MIXTURE NO. OF CLAD  
GAPOD       0.9246 CM GAP OUTER DIAMETER  
MGAP        9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```



```
.....
***
***              NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS  80 MIL CHANNEL
***
.....
***              ***** DATA LIBRARY INFORMATION *****
***
***              UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION
***              NUMBER        DATA SET NAME          NAME            -----
***              -----
***              89           G:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***              82           G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***              11           D:\PROJECTS\BU85-C-1\BWRFIN\19NZ2M\FT11F001  SHORT CROSS SECTION LIBRARY
***              90           D:\PROJECTS\BU85-C-1\BWRFIN\19NZ2M\FT90F001  INPUT DATA DIRECT ACCESS
***
.....
***              STANDARD COMPOSITION LIBRARY DATA
***              -----
***
***              UNIT NUMBER   : 89
***
***              DATASET NAME  : G:\scale43\DATALIB\FT89F001
***
***              LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
***              637 STANDARD COMPOSITIONS, 490 NUCLIDES
***              90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***              CREATION DATE: 6/30/95
***
.....
***              CROSS SECTION LIBRARY DATA
***              -----
***
***              UNIT NUMBER   : 82
***
***              DATASET NAME  : G:\scale43\DATALIB\FT82F001
***
***              LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***              BASED ON ENDF-B VERSION 4 DATA
***              COMPILED FOR NRC    1/27/89
***              LAST UPDATED
***              L.M.PETRIE   -   ORNL
***
***              08/12/94
***
.....

```

```
..... 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.



```

.....
***
***                               NAC-LWT CASK MODEL: EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL
***
.....
***                               *****
***                               NUMERIC PARAMETERS
***                               *****
***
***      TME      MAXIMUM PROBLEM TIME (MIN)      *****
***
***      TBA      TIME PER GENERATION (MIN)      0.50
***
***      GEN      NUMBER OF GENERATIONS      303
***
***      NPG      NUMBER PER GENERATION      1000
***
***      NSK      NUMBER OF GENERATIONS TO BE SKIPPED      3
***
***      BEG      BEGINNING GENERATION NUMBER      1
***
***      RES      GENERATIONS BETWEEN CHECKPOINTS      0
***
***      X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS      1
***
***      NBK      NEUTRON BANK SIZE      1025
***
***      XNB      EXTRA POSITIONS IN NEUTRON BANK      0
***
***      NFB      FISSION BANK SIZE      1000
***
***      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      BB627100001
***
***      NE8      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
***
.....

```



```

.....
***
***          NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS  80 MIL CHANNEL
***
.....
***
***          ***** ADDITIONAL INFORMATION *****
***
*** NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          YES
***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1      GLOBAL APRAY NUMBER          0
***
*** NO. OF SCATTERING ANGLES IN XSECS   2      NUMBER OF UNITS IN THE GLOBAL X DIR.  0
***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 19      NUMBER OF UNITS IN THE GLOBAL Y DIR.  0
***
*** ENTRIES/NEUTRON IN THE FISSION BANK 12      NUMBER OF UNITS IN THE GLOBAL Z DIR.  0
***
*** NUMBER OF MIXTURES USED             9      USE A GLOBAL REFLECTOR          YES
***
*** NUMBER OF BIAS ID'S USED            1      USE NESTED HOLES                YES
***
*** NUMBER OF DIFFERENTIAL ALBEDOS USED  1      NUMBER OF HOLES                 22
***
*** TOTAL INPUT GEOMETRY REGIONS        24      MAXIMUM HOLE NESTING LEVEL      2
***
*** NUMBER OF GEOMETRY REGIONS USED     24      USE NESTED ARRAYS              NO
***
*** LARGEST GEOMETRY UNIT NUMBER        6      NUMBER OF ARRAYS USED          1
***
*** LARGEST ARRAY NUMBER                 1      MAXIMUM ARRAY NESTING LEVEL    1
***
*** +X BOUNDARY CONDITION                H2O     -X BOUNDARY CONDITION          H2O
***
*** +Y BOUNDARY CONDITION                H2O     -Y BOUNDARY CONDITION          H2O
***
*** +Z BOUNDARY CONDITION                PER     -Z BOUNDARY CONDITION          PER
***
.....

```

```

.....
***
***          NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS  80 MIL CHANNEL
***
.....
***
***          ***** SPACE AND SUPERGROUP INFORMATION *****
***
*** 100000 WORDS IS THE TOTAL SPACE AVAILABLE.
***
*** 34647 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
***
*** 65353 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
***
*** 99458 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
***
*** 65292 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
***
*** 1576 WORDS ARE NEEDED FOR THE LARGEST GROUP.
***
*** 36466 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
***
*** 51430 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
***
*** 51872 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.
***
.....
***
***          SUPERGROUP      STARTING      ENDING      XSEC      ALBEDO      TOTAL
***          SUPERGROUP      GROUP      GROUP      LENGTH      LENGTH      LENGTH
***
***          1              1          27         2764       544        16854
***
.....

```

```

..... 0 IO'S WERE USED IN SUPERGROUPING .....
..... 0 IO'S WERE USED LOADING THE DATA .....

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NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 1 -----								
FUEL PIN CELL - WITH H2O								
1	CYLINDER	1	1	RADIUS = 0.45280	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2	CYLINDER	9	1	RADIUS = 0.46230	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CYLINDER	2	1	RADIUS = 0.53850	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4	CUBOID	3	1	+X = 0.72640	-X = -0.72640	+Y = 0.72640	-Y = -0.72640	+Z = 10.000 -Z = -10.000
----- UNIT 2 -----								
WATER ROD CELL - WITH H2O								
1	CYLINDER	3	1	RADIUS = 0.46230	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2	CYLINDER	2	1	RADIUS = 0.53850	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CUBOID	3	1	+X = 0.72640	-X = -0.72640	+Y = 0.72640	-Y = -0.72640	+Z = 10.000 -Z = -10.000
----- UNIT 3 EXTERNAL TO LATTICE 1 -----								
1	ARRAY NUMBER	1		+X = 6.5376	-X = -6.5376	+Y = 6.5376	-Y = -6.5376	+Z = 10.000 -Z = -10.000
2	CUBOID	3	1	+X = 6.7031	-X = -6.7031	+Y = 6.7031	-Y = -6.7031	+Z = 10.000 -Z = -10.000
3	CUBOID	2	1	+X = 6.9063	-X = -6.9063	+Y = 6.9063	-Y = -6.9063	+Z = 10.000 -Z = -10.000
4	CUBOID	3	1	+X = 7.3025	-X = -7.3025	+Y = 7.3025	-Y = -7.3025	+Z = 10.000 -Z = -10.000
----- UNIT 4 EXTERNAL TO LATTICE 1 -----								
1	ARRAY NUMBER	1		+X = 6.5376	-X = -6.5376	+Y = 6.5376	-Y = -6.5376	+Z = 10.000 -Z = -10.000
2	CUBOID	3	1	+X = 6.7031	-X = -6.7031	+Y = 6.7031	-Y = -6.7031	+Z = 10.000 -Z = -10.000
3	CUBOID	2	1	+X = 6.9063	-X = -6.9063	+Y = 6.9063	-Y = -6.9063	+Z = 10.000 -Z = -10.000
4	CUBOID	3	1	+X = 7.3025	-X = -7.3025	+Y = 7.3025	-Y = -7.3025	+Z = 10.000 -Z = -10.000

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 5 -----								
1	CYLINDER	4	1	RADIUS = 16.827	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	1		AT X = -7.4613	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	3
	HOLE NUMBER	2		AT X = 7.4613	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4
2	CYLINDER	3	1	RADIUS = 16.986	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CYLINDER	5	1	RADIUS = 18.891	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4	CYLINDER	6	1	RADIUS = 33.496	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5	CYLINDER	5	1	RADIUS = 36.544	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
6	CYLINDER	7	1	RADIUS = 49.244	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
7	CYLINDER	5	1	RADIUS = 49.854	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
..... GLOBAL ..... ----- UNIT 6 -----								
1	CYLINDER	8	1	RADIUS = 696.00	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	3		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	4		AT X = 0.00000	Y = 243.80	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	5		AT X = 211.17	Y = 121.90	Z = 0.00000	IS UNIT NUMBER	5

HOLE NUMBER	6	AT X =	211.17	Y =	-121.90	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	7	AT X =	0.00000	Y =	-243.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	8	AT X =	-211.17	Y =	-121.90	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	9	AT X =	-211.17	Y =	121.90	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	10	AT X =	0.00000	Y =	487.70	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	11	AT X =	211.20	Y =	365.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	12	AT X =	422.30	Y =	243.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	13	AT X =	422.30	Y =	0.00000	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	14	AT X =	422.30	Y =	-243.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	15	AT X =	211.20	Y =	-365.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	16	AT X =	0.00000	Y =	-487.70	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	17	AT X =	-211.20	Y =	-365.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	18	AT X =	-422.30	Y =	-243.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	19	AT X =	-422.30	Y =	0.00000	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	20	AT X =	-422.30	Y =	243.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	21	AT X =	-211.20	Y =	365.80	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	22	AT X =	633.51	Y =	121.90	Z =	0.00000	IS UNIT NUMBER	5				
2 CUBOID	8 1	+X =	696.00	-X =	-696.00	+Y =	696.00	-Y =	-696.00	+Z =	10.000	-Z =	-10.000

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 9 LEFT TO RIGHT Y ROW 1 TO 9 BOTTOM TO TOP

```

1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 2 1 1 1
1 1 1 1 2 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1

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VOLUME FRACTION OF FISSIONABLE MATERIAL IN THE CORE= 1.30338E-02

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 6.96000E+02 -X=-6.96000E+02 +Y= 6.96000E+02 -Y=-6.96000E+02 +Z= 1.00000E+01 -Z=-1.00000E+01

THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 24 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

976 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

0.45333 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.46933 MINUTES.

\_NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

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	0.03015E-01	WARNING... ONLY	874 INDEPENDENT	FISSION POINTS WERE	GENERATED	0.00000E+00
1	8.03015E-01	4.86000E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	0.55134E-01	WARNING... ONLY	967 INDEPENDENT	FISSION POINTS WERE	GENERATED	0.00000E+00
2	8.55134E-01	5.08000E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	0.61212E-01	WARNING... ONLY	904 INDEPENDENT	FISSION POINTS WERE	GENERATED	0.00000E+00
3	8.61212E-01	5.29000E-01	8.61212E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	8.44058E-01	5.51000E-01	8.52635E-01	8.57702E-03	0.00000E+00	0.00000E+00
5	8.82350E-01	5.73833E-01	8.62540E-01	1.10737E-02	0.00000E+00	0.00000E+00
6	8.47498E-01	5.97667E-01	8.58780E-01	8.68646E-03	0.00000E+00	0.00000E+00
7	8.51571E-01	6.20667E-01	8.57338E-01	6.88123E-03	0.00000E+00	0.00000E+00
8	8.93368E-01	6.41667E-01	8.63343E-01	8.22366E-03	0.00000E+00	0.00000E+00
9	8.33529E-01	6.64500E-01	8.59084E-01	8.15146E-03	0.00000E+00	0.00000E+00
10	8.36796E-01	6.87333E-01	8.56298E-01	7.58924E-03	0.00000E+00	0.00000E+00
11	8.82450E-01	7.09333E-01	8.59204E-01	7.29663E-03	0.00000E+00	0.00000E+00
12	8.44942E-01	7.32333E-01	8.57778E-01	6.68031E-03	0.00000E+00	0.00000E+00
13	8.42681E-01	7.55167E-01	8.56405E-01	6.19646E-03	0.00000E+00	0.00000E+00
14	8.42487E-01	7.78000E-01	8.55245E-01	5.77424E-03	0.00000E+00	0.00000E+00
15	8.27233E-01	8.01000E-01	8.53091E-01	5.73198E-03	0.00000E+00	0.00000E+00
16	8.58392E-01	8.23933E-01	8.53469E-01	5.32028E-03	0.00000E+00	0.00000E+00
17	8.42240E-01	8.45833E-01	8.52721E-01	5.00917E-03	0.00000E+00	0.00000E+00
18	8.33538E-01	8.68667E-01	8.51522E-01	4.83660E-03	0.00000E+00	0.00000E+00
19	8.75942E-01	8.91500E-01	8.52958E-01	4.76489E-03	0.00000E+00	0.00000E+00
20	8.17923E-01	9.15333E-01	8.51012E-01	4.89591E-03	0.00000E+00	0.00000E+00
21	8.49207E-01	9.40000E-01	8.50917E-01	4.63204E-03	0.00000E+00	0.00000E+00
22	8.28669E-01	9.63000E-01	8.49804E-01	4.53294E-03	0.00000E+00	0.00000E+00
23	8.19649E-01	9.85833E-01	8.48368E-01	4.54452E-03	0.00000E+00	0.00000E+00
24	8.72484E-01	1.00867E+00	8.49465E-01	4.46954E-03	0.00000E+00	0.00000E+00
25	8.08727E-01	1.03250E+00	8.47693E-01	4.62351E-03	0.00000E+00	0.00000E+00
26	8.63732E-01	1.05450E+00	8.48362E-01	4.47683E-03	0.00000E+00	0.00000E+00
27	8.27315E-01	1.07650E+00	8.47520E-01	4.37577E-03	0.00000E+00	0.00000E+00
28	8.69706E-01	1.09933E+00	8.48373E-01	4.28983E-03	0.00000E+00	0.00000E+00
29	8.44903E-01	1.12217E+00	8.48245E-01	4.12989E-03	0.00000E+00	0.00000E+00
30	8.33130E-01	1.14417E+00	8.47705E-01	4.01610E-03	0.00000E+00	0.00000E+00
31	8.77643E-01	1.16617E+00	8.48737E-01	4.01030E-03	0.00000E+00	0.00000E+00
32	8.42523E-01	1.18900E+00	8.48530E-01	3.87985E-03	0.00000E+00	0.00000E+00
33	8.60517E-01	1.21100E+00	8.48917E-01	3.77248E-03	0.00000E+00	0.00000E+00
34	8.50583E-01	1.23400E+00	8.48969E-01	3.65306E-03	0.00000E+00	0.00000E+00
35	8.98333E-01	1.25683E+00	8.50162E-01	3.73617E-03	0.00000E+00	0.00000E+00
36	8.28639E-01	1.27967E+00	8.49529E-01	3.67948E-03	0.00000E+00	0.00000E+00
37	8.98219E-01	1.30167E+00	8.50920E-01	3.83409E-03	0.00000E+00	0.00000E+00
38	8.55574E-01	1.32450E+00	8.51049E-01	3.72831E-03	0.00000E+00	0.00000E+00
39	8.64577E-01	1.34833E+00	8.51415E-01	3.64453E-03	0.00000E+00	0.00000E+00
40	8.18400E-01	1.37217E+00	8.50546E-01	3.65217E-03	0.00000E+00	0.00000E+00
41	8.44594E-01	1.39500E+00	8.50393E-01	3.56056E-03	0.00000E+00	0.00000E+00
42	8.25882E-01	1.41800E+00	8.49780E-01	3.52409E-03	0.00000E+00	0.00000E+00
43	8.94276E-01	1.43900E+00	8.50866E-01	3.60433E-03	0.00000E+00	0.00000E+00
44	8.48984E-01	1.46100E+00	8.50821E-01	3.51775E-03	0.00000E+00	0.00000E+00
45	8.38897E-01	1.48283E+00	8.50544E-01	3.44615E-03	0.00000E+00	0.00000E+00
46	8.27345E-01	1.50483E+00	8.50016E-01	3.40795E-03	0.00000E+00	0.00000E+00
47	8.43568E-01	1.52867E+00	8.49873E-01	3.33443E-03	0.00000E+00	0.00000E+00
48	8.34958E-01	1.55067E+00	8.49549E-01	3.27722E-03	0.00000E+00	0.00000E+00
49	8.28192E-01	1.57350E+00	8.49094E-01	3.23877E-03	0.00000E+00	0.00000E+00
50	8.79751E-01	1.59550E+00	8.49733E-01	3.23426E-03	0.00000E+00	0.00000E+00
51	8.30097E-01	1.61833E+00	8.49332E-01	3.19282E-03	0.00000E+00	0.00000E+00
52	8.31352E-01	1.64217E+00	8.48973E-01	3.14891E-03	0.00000E+00	0.00000E+00
53	8.02345E-01	1.66517E+00	8.48058E-01	3.21911E-03	0.00000E+00	0.00000E+00
54	8.29723E-01	1.68700E+00	8.47898E-01	3.16067E-03	0.00000E+00	0.00000E+00
55	8.40903E-01	1.71000E+00	8.47766E-01	3.10326E-03	0.00000E+00	0.00000E+00
56	8.68127E-01	1.73183E+00	8.48143E-01	3.06851E-03	0.00000E+00	0.00000E+00
57	8.55930E-01	1.75483E+00	8.48285E-01	3.01553E-03	0.00000E+00	0.00000E+00
58	8.32171E-01	1.77683E+00	8.47997E-01	2.97514E-03	0.00000E+00	0.00000E+00
59	8.32146E-01	1.79967E+00	8.47719E-01	2.93568E-03	0.00000E+00	0.00000E+00
60	8.61564E-01	1.82250E+00	8.47958E-01	2.89448E-03	0.00000E+00	0.00000E+00
61	8.36321E-01	1.84550E+00	8.47760E-01	2.85182E-03	0.00000E+00	0.00000E+00
62	8.22286E-01	1.87017E+00	8.47336E-01	2.83585E-03	0.00000E+00	0.00000E+00
63	8.05083E-01	1.89300E+00	8.46643E-01	2.87370E-03	0.00000E+00	0.00000E+00
64	8.58331E-01	1.91500E+00	8.46832E-01	2.83325E-03	0.00000E+00	0.00000E+00
65	8.31174E-01	1.93783E+00	8.46583E-01	2.79897E-03	0.00000E+00	0.00000E+00
66	8.26488E-01	1.96083E+00	8.46269E-01	2.77273E-03	0.00000E+00	0.00000E+00
67	8.41472E-01	1.98183E+00	8.46195E-01	2.73073E-03	0.00000E+00	0.00000E+00
68	8.70657E-01	2.00567E+00	8.46566E-01	2.71446E-03	0.00000E+00	0.00000E+00
69	8.59016E-01	2.02850E+00	8.46751E-01	2.68009E-03	0.00000E+00	0.00000E+00
70	8.64105E-01	2.05133E+00	8.47007E-01	2.65269E-03	0.00000E+00	0.00000E+00
71	8.65970E-01	2.07433E+00	8.47282E-01	2.62837E-03	0.00000E+00	0.00000E+00
72	8.45386E-01	2.09717E+00	8.47255E-01	2.59069E-03	0.00000E+00	0.00000E+00
73	8.20063E-01	2.12183E+00	8.46872E-01	2.58249E-03	0.00000E+00	0.00000E+00
74	8.18769E-01	2.14383E+00	8.46482E-01	2.57611E-03	0.00000E+00	0.00000E+00
75	8.28930E-01	2.16667E+00	8.46241E-01	2.55193E-03	0.00000E+00	0.00000E+00

76	8.41596E-01	2.19050E+00	8.46178E-01	2.51799E-03	0.00000E+00	0.00000E+00
77	8.55685E-01	2.21350E+00	8.46305E-01	2.48742E-03	0.00000E+00	0.00000E+00
78	8.53658E-01	2.23633E+00	8.46402E-01	2.45638E-03	0.00000E+00	0.00000E+00
79	8.74212E-01	2.25917E+00	8.46763E-01	2.45103E-03	0.00000E+00	0.00000E+00
80	8.66232E-01	2.28200E+00	8.47013E-01	2.43224E-03	0.00000E+00	0.00000E+00
81	8.25765E-01	2.30500E+00	8.46744E-01	2.41627E-03	0.00000E+00	0.00000E+00
82	8.22817E-01	2.32700E+00	8.46445E-01	2.40455E-03	0.00000E+00	0.00000E+00
83	8.19809E-01	2.35067E+00	8.46116E-01	2.39734E-03	0.00000E+00	0.00000E+00
84	8.41692E-01	2.37367E+00	8.46062E-01	2.36954E-03	0.00000E+00	0.00000E+00
85	8.63550E-01	2.39650E+00	8.46513E-01	2.38302E-03	0.00000E+00	0.00000E+00
86	8.57558E-01	2.41933E+00	8.46645E-01	2.35815E-03	0.00000E+00	0.00000E+00
87	8.91905E-01	2.44133E+00	8.47177E-01	2.39030E-03	0.00000E+00	0.00000E+00
88	8.35818E-01	2.46333E+00	8.47045E-01	2.36603E-03	0.00000E+00	0.00000E+00
89	8.49144E-01	2.48533E+00	8.47069E-01	2.33880E-03	0.00000E+00	0.00000E+00
90	8.47923E-01	2.50917E+00	8.47079E-01	2.31210E-03	0.00000E+00	0.00000E+00
91	8.38329E-01	2.53200E+00	8.46981E-01	2.28808E-03	0.00000E+00	0.00000E+00
92	8.46967E-01	2.55583E+00	8.46981E-01	2.26252E-03	0.00000E+00	0.00000E+00
93	8.22641E-01	2.57867E+00	8.46713E-01	2.25345E-03	0.00000E+00	0.00000E+00
94	8.38773E-01	2.60150E+00	8.46627E-01	2.23049E-03	0.00000E+00	0.00000E+00
95	8.72416E-01	2.62533E+00	8.46904E-01	2.22373E-03	0.00000E+00	0.00000E+00
96	8.42833E-01	2.64733E+00	8.46861E-01	2.20037E-03	0.00000E+00	0.00000E+00
97	8.39828E-01	2.67117E+00	8.46787E-01	2.17835E-03	0.00000E+00	0.00000E+00
98	8.20131E-01	2.69500E+00	8.46509E-01	2.17335E-03	0.00000E+00	0.00000E+00
99	8.27881E-01	2.71783E+00	8.46317E-01	2.15938E-03	0.00000E+00	0.00000E+00
100	8.89356E-01	2.73883E+00	8.46756E-01	2.18189E-03	0.00000E+00	0.00000E+00
101	8.75624E-01	2.76083E+00	8.47048E-01	2.17933E-03	0.00000E+00	0.00000E+00
102	8.58070E-01	2.78283E+00	8.47158E-01	2.16024E-03	0.00000E+00	0.00000E+00
103	8.50954E-01	2.80567E+00	8.47195E-01	2.13906E-03	0.00000E+00	0.00000E+00
104	8.25914E-01	2.82867E+00	8.46986E-01	2.12824E-03	0.00000E+00	0.00000E+00
105	8.30769E-01	2.85150E+00	8.46829E-01	2.11335E-03	0.00000E+00	0.00000E+00
106	8.44415E-01	2.87433E+00	8.46805E-01	2.09305E-03	0.00000E+00	0.00000E+00
107	8.25184E-01	2.89633E+00	8.46599E-01	2.08323E-03	0.00000E+00	0.00000E+00
108	8.37758E-01	2.91917E+00	8.46516E-01	2.06517E-03	0.00000E+00	0.00000E+00
109	8.49844E-01	2.94217E+00	8.46547E-01	2.04601E-03	0.00000E+00	0.00000E+00
110	8.55113E-01	2.96500E+00	8.46626E-01	2.02853E-03	0.00000E+00	0.00000E+00
111	8.46195E-01	2.98700E+00	8.46623E-01	2.00984E-03	0.00000E+00	0.00000E+00
112	8.45141E-01	3.00983E+00	8.46609E-01	1.99153E-03	0.00000E+00	0.00000E+00
113	8.31607E-01	3.03183E+00	8.46474E-01	1.97813E-03	0.00000E+00	0.00000E+00
114	8.24469E-01	3.05467E+00	8.46277E-01	1.97021E-03	0.00000E+00	0.00000E+00
115	8.55939E-01	3.07667E+00	8.46363E-01	1.95456E-03	0.00000E+00	0.00000E+00
116	8.35861E-01	3.09950E+00	8.46271E-01	1.93953E-03	0.00000E+00	0.00000E+00
117	8.89436E-01	3.12150E+00	8.46646E-01	1.95899E-03	0.00000E+00	0.00000E+00
118	8.36781E-01	3.14433E+00	8.46561E-01	1.94379E-03	0.00000E+00	0.00000E+00
119	8.56479E-01	3.16733E+00	8.46646E-01	1.92897E-03	0.00000E+00	0.00000E+00
120	8.31942E-01	3.19117E+00	8.46521E-01	1.91661E-03	0.00000E+00	0.00000E+00
121	8.47051E-01	3.21400E+00	8.46526E-01	1.90044E-03	0.00000E+00	0.00000E+00
122	8.56000E-01	3.23600E+00	8.46605E-01	1.88619E-03	0.00000E+00	0.00000E+00
123	8.66896E-01	3.25983E+00	8.46772E-01	1.87804E-03	0.00000E+00	0.00000E+00
124	8.87945E-01	3.28267E+00	8.47110E-01	1.89290E-02	0.00000E+00	0.00000E+00
125	8.03069E-01	3.30550E+00	8.46752E-01	1.91129E-03	0.00000E+00	0.00000E+00
126	8.28590E-01	3.32833E+00	8.46605E-01	1.90146E-03	0.00000E+00	0.00000E+00
127	8.37357E-01	3.35217E+00	8.46531E-01	1.88764E-03	0.00000E+00	0.00000E+00
128	8.54670E-01	3.37417E+00	8.46596E-01	1.87371E-03	0.00000E+00	0.00000E+00
129	8.34564E-01	3.39700E+00	8.46501E-01	1.86131E-03	0.00000E+00	0.00000E+00
130	8.31266E-01	3.41900E+00	8.46382E-01	1.85055E-03	0.00000E+00	0.00000E+00
131	8.26428E-01	3.44200E+00	8.46227E-01	1.84265E-03	0.00000E+00	0.00000E+00
132	7.89605E-01	3.46483E+00	8.45792E-01	1.87958E-03	0.00000E+00	0.00000E+00
133	8.36767E-01	3.48683E+00	8.45723E-01	1.86645E-03	0.00000E+00	0.00000E+00
134	8.63284E-01	3.51050E+00	8.45856E-01	1.85703E-03	0.00000E+00	0.00000E+00
135	8.58040E-01	3.53167E+00	8.45948E-01	1.84529E-03	0.00000E+00	0.00000E+00
136	8.47175E-01	3.55450E+00	8.45957E-01	1.83149E-03	0.00000E+00	0.00000E+00
137	8.11359E-01	3.57733E+00	8.45701E-01	1.83585E-03	0.00000E+00	0.00000E+00
138	8.36414E-01	3.60033E+00	8.45632E-01	1.82358E-03	0.00000E+00	0.00000E+00
139	8.34532E-01	3.62317E+00	8.45551E-01	1.81203E-03	0.00000E+00	0.00000E+00
140	8.29939E-01	3.64700E+00	8.45438E-01	1.80241E-03	0.00000E+00	0.00000E+00
141	8.32637E-01	3.67083E+00	8.45346E-01	1.79176E-03	0.00000E+00	0.00000E+00
142	8.61959E-01	3.69367E+00	8.45465E-01	1.78287E-03	0.00000E+00	0.00000E+00
143	8.93389E-01	3.71567E+00	8.45805E-01	1.80252E-03	0.00000E+00	0.00000E+00
144	8.40488E-01	3.73950E+00	8.45767E-01	1.78017E-03	0.00000E+00	0.00000E+00
145	8.37730E-01	3.76233E+00	8.45711E-01	1.77849E-03	0.00000E+00	0.00000E+00
146	8.08936E-01	3.78433E+00	8.45456E-01	1.78447E-03	0.00000E+00	0.00000E+00
147	8.51072E-01	3.80633E+00	8.45494E-01	1.77254E-03	0.00000E+00	0.00000E+00
148	8.25831E-01	3.82917E+00	8.45360E-01	1.76550E-02	0.00000E+00	0.00000E+00
149	8.72426E-01	3.85200E+00	8.45544E-01	1.76309E-03	0.00000E+00	0.00000E+00
150	8.48161E-01	3.87400E+00	8.45561E-01	1.75123E-03	0.00000E+00	0.00000E+00
151	8.12393E-01	3.89783E+00	8.45339E-01	1.75362E-03	0.00000E+00	0.00000E+00
152	8.27142E-01	3.91983E+00	8.45218E-01	1.74611E-03	0.00000E+00	0.00000E+00
153	8.56005E-01	3.94267E+00	8.45289E-01	1.73599E-03	0.00000E+00	0.00000E+00
154	8.43779E-01	3.96550E+00	8.45279E-01	1.72456E-03	0.00000E+00	0.00000E+00
155	8.23765E-01	3.98933E+00	8.45139E-01	1.71902E-03	0.00000E+00	0.00000E+00
156	8.62734E-01	4.01133E+00	8.45253E-01	1.71164E-03	0.00000E+00	0.00000E+00
157	8.36394E-01	4.03417E+00	8.45196E-01	1.70152E-03	0.00000E+00	0.00000E+00
158	8.14308E-01	4.05617E+00	8.45190E-01	1.69058E-03	0.00000E+00	0.00000E+00
159	8.62940E-01	4.07900E+00	8.45303E-01	1.68358E-03	0.00000E+00	0.00000E+00
160	8.61780E-01	4.10100E+00	8.45407E-01	1.67614E-03	0.00000E+00	0.00000E+00
161	8.35460E-01	4.12383E+00	8.45345E-01	1.66674E-03	0.00000E+00	0.00000E+00
162	8.25338E-01	4.14683E+00	8.45220E-01	1.66100E-03	0.00000E+00	0.00000E+00
163	8.40146E-01	4.16883E+00	8.45188E-01	1.65095E-03	0.00000E+00	0.00000E+00
164	8.42665E-01	4.19167E+00	8.45173E-01	1.64081E-03	0.00000E+00	0.00000E+00
165	8.39231E-01	4.21450E+00	8.45136E-01	1.63112E-03	0.00000E+00	0.00000E+00
166	8.54434E-01	4.23750E+00	8.45193E-01	1.62213E-03	0.00000E+00	0.00000E+00
167	8.59968E-01	4.26033E+00	8.45283E-01	1.61475E-03	0.00000E+00	0.00000E+00
168	8.44632E-01	4.28317E+00	8.45279E-01	1.60500E-03	0.00000E+00	0.00000E+00
169	8.66339E-01	4.30517E+00	8.45405E-01	1.60034E-03	0.00000E+00	0.00000E+00
170	8.30213E-01	4.32717E+00	8.45314E-01	1.59335E-03	0.00000E+00	0.00000E+00

171	8.53259E-01	4.34917E+00	8.45361E-01	1.58459E-03	0.00000E+00	0.00000E+00
172	8.52991E-01	4.37200E+00	8.45406E-01	1.57588E-03	0.00000E+00	0.00000E+00
173	8.35313E-01	4.39483E+00	8.45347E-01	1.56775E-03	0.00000E+00	0.00000E+00
174	8.29402E-01	4.41667E+00	8.45313E-01	1.55900E-03	0.00000E+00	0.00000E+00
175	8.85390E-01	4.44150E+00	8.45544E-01	1.56717E-03	0.00000E+00	0.00000E+00
176	8.67804E-01	4.46350E+00	8.45672E-01	1.56338E-03	0.00000E+00	0.00000E+00
177	8.90259E-01	4.48650E+00	8.45927E-01	1.57517E-03	0.00000E+00	0.00000E+00
178	8.63545E-01	4.50750E+00	8.46027E-01	1.56939E-03	0.00000E+00	0.00000E+00
179	8.24477E-01	4.53133E+00	8.45905E-01	1.56524E-03	0.00000E+00	0.00000E+00
180	8.48311E-01	4.55317E+00	8.45919E-01	1.55649E-03	0.00000E+00	0.00000E+00
181	8.24968E-01	4.57617E+00	8.45802E-01	1.55218E-03	0.00000E+00	0.00000E+00
182	8.74340E-01	4.59817E+00	8.45960E-01	1.55165E-03	0.00000E+00	0.00000E+00
183	8.43356E-01	4.62100E+00	8.45946E-01	1.54312E-03	0.00000E+00	0.00000E+00
184	7.96098E-01	4.64567E+00	8.45672E-01	1.55867E-03	0.00000E+00	0.00000E+00
185	8.19912E-01	4.66767E+00	8.45531E-01	1.55671E-03	0.00000E+00	0.00000E+00
186	8.50512E-01	4.68867E+00	8.45558E-01	1.54846E-03	0.00000E+00	0.00000E+00
187	8.38616E-01	4.71167E+00	8.45521E-01	1.54052E-03	0.00000E+00	0.00000E+00
188	8.32801E-01	4.73450E+00	8.45452E-01	1.53374E-03	0.00000E+00	0.00000E+00
189	8.18017E-01	4.75733E+00	8.45306E-01	1.53256E-03	0.00000E+00	0.00000E+00
190	8.06131E-01	4.78033E+00	8.45097E-01	1.53856E-03	0.00000E+00	0.00000E+00
191	8.34888E-01	4.80400E+00	8.45043E-01	1.53135E-03	0.00000E+00	0.00000E+00
192	8.40406E-01	4.82700E+00	8.45019E-01	1.52347E-03	0.00000E+00	0.00000E+00
193	8.51144E-01	4.84900E+00	8.45051E-01	1.51561E-03	0.00000E+00	0.00000E+00
194	8.51368E-01	4.87183E+00	8.45084E-01	1.50825E-03	0.00000E+00	0.00000E+00
195	8.53999E-01	4.89567E+00	8.45130E-01	1.50113E-03	0.00000E+00	0.00000E+00
196	8.57997E-01	4.91667E+00	8.45196E-01	1.49484E-03	0.00000E+00	0.00000E+00
197	8.31102E-01	4.93950E+00	8.45124E-01	1.48891E-03	0.00000E+00	0.00000E+00
198	8.60282E-01	4.96250E+00	8.45201E-01	1.48331E-03	0.00000E+00	0.00000E+00
199	8.09193E-01	4.98433E+00	8.45019E-01	1.48704E-03	0.00000E+00	0.00000E+00
200	8.45723E-01	5.00817E+00	8.45022E-01	1.47952E-03	0.00000E+00	0.00000E+00
201	8.47729E-01	5.03017E+00	8.45036E-01	1.47212E-03	0.00000E+00	0.00000E+00
202	8.67544E-01	5.05300E+00	8.45148E-01	1.46906E-03	0.00000E+00	0.00000E+00
203	8.42843E-01	5.07600E+00	8.45137E-01	1.46176E-03	0.00000E+00	0.00000E+00
204	8.50551E-01	5.09883E+00	8.45164E-01	1.45477E-03	0.00000E+00	0.00000E+00
205	8.15964E-01	5.12083E+00	8.45020E-01	1.45472E-03	0.00000E+00	0.00000E+00
206	8.43229E-01	5.14283E+00	8.45011E-01	1.44760E-03	0.00000E+00	0.00000E+00
207	8.66512E-01	5.16483E+00	8.45116E-01	1.44433E-03	0.00000E+00	0.00000E+00
208	8.56123E-01	5.18850E+00	8.45169E-01	1.43829E-03	0.00000E+00	0.00000E+00
209	8.34250E-01	5.21150E+00	8.45117E-01	1.43230E-03	0.00000E+00	0.00000E+00
210	8.24644E-01	5.23517E+00	8.45018E-01	1.42879E-03	0.00000E+00	0.00000E+00
211	8.23410E-01	5.25717E+00	8.44915E-01	1.42569E-03	0.00000E+00	0.00000E+00
212	8.32794E-01	5.28200E+00	8.44857E-01	1.42006E-03	0.00000E+00	0.00000E+00
213	8.65427E-01	5.30483E+00	8.44955E-01	1.41667E-03	0.00000E+00	0.00000E+00
214	8.32568E-01	5.32683E+00	8.44896E-01	1.41119E-03	0.00000E+00	0.00000E+00
215	8.54053E-01	5.34967E+00	8.44939E-01	1.40520E-03	0.00000E+00	0.00000E+00
216	8.71032E-01	5.37067E+00	8.45061E-01	1.40393E-03	0.00000E+00	0.00000E+00
217	8.52064E-01	5.39267E+00	8.45094E-01	1.39776E-03	0.00000E+00	0.00000E+00
218	8.32361E-01	5.41650E+00	8.45035E-01	1.39252E-03	0.00000E+00	0.00000E+00
219	8.69524E-01	5.43750E+00	8.45148E-01	1.39068E-03	0.00000E+00	0.00000E+00
220	8.56193E-01	5.46050E+00	8.45198E-01	1.38521E-03	0.00000E+00	0.00000E+00
221	8.61809E-01	5.48333E+00	8.45274E-01	1.38095E-03	0.00000E+00	0.00000E+00
222	8.63130E-01	5.50433E+00	8.45355E-01	1.37706E-03	0.00000E+00	0.00000E+00
223	8.14770E-01	5.52633E+00	8.45217E-01	1.37778E-03	0.00000E+00	0.00000E+00
224	8.06651E-01	5.55017E+00	8.45043E-01	1.38252E-03	0.00000E+00	0.00000E+00
225	8.61994E-01	5.57300E+00	8.45119E-01	1.37840E-03	0.00000E+00	0.00000E+00
226	8.35567E-01	5.59600E+00	8.45077E-01	1.37290E-03	0.00000E+00	0.00000E+00
227	8.18250E-01	5.61883E+00	8.44957E-01	1.37197E-03	0.00000E+00	0.00000E+00
228	8.50376E-01	5.64267E+00	8.44981E-01	1.36610E-03	0.00000E+00	0.00000E+00
229	8.37106E-01	5.66550E+00	8.44947E-01	1.36051E-03	0.00000E+00	0.00000E+00
230	8.59032E-01	5.68750E+00	8.45008E-01	1.35594E-03	0.00000E+00	0.00000E+00
231	8.38066E-01	5.71033E+00	8.44978E-01	1.35034E-03	0.00000E+00	0.00000E+00
232	8.78583E-01	5.73233E+00	8.45124E-01	1.35238E-03	0.00000E+00	0.00000E+00
233	8.00052E-01	5.75517E+00	8.44929E-01	1.36057E-03	0.00000E+00	0.00000E+00
234	8.38247E-01	5.77900E+00	8.44900E-01	1.35500E-03	0.00000E+00	0.00000E+00
235	8.13711E-01	5.80283E+00	8.44766E-01	1.35580E-03	0.00000E+00	0.00000E+00
236	8.19853E-01	5.82483E+00	8.44660E-01	1.35418E-03	0.00000E+00	0.00000E+00
237	8.59566E-01	5.84850E+00	8.44723E-01	1.34990E-03	0.00000E+00	0.00000E+00
238	8.73399E-01	5.87050E+00	8.44845E-01	1.34965E-03	0.00000E+00	0.00000E+00
239	8.28429E-01	5.89250E+00	8.44776E-01	1.34572E-03	0.00000E+00	0.00000E+00
240	9.03342E-01	5.91450E+00	8.45022E-01	1.36246E-03	0.00000E+00	0.00000E+00
241	8.45582E-01	5.93733E+00	8.45024E-01	1.35675E-03	0.00000E+00	0.00000E+00
242	8.44312E-01	5.96033E+00	8.45021E-01	1.35109E-03	0.00000E+00	0.00000E+00
243	8.31148E-01	5.98400E+00	8.44963E-01	1.34671E-03	0.00000E+00	0.00000E+00
244	8.42377E-01	6.00517E+00	8.44953E-01	1.34117E-03	0.00000E+00	0.00000E+00
245	8.26543E-01	6.02800E+00	8.44877E-01	1.33779E-03	0.00000E+00	0.00000E+00
246	8.69212E-01	6.05000E+00	8.44977E-01	1.33602E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 WARNING... ONLY 962 INDEPENDENT FISSION POINTS WERE GENERATED						
247	7.82290E-01	6.07383E+00	8.44721E-01	1.35493E-03	0.00000E+00	0.00000E+00
248	8.70272E-01	6.09493E+00	8.44825E-01	1.35341E-03	0.00000E+00	0.00000E+00
249	8.60825E-01	6.11767E+00	8.44914E-01	1.35086E-03	0.00000E+00	0.00000E+00
250	8.37830E-01	6.13967E+00	8.44885E-01	1.34570E-03	0.00000E+00	0.00000E+00
251	8.32824E-01	6.16350E+00	8.44837E-01	1.34116E-03	0.00000E+00	0.00000E+00
252	8.66829E-01	6.18550E+00	8.45005E-01	1.34630E-03	0.00000E+00	0.00000E+00
253	8.62470E-01	6.20750E+00	8.45074E-01	1.34273E-03	0.00000E+00	0.00000E+00
254	8.60390E-01	6.22933E+00	8.45135E-01	1.33878E-03	0.00000E+00	0.00000E+00
255	8.26730E-01	6.25233E+00	8.45062E-01	1.33546E-03	0.00000E+00	0.00000E+00
256	8.47655E-01	6.27517E+00	8.45073E-01	1.33023E-03	0.00000E+00	0.00000E+00
257	8.32829E-01	6.29717E+00	8.45025E-01	1.32587E-03	0.00000E+00	0.00000E+00
258	8.41696E-01	6.32000E+00	8.45012E-01	1.32075E-03	0.00000E+00	0.00000E+00
259	8.35759E-01	6.34283E+00	8.44976E-01	1.31609E-03	0.00000E+00	0.00000E+00
260	8.28722E-01	6.36667E+00	8.44913E-01	1.31249E-03	0.00000E+00	0.00000E+00
261	8.24629E-01	6.38867E+00	8.44834E-01	1.30976E-03	0.00000E+00	0.00000E+00
262	8.36084E-01	6.41150E+00	8.44801E-01	1.30514E-03	0.00000E+00	0.00000E+00
263	8.46821E-01	6.43450E+00	8.44808E-01	1.30016E-03	0.00000E+00	0.00000E+00
264	8.46912E-01	6.45650E+00	8.44816E-01	1.29521E-03	0.00000E+00	0.00000E+00

265	8.46996E-01	6.47833E+00	8.44825E-01	1.29030E-03	0.00000E+00	0.00000E+00
266	8.67247E-01	6.50217E+00	8.44910E-01	1.28821E-03	0.00000E+00	0.00000E+00
267	8.66171E-01	6.52500E+00	8.44990E-01	1.28584E-03	0.00000E+00	0.00000E+00
268	8.78363E-01	6.54617E+00	8.45115E-01	1.28713E-03	0.00000E+00	0.00000E+00
269	8.34032E-01	6.57000E+00	8.45074E-01	1.28297E-03	0.00000E+00	0.00000E+00
270	8.74759E-01	6.59283E+00	8.45185E-01	1.28297E-03	0.00000E+00	0.00000E+00
271	8.67916E-01	6.61567E+00	8.45269E-01	1.28098E-03	0.00000E+00	0.00000E+00
272	8.51054E-01	6.63950E+00	8.45290E-01	1.27640E-03	0.00000E+00	0.00000E+00
273	8.31307E-01	6.66150E+00	8.45239E-01	1.27273E-03	0.00000E+00	0.00000E+00
274	8.44673E-01	6.68533E+00	8.45237E-01	1.26805E-03	0.00000E+00	0.00000E+00
275	8.33542E-01	6.70817E+00	8.45194E-01	1.26412E-03	0.00000E+00	0.00000E+00
276	8.59575E-01	6.72917E+00	8.45246E-01	1.26059E-03	0.00000E+00	0.00000E+00
277	8.33866E-01	6.75300E+00	8.45205E-01	1.25668E-03	0.00000E+00	0.00000E+00
278	8.12346E-01	6.77583E+00	8.45086E-01	1.25776E-03	0.00000E+00	0.00000E+00
279	8.89446E-01	6.79783E+00	8.45246E-01	1.26341E-03	0.00000E+00	0.00000E+00
280	7.95746E-01	6.82083E+00	8.45068E-01	1.27138E-03	0.00000E+00	0.00000E+00
281	8.27775E-01	6.84367E+00	8.45006E-01	1.26833E-03	0.00000E+00	0.00000E+00
282	8.66185E-01	6.86467E+00	8.45082E-01	1.26606E-03	0.00000E+00	0.00000E+00
283	8.75302E-01	6.88750E+00	8.45189E-01	1.26612E-03	0.00000E+00	0.00000E+00
284	8.16010E-01	6.91050E+00	8.45086E-01	1.26586E-03	0.00000E+00	0.00000E+00
285	8.63003E-01	6.93333E+00	8.45149E-01	1.26297E-03	0.00000E+00	0.00000E+00
286	8.73404E-01	6.95533E+00	8.45249E-01	1.26244E-03	0.00000E+00	0.00000E+00
287	8.61558E-01	6.97817E+00	8.45306E-01	1.25930E-03	0.00000E+00	0.00000E+00
288	8.57909E-01	7.00200E+00	8.45350E-01	1.25566E-03	0.00000E+00	0.00000E+00
289	8.08852E-01	7.02300E+00	8.45223E-01	1.25773E-03	0.00000E+00	0.00000E+00
290	8.31189E-01	7.04683E+00	8.45174E-01	1.25430E-03	0.00000E+00	0.00000E+00
291	8.34772E-01	7.06883E+00	8.45138E-01	1.25047E-03	0.00000E+00	0.00000E+00
292	8.18060E-01	7.09167E+00	8.45045E-01	1.24964E-03	0.00000E+00	0.00000E+00
293	8.01426E-01	7.11550E+00	8.44895E-01	1.25433E-03	0.00000E+00	0.00000E+00
294	8.35443E-01	7.13750E+00	8.44862E-01	1.25045E-03	0.00000E+00	0.00000E+00
295	8.35251E-01	7.16033E+00	8.44830E-01	1.24660E-03	0.00000E+00	0.00000E+00
296	8.18200E-01	7.18333E+00	8.44732E-01	1.24565E-03	0.00000E+00	0.00000E+00
297	8.00944E-01	7.20700E+00	8.44591E-01	1.25027E-03	0.00000E+00	0.00000E+00
298	8.21223E-01	7.23000E+00	8.44512E-01	1.24853E-03	0.00000E+00	0.00000E+00
299	8.47216E-01	7.25100E+00	8.44521E-01	1.24436E-03	0.00000E+00	0.00000E+00
300	8.60221E-01	7.27300E+00	8.44573E-01	1.24129E-03	0.00000E+00	0.00000E+00
301	8.49427E-01	7.29583E+00	8.44590E-01	1.23724E-03	0.00000E+00	0.00000E+00
302	8.72947E-01	7.31783E+00	8.44684E-01	1.23673E-03	0.00000E+00	0.00000E+00
303	8.51278E-01	7.33983E+00	8.44706E-01	1.23281E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

LIFETIME = 1.15449E-04 + OR - 3.48275E-07      GENERATION TIME = 3.88784E-05 + OR - 1.17453E-07  
 NU BAR = 2.43690E+00 + OR - 1.11422E-04      AVERAGE FISSION GROUP = 2.23149E+01 + OR - 6.58134E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.81957E-01 + OR - 1.00812E-03

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	0.84465	+ OR - 0.00124	0.84342 TO 0.84589	0.84218 TO 0.84712	0.84094 TO 0.84836	300000
4	0.84465	+ OR - 0.00124	0.84341 TO 0.84589	0.84217 TO 0.84713	0.84093 TO 0.84837	299000
5	0.84453	+ OR - 0.00124	0.84329 TO 0.84576	0.84205 TO 0.84700	0.84081 TO 0.84824	298000
6	0.84452	+ OR - 0.00124	0.84327 TO 0.84576	0.84203 TO 0.84700	0.84079 TO 0.84824	297000
7	0.84449	+ OR - 0.00125	0.84325 TO 0.84574	0.84200 TO 0.84698	0.84076 TO 0.84823	296000
8	0.84433	+ OR - 0.00124	0.84309 TO 0.84557	0.84185 TO 0.84680	0.84061 TO 0.84804	295000
9	0.84436	+ OR - 0.00124	0.84312 TO 0.84561	0.84188 TO 0.84685	0.84064 TO 0.84809	294000
10	0.84439	+ OR - 0.00125	0.84314 TO 0.84564	0.84190 TO 0.84688	0.84065 TO 0.84813	293000
11	0.84426	+ OR - 0.00124	0.84302 TO 0.84550	0.84177 TO 0.84675	0.84053 TO 0.84799	292000
12	0.84426	+ OR - 0.00125	0.84301 TO 0.84550	0.84176 TO 0.84675	0.84051 TO 0.84800	291000
17	0.84429	+ OR - 0.00127	0.84302 TO 0.84555	0.84175 TO 0.84682	0.84048 TO 0.84809	286000
22	0.84434	+ OR - 0.00128	0.84306 TO 0.84562	0.84178 TO 0.84690	0.84050 TO 0.84818	281000
27	0.84445	+ OR - 0.00129	0.84317 TO 0.84574	0.84188 TO 0.84702	0.84059 TO 0.84831	276000
31	0.84428	+ OR - 0.00130	0.84298 TO 0.84558	0.84168 TO 0.84688	0.84038 TO 0.84818	271000
37	0.84389	+ OR - 0.00130	0.84259 TO 0.84518	0.84130 TO 0.84648	0.84000 TO 0.84777	266000
42	0.84393	+ OR - 0.00131	0.84262 TO 0.84524	0.84131 TO 0.84655	0.83999 TO 0.84786	261000
47	0.84380	+ OR - 0.00132	0.84248 TO 0.84512	0.84116 TO 0.84644	0.83984 TO 0.84776	256000
52	0.84386	+ OR - 0.00134	0.84252 TO 0.84519	0.84119 TO 0.84653	0.83985 TO 0.84786	251000
57	0.84391	+ OR - 0.00135	0.84256 TO 0.84525	0.84121 TO 0.84660	0.83986 TO 0.84795	246000
62	0.84405	+ OR - 0.00137	0.84268 TO 0.84542	0.84132 TO 0.84679	0.83995 TO 0.84816	241000
67	0.84430	+ OR - 0.00138	0.84291 TO 0.84568	0.84153 TO 0.84706	0.84015 TO 0.84844	236000
72	0.84393	+ OR - 0.00140	0.84253 TO 0.84533	0.84113 TO 0.84674	0.83973 TO 0.84814	231000
77	0.84418	+ OR - 0.00142	0.84275 TO 0.84560	0.84133 TO 0.84702	0.83991 TO 0.84844	226000
82	0.84408	+ OR - 0.00144	0.84264 TO 0.84551	0.84120 TO 0.84695	0.83977 TO 0.84839	221000
87	0.84373	+ OR - 0.00144	0.84230 TO 0.84517	0.84086 TO 0.84660	0.83943 TO 0.84804	216000
92	0.84374	+ OR - 0.00147	0.84227 TO 0.84520	0.84080 TO 0.84667	0.83933 TO 0.84814	211000

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

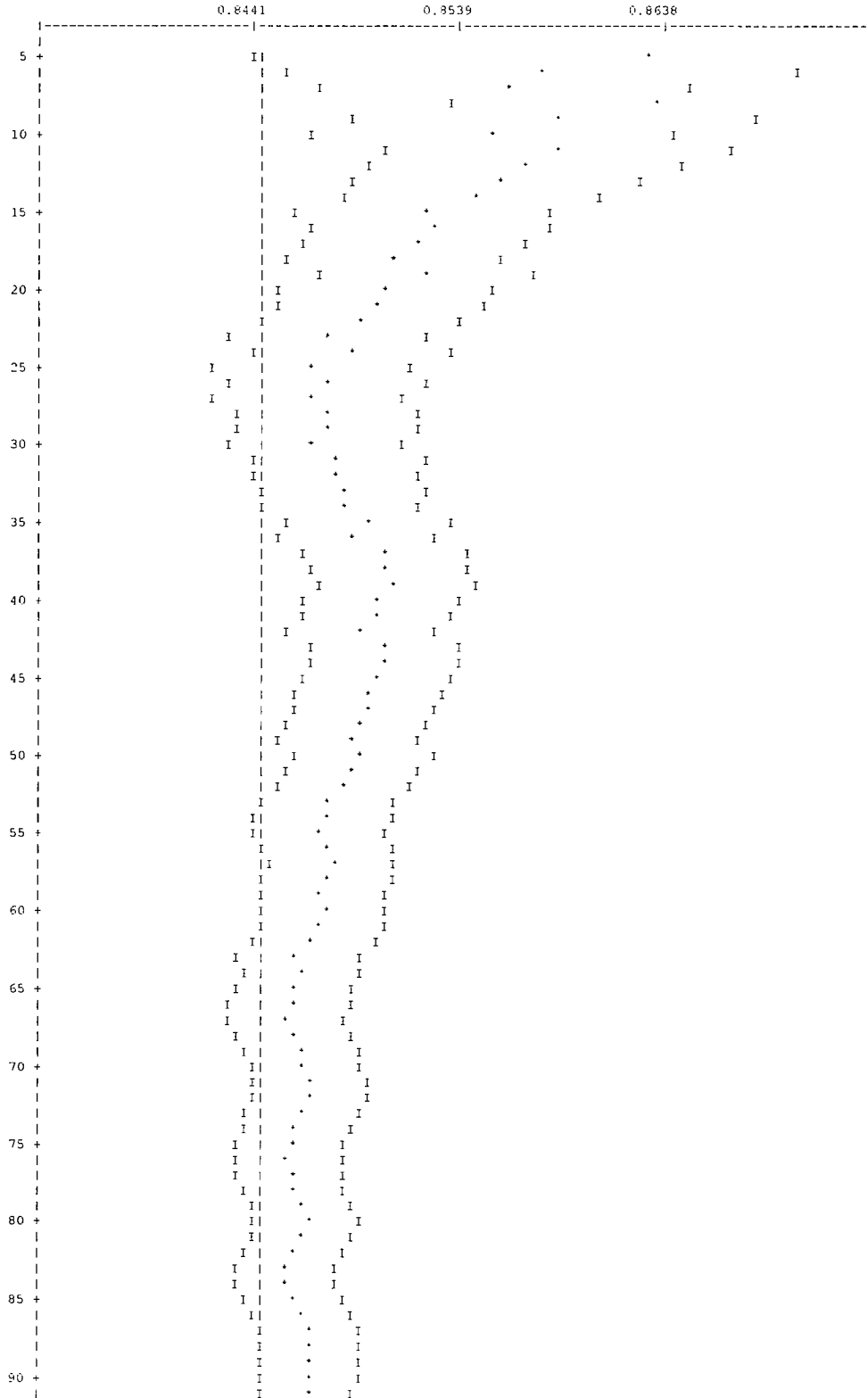
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
97	0.84375	+ OR - 0.00149	0.84225 TO 0.84524	0.84076 TO 0.84673	0.83926 TO 0.84823	206000
102	0.84349	+ OR - 0.00150	0.84199 TO 0.84498	0.84049 TO 0.84648	0.83899 TO 0.84798	201000
107	0.84369	+ OR - 0.00153	0.84216 TO 0.84522	0.84064 TO 0.84675	0.83911 TO 0.84828	196000
112	0.84361	+ OR - 0.00157	0.84204 TO 0.84518	0.84048 TO 0.84674	0.83891 TO 0.84831	191000
117	0.84351	+ OR - 0.00158	0.84192 TO 0.84509	0.84034 TO 0.84667	0.83876 TO 0.84826	186000
122	0.84345	+ OR - 0.00162	0.84183 TO 0.84507	0.84020 TO 0.84669	0.83858 TO 0.84831	181000
127	0.84341	+ OR - 0.00162	0.84179 TO 0.84503	0.84016 TO 0.84666	0.83854 TO 0.84828	176000
132	0.84398	+ OR - 0.00164	0.84225 TO 0.84552	0.84061 TO 0.84715	0.83898 TO 0.84879	171000
137	0.84390	+ OR - 0.00167	0.84223 TO 0.84556	0.84057 TO 0.84723	0.83890 TO 0.84890	166000
142	0.84405	+ OR - 0.00171	0.84234 TO 0.84576	0.84063 TO 0.84746	0.83892 TO 0.84917	161000
147	0.84397	+ OR - 0.00172	0.84225 TO 0.84569	0.84054 TO 0.84741	0.83882 TO 0.84913	156000
152	0.84420	+ OR - 0.00175	0.84245 TO 0.84594	0.84071 TO 0.84769	0.83896 TO 0.84943	151000
157	0.84419	+ OR - 0.00179	0.84239 TO 0.84598	0.84060 TO 0.84777	0.83881 TO 0.84956	146000
162	0.84412	+ OR - 0.00184	0.84228 TO 0.84596	0.84044 TO 0.84781	0.83860 TO 0.84965	141000
167	0.84401	+ OR - 0.00190	0.84210 TO 0.84591	0.84020 TO 0.84781	0.83829 TO 0.84972	136000
172	0.84380	+ OR - 0.00196	0.84183 TO 0.84576	0.83987 TO 0.84773	0.83791 TO 0.84969	131000
177	0.84301	+ OR - 0.00197	0.84104 TO 0.84498	0.83907 TO 0.84695	0.83710 TO 0.84892	126000
182	0.84284	+ OR - 0.00202	0.84083 TO 0.84486	0.83881 TO 0.84687	0.83679 TO 0.84889	121000
187	0.84341	+ OR - 0.00205	0.84136 TO 0.84546	0.83930 TO 0.84751	0.83725 TO 0.84956	116000
192	0.84417	+ OR - 0.00210	0.84207 TO 0.84627	0.83997 TO 0.84837	0.83787 TO 0.85047	111000
197	0.84394	+ OR - 0.00219	0.84175 TO 0.84612	0.83956 TO 0.84831	0.83737 TO 0.85050	106000
202	0.84383	+ OR - 0.00225	0.84158 TO 0.84608	0.83933 TO 0.84833	0.83707 TO 0.85059	101000
207	0.84383	+ OR - 0.00234	0.84149 TO 0.84617	0.83915 TO 0.84851	0.83681 TO 0.85085	96000
212	0.84436	+ OR - 0.00244	0.84192 TO 0.84680	0.83948 TO 0.84924	0.83704 TO 0.85167	91000
217	0.84374	+ OR - 0.00254	0.84120 TO 0.84628	0.83865 TO 0.84882	0.83611 TO 0.85136	86000
222	0.84294	+ OR - 0.00265	0.84029 TO 0.84559	0.83764 TO 0.84824	0.83499 TO 0.85090	81000
227	0.84396	+ OR - 0.00272	0.84124 TO 0.84669	0.83851 TO 0.84941	0.83579 TO 0.85214	76000

NAC-LWT CASK MODEL; EYXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

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
232	0.84335	+ OR - 0.00286	0.84049 TO 0.84621	0.83763 TO 0.84908	0.83476 TO 0.85194	71000
237	0.84464	+ OR - 0.00294	0.84171 TO 0.84758	0.83877 TO 0.85052	0.83583 TO 0.85346	66000
242	0.84347	+ OR - 0.00298	0.84049 TO 0.84644	0.83752 TO 0.84942	0.83454 TO 0.85239	61000
247	0.84464	+ OR - 0.00299	0.84165 TO 0.84763	0.83867 TO 0.85062	0.83568 TO 0.85360	56000
252	0.84324	+ OR - 0.00309	0.84016 TO 0.84633	0.83707 TO 0.84941	0.83399 TO 0.85250	51000
257	0.84294	+ OR - 0.00335	0.83959 TO 0.84629	0.83624 TO 0.84964	0.83290 TO 0.85299	46000
262	0.84411	+ OR - 0.00371	0.84040 TO 0.84781	0.83670 TO 0.85152	0.83299 TO 0.85522	41000
267	0.84262	+ OR - 0.00412	0.83850 TO 0.84674	0.83438 TO 0.85086	0.83026 TO 0.85498	36000
272	0.83962	+ OR - 0.00440	0.83521 TO 0.84402	0.83081 TO 0.84842	0.82641 TO 0.85282	31000
277	0.83943	+ OR - 0.00518	0.83425 TO 0.84461	0.82907 TO 0.84979	0.82388 TO 0.85497	26000
282	0.83970	+ OR - 0.00522	0.83447 TO 0.84492	0.82925 TO 0.85014	0.82403 TO 0.85536	21000
287	0.83402	+ OR - 0.00538	0.82864 TO 0.83940	0.82326 TO 0.84479	0.81788 TO 0.85017	16000
292	0.83578	+ OR - 0.00704	0.82874 TO 0.84282	0.82170 TO 0.84986	0.81466 TO 0.85690	11000
297	0.85039	+ OR - 0.00700	0.84339 TO 0.85738	0.83639 TO 0.86438	0.82940 TO 0.87137	6000

NAC-LWT CASK MODEL: EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS K-EFF = 0.8447 + OR - 0.0012 WHICH OCCURS FOR 303 GENERATIONS RUN.





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		I		*	I
		I		*	I
		I		*	I
		I		*	I
290	+	I		*	I
		I		*	I
		I		*	I
		I		*	I
		I		*	I
		I		*	I
295	+	I		*	I
		I		*	I
		I		*	I
		I		*	I
		I		*	I
		I		*	I
300	+	I		*	I
		I		*	I
		I		*	I
		I		*	I

NAC-LWT CASK MODEL: EXXON 9X9 - 2 WATER RODS 50 MIL CHANNEL

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0043			3.61777E-03	2.2735	2.18472E-03	1.6447	0.00000E+00	0.0000
2	0.0185			1.56076E-02	0.6937	7.98975E-03	0.5770	0.00000E+00	0.0000
3	0.0206			1.74335E-02	0.6802	7.32774E-03	0.6498	0.00000E+00	0.0000
4	0.0087			7.32810E-03	0.7389	3.57368E-03	0.7003	0.00000E+00	0.0000
5	0.0029			2.41700E-03	0.5573	2.60715E-03	0.4706	0.00000E+00	0.0000
6	0.0026			2.17260E-03	0.4693	4.41687E-03	0.3848	0.00000E+00	0.0000
7	0.0025			2.14659E-03	0.4714	5.01186E-03	0.3688	0.00000E+00	0.0000
8	0.0025			2.11131E-03	0.5189	7.13242E-03	0.4091	0.00000E+00	0.0000
9	0.0034			2.90308E-03	0.5647	1.14886E-02	0.4381	0.00000E+00	0.0000
10	0.0073			6.15712E-03	0.5802	1.69292E-02	0.4601	0.00000E+00	0.0000
11	0.0153			1.29563E-02	0.6108	2.73480E-02	0.4723	0.00000E+00	0.0000
12	0.0197			1.66202E-02	0.6463	2.84516E-02	0.5647	0.00000E+00	0.0000
13	0.0182			1.53687E-02	0.7378	2.89485E-02	0.6118	0.00000E+00	0.0000
14	0.0142			1.19993E-02	0.6820	4.07978E-02	0.5531	0.00000E+00	0.0000
15	0.0032			2.70080E-03	1.0990	9.69814E-03	0.7238	0.00000E+00	0.0000
16	0.0022			1.83704E-03	1.4949	5.76935E-03	0.8555	0.00000E+00	0.0000
17	0.0034			2.89596E-03	1.7804	3.96015E-03	1.0609	0.00000E+00	0.0000
18	0.0044			3.75823E-03	1.9471	4.04526E-03	1.1440	0.00000E+00	0.0000
19	0.0055			4.68498E-03	1.4897	6.51489E-03	0.8758	0.00000E+00	0.0000
20	0.0230			1.94468E-02	0.8207	2.53005E-02	0.5405	0.00000E+00	0.0000
21	0.0121			1.02811E-02	1.2461	1.07616E-02	0.7964	0.00000E+00	0.0000
22	0.0290			2.44663E-02	0.9071	2.45684E-02	0.6055	0.00000E+00	0.0000
23	0.1059			8.94160E-02	0.4903	9.55808E-02	0.3058	0.00000E+00	0.0000
24	0.2106			1.77859E-01	0.3520	1.91926E-01	0.1990	0.00000E+00	0.0000
25	0.1788			1.51066E-01	0.4321	1.63657E-01	0.2162	0.00000E+00	0.0000
26	0.2140			1.80725E-01	0.3744	1.99844E-01	0.2280	0.00000E+00	0.0000
27	0.0671			5.66943E-02	0.7907	6.62470E-02	0.4302	0.00000E+00	0.0000
SYSTEM TOTAL =				8.44651E-01	0.1463	1.00208E+00	0.0498	0.00000E+00	0.0000

THE WEIGHT LOST IN THE ALBEDO PORTION OF THE PROBLEM = 1.2281E-07 + OR - 0.0000

ELAPSED TIME 7.34067 MINUTES

RANDOM NUMBER= 26E447865737

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

```
FREQUENCY FOR GENERATIONS 4 TO 303
0.7799 TO 0.7925 **
0.7925 TO 0.8052 *****
0.8052 TO 0.8178 *****
0.8178 TO 0.8305 *****
0.8305 TO 0.8431 *****
0.8431 TO 0.8558 *****
0.8558 TO 0.8684 *****
0.8684 TO 0.8811 *****
0.8811 TO 0.8937 *****
0.8937 TO 0.9064 ***
```

```
FREQUENCY FOR GENERATIONS 79 TO 303
0.7799 TO 0.7925 **
0.7925 TO 0.8052 *****
0.8052 TO 0.8178 *****
0.8178 TO 0.8305 *****
0.8305 TO 0.8431 *****
0.8431 TO 0.8558 *****
0.8558 TO 0.8684 *****
0.8684 TO 0.8811 *****
0.8811 TO 0.8937 *****
0.8937 TO 0.9064 *
```

```
FREQUENCY FOR GENERATIONS 154 TO 303
0.7799 TO 0.7925 *
0.7925 TO 0.8052 *****
0.8052 TO 0.8178 *****
0.8178 TO 0.8305 *****
0.8305 TO 0.8431 *****
0.8431 TO 0.8558 *****
0.8558 TO 0.8684 *****
0.8684 TO 0.8811 *****
0.8811 TO 0.8937 *****
0.8937 TO 0.9064 *
```

```
FREQUENCY FOR GENERATIONS 229 TO 303
0.7799 TO 0.7925 *
0.7925 TO 0.8052 *****
0.8052 TO 0.8178 *****
0.8178 TO 0.8305 *****
0.8305 TO 0.8431 *****
0.8431 TO 0.8558 *****
0.8558 TO 0.8684 *****
0.8684 TO 0.8811 *****
0.8811 TO 0.8937 **
0.8937 TO 0.9064 *
```

```
.....
*
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 7.34067 MINUTES
.....
*
```

Figure 6.6.2-2 CSAS Input/Output for NAC-LWT with BWR Fuel Assemblies – Most Reactive Accident Condition Configuration

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
NAC-LWT CASK MODEL; EXXON 9x9 - 2 Water Rods 80 MIL CHANNEL
37GROUPHDF4 LATTICECELL
UO2 1 0.95 293.0 92235 4.0 92238 96.0 END
ZIRCALLOY 2 1.0 293.0 END
H2O 3 1.000 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.0E-20 293.0 END
H2O 8 1.0E-20 293.0 END
H2O 9 1.0 293.0 END
END COMP
SQUAREPITCH 1.4529 0.9055 1 3 1.0770 2 0.9246 9 END
NAC-LWT CASK MODEL; EXXON 9x9 - 2 Water Rods 80 MIL CHANNEL
READ PARAM RUN=YES PLT=NO TME=5000 GEN=303 NPG=1000 END PARAM
READ GEOM
UNIT 1
COM='FUEL PIN CELL - WITH H2O'
CYLINDER 1 1 0.4528 2P10.0
CYLINDER 9 1 0.4623 2P10.0
CYLINDER 2 1 0.5385 2P10.0
CUBOID 3 1 4P0.7264 2P10.0
UNIT 2
COM='WATER ROD CELL - WITH H2O'
CYLINDER 3 1 0.4623 2P10.0
CYLINDER 2 1 0.5385 2P10.0
CUBOID 3 1 4P0.7264 2P10.0
UNIT 3
ARRAY 1 -6.5376 -6.5376 -10.0
CUBOID 3 1 4P6.7031 2P10.0
CUBOID 2 1 4P6.9063 2P10.0
CUBOID 3 1 4P7.3025 2P10.0
UNIT 4
ARRAY 1 -6.5376 -6.5376 -10.0
CUBOID 3 1 4P6.7031 2P10.0
CUBOID 2 1 4P6.9063 2P10.0
CUBOID 3 1 4P7.3025 2P10.0
UNIT 5
CYLINDER 4 1 16.8275 2P10.0
HOLE 3 -7.4613 0.0 0.0
HOLE 4 7.4613 0.0 0.0
CYLINDER 3 1 16.9863 2P10.0
CYLINDER 5 1 18.8913 2P10.0
CYLINDER 6 1 33.4963 2P10.0
CYLINDER 5 1 36.5443 2P10.0
CYLINDER 7 1 49.2443 2P10.0
CYLINDER 5 1 49.8539 2P10.0
GLOBAL UNIT 6
CYLINDER 8 1 314.00 2P10.0
HOLE 5 00.00 00.00 0.0
HOLE 5 00.00 99.80 0.0
HOLE 5 96.43 49.90 0.0
HOLE 5 96.43 -49.90 0.0
HOLE 5 00.00 -99.80 0.0
HOLE 5 -86.43 -49.90 0.0
HOLE 5 -86.43 49.90 0.0
HOLE 5 0.0 199.6 0.0
HOLE 5 86.43 149.7 0.0
HOLE 5 172.86 99.8 0.0
HOLE 5 172.86 0.0 0.0
HOLE 5 172.86 -99.8 0.0
HOLE 5 86.43 -149.7 0.0
HOLE 5 0.0 -199.6 0.0
HOLE 5 -86.43 -149.7 0.0
HOLE 5 -172.86 -99.88 0.0
HOLE 5 -172.86 0.0 0.0
HOLE 5 -172.86 99.8 0.0
HOLE 5 -86.43 149.7 0.0
HOLE 5 259.29 49.9 0.0
CUBOID 8 1 4P314.00 2P10.0
END GEOM
READ ARRAY
ARA=1 NUZ=9 NUZ=9 NUZ=1 FILL
36R1
4R1 2 4R1
5R1 2 3R1
27R1
END FILL
END ARRAY
READ BOUNDS ZFC=PER YXF=H2O END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.

MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.55 (SECONDS).
```

SECONDARY MODULE 000002 HAS BEEN CALLED.  
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 5.93 (SECONDS).  
SECONDARY MODULE 000009 HAS BEEN CALLED.  
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 438.36 (SECONDS).  
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 446.44 (SECONDS).





```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSSSS  CCCCCCCCCCCC  AAAAAAAAAAAA  LL  EEEEEEEEEEEE  PPPPPPPPPPPP  CCCCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL  EE  PP      PP  CC      CC
SS      CC  CC      AA      AA  LL  EE  PP      PP  CC      CC
SS      CC  AA      AA  LL  EE  PP      PP  CC      CC
SSSSSSSSSSSS  CC  AAAAAAAAAAAAAA  LL  EEEEEEEEE  -----  PPPPPPPPPPPP  CC
SSSSSSSSSSSS  CC  AAAAAAAAAAAAAA  LL  EEEEEEEEE  -----  PPPPPPPPPPPP  CC
      SS  CC  AA      AA  LL  EE  PP      CC
      SS  CC  AA      AA  LL  EE  PP      CC
SS      SS  CC      CC  AA      AA  LL  EE  PP      CC      CC
SSSSSSSSSSSS  CCCCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCCCC
SSSSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

.....
.....
.....
*****
*****
*****          PROGRAM VERIFICATION INFORMATION          *****
*****
*****          CODE SYSTEM:  SCALE-PC VERSION:  4.3          *****
*****
.....
*****
*****          PROGRAM:  CSAS          *****
*****
*****          CREATION DATE:  03/08/96          *****
*****
*****          VOLUME:  ENG          *****
*****
*****          LIBRARY:  G:\SCALE43\WIN_NT\EXE          *****
*****
*****          PRODUCTION CODE:  CSAS          *****
*****
*****          VERSION:  3.1          *****
*****
*****          JOBNAME:  SCALE-PC          *****
*****
*****          DATE OF EXECUTION:  07/21/98          *****
*****
*****          TIME OF EXECUTION:  12:27:03          *****
*****
.....
.....
.....
    
```

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
 MIX 9 MIXTURES  
 MSC 9 COMPOSITION SPECIFICATIONS  
 IZM 4 MATERIAL ZONES  
 GE LATTICECELL GEOMETRY  
 MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
 MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
 MX 1 MIXTURE NO.  
 VF 0.9500 VOLUME FRACTION  
 ROTH 10.9600 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 92000 1.00 ATOM/MOLECULE  
 92235 4.000 WT%  
 92238 96.000 WT%  
 8016 2.00 ATOMS/MOLECULE  
 END

SC ZIRCALLOY STANDARD COMPOSITION  
 MX 2 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 6.5600 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 40302 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 3 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC AL STANDARD COMPOSITION  
 MX 4 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 2.7020 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 13027 1.00 ATOM/MOLECULE  
 END

SC SS304 STANDARD COMPOSITION  
 MX 5 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 7.9200 THEORETICAL DENSITY  
 NEL 4 NO. ELEMENTS  
 ICP 0 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 24304 19.000 WT%  
 25055 2.000 WT%  
 26304 69.500 WT%  
 28304 9.500 WT%  
 END

SC PB STANDARD COMPOSITION  
 MX 6 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 11.3440 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 82000 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 7 MIXTURE NO.  
 VF 0.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION

```
MX          8 MIXTURE NO.  
VF          0.0000 VOLUME FRACTION  
ROTH       0.9982 THEORETICAL DENSITY  
NEL        2 NO. ELEMENTS  
ICP        1 0/1 MIXTURE/COMPOUND  
TEMP       293.0 DEG KELVIN  
           1001 2.00 ATOMS/MOLECULE  
           8016 1.00 ATOM/MOLECULE  
END
```

```
SC H2O      STANDARD COMPOSITION  
MX          9 MIXTURE NO.  
VF          1.0000 VOLUME FRACTION  
ROTH       0.9982 THEORETICAL DENSITY  
NEL        2 NO. ELEMENTS  
ICP        1 0/1 MIXTURE/COMPOUND  
TEMP       293.0 DEG KELVIN  
           1001 2.00 ATOMS/MOLECULE  
           8016 1.00 ATOM/MOLECULE  
END
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP SQUAREPITCH CELL TYPE  
PITCH      1.4529 CM CENTER TO CENTER SPACING  
FUELOD     0.9055 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL      1 MIXTURE NO. OF FUEL  
MMOD       3 MIXTURE NO. OF MODERATOR  
CLADOD     1.0770 CM CLAD OUTER DIAMETER  
MCLAD      2 MIXTURE NO. OF CLAD  
GAFOD      0.9246 CM GAP OUTER DIAMETER  
MGAP       9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```

```

.....
***
***              NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS  80 MIL CHANNEL
***
.....
***              ***** DATA LIBRARY INFORMATION *****
***
***              UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION
***              NUMBER          DATA SET NAME          NAME          -----
***              -----
***              89      G:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***              82      G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***              11      D:\PROJECTS\BU85-C-1\BWRFIN\19HX1M\FT11F001          SHORT CROSS SECTION LIBRARY
***              90      D:\PROJECTS\BU85-C-1\BWRFIN\19HX1M\FT90F001          INPUT DATA DIRECT ACCESS
***
.....
***              STANDARD COMPOSITION LIBRARY DATA
***              -----
***
***              UNIT NUMBER : 89
***
***              DATASET NAME : G:\scale43\DATALIB\FT89F001
***
***              LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
***              637 STANDARD COMPOSITIONS, 490 NUCLIDES
***              90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***              CREATION DATE: 6/30/95
***
***              CROSS SECTION LIBRARY DATA
***              -----
***
***              UNIT NUMBER : 82
***
***              DATASET NAME : G:\scale43\DATALIB\FT82F001
***
***              LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***              BASED ON ENDF-B VERSION 4 DATA
***              COMPILED FOR NRC      1/27/89
***              LAST UPDATED
***              L.M.PETRIE - ORNL
***              08/12/94
***
.....

```

```

.....      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.

```

KK      KK  EEEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEEE  NN      NN  000000000000     VV      VV
KK      KK  EE            NNNN     NN  00      00     VV      VV
KK      KK  EE            NN  NN     NN  00      00     VV      VV
KK      KK  EE            NN  NN     NN  00      00     VV      VV
KKKKKKKK EEEEEEEEEEEE  NN      NN  00      00     VV      VV
KKKKKKKK EEEEEEEEEEEE  NN      NN  00      00     VV      VV
KK      KK  EE            NN  NN  NN  00      00     VV      VV
KK      KK  EE            NN  NN  NN  00      00     VV      VV
KK      KK  EE            NN  NN  NN  00      00     VV      VV
KK      KK  EEEEEEEEEEEE  NN      NN  000000000000     VVV
KK      KK  EEEEEEEEEEEE  NN      NN  0000000000      V
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE            PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE            PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE            PP      PP  CC      CC
SSSSSSSSSS  CC      AA      AA      LL      EEEEEEEEEEEE  PPPPPPPPPP  CC
SSSSSSSSSS  CC      AA      AA      LL      EEEEEEEEEEEE  PPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE            PP      CC
SS      SS  CC      AA      AA  LL      EE            PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

0000000  7777777777  //  2222222222  11
00000000  7777777777  //  222222222222  111
00      00  77      77  //  22      22  1111  99
00      00  77      77  //  22      22  11      99
00      00  77      77  //  22      22  11      99
00      00  77      77  //  22      22  11      99
00      00  77      77  //  22      22  11      99
00      00  77      77  //  22      22  11      99
00      00  77      77  //  22      22  11      99
00000000  77      //  222222222222  11111111  //  9999999999  8888888888
0000000  77      //  222222222222  11111111  //  9999999999  8888888888
    
```

```

11      2222222222  2222222222  7777777777  11      11
111     2222222222  2222222222  7777777777  111     111
1111    22      22  :::  22      22  77      77  :::  1111    1111
11      22      22  :::  22      22  77      77  :::  11      11
11      22      22  :::  22      22  77      77  :::  11      11
11      22      22  :::  22      22  77      77  :::  11      11
11      22      22  :::  22      22  77      77  :::  11      11
11      22      22  :::  22      22  77      77  :::  11      11
11      22      22  :::  22      22  77      77  :::  11      11
11111111  222222222222  222222222222  77      77  11111111  11111111
11111111  222222222222  222222222222  77      77  11111111  11111111
    
```

```

.....
***
***              NAC-LWT CASK MODEL: EXXON 9X9 - 2 WATER RODS  80 MIL CHANNEL
***
.....
***              *****      NUMERIC PARAMETERS      *****
***
***              TME              MAXIMUM PROBLEM TIME (MIN)              *****
***
***              TBA              TIME PER GENERATION (MIN)              0.50
***
***              GEN              NUMBER OF GENERATIONS              303
***
***              NPG              NUMBER PER GENERATION              1000
***
***              NSK              NUMBER OF GENERATIONS TO BE SKIPPED              3
***
***              BEG              BEGINNING GENERATION NUMBER              1
***
***              RES              GENERATIONS BETWEEN CHECKPOINTS              0
***
***              X1D              NUMBER OF EXTRA 1-D CROSS SECTIONS              1
***
***              NBK              NEUTRON BANK SIZE              1025
***
***              XNB              EXTRA POSITIONS IN NEUTRON BANK              0
***
***              NFB              FISSION BANK SIZE              1000
***
***              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              BB827100001
***
***              NBS              NUMBER OF D.A. BLOCKS ON UNIT 8              200
***
***              NLS              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
***
.....

```







NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
----- UNIT 1 -----							
FUEL PIN CELL - WITH H2O							
1	CYLINDER	1 1	RADIUS = 0.45280	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2	CYLINDER	9 1	RADIUS = 0.46230	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3	CYLINDER	2 1	RADIUS = 0.53850	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4	CUBOID	3 1	+X = 0.72640	-X = -0.72640	+Y = 0.72640	-Y = -0.72640 +Z = 10.000 -Z = -10.000	
----- UNIT 2 -----							
WATER ROD CELL - WITH H2O							
1	CYLINDER	3 1	RADIUS = 0.46230	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2	CYLINDER	2 1	RADIUS = 0.53850	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3	CUBOID	3 1	+X = 0.72640	-X = -0.72640	+Y = 0.72640	-Y = -0.72640 +Z = 10.000 -Z = -10.000	
----- UNIT 3 EXTERNAL TO LATTICE 1 -----							
1	ARRAY NUMBER	1	+X = 6.5376	-X = -6.5376	+Y = 6.5376	-Y = -6.5376 +Z = 10.000 -Z = -10.000	
2	CUBOID	3 1	+X = 6.7031	-X = -6.7031	+Y = 6.7031	-Y = -6.7031 +Z = 10.000 -Z = -10.000	
3	CUBOID	2 1	+X = 6.9063	-X = -6.9063	+Y = 6.9063	-Y = -6.9063 +Z = 10.000 -Z = -10.000	
4	CUBOID	3 1	+X = 7.3025	-X = -7.3025	+Y = 7.3025	-Y = -7.3025 +Z = 10.000 -Z = -10.000	
----- UNIT 4 EXTERNAL TO LATTICE 1 -----							
1	ARRAY NUMBER	1	+X = 6.5376	-X = -6.5376	+Y = 6.5376	-Y = -6.5376 +Z = 10.000 -Z = -10.000	
2	CUBOID	3 1	+X = 6.7031	-X = -6.7031	+Y = 6.7031	-Y = -6.7031 +Z = 10.000 -Z = -10.000	
3	CUBOID	2 1	+X = 6.9063	-X = -6.9063	+Y = 6.9063	-Y = -6.9063 +Z = 10.000 -Z = -10.000	
4	CUBOID	3 1	+X = 7.3025	-X = -7.3025	+Y = 7.3025	-Y = -7.3025 +Z = 10.000 -Z = -10.000	

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
----- UNIT 5 -----							
1	CYLINDER	4 1	RADIUS = 16.827	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
	HOLE NUMBER	1	AT X = -7.4613	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 3	
	HOLE NUMBER	2	AT X = 7.4613	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 4	
2	CYLINDER	3 1	RADIUS = 16.986	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3	CYLINDER	5 1	RADIUS = 18.891	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4	CYLINDER	6 1	RADIUS = 33.496	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
5	CYLINDER	5 1	RADIUS = 36.544	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
6	CYLINDER	7 1	RADIUS = 49.244	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
7	CYLINDER	5 1	RADIUS = 49.854	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
***** GLOBAL ***** ----- UNIT 6 -----							
1	CYLINDER	8 1	RADIUS = 314.00	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
	HOLE NUMBER	3	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 5	
	HOLE NUMBER	4	AT X = 0.00000	Y = 99.800	Z = 0.00000	IS UNIT NUMBER 5	
	HOLE NUMBER	5	AT X = 86.430	Y = 49.900	Z = 0.00000	IS UNIT NUMBER 5	

HOLE NUMBER	6	AT X =	86.430	Y =	-49.900	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	7	AT X =	0.00000	Y =	-99.800	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	8	AT X =	-86.430	Y =	-49.900	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	9	AT X =	-86.430	Y =	49.900	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	10	AT X =	0.00000	Y =	199.60	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	11	AT X =	86.430	Y =	149.70	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	12	AT X =	172.86	Y =	99.800	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	13	AT X =	172.86	Y =	0.00000	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	14	AT X =	172.86	Y =	-99.800	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	15	AT X =	86.430	Y =	-149.70	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	16	AT X =	0.00000	Y =	-199.60	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	17	AT X =	-86.430	Y =	-149.70	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	18	AT X =	-172.86	Y =	-99.800	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	19	AT X =	-172.86	Y =	0.00000	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	20	AT X =	-172.86	Y =	99.800	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	21	AT X =	-86.430	Y =	149.70	Z =	0.00000	IS UNIT NUMBER	5				
HOLE NUMBER	22	AT X =	159.29	Y =	49.900	Z =	0.00000	IS UNIT NUMBER	5				
2 CUBOID	8 1	+X =	314.00	-X =	-314.00	+Y =	314.00	-Y =	-314.00	+Z =	10.000	-Z =	-10.000

NAC-LWT CASK MODEL: EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 9 LEFT TO RIGHT Y ROW 1 TO 9 BOTTOM TO TOP

1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1

1 1 1 1 1 2 1 1 1

1 1 1 1 2 1 1 1 1

1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1

NAC-LWT CASK MODEL: EXXON 999 - 2 WATER RODS 80 MIL CHANNEL  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	1.28823E+01 CM**3	1.28823E+01 CM**3
	2	2	5.46226E-01 CM**3	1.34285E+01 CM**3
	3	3	4.79162E+00 CM**3	1.82201E+01 CM**3
	4	4	2.39924E+01 CM**3	4.22126E+01 CM**3
2	1	5	1.34285E+01 CM**3	1.34285E+01 CM**3
	2	6	4.79162E+00 CM**3	1.82201E+01 CM**3
	3	7	2.39924E+01 CM**3	4.22126E+01 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 9 IS AN ARRAY PLACEMENT BOUNDARY REGION				
3	1	8	3.41922E+03 CM**3	3.41922E+03 CM**3
	2	9	1.75307E+02 CM**3	3.59452E+03 CM**3
	3	10	2.21234E+02 CM**3	3.81576E+03 CM**3
	4	11	4.50362E+02 CM**3	4.26612E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 12 IS AN ARRAY PLACEMENT BOUNDARY REGION				
4	1	12	3.41922E+03 CM**3	3.41922E+03 CM**3
	2	13	1.75307E+02 CM**3	3.59452E+03 CM**3
	3	14	2.21234E+02 CM**3	3.81576E+03 CM**3
	4	15	4.50362E+02 CM**3	4.26612E+03 CM**3
5	1	16	9.25953E+03 CM**3	1.77918E+04 CM**3
	2	17	3.37383E+02 CM**3	1.91291E+04 CM**3
	3	18	4.29436E+03 CM**3	2.24235E+04 CM**3
	4	19	4.80740E+04 CM**3	7.04975E+04 CM**3
	5	20	1.34136E+04 CM**3	8.39110E+04 CM**3
	6	21	6.84563E+04 CM**3	1.52367E+05 CM**3
	7	22	3.79567E+03 CM**3	1.56163E+05 CM**3
6	1	23	3.07171E+06 CM**3	6.19497E+06 CM**3
	2	24	1.69271E+06 CM**3	7.88768E+06 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	3160	1	1	4.07080E+04 CM**3
		2	9	1.72607E+03 CM**3
		3	2	1.51415E+04 CM**3
		4	3	7.58161E+04 CM**3
2	80	1	3	1.07428E+03 CM**3
		2	2	3.83329E+02 CM**3
		3	3	1.91939E+03 CM**3
3	20	1	3	6.83843E+04 CM**3
		2	3	3.50614E+03 CM**3
		3	2	4.42469E+03 CM**3
		4	3	9.00723E+03 CM**3
4	20	1	3	6.83843E+04 CM**3
		2	3	3.50614E+03 CM**3
		3	2	4.42469E+03 CM**3
		4	3	9.00723E+03 CM**3
5	20	1	4	1.85191E+05 CM**3
		2	3	6.74766E+03 CM**3
		3	5	8.58872E+04 CM**3
		4	6	9.61479E+05 CM**3
		5	5	2.68272E+05 CM**3
		6	7	1.36913E+06 CM**3
		7	5	7.59134E+04 CM**3
6	1	1	8	3.07171E+06 CM**3
		2	8	1.69271E+06 CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	4.07080E+04 CM**3	4.23851E+05
2	2.43742E+04 CM**3	1.59895E+05
3	1.10584E+05 CM**3	1.10382E+05
4	1.85191E+05 CM**3	5.00385E+05
5	4.30072E+05 CM**3	3.40617E+06
6	9.61479E+05 CM**3	1.09070E+07
7	1.36913E+06 CM**3	1.36662E+14
8	4.76442E+06 CM**3	4.75571E+14
9	1.72607E+03 CM**3	1.72292E+03

.....  
 \*\*\*  
 \*\*\* BIASING INFORMATION \*\*\*  
 \*\*\*  
 \*\*\* A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BTAS ID'S. \*\*\*  
 \*\*\*  
 .....

..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....

..... 0.00833 MINUTES WERE USED PROCESSING DATA. ....

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 1.30338E-02

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:  
+X= 3.14000E+02 -X=-3.14000E+02 +Y= 3.14000E+02 -Y=-3.14000E+02 +Z= 1.00000E+01 -Z=-1.00000E+01

THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 148 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

852 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

0.45350 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.46933 MINUTES.

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

GENERATION KENO MESSAGE NUMBER	GENERATION K-EFFECTIVE NUMBER	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
1	9.01189E-01	4.86167E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.28035E-01	5.07167E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	8.92323E-01	5.29167E-01	8.92323E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.34444E-01	5.50167E-01	9.13383E-01	2.10603E-02	0.00000E+00	0.00000E+00
5	9.07684E-01	5.73000E-01	9.11483E-01	1.23067E-02	0.00000E+00	0.00000E+00
6	9.48055E-01	5.96000E-01	9.20626E-01	1.26222E-02	0.00000E+00	0.00000E+00
7	8.92456E-01	6.18833E-01	9.14992E-01	1.12843E-02	0.00000E+00	0.00000E+00
8	9.27400E-01	6.39833E-01	9.17060E-01	9.44284E-03	0.00000E+00	0.00000E+00
9	9.27652E-01	6.62833E-01	9.18573E-01	8.12283E-03	0.00000E+00	0.00000E+00
10	9.14856E-01	6.83833E-01	9.18109E-01	7.04991E-03	0.00000E+00	0.00000E+00
11	8.96192E-01	7.06667E-01	9.15673E-01	6.67731E-03	0.00000E+00	0.00000E+00
12	8.97511E-01	7.27833E-01	9.13857E-01	6.24242E-03	0.00000E+00	0.00000E+00
13	9.10384E-01	7.49667E-01	9.13541E-01	5.65531E-03	0.00000E+00	0.00000E+00
14	9.30904E-01	7.72667E-01	9.14986E-01	5.36149E-03	0.00000E+00	0.00000E+00
15	9.47282E-01	7.93667E-01	9.17473E-01	5.52215E-03	0.00000E+00	0.00000E+00
16	9.07252E-01	8.15667E-01	9.16742E-01	5.16438E-03	0.00000E+00	0.00000E+00
17	9.01455E-01	8.37667E-01	9.15723E-01	4.91462E-03	0.00000E+00	0.00000E+00
18	8.88184E-01	8.59667E-01	9.14002E-01	4.90885E-03	0.00000E+00	0.00000E+00
19	8.96816E-01	8.83333E-01	9.12991E-01	4.72059E-03	0.00000E+00	0.00000E+00
20	9.40758E-01	9.07167E-01	9.14534E-01	4.71037E-03	0.00000E+00	0.00000E+00
21	9.02359E-01	9.30167E-01	9.13893E-01	4.50140E-03	0.00000E+00	0.00000E+00
22	9.53151E-01	9.52000E-01	9.15856E-01	4.69994E-03	0.00000E+00	0.00000E+00
23	9.22802E-01	9.75000E-01	9.16187E-01	4.48275E-03	0.00000E+00	0.00000E+00
24	9.32954E-01	9.96833E-01	9.16949E-01	4.34156E-03	0.00000E+00	0.00000E+00
25	9.47618E-01	1.01883E+00	9.18282E-01	4.35754E-03	0.00000E+00	0.00000E+00
26	9.36387E-01	1.04183E+00	9.19037E-01	4.23967E-03	0.00000E+00	0.00000E+00
27	9.64695E-01	1.06367E+00	9.20862E-01	4.45769E-03	0.00000E+00	0.00000E+00
28	9.41832E-01	1.08463E+00	9.21669E-01	4.35809E-03	0.00000E+00	0.00000E+00
29	9.41274E-01	1.10767E+00	9.22395E-01	4.25597E-03	0.00000E+00	0.00000E+00
30	9.43159E-01	1.12967E+00	9.23137E-01	4.16766E-03	0.00000E+00	0.00000E+00
31	9.11565E-01	1.15350E+00	9.22738E-01	4.04113E-03	0.00000E+00	0.00000E+00
32	9.11421E-01	1.17633E+00	9.22360E-01	3.92228E-03	0.00000E+00	0.00000E+00
33	9.11966E-01	1.19917E+00	9.22025E-01	3.80844E-03	0.00000E+00	0.00000E+00
34	9.17329E-01	1.22300E+00	9.21878E-01	3.69042E-03	0.00000E+00	0.00000E+00
35	8.90667E-01	1.24500E+00	9.20933E-01	3.69978E-03	0.00000E+00	0.00000E+00
36	9.29267E-01	1.26783E+00	9.21178E-01	3.59767E-03	0.00000E+00	0.00000E+00
37	9.38488E-01	1.29167E+00	9.21672E-01	3.52820E-03	0.00000E+00	0.00000E+00
38	9.15709E-01	1.31450E+00	9.21507E-01	3.43279E-03	0.00000E+00	0.00000E+00
39	9.11158E-01	1.33933E+00	9.21227E-01	3.35042E-03	0.00000E+00	0.00000E+00
40	8.92336E-01	1.36133E+00	9.20464E-01	3.34912E-03	0.00000E+00	0.00000E+00
41	8.91023E-01	1.38500E+00	9.19709E-01	3.34832E-03	0.00000E+00	0.00000E+00
42	9.11460E-01	1.40700E+00	9.19503E-01	3.27005E-03	0.00000E+00	0.00000E+00
43	8.81758E-01	1.42983E+00	9.18582E-01	3.31950E-03	0.00000E+00	0.00000E+00
44	8.89869E-01	1.45183E+00	9.17999E-01	3.31085E-03	0.00000E+00	0.00000E+00
45	8.88130E-01	1.47567E+00	9.17206E-01	3.30623E-03	0.00000E+00	0.00000E+00
46	9.54337E-01	1.49850E+00	9.18050E-01	3.33863E-03	0.00000E+00	0.00000E+00
47	9.32707E-01	1.52050E+00	9.18376E-01	3.27981E-03	0.00000E+00	0.00000E+00
48	9.25099E-01	1.54350E+00	9.18522E-01	3.21104E-03	0.00000E+00	0.00000E+00
49	9.04156E-01	1.56533E+00	9.18216E-01	3.15681E-03	0.00000E+00	0.00000E+00
50	9.52327E-01	1.58733E+00	9.18927E-01	3.17100E-03	0.00000E+00	0.00000E+00
51	9.26219E-01	1.60933E+00	9.19076E-01	3.10918E-03	0.00000E+00	0.00000E+00
52	9.38677E-01	1.63217E+00	9.19468E-01	3.07148E-03	0.00000E+00	0.00000E+00
53	9.59202E-01	1.65517E+00	9.20247E-01	3.10983E-03	0.00000E+00	0.00000E+00
54	9.34213E-01	1.67700E+00	9.20516E-01	3.06124E-03	0.00000E+00	0.00000E+00
55	9.23051E-01	1.70000E+00	9.20563E-01	3.00331E-03	0.00000E+00	0.00000E+00
56	9.43534E-01	1.72283E+00	9.20989E-01	2.97771E-03	0.00000E+00	0.00000E+00
57	8.99568E-01	1.74667E+00	9.20599E-01	2.94890E-03	0.00000E+00	0.00000E+00
58	9.47481E-01	1.76867E+00	9.21079E-01	2.93528E-03	0.00000E+00	0.00000E+00
59	9.19284E-01	1.79067E+00	9.21048E-01	2.88349E-03	0.00000E+00	0.00000E+00
60	9.33921E-01	1.81350E+00	9.21270E-01	2.84202E-03	0.00000E+00	0.00000E+00
61	9.04019E-01	1.83633E+00	9.20977E-01	2.80870E-03	0.00000E+00	0.00000E+00
62	9.03335E-01	1.85833E+00	9.20683E-01	2.77710E-03	0.00000E+00	0.00000E+00
63	9.43630E-01	1.88117E+00	9.21060E-01	2.75698E-03	0.00000E+00	0.00000E+00
64	9.15463E-01	1.90317E+00	9.20969E-01	2.71365E-03	0.00000E+00	0.00000E+00
65	9.27783E-01	1.92700E+00	9.21077E-01	2.67242E-03	0.00000E+00	0.00000E+00
66	9.64049E-01	1.94900E+00	9.21749E-01	2.71467E-03	0.00000E+00	0.00000E+00
67	9.52222E-01	1.97100E+00	9.2218E-01	2.71339E-03	0.00000E+00	0.00000E+00
68	9.38790E-01	1.99383E+00	9.22469E-01	2.68373E-03	0.00000E+00	0.00000E+00
69	9.39284E-01	2.01583E+00	9.22720E-01	2.65526E-03	0.00000E+00	0.00000E+00
70	9.18021E-01	2.03867E+00	9.22651E-01	2.61683E-03	0.00000E+00	0.00000E+00
71	9.09255E-01	2.06250E+00	9.22457E-01	2.58593E-03	0.00000E+00	0.00000E+00
72	9.85449E-01	2.08350E+00	9.22356E-01	2.70292E-03	0.00000E+00	0.00000E+00
73	8.82877E-01	2.10733E+00	9.2278E-01	2.72489E-03	0.00000E+00	0.00000E+00
74	9.20326E-01	2.13017E+00	9.22752E-01	2.68700E-03	0.00000E+00	0.00000E+00
75	8.82683E-01	2.15217E+00	9.22203E-01	2.70618E-03	0.00000E+00	0.00000E+00
76	9.51438E-01	2.17417E+00	9.22598E-01	2.69844E-03	0.00000E+00	0.00000E+00
77	9.20571E-01	2.19617E+00	9.22571E-01	2.66235E-03	0.00000E+00	0.00000E+00
78	9.38215E-01	2.21900E+00	9.22777E-01	2.63514E-03	0.00000E+00	0.00000E+00
79	9.19033E-01	2.24183E+00	9.22729E-01	2.60115E-03	0.00000E+00	0.00000E+00
80	9.20555E-01	2.26483E+00	9.22701E-01	2.56774E-03	0.00000E+00	0.00000E+00
81	9.21486E-01	2.28667E+00	9.22685E-01	2.53507E-03	0.00000E+00	0.00000E+00
82	9.18215E-01	2.30967E+00	9.22629E-01	2.50381E-03	0.00000E+00	0.00000E+00
83	9.27842E-01	2.33250E+00	9.22694E-01	2.47354E-03	0.00000E+00	0.00000E+00
84	9.11449E-01	2.35450E+00	9.22557E-01	2.44703E-03	0.00000E+00	0.00000E+00
85	9.03452E-01	2.37650E+00	9.22326E-01	2.42830E-03	0.00000E+00	0.00000E+00
86	9.28189E-01	2.39933E+00	9.22396E-01	2.40024E-03	0.00000E+00	0.00000E+00
87	9.32908E-01	2.42217E+00	9.22520E-01	2.37505E-03	0.00000E+00	0.00000E+00
88	9.32844E-01	2.44417E+00	9.22640E-01	2.35034E-03	0.00000E+00	0.00000E+00
89	9.37330E-01	2.46717E+00	9.22809E-01	2.32930E-03	0.00000E+00	0.00000E+00

90	9.35225E-01	2.48900E+00	9.22950E-01	2.30699E-03	0.00000E+00	0.00000E+00
91	9.34490E-01	2.51100E+00	9.23079E-01	2.28461E-03	0.00000E+00	0.00000E+00
92	9.08846E-01	2.53383E+00	9.22921E-01	2.26461E-03	0.00000E+00	0.00000E+00
93	9.17967E-01	2.55500E+00	9.22867E-01	2.24025E-03	0.00000E+00	0.00000E+00
94	8.85436E-01	2.57883E+00	9.22460E-01	2.25281E-03	0.00000E+00	0.00000E+00
95	9.31770E-01	2.60067E+00	9.22560E-01	2.23070E-03	0.00000E+00	0.00000E+00
96	8.86037E-01	2.62367E+00	9.22172E-01	2.24078E-03	0.00000E+00	0.00000E+00
97	9.34995E-01	2.64567E+00	9.22307E-01	2.22118E-03	0.00000E+00	0.00000E+00
98	9.41666E-01	2.66850E+00	9.22508E-01	2.20715E-03	0.00000E+00	0.00000E+00
99	9.32066E-01	2.68950E+00	9.22607E-01	2.18650E-03	0.00000E+00	0.00000E+00
100	9.22857E-01	2.71150E+00	9.22609E-01	2.16407E-03	0.00000E+00	0.00000E+00
101	9.31972E-01	2.73350E+00	9.22704E-01	2.14419E-03	0.00000E+00	0.00000E+00
102	9.09239E-01	2.75733E+00	9.22569E-01	2.12691E-03	0.00000E+00	0.00000E+00
103	8.75690E-01	2.78017E+00	9.22105E-01	2.15629E-03	0.00000E+00	0.00000E+00
104	9.00232E-01	2.80300E+00	9.21891E-01	2.14579E-03	0.00000E+00	0.00000E+00
105	9.03079E-01	2.82600E+00	9.21708E-01	2.13269E-03	0.00000E+00	0.00000E+00
106	9.40959E-01	2.84883E+00	9.21893E-01	2.12018E-03	0.00000E+00	0.00000E+00
107	9.49846E-01	2.87167E+00	9.22159E-01	2.11670E-03	0.00000E+00	0.00000E+00
108	9.39698E-01	2.89467E+00	9.22325E-01	2.10315E-03	0.00000E+00	0.00000E+00
109	9.32212E-01	2.91750E+00	9.22417E-01	2.08545E-03	0.00000E+00	0.00000E+00
110	8.92871E-01	2.94033E+00	9.22144E-01	2.08408E-03	0.00000E+00	0.00000E+00
111	9.28407E-01	2.96233E+00	9.22201E-01	2.06568E-03	0.00000E+00	0.00000E+00
112	9.21416E-01	2.98517E+00	9.22194E-01	2.04682E-03	0.00000E+00	0.00000E+00
113	9.33755E-01	3.00817E+00	9.22298E-01	2.03097E-03	0.00000E+00	0.00000E+00
114	9.35223E-01	3.03100E+00	9.22414E-01	2.01606E-03	0.00000E+00	0.00000E+00
115	9.39859E-01	3.05383E+00	9.22568E-01	2.00410E-03	0.00000E+00	0.00000E+00
116	9.12919E-01	3.07767E+00	9.22483E-01	1.98824E-03	0.00000E+00	0.00000E+00
117	9.31885E-01	3.10050E+00	9.22565E-01	1.97257E-03	0.00000E+00	0.00000E+00
118	9.34053E-01	3.12250E+00	9.22664E-01	1.95800E-03	0.00000E+00	0.00000E+00
119	9.57707E-01	3.14450E+00	9.22964E-01	1.96416E-03	0.00000E+00	0.00000E+00
120	9.38524E-01	3.16650E+00	9.23095E-01	1.95190E-03	0.00000E+00	0.00000E+00
121	9.16934E-01	3.18933E+00	9.23044E-01	1.93612E-03	0.00000E+00	0.00000E+00
122	9.19902E-01	3.21217E+00	9.23018E-01	1.92010E-03	0.00000E+00	0.00000E+00
123	9.04315E-01	3.23333E+00	9.22863E-01	1.91043E-03	0.00000E+00	0.00000E+00
124	8.89191E-01	3.25617E+00	9.22587E-01	1.91470E-03	0.00000E+00	0.00000E+00
125	8.78869E-01	3.27900E+00	9.22232E-01	1.93205E-03	0.00000E+00	0.00000E+00
126	9.21744E-01	3.30100E+00	9.22228E-01	1.91641E-03	0.00000E+00	0.00000E+00
127	9.29411E-01	3.32400E+00	9.22285E-01	1.90188E-03	0.00000E+00	0.00000E+00
128	9.28569E-01	3.34500E+00	9.22335E-01	1.88739E-03	0.00000E+00	0.00000E+00
129	9.54092E-01	3.36700E+00	9.22585E-01	1.88909E-03	0.00000E+00	0.00000E+00
130	9.14894E-01	3.38900E+00	9.22525E-01	1.87523E-03	0.00000E+00	0.00000E+00
131	8.92940E-01	3.41083E+00	9.22296E-01	1.87472E-03	0.00000E+00	0.00000E+00
132	9.15062E-01	3.43283E+00	9.22240E-01	1.86108E-03	0.00000E+00	0.00000E+00
133	9.34626E-01	3.45567E+00	9.22334E-01	1.84924E-03	0.00000E+00	0.00000E+00
134	9.30755E-01	3.47867E+00	9.22398E-01	1.83628E-03	0.00000E+00	0.00000E+00
135	8.84656E-01	3.50067E+00	9.22114E-01	1.84438E-03	0.00000E+00	0.00000E+00
136	8.97894E-01	3.52350E+00	9.21934E-01	1.83947E-03	0.00000E+00	0.00000E+00
137	8.83584E-01	3.54633E+00	9.21650E-01	1.84776E-03	0.00000E+00	0.00000E+00
138	8.90514E-01	3.56933E+00	9.21421E-01	1.84836E-03	0.00000E+00	0.00000E+00
139	9.40755E-01	3.59217E+00	9.21562E-01	1.84023E-03	0.00000E+00	0.00000E+00
140	9.26957E-01	3.61417E+00	9.21601E-01	1.82727E-03	0.00000E+00	0.00000E+00
141	9.41954E-01	3.63517E+00	9.21747E-01	1.81997E-03	0.00000E+00	0.00000E+00
142	8.86837E-01	3.65900E+00	9.21498E-01	1.82405E-03	0.00000E+00	0.00000E+00
143	9.11581E-01	3.68100E+00	9.21428E-01	1.81244E-03	0.00000E+00	0.00000E+00
144	9.59398E-01	3.70283E+00	9.21695E-01	1.81938E-03	0.00000E+00	0.00000E+00
145	9.14863E-01	3.72483E+00	9.21647E-01	1.80725E-03	0.00000E+00	0.00000E+00
146	9.31201E-01	3.74683E+00	9.21714E-01	1.79588E-03	0.00000E+00	0.00000E+00
147	8.92769E-01	3.76883E+00	9.21514E-01	1.79459E-03	0.00000E+00	0.00000E+00
148	9.65823E-01	3.79167E+00	9.21817E-01	1.80791E-03	0.00000E+00	0.00000E+00
149	9.38353E-01	3.81467E+00	9.21930E-01	1.79909E-03	0.00000E+00	0.00000E+00
150	8.90125E-01	3.83750E+00	9.21715E-01	1.79976E-03	0.00000E+00	0.00000E+00
151	9.40850E-01	3.85950E+00	9.21844E-01	1.79225E-03	0.00000E+00	0.00000E+00
152	9.50210E-01	3.88150E+00	9.22033E-01	1.79028E-03	0.00000E+00	0.00000E+00
153	9.10546E-01	3.90333E+00	9.21957E-01	1.78001E-03	0.00000E+00	0.00000E+00
154	9.31720E-01	3.92633E+00	9.22021E-01	1.76943E-03	0.00000E+00	0.00000E+00
155	9.01260E-01	3.94917E+00	9.21885E-01	1.76305E-03	0.00000E+00	0.00000E+00
156	9.42117E-01	3.97117E+00	9.22016E-01	1.75649E-03	0.00000E+00	0.00000E+00
157	9.24665E-01	3.99317E+00	9.22034E-01	1.74520E-03	0.00000E+00	0.00000E+00
158	9.22738E-01	4.01683E+00	9.22038E-01	1.73399E-03	0.00000E+00	0.00000E+00
159	9.32738E-01	4.03900E+00	9.22106E-01	1.72425E-03	0.00000E+00	0.00000E+00
160	8.92679E-01	4.06083E+00	9.21920E-01	1.72340E-03	0.00000E+00	0.00000E+00
161	9.08268E-01	4.08183E+00	9.21834E-01	1.71468E-03	0.00000E+00	0.00000E+00
162	8.95632E-01	4.10483E+00	9.21670E-01	1.71178E-03	0.00000E+00	0.00000E+00
163	9.32096E-01	4.12767E+00	9.21735E-01	1.70234E-03	0.00000E+00	0.00000E+00
164	9.51827E-01	4.14867E+00	9.21921E-01	1.70197E-03	0.00000E+00	0.00000E+00
165	8.85013E-01	4.17067E+00	9.21694E-01	1.70659E-03	0.00000E+00	0.00000E+00
166	9.05424E-01	4.19167E+00	9.21595E-01	1.69905E-03	0.00000E+00	0.00000E+00
167	9.38226E-01	4.21467E+00	9.21696E-01	1.69172E-03	0.00000E+00	0.00000E+00
168	9.18271E-01	4.23750E+00	9.21675E-01	1.68163E-03	0.00000E+00	0.00000E+00
169	9.24393E-01	4.25950E+00	9.21692E-01	1.67161E-03	0.00000E+00	0.00000E+00
170	8.82554E-01	4.28233E+00	9.21459E-01	1.67788E-03	0.00000E+00	0.00000E+00
171	9.18620E-01	4.30350E+00	9.21442E-01	1.66801E-03	0.00000E+00	0.00000E+00
172	9.37974E-01	4.32633E+00	9.21539E-01	1.66101E-03	0.00000E+00	0.00000E+00
173	9.49211E-01	4.34733E+00	9.21701E-01	1.65918E-03	0.00000E+00	0.00000E+00
174	9.12638E-01	4.37117E+00	9.21648E-01	1.65035E-03	0.00000E+00	0.00000E+00
175	9.28413E-01	4.39317E+00	9.21687E-01	1.64125E-03	0.00000E+00	0.00000E+00
176	9.40138E-01	4.41517E+00	9.21793E-01	1.63523E-03	0.00000E+00	0.00000E+00
177	9.25922E-01	4.43700E+00	9.21917E-01	1.62603E-03	0.00000E+00	0.00000E+00
178	9.42747E-01	4.46000E+00	9.21936E-01	1.62113E-03	0.00000E+00	0.00000E+00
179	9.43369E-01	4.48283E+00	9.22057E-01	1.61649E-03	0.00000E+00	0.00000E+00
180	9.64434E-01	4.50483E+00	9.22295E-01	1.62492E-03	0.00000E+00	0.00000E+00
181	9.61077E-01	4.52767E+00	9.22512E-01	1.63027E-03	0.00000E+00	0.00000E+00
182	9.21660E-01	4.55150E+00	9.22507E-01	1.62120E-03	0.00000E+00	0.00000E+00
183	9.06974E-01	4.57533E+00	9.22421E-01	1.61450E-03	0.00000E+00	0.00000E+00
184	8.98868E-01	4.59917E+00	9.22292E-01	1.61080E-03	0.00000E+00	0.00000E+00

185	9.33264E-01	4.62200E+00	9.22352E-01	1.60310E-03	0.00000E+00	0.00000E+00
186	9.04862E-01	4.64483E+00	9.22257E-01	1.59719E-03	0.00000E+00	0.00000E+00
187	9.27530E-01	4.66783E+00	9.22285E-01	1.58879E-03	0.00000E+00	0.00000E+00
188	9.02055E-01	4.69067E+00	9.22177E-01	1.58397E-03	0.00000E+00	0.00000E+00
189	9.67078E-01	4.71167E+00	9.22417E-01	1.59366E-03	0.00000E+00	0.00000E+00
190	9.60754E-01	4.73367E+00	9.22621E-01	1.59823E-03	0.00000E+00	0.00000E+00
191	9.25358E-01	4.75650E+00	9.22635E-01	1.58982E-03	0.00000E+00	0.00000E+00
192	9.82945E-01	4.77950E+00	9.22952E-01	1.61297E-03	0.00000E+00	0.00000E+00
193	9.36432E-01	4.80233E+00	9.23023E-01	1.60605E-03	0.00000E+00	0.00000E+00
194	9.52149E-01	4.82617E+00	9.23175E-01	1.60485E-03	0.00000E+00	0.00000E+00
195	9.50764E-01	4.84900E+00	9.23318E-01	1.60290E-03	0.00000E+00	0.00000E+00
196	9.07413E-01	4.87183E+00	9.23236E-01	1.59672E-03	0.00000E+00	0.00000E+00
197	9.28760E-01	4.89567E+00	9.23264E-01	1.58877E-03	0.00000E+00	0.00000E+00
198	9.07747E-01	4.91767E+00	9.23185E-01	1.58262E-03	0.00000E+00	0.00000E+00
199	9.21906E-01	4.94150E+00	9.23178E-01	1.57458E-03	0.00000E+00	0.00000E+00
200	9.25988E-01	4.96533E+00	9.23193E-01	1.56667E-03	0.00000E+00	0.00000E+00
201	9.29846E-01	4.98733E+00	9.23226E-01	1.55914E-03	0.00000E+00	0.00000E+00
202	9.15257E-01	5.01017E+00	9.23186E-01	1.55183E-03	0.00000E+00	0.00000E+00
203	9.08503E-01	5.03400E+00	9.23113E-01	1.54582E-03	0.00000E+00	0.00000E+00
204	9.08062E-01	5.05683E+00	9.23039E-01	1.53995E-03	0.00000E+00	0.00000E+00
205	9.08777E-01	5.07883E+00	9.22968E-01	1.53396E-03	0.00000E+00	0.00000E+00
206	9.02570E-01	5.10167E+00	9.22868E-01	1.52796E-03	0.00000E+00	0.00000E+00
207	9.23500E-01	5.12367E+00	9.22871E-01	1.52221E-03	0.00000E+00	0.00000E+00
208	8.96954E-01	5.14650E+00	9.22746E-01	1.52002E-03	0.00000E+00	0.00000E+00
209	9.09160E-01	5.16850E+00	9.22680E-01	1.51409E-03	0.00000E+00	0.00000E+00
210	9.25769E-01	5.19050E+00	9.22695E-01	1.50686E-03	0.00000E+00	0.00000E+00
211	9.02445E-01	5.21433E+00	9.22598E-01	1.50776E-03	0.00000E+00	0.00000E+00
212	9.04908E-01	5.23717E+00	9.22514E-01	1.49796E-03	0.00000E+00	0.00000E+00
213	9.10647E-01	5.26000E+00	9.22457E-01	1.49190E-03	0.00000E+00	0.00000E+00
214	8.68898E-01	5.28300E+00	9.22205E-01	1.50619E-03	0.00000E+00	0.00000E+00
215	9.45750E-01	5.30483E+00	9.22315E-01	1.50317E-03	0.00000E+00	0.00000E+00
216	9.32390E-01	5.32600E+00	9.22362E-01	1.49687E-03	0.00000E+00	0.00000E+00
217	9.43201E-01	5.34800E+00	9.22459E-01	1.49304E-03	0.00000E+00	0.00000E+00
218	9.35512E-01	5.37083E+00	9.22520E-01	1.48734E-03	0.00000E+00	0.00000E+00
219	8.85614E-01	5.39367E+00	9.22350E-01	1.49021E-03	0.00000E+00	0.00000E+00
220	9.81417E-01	5.41567E+00	9.22621E-01	1.50790E-03	0.00000E+00	0.00000E+00
221	9.44546E-01	5.43767E+00	9.22721E-01	1.50433E-03	0.00000E+00	0.00000E+00
222	9.39459E-01	5.46150E+00	9.22797E-01	1.49941E-03	0.00000E+00	0.00000E+00
223	9.10404E-01	5.48433E+00	9.22741E-01	1.49366E-03	0.00000E+00	0.00000E+00
224	9.18697E-01	5.50717E+00	9.22723E-01	1.48703E-03	0.00000E+00	0.00000E+00
225	8.84000E-01	5.53100E+00	9.22549E-01	1.49050E-03	0.00000E+00	0.00000E+00
226	9.02204E-01	5.55383E+00	9.22458E-01	1.48661E-03	0.00000E+00	0.00000E+00
227	9.24094E-01	5.57767E+00	9.22465E-01	1.48000E-03	0.00000E+00	0.00000E+00
228	9.02574E-01	5.60067E+00	9.22377E-01	1.47606E-03	0.00000E+00	0.00000E+00
229	9.26655E-01	5.62350E+00	9.22396E-01	1.46967E-03	0.00000E+00	0.00000E+00
230	9.24029E-01	5.64633E+00	9.22403E-01	1.46323E-03	0.00000E+00	0.00000E+00
231	9.20599E-01	5.66917E+00	9.22395E-01	1.45684E-03	0.00000E+00	0.00000E+00
232	9.34938E-01	5.69117E+00	9.22450E-01	1.45152E-03	0.00000E+00	0.00000E+00
233	9.27772E-01	5.71500E+00	9.22473E-01	1.44541E-03	0.00000E+00	0.00000E+00
234	9.26126E-01	5.73783E+00	9.22489E-01	1.43925E-03	0.00000E+00	0.00000E+00
235	8.98642E-01	5.75963E+00	9.22386E-01	1.43671E-03	0.00000E+00	0.00000E+00
236	8.87684E-01	5.78283E+00	9.22398E-01	1.43822E-03	0.00000E+00	0.00000E+00
237	9.32308E-01	5.80567E+00	9.22281E-01	1.43273E-03	0.00000E+00	0.00000E+00
238	8.85845E-01	5.82950E+00	9.22127E-01	1.43498E-03	0.00000E+00	0.00000E+00
239	9.39433E-01	5.85133E+00	9.22200E-01	1.43077E-03	0.00000E+00	0.00000E+00
240	9.06601E-01	5.87433E+00	9.22134E-01	1.42626E-03	0.00000E+00	0.00000E+00
241	9.27072E-01	5.89817E+00	9.22155E-01	1.42043E-03	0.00000E+00	0.00000E+00
242	9.23204E-01	5.92183E+00	9.22159E-01	1.41450E-03	0.00000E+00	0.00000E+00
243	9.58466E-01	5.94393E+00	9.22310E-01	1.41665E-03	0.00000E+00	0.00000E+00
244	9.54488E-01	5.96767E+00	9.22443E-01	1.41704E-03	0.00000E+00	0.00000E+00
245	9.53238E-01	5.98967E+00	9.22569E-01	1.41687E-03	0.00000E+00	0.00000E+00
246	9.40665E-01	6.01167E+00	9.22644E-01	1.41300E-03	0.00000E+00	0.00000E+00
247	8.89099E-01	6.03633E+00	9.22507E-01	1.41387E-03	0.00000E+00	0.00000E+00
248	9.59811E-01	6.05917E+00	9.22658E-01	1.41625E-03	0.00000E+00	0.00000E+00
249	9.36168E-01	6.08033E+00	9.22713E-01	1.41157E-03	0.00000E+00	0.00000E+00
250	9.12594E-01	6.10400E+00	9.22672E-01	1.40646E-03	0.00000E+00	0.00000E+00
251	9.11767E-01	6.12700E+00	9.22628E-01	1.40148E-03	0.00000E+00	0.00000E+00
252	9.12741E-01	6.15083E+00	9.22589E-01	1.39642E-03	0.00000E+00	0.00000E+00
253	8.81522E-01	6.17367E+00	9.22425E-01	1.40044E-03	0.00000E+00	0.00000E+00
254	9.43794E-01	6.19650E+00	9.22510E-01	1.39745E-03	0.00000E+00	0.00000E+00
255	9.35168E-01	6.21933E+00	9.22560E-01	1.39281E-03	0.00000E+00	0.00000E+00
256	9.50770E-01	6.24133E+00	9.22671E-01	1.39175E-03	0.00000E+00	0.00000E+00
257	9.01853E-01	6.26433E+00	9.22590E-01	1.38869E-03	0.00000E+00	0.00000E+00
258	9.25094E-01	6.28617E+00	9.22599E-01	1.38329E-03	0.00000E+00	0.00000E+00
259	8.87971E-01	6.31000E+00	9.22465E-01	1.38447E-03	0.00000E+00	0.00000E+00
260	9.16477E-01	6.33200E+00	9.22441E-01	1.37929E-03	0.00000E+00	0.00000E+00
261	9.24263E-01	6.35583E+00	9.22448E-01	1.37397E-03	0.00000E+00	0.00000E+00
262	8.86397E-01	6.37867E+00	9.22310E-01	1.37568E-03	0.00000E+00	0.00000E+00
263	9.15748E-01	6.40150E+00	9.22285E-01	1.37063E-03	0.00000E+00	0.00000E+00
264	9.21627E-01	6.42350E+00	9.22282E-01	1.36539E-03	0.00000E+00	0.00000E+00
265	9.27530E-01	6.44650E+00	9.22302E-01	1.36033E-03	0.00000E+00	0.00000E+00
266	9.43546E-01	6.46933E+00	9.22383E-01	1.35756E-03	0.00000E+00	0.00000E+00
267	9.60302E-01	6.49133E+00	9.22526E-01	1.35997E-03	0.00000E+00	0.00000E+00
268	9.05761E-01	6.51417E+00	9.22463E-01	1.35632E-03	0.00000E+00	0.00000E+00
269	9.55820E-01	6.53700E+00	9.22588E-01	1.35699E-03	0.00000E+00	0.00000E+00
270	9.09560E-01	6.55900E+00	9.22539E-01	1.35279E-03	0.00000E+00	0.00000E+00
271	9.21786E-01	6.58200E+00	9.22536E-01	1.34776E-03	0.00000E+00	0.00000E+00
272	9.16804E-01	6.60483E+00	9.22515E-01	1.34292E-03	0.00000E+00	0.00000E+00
273	9.07458E-01	6.62867E+00	9.22459E-01	1.33911E-03	0.00000E+00	0.00000E+00
274	9.00971E-01	6.65050E+00	9.22380E-01	1.33652E-03	0.00000E+00	0.00000E+00
275	9.36201E-01	6.67067E+00	9.22431E-01	1.33257E-03	0.00000E+00	0.00000E+00
276	9.20443E-01	6.69367E+00	9.22424E-01	1.32772E-03	0.00000E+00	0.00000E+00
277	9.20281E-01	6.71733E+00	9.22416E-01	1.32291E-03	0.00000E+00	0.00000E+00
278	9.34639E-01	6.74033E+00	9.22460E-01	1.31885E-03	0.00000E+00	0.00000E+00
279	9.61809E-01	6.76233E+00	9.22602E-01	1.32174E-03	0.00000E+00	0.00000E+00

280	9.22592E-01	6.78417E+00	9.22602E-01	1.31697E-03	0.00000E+00	0.00000E+00
281	9.54083E-01	6.80717E+00	9.22715E-01	1.31709E-03	0.00000E+00	0.00000E+00
282	9.53818E-01	6.82917E+00	9.22826E-01	1.31707E-03	0.00000E+00	0.00000E+00
283	8.97614E-01	6.85283E+00	9.22736E-01	1.31543E-03	0.00000E+00	0.00000E+00
284	9.11954E-01	6.87667E+00	9.22698E-01	1.31132E-03	0.00000E+00	0.00000E+00
285	9.21965E-01	6.89867E+00	9.22696E-01	1.30668E-03	0.00000E+00	0.00000E+00
286	9.34111E-01	6.92150E+00	9.22736E-01	1.30269E-03	0.00000E+00	0.00000E+00
287	9.36498E-01	6.94450E+00	9.22784E-01	1.29901E-03	0.00000E+00	0.00000E+00
288	9.22643E-01	6.96633E+00	9.22784E-01	1.29446E-03	0.00000E+00	0.00000E+00
289	9.31979E-01	6.98933E+00	9.22916E-01	1.29034E-03	0.00000E+00	0.00000E+00
290	9.28679E-01	7.01133E+00	9.22836E-01	1.28601E-03	0.00000E+00	0.00000E+00
291	9.46820E-01	7.03317E+00	9.22919E-01	1.28424E-03	0.00000E+00	0.00000E+00
292	9.09605E-01	7.05617E+00	9.22873E-01	1.28062E-03	0.00000E+00	0.00000E+00
293	8.99557E-01	7.07800E+00	9.22793E-01	1.27873E-03	0.00000E+00	0.00000E+00
294	9.32222E-01	7.10100E+00	9.22825E-01	1.27475E-03	0.00000E+00	0.00000E+00
295	9.65427E-01	7.12383E+00	9.22971E-01	1.27869E-03	0.00000E+00	0.00000E+00
296	8.93684E-01	7.14583E+00	9.22871E-01	1.27822E-03	0.00000E+00	0.00000E+00
297	9.39107E-01	7.16867E+00	9.22926E-01	1.27507E-03	0.00000E+00	0.00000E+00
298	9.29070E-01	7.19067E+00	9.22947E-01	1.27092E-03	0.00000E+00	0.00000E+00
299	8.85026E-01	7.21350E+00	9.22819E-01	1.27305E-03	0.00000E+00	0.00000E+00
300	9.44079E-01	7.23550E+00	9.22890E-01	1.27078E-03	0.00000E+00	0.00000E+00
301	9.33244E-01	7.25750E+00	9.22925E-01	1.26699E-03	0.00000E+00	0.00000E+00
302	9.49263E-01	7.28033E+00	9.23013E-01	1.26581E-03	0.00000E+00	0.00000E+00
303	9.34646E-01	7.30150E+00	9.23051E-01	1.26219E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.



NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

LIFETIME = 4.56164E-04 + OR - 4.31099E-06      GENERATION TIME = 4.02381E-05 + OR - 1.18607E-07  
 NU BAR = 2.43523E+00 + OR - 9.27544E-05      AVERAGE FISSION GROUP = 2.24439E+01 + OR - 5.65727E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.63071E-01 + OR - 7.57220E-04

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	0.92315	+ OR - 0.00126	0.92189 TO 0.92442	0.92063 TO 0.92566	0.91937 TO 0.92694	300000
4	0.92312	+ OR - 0.00127	0.92185 TO 0.92438	0.92058 TO 0.92565	0.91932 TO 0.92691	299000
5	0.92317	+ OR - 0.00127	0.92190 TO 0.92444	0.92063 TO 0.92571	0.91936 TO 0.92698	298000
6	0.92308	+ OR - 0.00127	0.92181 TO 0.92435	0.92054 TO 0.92563	0.91927 TO 0.92690	297000
7	0.92319	+ OR - 0.00127	0.92192 TO 0.92446	0.92065 TO 0.92573	0.91938 TO 0.92700	296000
8	0.92317	+ OR - 0.00127	0.92190 TO 0.92445	0.92062 TO 0.92572	0.91935 TO 0.92700	295000
9	0.92316	+ OR - 0.00128	0.92188 TO 0.92444	0.92060 TO 0.92572	0.91932 TO 0.92700	294000
10	0.92319	+ OR - 0.00128	0.92190 TO 0.92447	0.92062 TO 0.92575	0.91934 TO 0.92704	293000
11	0.92328	+ OR - 0.00128	0.92199 TO 0.92456	0.92071 TO 0.92585	0.91943 TO 0.92713	292000
12	0.92337	+ OR - 0.00129	0.92208 TO 0.92465	0.92080 TO 0.92594	0.91951 TO 0.92722	291000
17	0.92344	+ OR - 0.00130	0.92213 TO 0.92474	0.92083 TO 0.92604	0.91953 TO 0.92734	286000
22	0.92356	+ OR - 0.00131	0.92226 TO 0.92487	0.92095 TO 0.92618	0.91964 TO 0.92748	281000
27	0.92325	+ OR - 0.00132	0.92193 TO 0.92457	0.92061 TO 0.92589	0.91930 TO 0.92720	276000
32	0.92313	+ OR - 0.00134	0.92179 TO 0.92446	0.92046 TO 0.92580	0.91912 TO 0.92713	271000
37	0.92323	+ OR - 0.00135	0.92188 TO 0.92459	0.92053 TO 0.92594	0.91918 TO 0.92729	266000
42	0.92360	+ OR - 0.00137	0.92223 TO 0.92496	0.92086 TO 0.92633	0.91950 TO 0.92769	261000
47	0.92387	+ OR - 0.00136	0.92251 TO 0.92524	0.92115 TO 0.92660	0.91978 TO 0.92796	256000
52	0.92377	+ OR - 0.00138	0.92238 TO 0.92515	0.92100 TO 0.92653	0.91962 TO 0.92791	251000
57	0.92360	+ OR - 0.00140	0.92220 TO 0.92500	0.92081 TO 0.92639	0.91941 TO 0.92779	246000
62	0.92364	+ OR - 0.00142	0.92222 TO 0.92506	0.92081 TO 0.92648	0.91939 TO 0.92789	241000
67	0.92328	+ OR - 0.00143	0.92185 TO 0.92471	0.92042 TO 0.92614	0.91900 TO 0.92757	236000
72	0.92296	+ OR - 0.00143	0.92153 TO 0.92439	0.92010 TO 0.92582	0.91867 TO 0.92725	231000
77	0.92321	+ OR - 0.00143	0.92178 TO 0.92464	0.92034 TO 0.92608	0.91891 TO 0.92751	226000
82	0.92320	+ OR - 0.00146	0.92174 TO 0.92467	0.92028 TO 0.92613	0.91881 TO 0.92760	221000
87	0.92326	+ OR - 0.00149	0.92177 TO 0.92475	0.92027 TO 0.92625	0.91878 TO 0.92774	216000
92	0.92311	+ OR - 0.00152	0.92158 TO 0.92463	0.92006 TO 0.92615	0.91854 TO 0.92768	211000

NAC-LWT CASK MODEL; EXHIB 502 - 2 WATER RODS 80 MIL CHANNEL

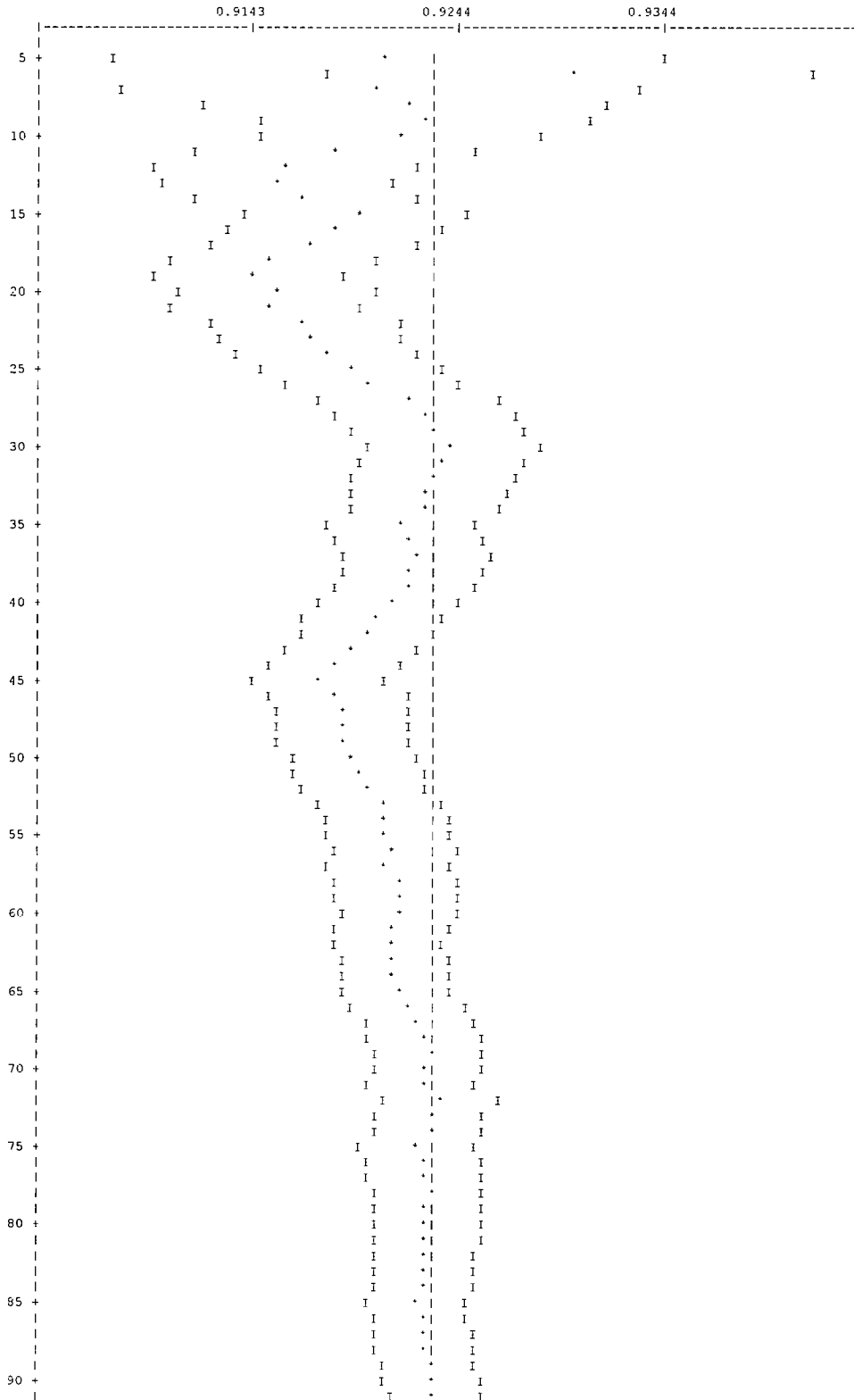
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
97	0.92340	+ OR - 0.00154	0.92186 TO 0.92493	0.92032 TO 0.92647	0.91878 TO 0.92801	206000
102	0.92329	+ OR - 0.00157	0.92172 TO 0.92486	0.92015 TO 0.92643	0.91858 TO 0.92800	201000
107	0.92353	+ OR - 0.00157	0.92195 TO 0.92510	0.92038 TO 0.92668	0.91880 TO 0.92825	196000
112	0.92355	+ OR - 0.00161	0.92194 TO 0.92515	0.92034 TO 0.92676	0.91873 TO 0.92836	191000
117	0.92335	+ OR - 0.00164	0.92171 TO 0.92499	0.92007 TO 0.92664	0.91842 TO 0.92828	186000
122	0.92307	+ OR - 0.00167	0.92140 TO 0.92475	0.91973 TO 0.92642	0.91805 TO 0.92809	181000
127	0.92360	+ OR - 0.00169	0.92191 TO 0.92528	0.92022 TO 0.92697	0.91853 TO 0.92866	176000
132	0.92367	+ OR - 0.00172	0.92195 TO 0.92538	0.92024 TO 0.92710	0.91852 TO 0.92882	171000
137	0.92419	+ OR - 0.00173	0.92247 TO 0.92592	0.92074 TO 0.92764	0.91901 TO 0.92937	166000
142	0.92440	+ OR - 0.00175	0.92266 TO 0.92615	0.92091 TO 0.92789	0.91917 TO 0.92964	161000
147	0.92448	+ OR - 0.00177	0.92271 TO 0.92625	0.92094 TO 0.92803	0.91916 TO 0.92980	156000
152	0.92406	+ OR - 0.00178	0.92228 TO 0.92585	0.92050 TO 0.92763	0.91872 TO 0.92941	151000
157	0.92413	+ OR - 0.00183	0.92230 TO 0.92596	0.92047 TO 0.92779	0.91864 TO 0.92962	146000
162	0.92462	+ OR - 0.00187	0.92275 TO 0.92648	0.92089 TO 0.92835	0.91902 TO 0.93021	141000
167	0.92470	+ OR - 0.00189	0.92280 TO 0.92659	0.92091 TO 0.92848	0.91902 TO 0.93037	136000
172	0.92501	+ OR - 0.00193	0.92308 TO 0.92695	0.92115 TO 0.92988	0.91921 TO 0.93082	131000
177	0.92477	+ OR - 0.00200	0.92277 TO 0.92676	0.92078 TO 0.92876	0.91978 TO 0.93075	126000
182	0.92386	+ OR - 0.00202	0.92184 TO 0.92588	0.91983 TO 0.92789	0.91781 TO 0.92991	121000
187	0.92427	+ OR - 0.00208	0.92219 TO 0.92635	0.92012 TO 0.92843	0.91804 TO 0.93051	116000
192	0.92322	+ OR - 0.00203	0.92119 TO 0.92525	0.91916 TO 0.92729	0.91712 TO 0.92932	111000
197	0.92266	+ OR - 0.00208	0.92058 TO 0.92474	0.91849 TO 0.92683	0.91641 TO 0.92891	106000
202	0.92278	+ OR - 0.00218	0.92060 TO 0.92496	0.91842 TO 0.92714	0.91624 TO 0.92933	101000
207	0.92344	+ OR - 0.00227	0.92117 TO 0.92570	0.91890 TO 0.92797	0.91663 TO 0.93024	96000
212	0.92429	+ OR - 0.00235	0.92194 TO 0.92664	0.91960 TO 0.92899	0.91725 TO 0.93134	91000
217	0.92453	+ OR - 0.00237	0.92216 TO 0.92690	0.91979 TO 0.92927	0.91742 TO 0.93164	86000
222	0.92374	+ OR - 0.00234	0.92140 TO 0.92608	0.91906 TO 0.92842	0.91672 TO 0.93076	81000
227	0.92479	+ OR - 0.00241	0.92237 TO 0.92720	0.91996 TO 0.92961	0.91755 TO 0.93202	76000

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

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
232	0.92500	+ OR - 0.00256	0.92244 TO 0.92756	0.91988 TO 0.93012	0.91732 TO 0.93268	71000
237	0.92579	+ OR - 0.00266	0.92314 TO 0.92845	0.92048 TO 0.93111	0.91782 TO 0.93377	66000
242	0.92656	+ OR - 0.00277	0.92379 TO 0.92934	0.92102 TO 0.93211	0.91824 TO 0.93488	61000
247	0.92543	+ OR - 0.00279	0.92265 TO 0.92822	0.91986 TO 0.93101	0.91707 TO 0.93380	56000
252	0.92532	+ OR - 0.00295	0.92237 TO 0.92827	0.91942 TO 0.93121	0.91648 TO 0.93416	51000
257	0.92561	+ OR - 0.00300	0.92261 TO 0.92861	0.91962 TO 0.93161	0.91662 TO 0.93460	46000
262	0.92776	+ OR - 0.00306	0.92469 TO 0.93082	0.92163 TO 0.93398	0.91857 TO 0.93694	41000
267	0.92692	+ OR - 0.00332	0.92361 TO 0.93024	0.92029 TO 0.93355	0.91637 TO 0.93687	36000
272	0.92773	+ OR - 0.00361	0.92412 TO 0.93134	0.92050 TO 0.93495	0.91689 TO 0.93856	31000
277	0.92977	+ OR - 0.00406	0.92572 TO 0.93383	0.92166 TO 0.93789	0.91760 TO 0.94195	26000
282	0.92606	+ OR - 0.00440	0.92165 TO 0.93046	0.91725 TO 0.93486	0.91285 TO 0.93927	21000
287	0.92782	+ OR - 0.00536	0.92246 TO 0.93318	0.91710 TO 0.93854	0.91173 TO 0.94390	16000
292	0.92776	+ OR - 0.00748	0.92027 TO 0.93524	0.91279 TO 0.94272	0.90531 TO 0.95020	11000
297	0.92922	+ OR - 0.00935	0.91987 TO 0.93857	0.91053 TO 0.94792	0.90118 TO 0.95726	6000

NAC-LWT CASK MODEL; EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS  $K\text{-EFF} = 0.9232 + OP - 0.0013$  WHICH OCCURS FOR 303 GENERATIONS RUN.







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285 +	I *  I
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290 +	I *  I
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295 +	I *  I
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300 +	I *  I
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	I *  I

NAC-LWT CASK MODEL: EXXON 909 - 2 WATER RODS 80 MIL CHANNEL

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0041			3.77954E-03	0.4762	2.27971E-03	1.7625	0.00000E+00	0.0000
2	0.0166			1.53484E-02	0.6823	7.91156E-03	0.5604	0.00000E+00	0.0000
3	0.0165			1.70463E-02	0.6535	7.23633E-03	0.6156	0.00000E+00	0.0000
4	0.0078			7.19320E-03	0.6032	3.55433E-03	0.7494	0.00000E+00	0.0000
5	0.0026			2.36365E-03	0.5822	2.76274E-03	0.4823	0.00000E+00	0.0000
6	0.0024			2.18845E-03	0.4869	5.90695E-03	0.4100	0.00000E+00	0.0000
7	0.0024			2.19241E-03	0.4650	8.30656E-03	0.4008	0.00000E+00	0.0000
8	0.0024			2.23029E-03	0.4971	1.00129E-02	0.3918	0.00000E+00	0.0000
9	0.0033			3.05338E-03	0.5503	1.42582E-02	0.3963	0.00000E+00	0.0000
10	0.0071			6.54045E-03	0.5588	2.39631E-02	0.4360	0.00000E+00	0.0000
11	0.0150			1.38589E-02	0.6088	3.57136E-02	0.4483	0.00000E+00	0.0000
12	0.0191			1.76731E-02	0.6127	3.44911E-02	0.4689	0.00000E+00	0.0000
13	0.0180			1.66595E-02	0.6443	3.67475E-02	0.4907	0.00000E+00	0.0000
14	0.0142			1.31041E-02	0.5990	5.11136E-02	0.4462	0.00000E+00	0.0000
15	0.0031			2.87393E-03	1.0394	1.43410E-02	0.6200	0.00000E+00	0.0000
16	0.0022			2.02285E-03	1.3462	8.24815E-03	0.7862	0.00000E+00	0.0000
17	0.0033			3.08454E-03	1.9387	5.08476E-03	0.9479	0.00000E+00	0.0000
18	0.0045			4.14548E-03	1.7991	5.04738E-03	1.0115	0.00000E+00	0.0000
19	0.0055			5.09696E-03	1.4471	7.99143E-03	0.7852	0.00000E+00	0.0000
20	0.0234			2.15608E-02	0.7556	2.94462E-02	0.5373	0.00000E+00	0.0000
21	0.0122			1.12665E-02	1.3926	1.19914E-02	0.8317	0.00000E+00	0.0000
22	0.0301			2.77517E-02	0.9038	2.66452E-02	0.6349	0.00000E+00	0.0000
23	0.1071			9.89951E-02	0.4773	8.80475E-02	0.3489	0.00000E+00	0.0000
24	0.2116			1.95307E-01	0.3360	1.56040E-01	0.2555	0.00000E+00	0.0000
25	0.1806			1.66702E-01	0.3986	1.28382E-01	0.3147	0.00000E+00	0.0000
26	0.2136			1.97207E-01	0.2631	1.51858E-01	0.2826	0.00000E+00	0.0000
27	0.0693			6.40088E-02	0.7565	5.95539E-02	0.5464	0.00000E+00	0.0000
SYSTEM TOTAL =				9.23154E-01	0.1567	9.36935E-01	0.0630	0.00000E+00	0.0000

THE WEIGHT LOST IN THE ALBEDO PORTION OF THE PROBLEM = 6.5153E-02 + OR - 0.0004

ELAPSED TIME 7.30156 MINUTES

RANDOM NUMBER= 677D583D1706



NAC-LWT CASK MODEL: EXXON 9X9 - 2 WATER RODS 80 MIL CHANNEL

```
FREQUENCY FOR GENERATIONS 4 TO 303
0.8597 TO 0.8724 *
0.8724 TO 0.8850 *****
0.8850 TO 0.8977 *****
0.8977 TO 0.9103 *****
0.9103 TO 0.9230 *****
0.9230 TO 0.9356 *****
0.9356 TO 0.9483 *****
0.9483 TO 0.9609 *****
0.9609 TO 0.9736 *****
0.9736 TO 0.9862 *****
```

```
FREQUENCY FOR GENERATIONS 79 TO 303
0.8597 TO 0.8724 *
0.8724 TO 0.8850 *****
0.8850 TO 0.8977 *****
0.8977 TO 0.9103 *****
0.9103 TO 0.9230 *****
0.9230 TO 0.9356 *****
0.9356 TO 0.9483 *****
0.9483 TO 0.9609 *****
0.9609 TO 0.9736 *****
0.9736 TO 0.9862 *****
```

```
FREQUENCY FOR GENERATIONS 154 TO 303
0.8597 TO 0.8724 *
0.8724 TO 0.8850 *****
0.8850 TO 0.8977 *****
0.8977 TO 0.9103 *****
0.9103 TO 0.9230 *****
0.9230 TO 0.9356 *****
0.9356 TO 0.9483 *****
0.9483 TO 0.9609 *****
0.9609 TO 0.9736 *****
0.9736 TO 0.9862 *****
```

```
FREQUENCY FOR GENERATIONS 229 TO 303
0.8597 TO 0.8724 *
0.8724 TO 0.8850 *****
0.8850 TO 0.8977 *****
0.8977 TO 0.9103 *****
0.9103 TO 0.9230 *****
0.9230 TO 0.9356 *****
0.9356 TO 0.9483 *****
0.9483 TO 0.9609 *****
0.9609 TO 0.9736 *****
0.9736 TO 0.9862 *****
```

```
.....
*
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 7.30233 MINUTES
.....
*
```

**6.6.3**      **MTR Fuel Elements**

This section contains abbreviated output files from the most reactive normal condition and accident condition moderator density variation cases.

Figure 6.6.3-1 CSAS Input/Output for NAC-LWT with Design Basis MTR Fuel - Most Reactive Normal Condition Configuration

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT HFBR DESIGN U308-AL FUEL 93 W/O U235 ELEMENTS IN CLOSE, MIN BASKET PLATES
27GPGUPNDF4 LATTICECELL
'LINE MATCH
URANIUM 1 DEN=3.990 0.3000 293 92235 93. 92238 7. END
O 1 DEN=3.990 0.0542 293 END
AL 1 DEN=3.990 0.6468 293 END
AL 2 1.0 293.0 END
H2O 3 1.000 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.000 293.0 END
H2O 8 1.0 293.0 END
END COMP
SYMSLABCELL 0.3708 0.053 1 3 0.127 2 END

READ PARAM RUN=YES PLT=YES RND=2 GEN=206 NPG=800 END PARAM
READ GEOM
UNIT 1
COM='AL PLATE CELL'
CUBOID 2 1 2P3.1250 2P0.127 2P10.0
CUBOID 3 1 2P3.1250 2P0.254 2P10.0
UNIT 2
COM='HFBR FUEL PLATE CELL 1'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 0.1905 -0.2134 2P10.0
UNIT 3
COM='HFBR FUEL PLATE CELL 2'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 0.2134 -0.2007 2P10.0
UNIT 4
COM='HFBR FUEL PLATE CELL 3'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 0.2007 -0.1854 2P10.0
UNIT 5
COM='HFBR FUEL PLATE CELL 4'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 0.1854 -0.1854 2P10.0
UNIT 6
COM='HFBR FUEL PLATE CELL 5'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 0.1854 -0.2007 2P10.0
UNIT 7
COM='HFBR FUEL PLATE CELL 6'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 0.2007 -0.2134 2P10.0
UNIT 8
COM='HFBR FUEL PLATE CELL 7'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 0.2134 -0.1905 2P10.0
UNIT 90
COM='HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB CENTER'
ARRAY 1 -3.1250 -3.9369 -10.0
REPLICATE 3 1 2R0.0 2R0.1631 2R0.0 1
REPLICATE 4 1 2R0.4750 4R0.0 1
REPLICATE 3 1 2R0.7690 2R0.2688 2R0.0 1
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 91
COM='HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT'
ARRAY 1 -3.1250 -3.9369 -10.0
REPLICATE 3 1 2R0.0 2R0.1631 2R0.0 1
REPLICATE 4 1 2R0.4750 4R0.0 1
REPLICATE 3 1 1.5380 0.0 2R0.2688 2R0.0 1
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 92
COM='HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT'
ARRAY 1 -3.1250 -3.9369 -10.0
REPLICATE 3 1 2R0.0 2R0.1631 2R0.0 1
REPLICATE 4 1 2R0.4750 4R0.0 1
REPLICATE 3 1 0.0 1.5380 2R0.2688 2R0.0 1
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 10
COM='HFBR FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK'
ARRAY 1 -3.1250 -3.9369 -10.0
REPLICATE 3 1 2R0.0 2R0.1631 2R0.0 1
REPLICATE 4 1 2R0.4750 4R0.0 1
REPLICATE 3 1 2R0.7690 0.5376 0.0 2R0.0 1
REPLICATE 5 1 0.3048 5P0.0 1
UNIT 101
COM='HFBR FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
```

```
ARRAY 1 -3.1250 -3.9369 -10.0
REPLICATE 3 1 2R0.0 2R0.1631 2R0.0 1
REPLICATE 4 1 2R0.4750 4R0.0 1
REPLICATE 3 1 2R0.7690 0.0 0.5376 2R0.0 1
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 11
COM='HFBR FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK'
ARRAY 1 -3.1250 -3.9369 -10.0
REPLICATE 3 1 2R0.0 2R0.1631 2R0.0 1
REPLICATE 4 1 2R0.4750 4R0.0 1
REPLICATE 3 1 2R0.7690 0.5376 0.0 2R0.0 1
REPLICATE 5 1 0.0 0.3048 4R0.0 1
UNIT 111
COM='HFBR FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 1 -3.1250 -3.9369 -10.0
REPLICATE 3 1 2R0.0 2R0.1631 2R0.0 1
REPLICATE 4 1 2R0.4750 4R0.0 1
REPLICATE 3 1 2R0.7690 0.0 0.5376 2R0.0 1
REPLICATE 5 1 0.0 0.3048 4R0.0 1
UNIT 12
COM='2 UNIT ARRAY WITH 0.120 IN. PLATE ON TOP AND SIDES'
ARRAY 2 -9.0428 -4.3688 -10.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 13
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 3 -14.1738 -4.3688 -10.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 14
COM='2 UNIT ARRAY WITH 0.120 IN. PLATE ON BOTTOM and SIDES'
ARRAY 4 -9.0428 -4.3688 -10.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
'LINE MATCH
'LINE MATCH
'LINE MATCH
GLOBAL UNIT 15
COM='7 HFBR ASSEMBLIES IN THE LWT'
CYLINDER 3 1 17.0500 2P10.0
HOLE 12 0.0 +9.4489 0.0
HOLE 13 0.0 0.0 0.0
HOLE 14 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 2P10.0
CYLINDER 6 1 33.4963 2P10.0
CYLINDER 5 1 36.5443 2P10.0
CYLINDER 8 1 49.2443 2P10.0
CYLINDER 5 1 80.33900 2P10.0
CUBOID 7 1 4P80.33900 2P10.0
END GEOM
READ ARRAY
ARA=1 NUX=1 NUZ=1 NUY=20 FILL 1 8 7 6 1CR5 4 3 2 1 END FILL
ARA=2 NUX=2 NUY=1 NUZ=1 FILL 10 11 END FILL
ARA=3 NUX=3 NUY=1 NUZ=1 FILL 92 90 91 END FILL
ARA=4 NUX=2 NUY=1 NUZ=1 FILL 101 111 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
READ PLOT
TTL='X-Y PLOT OF ASSEMBLY'
NCH=' FCWASPW'
UAX=1.0 VDN=-1.0 NAX=130
XUL=-5.0 YUL=5.0 ZUL=0.0
XLR=5.0 YLR=-5.0 ZLR=0.0 END
TTL='X-Y PLOT OF CASK'
UAX=1.0 VDN=-1.0 NAX=130
XUL=-65.0 YUL=65.0 ZUL=0.0
XLR=65.0 YLR=-65.0 ZLR=0.0 END
TTL='X-Y PLOT OF BASKET'
UAX=1.0 VDN=-1.0 NAX=130
XUL=-17.0 YUL=17.0 ZUL=0.0
XLR=17.0 YLR=-17.0 ZLR=0.0 END
TTL='X-Z PLOT OF BASKET'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=10.0
XLR=0.0 YLR=5.0 ZLR=-10.0
END PLOT
END DATA
```

SECONDARY MODULE 00008 HAS BEEN CALLED.

```

CCCCCCCCC      SSSSSSSSS      AAAAAAAA      SSSSSSSSS      222222222      555555555555
CCCCCCCCCCCC    SSSSSSSSSSS    AAAAAAAAAA    SSSSSSSSSSS    22222222222    555555555555
CC      CC      SS      SS      AA      AA      SS      SS      22      22      55
CC      SS      SS      AA      AA      SS      SS      22      22      55
CC      SS      AA      AA      SS      SS      22      22      55
CC      SSSSSSSSSSS      AAAAAAAAAAAAA      SSSSSSSSSSS      22      55555555555
CC      SSSSSSSSSSS      AAAAAAAAAAAAA      SSSSSSSSSSS      22      555555555555
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      CC      SS      SS      AA      AA      SS      SS      22      55      55
CCCCCCCCCCCC    SSSSSSSSSSS    AA      AA      SSSSSSSSSSS    22222222222    555555555555
CCCCCCCCC      SSSSSSSSS      AA      AA      SSSSSSSSS      22222222222      55555555555
    
```

```

SSSSSSSSSS      CCCCCCCCCC      AAAAAAAA      LL      EEEEEEEEEEE      PPPPPPPPPPP      CCCCCCCCCC
SSSSSSSSSSSS    CCCCCCCCCCCC    AAAAAAAAAA    LL      EEEEEEEEEEE      PPPPPPPPPPP      CCCCCCCCCCCC
SS      SS      CC      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SSSSSSSSSSSS    CC      AAAAAAAAAAAAA      LL      EEEEEEEEE     -----      PPPPPPPPPPP      CC
SSSSSSSSSSSS    CC      AAAAAAAAAAAAA      LL      EEEEEEEEE     -----      PPPPPPPPPPP      CC
SS      SS      CC      AA      LL      EE      PP      CC      CC
SS      SS      CC      AA      LL      EE      PP      CC      CC
SS      SS      CC      AA      LL      EE      PP      CC      CC
SSSSSSSSSSSS    CCCCCCCCCCCC    AA      AA      LLLLLLLLLLL      EEEEEEEEEEE      PP      CC      CC
SSSSSSSSSSSS    CCCCCCCCCC      AA      AA      LLLLLLLLLLL      EEEEEEEEEEE      PP      CCCCCCCCCC
    
```

```

0000000      666666666666 //      11      555555555555 //      9999999999      8888888888
000000000    666666666666 //      111     555555555555 //      999999999999  888888888888
00      00      66 //      1111    55 //      99      99      88      88
00      00      66 //      11      55 //      99      99      88      88
00      00      66 //      11      55 //      99      99      88      88
00      00      666666666666 //      11     555555555555 //      999999999999  888888888888
00      00      666666666666 //      11     555555555555 //      999999999999  888888888888
00      00      66      66 //      11      55 //      99      88      88
00      00      66      66 //      11      55 //      99      88      88
00      00      66      66 //      11      55 //      99      88      88
000000000    666666666666 //      11111111  555555555555 //      999999999999  888888888888
0000000      666666666666 //      11111111  555555555555 //      999999999999  888888888888
    
```

```

11      44      22222222222      99999999999      0000000      99999999999
111     444      2222222222222      9999999999999      000000000     9999999999999
1111    4444      :::      22      99      99      :::      00      00      99      99
11      44 44      :::      22      99      99      :::      00      00      99      99
11      44 44      :::      22      99      99      :::      00      00      99      99
11      44 44      22      9999999999999      00      00      9999999999999
11      44 44      22      9999999999999      00      00      9999999999999
11      444444444444      :::      22      99      99      :::      00      00      99
11      4444444444444      :::      22      99      99      :::      00      00      99
11      44      :::      22      99      99      :::      00      00      99
11111111      44      2222222222222      9999999999999      000000000     9999999999999
11111111      44      2222222222222      9999999999999      0000000      9999999999999
    
```



```
.....  
***  
*** LWT HFBR DESIGN U308-AL FUEL 93 W/O U235 ELEMENTS IN CLOSE, MIN BASKET PLATES ***  
***  
.....  
*** DATA LIBRARY INFORMATION ***  
***  
*** UNIT NUMBER DATA SET NAME VOLUME NAME UNIT FUNCTION ***  
*** -----  
*** 89 G:\scale43\DATALIB\FT89F001 STANDARD COMPOSITION LIBRARY ***  
*** 82 G:\scale43\DATALIB\FT82F001 CROSS SECTION LIBRARY ***  
*** 11 C:\PROJECTS\bu85-crit\nct\NCTY3M\FT11F001 SHORT CROSS SECTION LIBRARY ***  
*** 90 C:\PROJECTS\bu85-crit\nct\NCTY3M\FT90F001 INPUT DATA DIRECT ACCESS ***  
***  
.....  
*** STANDARD COMPOSITION LIBRARY DATA ***  
*** -----  
*** UNIT NUMBER : 89 ***  
*** DATASET NAME : G:\scale43\DATALIB\FT89F001 ***  
*** LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY ***  
*** 637 STANDARD COMPOSITIONS, 490 NUCLIDES ***  
*** 90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS. ***  
*** CREATION DATE: 6/30/95 ***  
***  
*** CROSS SECTION LIBRARY DATA ***  
*** -----  
*** UNIT NUMBER : 82 ***  
*** DATASET NAME : G:\scale43\DATALIB\FT82F001 ***  
*** LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY ***  
*** BASED ON ENDF-E VERSION 4 DATA ***  
*** COMPILED FOR NRC 1/27/89 ***  
*** LAST UPDATED 08/12/94 ***  
*** L.M. PETRIE - ORNL ***  
***  
.....
```











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.....
***
***
***
.....
.....
***
***
UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION
NUMBER        -----
-----
***
XSC  14      C:\PROJECTS\bu85-crit\nct\NCTY3M\FT14F001
***
ALB  79      G:\scale43\DALALIB\FT79F001
***
WTS  80      G:\scale43\DALALIB\FT80F001
***
SKT  16      UNKNOWN
***
BIN  95      C:\PROJECTS\bu85-crit\nct\NCTY3M\FT95F001
***
RST  95      C:\PROJECTS\bu85-crit\nct\NCTY3M\FT95F001
***
LIB  4        C:\PROJECTS\bu85-crit\nct\NCTY3M\FT04F001
***
      8        C:\PROJECTS\bu85-crit\nct\NCTY3M\FT08F001
***
      9        UNKNOWN
***
      10       UNKNOWN
***
.....

```

MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD =3.0E-05

MIXTURE =	1	DENSITY (G/CC) =	3.9940			NUCLIDE	TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
08/12/94	1008016	8.14428E-03	5.41451E-02	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
08/12/94	1013027	5.76000E-02	6.46154E-01	13027	26.9818	AL-27 1193 218	GP 040375(5)	UPDATED
08/12/94	1092235	2.85219E-03	2.78722E-01	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED
08/12/94	1092238	2.11969E-04	2.09790E-02	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED
MIXTURE =	2	DENSITY (G/CC) =	2.7020			NUCLIDE	TITLE	
08/12/94	2013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218	GP 040375(5)	UPDATED
MIXTURE =	3	DENSITY (G/CC) =	0.99817			NUCLIDE	TITLE	
08/12/94	3001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	3008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE =	4	DENSITY (G/CC) =	2.7020			NUCLIDE	TITLE	
08/12/94	4013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218	GP 040375(5)	UPDATED
MIXTURE =	5	DENSITY (G/CC) =	7.9200			NUCLIDE	TITLE	
08/12/94	5024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED
08/12/94	5025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED
08/12/94	5026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED
08/12/94	5028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED
MIXTURE =	6	DENSITY (G/CC) =	11.344			NUCLIDE	TITLE	
08/12/94	6082000	3.29690E-02	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K		UPDATED
MIXTURE =	7	DENSITY (G/CC) =	0.99817			NUCLIDE	TITLE	
08/12/94	7001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	7008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE =	8	DENSITY (G/CC) =	0.99817			NUCLIDE	TITLE	
08/12/94	8001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	8008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
			3001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	
			7001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	
			8001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	
			1008016	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	
			3008016	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	
			7008016	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	
			8008016	OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	
			1013027	AL-27 1193 218	GP 040375(5)		UPDATED 08/12/94	
			2013027	AL-27 1193 218	GP 040375(5)		UPDATED 08/12/94	
			4013027	AL-27 1193 218	GP 040375(5)		UPDATED 08/12/94	
			5024304	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	
			5025055	MANGANESE-55	ENDF/B-IV MAT 1197		UPDATED 08/12/94	
			5026304	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	
			5028304	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	
			6082000	PB 1288 218NGP 042375 P-3 293K			UPDATED 08/12/94	
			1092235	URANIUM-235	ENDF/B-IV MAT 1261		UPDATED 08/12/94	
			1092238	URANIUM-238	ENDF/B-IV MAT 1262		UPDATED 08/12/94	

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***** ADDITIONAL INFORMATION *****
***
*** NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          YES ***
*** 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 22     NUMBER OF UNITS IN THE GLOBAL Y DIR.  0 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK 15     NUMBER OF UNITS IN THE GLOBAL Z DIR.  0 ***
*** NUMBER OF MIXTURES USED             8      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               3 ***
*** TOTAL INPUT GEOMETRY REGIONS        71     MAXIMUM HOLE NESTING LEVEL     1 ***
*** NUMBER OF GEOMETRY REGIONS USED     71     USE NESTED ARRAYS             YES ***
*** LARGEST GEOMETRY UNIT NUMBER        111    NUMBER OF ARRAYS USED          4 ***
*** LARGEST ARRAY NUMBER                4      MAXIMUM ARRAY NESTING LEVEL    2 ***
***
*** +X BOUNDARY CONDITION                MIR    -X BOUNDARY CONDITION          MIR ***
*** +Y BOUNDARY CONDITION                MIR    -Y BOUNDARY CONDITION          MIR ***
*** +Z BOUNDARY CONDITION                MIR    -Z BOUNDARY CONDITION          MIR ***
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***
***** SPACE AND SUPERGROUP INFORMATION *****
***
100000 WORDS IS THE TOTAL SPACE AVAILABLE.
***
34213 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
***
65787 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
***
99721 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
***
65727 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
***
1037 WORDS ARE NEEDED FOR THE LARGEST GROUP.
***
35466 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
***
45792 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
***
46240 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.
***
.....
***
***
*** SUPERGROUP      STARTING  ENDING  XSEC   ALBEDO  TOTAL
***   GROUP          GROUP   LENGTH LENGTH   LENGTH
***
***     1             1       27     2252     0     11519
***
***
***
.....
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..... 0 IO'S WERE USED IN SUPERGROUPING .....

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.....
**
**
** ARRAY      UNITS IN  UNITS IN  UNITS IN  NESTING
** NUMBER     X DIR.    Y DIR.    Z DIR.    LEVEL
**
**     1         1       20        1         2
**
**     2         2        1        1         1
**
**     3         3        1        1         1
**
**     4         2        1        1         1
**
**
**
.....
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MEDIA BIAS REGION GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

				-----	UNIT	1	-----								
AL PLATE CELL															
1	CUBOID	2	1	+X =	3.1250	-X =	-3.1250	+Y =	0.12700	-Y =	-0.12700	+Z =	10.000	-Z =	-10.000
2	CUBOID	3	1	+X =	3.1250	-X =	-3.1250	+Y =	0.25400	-Y =	-0.25400	+Z =	10.000	-Z =	-10.000
				-----	UNIT	2	-----								
HFBR FUEL PLATE CELL 1															
1	CUBOID	1	1	+X =	2.8600	-X =	-2.8600	+Y =	2.65000E-02	-Y =	-2.65000E-02	+Z =	10.000	-Z =	-10.000
2	CUBOID	2	1	+X =	3.1250	-X =	-3.1250	+Y =	6.35000E-02	-Y =	-6.35000E-02	+Z =	10.000	-Z =	-10.000
3	CUBOID	3	1	+X =	3.1250	-X =	-3.1250	+Y =	0.19050	-Y =	-0.21340	+Z =	10.000	-Z =	-10.000
				-----	UNIT	3	-----								
HFBR FUEL PLATE CELL 2															
1	CUBOID	1	1	+X =	2.8600	-X =	-2.8600	+Y =	2.65000E-02	-Y =	-2.65000E-02	+Z =	10.000	-Z =	-10.000
2	CUBOID	2	1	+X =	3.1250	-X =	-3.1250	+Y =	6.35000E-02	-Y =	-6.35000E-02	+Z =	10.000	-Z =	-10.000
3	CUBOID	3	1	+X =	3.1250	-X =	-3.1250	+Y =	0.21340	-Y =	-0.20070	+Z =	10.000	-Z =	-10.000
				-----	UNIT	4	-----								
HFBR FUEL PLATE CELL 3															
1	CUBOID	1	1	+X =	2.8600	-X =	-2.8600	+Y =	2.65000E-02	-Y =	-2.65000E-02	+Z =	10.000	-Z =	-10.000
2	CUBOID	2	1	+X =	3.1250	-X =	-3.1250	+Y =	6.35000E-02	-Y =	-6.35000E-02	+Z =	10.000	-Z =	-10.000
3	CUBOID	3	1	+X =	3.1250	-X =	-3.1250	+Y =	0.20070	-Y =	-0.18540	+Z =	10.000	-Z =	-10.000
				-----	UNIT	5	-----								
HFBR FUEL PLATE CELL 4															
1	CUBOID	1	1	+X =	2.8600	-X =	-2.8600	+Y =	2.65000E-02	-Y =	-2.65000E-02	+Z =	10.000	-Z =	-10.000
2	CUBOID	2	1	+X =	3.1250	-X =	-3.1250	+Y =	6.35000E-02	-Y =	-6.35000E-02	+Z =	10.000	-Z =	-10.000
3	CUBOID	3	1	+X =	3.1250	-X =	-3.1250	+Y =	0.19540	-Y =	-0.18540	+Z =	10.000	-Z =	-10.000



REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			----- UNIT 6 -----					
HFBR FUEL PLATE CELL 5								
1 CUBOID	1	1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2 CUBOID	2	1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3 CUBOID	3	1	+X = 3.1250	-X = -3.1250	+Y = 0.18540	-Y = -0.20070	+Z = 10.000	-Z = -10.000
			----- UNIT 7 -----					
HFBR FUEL PLATE CELL 6								
1 CUBOID	1	1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2 CUBOID	2	1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3 CUBOID	3	1	+X = 3.1250	-X = -3.1250	+Y = 0.20070	-Y = -0.21340	+Z = 10.000	-Z = -10.000
			----- UNIT 8 -----					
HFBR FUEL PLATE CELL 7								
1 CUBOID	1	1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2 CUBOID	2	1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3 CUBOID	3	1	+X = 3.1250	-X = -3.1250	+Y = 0.21340	-Y = -0.19050	+Z = 10.000	-Z = -10.000
			----- UNIT 10 EXTERNAL TO LATTICE 1 -----					
HFBR FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK								
1 ARRAY NUMBER	1		+X = 3.1250	-X = -3.1250	+Y = 3.9369	-Y = -3.9369	+Z = 10.000	-Z = -10.000
2 CUBOID	3	1	+X = 3.1250	-X = -3.1250	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000
3 CUBOID	4	1	+X = 3.6000	-X = -3.6000	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000
4 CUBOID	3	1	+X = 4.3690	-X = -4.3690	+Y = 4.6376	-Y = -4.1000	+Z = 10.000	-Z = -10.000
5 CUBOID	5	1	+X = 4.6738	-X = -4.3690	+Y = 4.6376	-Y = -4.1000	+Z = 10.000	-Z = -10.000

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
----- UNIT 11 EXTERNAL TO LATTICE 1 -----								
HFBR FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK								
1	ARRAY NUMBER 1	+X = 3.1250	-X = -3.1250	+Y = 3.9369	-Y = -3.9369	+Z = 10.000	-Z = -10.000	
2	CUBOID 3 1	+X = 3.1250	-X = -3.1250	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
3	CUBOID 4 1	+X = 3.6000	-X = -3.6000	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
4	CUBOID 3 1	+X = 4.3690	-X = -4.3690	+Y = 4.6376	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
5	CUBOID 5 1	+X = 4.3690	-X = -4.6738	+Y = 4.6376	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
----- UNIT 12 EXTERNAL TO LATTICE 2 -----								
2 UNIT ARRAY WITH 0.120 IN. PLATE ON TOP AND SIDES								
1	ARRAY NUMBER 2	+X = 9.0428	-X = -9.0428	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000	
2	CUBOID 5 1	+X = 9.3476	-X = -9.3476	+Y = 4.6736	-Y = -4.3688	+Z = 10.000	-Z = -10.000	
----- UNIT 13 EXTERNAL TO LATTICE 3 -----								
3 UNIT ARRAY WITH REST OF 5/16 WEB								
1	ARRAY NUMBER 3	+X = 14.174	-X = -14.174	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000	
2	CUBOID 5 1	+X = 14.529	-X = -14.529	+Y = 5.0800	-Y = -5.0800	+Z = 10.000	-Z = -10.000	
----- UNIT 14 EXTERNAL TO LATTICE 4 -----								
2 UNIT ARRAY WITH 0.120 IN. PLATE ON BOTTOM AND SIDES								
1	ARRAY NUMBER 4	+X = 9.0428	-X = -9.0428	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000	
2	CUBOID 5 1	+X = 9.3476	-X = -9.3476	+Y = 4.3688	-Y = -4.6736	+Z = 10.000	-Z = -10.000	

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
		..... GLOBAL ..... ----- UNIT 15 -----						
7 HFBR ASSEMBLIES IN THE LWT								
1	CYLINDER	3 1	RADIUS = 17.050	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000		
	HOLE NUMBER	1	AT X = 0.00000	Y = 9.4489	Z = 0.00000	IS UNIT NUMBER 12		
	HOLE NUMBER	2	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 13		
	HOLE NUMBER	3	AT X = 0.00000	Y = -9.4489	Z = 0.00000	IS UNIT NUMBER 14		
2	CYLINDER	5 1	RADIUS = 18.891	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000		
3	CYLINDER	6 1	RADIUS = 33.496	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000		
4	CYLINDER	5 1	RADIUS = 36.544	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000		
5	CYLINDER	8 1	RADIUS = 49.244	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000		
6	CYLINDER	5 1	RADIUS = 80.339	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000		
7	CUBOID	7 1	+X = 80.339	-X = -80.339	+Y = 80.339	-Y = -80.339	+Z = 10.000 -Z = -10.000	
		----- UNIT 90 EXTERNAL TO LATTICE 1 -----						
HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB CENTER								
1	ARRAY NUMBER	1	+X = 3.1250	-X = -3.1250	+Y = 3.9369	-Y = -3.9369	+Z = 10.000 -Z = -10.000	
2	CUBOID	3 1	+X = 3.1250	-X = -3.1250	+Y = 4.1000	-Y = -4.1000	+Z = 10.000 -Z = -10.000	
3	CUBOID	4 1	+X = 3.6000	-X = -3.6000	+Y = 4.1000	-Y = -4.1000	+Z = 10.000 -Z = -10.000	
4	CUBOID	3 1	+X = 4.3690	-X = -4.3690	+Y = 4.3688	-Y = -4.3688	+Z = 10.000 -Z = -10.000	
5	CUBOID	5 1	+X = 4.7246	-X = -4.7246	+Y = 4.3688	-Y = -4.3688	+Z = 10.000 -Z = -10.000	
		----- UNIT 91 EXTERNAL TO LATTICE 1 -----						
HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT								
1	ARRAY NUMBER	1	+X = 3.1250	-X = -3.1250	+Y = 3.9369	-Y = -3.9369	+Z = 10.000 -Z = -10.000	
2	CUBOID	3 1	+X = 3.1250	-X = -3.1250	+Y = 4.1000	-Y = -4.1000	+Z = 10.000 -Z = -10.000	
3	CUBOID	4 1	+X = 3.6000	-X = -3.6000	+Y = 4.1000	-Y = -4.1000	+Z = 10.000 -Z = -10.000	
4	CUBOID	3 1	+X = 5.1380	-X = -3.6000	+Y = 4.3688	-Y = -4.3688	+Z = 10.000 -Z = -10.000	
5	CUBOID	5 1	+X = 5.4936	-X = -3.9556	+Y = 4.3688	-Y = -4.3688	+Z = 10.000 -Z = -10.000	

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
		----- UNIT 92 EXTERNAL TO LATTICE 1 -----						
HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT								
1	ARRAY NUMBER 1	+X = 3.1250	-X = -3.1250	+Y = 3.9369	-Y = -3.9369	+Z = 10.000	-Z = -10.000	
2	CUBOID 3 1	+X = 3.1250	-X = -3.1250	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
3	CUBOID 4 1	+X = 3.6000	-X = -3.6000	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
4	CUBOID 3 1	+X = 3.6000	-X = -5.1380	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000	
5	CUBOID 5 1	+X = 3.9556	-X = -5.4936	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000	
		----- UNIT 101 EXTERNAL TO LATTICE 1 -----						
HFBR FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK								
1	ARRAY NUMBER 1	+X = 3.1250	-X = -3.1250	+Y = 3.9369	-Y = -3.9369	+Z = 10.000	-Z = -10.000	
2	CUBOID 3 1	+X = 3.1250	-X = -3.1250	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
3	CUBOID 4 1	+X = 3.6000	-X = -3.6000	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
4	CUBOID 3 1	+X = 4.3690	-X = -4.3690	+Y = 4.1000	-Y = -4.6376	+Z = 10.000	-Z = -10.000	
5	CUBOID 5 1	+X = 4.6738	-X = -4.3690	+Y = 4.1000	-Y = -4.6376	+Z = 10.000	-Z = -10.000	
		----- UNIT 111 EXTERNAL TO LATTICE 1 -----						
HFBR FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK								
1	ARRAY NUMBER 1	+X = 3.1250	-X = -3.1250	+Y = 3.9369	-Y = -3.9369	+Z = 10.000	-Z = -10.000	
2	CUBOID 3 1	+X = 3.1250	-X = -3.1250	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
3	CUBOID 4 1	+X = 3.6000	-X = -3.6000	+Y = 4.1000	-Y = -4.1000	+Z = 10.000	-Z = -10.000	
4	CUBOID 3 1	+X = 4.3690	-X = -4.3690	+Y = 4.1000	-Y = -4.6376	+Z = 10.000	-Z = -10.000	
5	CUBOID 5 1	+X = 4.3690	-X = -4.6738	+Y = 4.1000	-Y = -4.6376	+Z = 10.000	-Z = -10.000	



VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	3.17500E+01 CM**3	3.17500E+01 CM**3
	2	2	3.17500E+01 CM**3	6.35000E+01 CM**3
2	1	3	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	4	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	5	3.46125E+01 CM**3	5.04875E+01 CM**3
3	1	6	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	7	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	8	3.58875E+01 CM**3	5.17625E+01 CM**3
4	1	9	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	10	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	11	3.23875E+01 CM**3	4.82625E+01 CM**3
5	1	12	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	13	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	14	3.04750E+01 CM**3	4.63500E+01 CM**3
6	1	15	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	16	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	17	3.23875E+01 CM**3	4.82625E+01 CM**3
7	1	18	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	19	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	20	3.58875E+01 CM**3	5.17625E+01 CM**3
8	1	21	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	22	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	23	3.46125E+01 CM**3	5.04875E+01 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 39 IS AN ARRAY PLACEMENT BOUNDARY REGION				
10	1	39	9.84225E+02 CM**3	9.84225E+02 CM**3
	2	40	4.07750E+01 CM**3	1.02500E+03 CM**3
	3	41	1.55800E+02 CM**3	1.18080E+03 CM**3
	4	42	3.46183E+02 CM**3	1.52698E+03 CM**3
	5	43	5.32644E+01 CM**3	1.58025E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 49 IS AN ARRAY PLACEMENT BOUNDARY REGION				
11	1	49	9.84225E+02 CM**3	9.84225E+02 CM**3
	2	50	4.07750E+01 CM**3	1.02500E+03 CM**3
	3	51	1.55800E+02 CM**3	1.18080E+03 CM**3
	4	52	3.46183E+02 CM**3	1.52698E+03 CM**3
	5	53	5.32644E+01 CM**3	1.58025E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 59 IS AN ARRAY PLACEMENT BOUNDARY REGION				
12	1	59	3.16049E+03 CM**3	3.16049E+03 CM**3
	2	60	2.20495E+02 CM**3	3.38099E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 61 IS AN ARRAY PLACEMENT BOUNDARY REGION				
13	1	61	4.95380E+03 CM**3	4.95380E+03 CM**3
	2	62	9.50948E+02 CM**3	5.90475E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 63 IS AN ARRAY PLACEMENT BOUNDARY REGION				
14	1	63	3.16049E+03 CM**3	3.16049E+03 CM**3
	2	64	2.20495E+02 CM**3	3.38099E+03 CM**3
15	1	65	5.59865E+03 CM**3	1.82654E+04 CM**3
	2	66	4.15813E+03 CM**3	2.24235E+04 CM**3
	3	67	4.80740E+04 CM**3	7.04975E+04 CM**3
	4	68	1.34136E+04 CM**3	8.39110E+04 CM**3
	5	69	6.84563E+04 CM**3	1.52367E+05 CM**3
	6	70	2.53172E+05 CM**3	4.05539E+05 CM**3
	7	71	1.10809E+05 CM**3	5.16348E+05 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 24 IS AN ARRAY PLACEMENT BOUNDARY REGION				
90	1	24	9.84225E+02 CM**3	9.84225E+02 CM**3
	2	25	4.07750E+01 CM**3	1.02500E+03 CM**3
	3	26	1.55800E+02 CM**3	1.18080E+03 CM**3
	4	27	3.46183E+02 CM**3	1.52698E+03 CM**3
	5	28	1.24284E+02 CM**3	1.65127E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 29 IS AN ARRAY PLACEMENT BOUNDARY REGION				
91	1	29	9.84225E+02 CM**3	9.84225E+02 CM**3
	2	30	4.07750E+01 CM**3	1.02500E+03 CM**3
	3	31	1.55800E+02 CM**3	1.18080E+03 CM**3
	4	32	3.46183E+02 CM**3	1.52698E+03 CM**3
	5	33	1.24284E+02 CM**3	1.65127E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 34 IS AN ARRAY PLACEMENT BOUNDARY REGION				
92	1	34	9.84225E+02 CM**3	9.84225E+02 CM**3

	2	35	4.07750E+01	CM**3	1.02500E+03	CM**3
	3	36	1.55800E+02	CM**3	1.18080E+03	CM**3
	4	37	3.46183E+02	CM**3	1.52698E+03	CM**3
	5	38	1.24284E+02	CM**3	1.65127E+03	CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 44 IS AN ARRAY PLACEMENT BOUNDARY REGION						
101	1	44	9.84225E+02	CM**3	9.84225E+02	CM**3
	2	45	4.07750E+01	CM**3	1.02500E+03	CM**3
	3	46	1.55800E+02	CM**3	1.18080E+03	CM**3
	4	47	3.46183E+02	CM**3	1.52698E+03	CM**3
	5	48	5.32644E+01	CM**3	1.58025E+03	CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 54 IS AN ARRAY PLACEMENT BOUNDARY REGION						
111	1	54	9.84225E+02	CM**3	9.84225E+02	CM**3
	2	55	4.07750E+01	CM**3	1.02500E+03	CM**3
	3	56	1.55800E+02	CM**3	1.18080E+03	CM**3
	4	57	3.46183E+02	CM**3	1.52698E+03	CM**3
	5	58	5.32644E+01	CM**3	1.58025E+03	CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	14	1	2	4.44500E+02 CM**3
		2	3	4.44500E+02 CM**3
2	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.42288E+02 CM**3
3	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.51213E+02 CM**3
4	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.26713E+02 CM**3
5	84	1	1	5.09309E+02 CM**3
		2	2	8.24191E+02 CM**3
		3	3	2.55990E+03 CM**3
6	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.26713E+02 CM**3
7	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.51213E+02 CM**3
8	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.42288E+02 CM**3
10	1	1		9.84225E+02 CM**3
		2	3	4.07750E+01 CM**3
		3	4	1.55800E+02 CM**3
		4	3	3.46183E+02 CM**3
		5	5	5.32644E+01 CM**3
11	1	1		9.84225E+02 CM**3
		2	3	4.07750E+01 CM**3
		3	4	1.55800E+02 CM**3
		4	3	3.46183E+02 CM**3
		5	5	5.32644E+01 CM**3
12	1	1		3.16049E+03 CM**3
		2	5	2.20495E+02 CM**3
13	1	1		4.95380E+03 CM**3
		2	5	9.50948E+02 CM**3
14	1	1		3.16049E+03 CM**3
		2	5	2.20495E+02 CM**3
15	1	1	3	5.59865E+03 CM**3
		2	5	4.15813E+03 CM**3
		3	6	4.80740E+04 CM**3
		4	5	1.34136E+04 CM**3
		5	8	6.84563E+04 CM**3
		6	5	2.53172E+05 CM**3
		7	7	1.10809E+05 CM**3
90	1	1		9.84225E+02 CM**3
		2	3	4.07750E+01 CM**3
		3	4	1.55800E+02 CM**3
		4	3	3.46183E+02 CM**3
		5	5	1.24284E+02 CM**3
91	1	1		9.84225E+02 CM**3
		2	3	4.07750E+01 CM**3
		3	4	1.55800E+02 CM**3
		4	3	3.46183E+02 CM**3

		5	5	1.24284E+02 CM**3
92	1	1		9.84225E+02 CM**3
		2	3	4.07750E+01 CM**3
		3	4	1.55800E+02 CM**3
		4	3	3.46183E+02 CM**3
		5	5	1.24284E+02 CM**3
101	1	1		9.84225E+02 CM**3
		2	3	4.07750E+01 CM**3
		3	4	1.55800E+02 CM**3
		4	3	3.46183E+02 CM**3
		5	5	5.32644E+01 CM**3
111	1	1		9.84225E+02 CM**3
		2	3	4.07750E+01 CM**3
		3	4	1.55800E+02 CM**3
		4	3	3.46183E+02 CM**3
		5	5	5.32644E+01 CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	7.63963E+02 CM**3	3.05126E+03
2	1.68079E+03 CM**3	4.54148E+03
3	1.27522E+04 CM**3	1.27289E+04
4	1.09060E+03 CM**3	2.94680E+03
5	2.72721E+05 CM**3	2.15995E+06
6	4.80740E+04 CM**3	5.45351E+05
7	1.10809E+05 CM**3	1.10607E+05
8	6.84563E+04 CM**3	6.83311E+04

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***                               ***
***          BIASING INFORMATION          ***
***
***  A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S.  ***
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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....

..... 0.01750 MINUTES WERE USED PROCESSING DATA. ....

VOLUME FRACTION OF FISSION MATERIAL IN THE CORE= 6.03126E-02

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:  
+X= 8.03390E+01 -X=-8.03390E+01 +Y= 8.03390E+01 -Y=-8.03390E+01 +Z= 1.00000E+01 -Z=-1.00000E+01

THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 336 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

464 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

0.45383 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.48000 MINUTES.

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE GENERATED	MATRIX K-EFF DEVIATION
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	700 INDEPENDENT	FISSION POINTS WERE	GENERATED		
1	7.82588E-01	5.06333E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	744 INDEPENDENT	FISSION POINTS WERE	GENERATED		
2	8.20012E-01	5.35500E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	741 INDEPENDENT	FISSION POINTS WERE	GENERATED		
3	8.31350E-01	5.64833E-01	8.31350E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	7.85323E-01	5.95000E-01	8.08337E-01	2.30137E-02	0.00000E+00	0.00000E+00
5	8.23855E-01	6.24333E-01	8.13509E-01	1.42583E-02	0.00000E+00	0.00000E+00
6	7.56112E-01	6.54500E-01	7.99160E-01	1.75371E-02	0.00000E+00	0.00000E+00
7	8.45663E-01	6.84833E-01	8.08461E-01	1.64631E-02	0.00000E+00	0.00000E+00
8	7.80519E-01	7.15000E-01	8.03804E-01	1.42259E-02	0.00000E+00	0.00000E+00
9	7.77308E-01	7.45167E-01	8.00019E-01	1.26048E-02	0.00000E+00	0.00000E+00
10	8.03211E-01	7.75333E-01	8.00418E-01	1.09234E-02	0.00000E+00	0.00000E+00
11	7.61307E-01	8.04667E-01	7.96072E-01	1.05683E-02	0.00000E+00	0.00000E+00
12	8.34185E-01	8.35833E-01	7.99883E-01	1.01920E-02	0.00000E+00	0.00000E+00
13	7.68171E-01	8.66000E-01	7.97000E-01	9.65928E-03	0.00000E+00	0.00000E+00
14	8.61627E-01	8.93500E-01	8.02386E-01	1.03322E-02	0.00000E+00	0.00000E+00
15	8.43867E-01	9.23667E-01	8.05577E-01	1.00256E-02	0.00000E+00	0.00000E+00
16	8.23382E-01	9.53000E-01	8.06849E-01	9.36864E-03	0.00000E+00	0.00000E+00
17	7.80078E-01	9.83167E-01	8.05064E-01	8.90246E-03	0.00000E+00	0.00000E+00
18	8.45103E-01	1.01250E+00	8.07566E-01	8.69537E-03	0.00000E+00	0.00000E+00
19	7.79327E-01	1.04267E+00	8.05905E-01	8.33508E-03	0.00000E+00	0.00000E+00
20	7.67797E-01	1.07300E+00	8.03788E-01	8.13857E-03	0.00000E+00	0.00000E+00
21	8.11431E-01	1.10400E+00	8.04190E-01	7.70882E-03	0.00000E+00	0.00000E+00
22	8.23154E-01	1.13433E+00	8.05138E-01	7.37444E-03	0.00000E+00	0.00000E+00
23	7.58645E-01	1.16450E+00	8.02925E-01	7.35546E-03	0.00000E+00	0.00000E+00
24	8.22415E-01	1.19467E+00	8.03811E-01	7.06889E-03	0.00000E+00	0.00000E+00
25	8.05434E-01	1.22583E+00	8.03881E-01	6.75493E-03	0.00000E+00	0.00000E+00
26	8.03967E-01	1.25600E+00	8.03885E-01	6.46735E-03	0.00000E+00	0.00000E+00
27	7.94770E-01	1.28617E+00	8.03520E-01	6.21397E-03	0.00000E+00	0.00000E+00
28	7.85637E-01	1.31833E+00	8.02833E-01	6.00968E-03	0.00000E+00	0.00000E+00
29	8.06424E-01	1.34850E+00	8.02966E-01	5.78435E-03	0.00000E+00	0.00000E+00
30	8.66667E-01	1.37783E+00	8.05241E-01	6.02035E-03	0.00000E+00	0.00000E+00
31	7.60055E-01	1.40883E+00	8.03683E-01	6.01438E-03	0.00000E+00	0.00000E+00
32	7.38283E-01	1.44100E+00	8.01503E-01	6.20593E-03	0.00000E+00	0.00000E+00
33	7.67211E-01	1.47117E+00	8.00396E-01	6.10348E-03	0.00000E+00	0.00000E+00
34	7.73616E-01	1.50233E+00	7.99559E-01	5.96863E-03	0.00000E+00	0.00000E+00
35	8.51868E-01	1.53150E+00	8.01145E-01	5.99817E-03	0.00000E+00	0.00000E+00
36	8.07863E-01	1.56183E+00	8.01342E-01	5.82243E-03	0.00000E+00	0.00000E+00
37	8.05200E-01	1.59283E+00	8.01452E-01	5.65471E-03	0.00000E+00	0.00000E+00
38	7.85393E-01	1.62317E+00	8.01006E-01	5.51346E-03	0.00000E+00	0.00000E+00
39	7.67882E-01	1.65333E+00	8.00111E-01	5.43660E-03	0.00000E+00	0.00000E+00
40	8.40520E-01	1.68350E+00	8.01174E-01	5.39739E-03	0.00000E+00	0.00000E+00
41	8.53727E-01	1.71283E+00	8.02522E-01	5.42712E-03	0.00000E+00	0.00000E+00
42	8.04652E-01	1.74400E+00	8.02575E-01	5.28997E-03	0.00000E+00	0.00000E+00
43	8.28772E-01	1.77500E+00	8.03214E-01	5.19875E-03	0.00000E+00	0.00000E+00
44	7.84712E-01	1.80717E+00	8.02774E-01	5.09255E-03	0.00000E+00	0.00000E+00
45	7.97866E-01	1.83733E+00	8.02660E-01	4.97401E-03	0.00000E+00	0.00000E+00
46	7.82687E-01	1.86750E+00	8.02206E-01	4.88081E-03	0.00000E+00	0.00000E+00
47	8.10596E-01	1.89683E+00	8.02392E-01	4.77475E-03	0.00000E+00	0.00000E+00
48	8.36581E-01	1.92700E+00	8.03135E-01	4.72858E-03	0.00000E+00	0.00000E+00
49	8.35149E-01	1.95717E+00	8.03816E-01	4.67674E-03	0.00000E+00	0.00000E+00
50	8.07847E-01	1.98650E+00	8.03900E-01	4.57905E-03	0.00000E+00	0.00000E+00
51	7.90965E-01	2.01583E+00	8.03636E-01	4.49239E-03	0.00000E+00	0.00000E+00
52	7.91820E-01	2.04700E+00	8.03400E-01	4.40796E-03	0.00000E+00	0.00000E+00
53	8.58332E-01	2.07617E+00	8.04477E-01	4.45290E-03	0.00000E+00	0.00000E+00
54	7.93312E-01	2.10733E+00	8.04262E-01	4.37170E-03	0.00000E+00	0.00000E+00
55	8.46627E-01	2.13667E+00	8.05062E-01	4.36228E-03	0.00000E+00	0.00000E+00
56	8.50713E-01	2.16783E+00	8.05907E-01	4.36342E-03	0.00000E+00	0.00000E+00
57	7.93341E-01	2.19800E+00	8.05679E-01	4.28944E-03	0.00000E+00	0.00000E+00
58	7.63313E-01	2.22817E+00	8.04922E-01	4.27954E-03	0.00000E+00	0.00000E+00
59	7.77036E-01	2.25833E+00	8.04433E-01	4.23216E-03	0.00000E+00	0.00000E+00
60	7.99289E-01	2.28767E+00	8.04344E-01	4.15950E-03	0.00000E+00	0.00000E+00
61	8.41467E-01	2.31883E+00	8.04973E-01	4.13653E-03	0.00000E+00	0.00000E+00
62	8.13266E-01	2.34900E+00	8.05112E-01	4.06935E-03	0.00000E+00	0.00000E+00
63	8.19781E-01	2.38017E+00	8.05352E-01	4.00930E-03	0.00000E+00	0.00000E+00
64	8.32399E-01	2.41133E+00	8.05788E-01	3.96816E-03	0.00000E+00	0.00000E+00
65	8.11585E-01	2.44150E+00	8.05880E-01	3.90575E-03	0.00000E+00	0.00000E+00
66	8.01330E-01	2.47167E+00	8.05809E-01	3.84489E-03	0.00000E+00	0.00000E+00
67	8.35365E-01	2.50183E+00	8.06264E-01	3.81249E-03	0.00000E+00	0.00000E+00
68	8.14892E-01	2.53117E+00	8.06395E-01	3.75656E-03	0.00000E+00	0.00000E+00
69	7.95587E-01	2.56050E+00	8.06233E-01	3.70358E-03	0.00000E+00	0.00000E+00
70	8.18935E-01	2.59167E+00	8.06420E-01	3.65349E-03	0.00000E+00	0.00000E+00
71	7.74137E-01	2.62367E+00	8.05952E-01	3.63042E-03	0.00000E+00	0.00000E+00
72	8.45016E-01	2.65383E+00	8.06510E-01	3.62144E-03	0.00000E+00	0.00000E+00

73	7.67445E-01	2.68500E+00	8.05960E-01	3.61222E-03	0.00000E+00	0.00000E+00
74	8.70584E-01	2.71433E+00	8.06858E-01	3.67304E-03	0.00000E+00	0.00000E+00
75	8.94342E-01	2.74533E+00	8.08056E-01	3.81547E-03	0.00000E+00	0.00000E+00
76	7.88294E-01	2.77467E+00	8.07789E-01	3.77302E-03	0.00000E+00	0.00000E+00
77	8.07239E-01	2.80483E+00	8.07782E-01	3.72238E-03	0.00000E+00	0.00000E+00
78	8.27889E-01	2.83417E+00	8.08048E-01	3.68269E-03	0.00000E+00	0.00000E+00
79	8.03489E-01	2.86433E+00	8.07988E-01	3.63503E-03	0.00000E+00	0.00000E+00
80	7.63271E-01	2.89467E+00	8.07415E-01	3.63364E-03	0.00000E+00	0.00000E+00
81	7.63581E-01	2.92567E+00	8.06860E-01	3.63000E-03	0.00000E+00	0.00000E+00
82	7.71390E-01	2.95600E+00	8.06417E-01	3.61166E-03	0.00000E+00	0.00000E+00
83	7.87178E-01	2.98617E+00	8.06175E-01	3.57469E-03	0.00000E+00	0.00000E+00
84	7.96475E-01	3.01733E+00	8.06061E-01	3.53281E-03	0.00000E+00	0.00000E+00
85	8.33068E-01	3.04650E+00	8.06386E-01	3.50512E-03	0.00000E+00	0.00000E+00
86	7.88310E-01	3.07683E+00	8.06171E-01	3.46982E-03	0.00000E+00	0.00000E+00
87	7.73423E-01	3.10700E+00	8.05786E-01	3.45034E-03	0.00000E+00	0.00000E+00
88	8.19029E-01	3.13817E+00	8.05940E-01	3.41345E-03	0.00000E+00	0.00000E+00
89	8.08473E-01	3.16917E+00	8.05969E-01	3.37412E-03	0.00000E+00	0.00000E+00
90	8.24039E-01	3.19767E+00	8.06174E-01	3.34187E-03	0.00000E+00	0.00000E+00
91	8.03419E-01	3.22867E+00	8.06143E-01	3.30425E-03	0.00000E+00	0.00000E+00
92	8.31295E-01	3.25900E+00	8.06423E-01	3.27926E-03	0.00000E+00	0.00000E+00
93	8.05054E-01	3.29183E+00	8.06408E-01	3.24306E-03	0.00000E+00	0.00000E+00
94	7.80756E-01	3.32117E+00	8.06129E-01	3.21971E-03	0.00000E+00	0.00000E+00
95	8.21524E-01	3.35233E+00	8.06295E-01	3.18920E-03	0.00000E+00	0.00000E+00
96	7.86701E-01	3.38250E+00	8.06086E-01	3.16197E-03	0.00000E+00	0.00000E+00
97	8.30205E-01	3.41283E+00	8.06340E-01	3.13879E-03	0.00000E+00	0.00000E+00
98	7.78165E-01	3.44300E+00	8.06047E-01	3.11976E-03	0.00000E+00	0.00000E+00
99	8.65698E-01	3.47133E+00	8.06662E-01	3.14808E-03	0.00000E+00	0.00000E+00
100	7.89119E-01	3.50150E+00	8.06483E-01	3.12093E-03	0.00000E+00	0.00000E+00
101	7.71266E-01	3.53267E+00	8.06127E-01	3.10966E-03	0.00000E+00	0.00000E+00
102	7.42795E-01	3.56383E+00	8.05493E-01	3.14287E-03	0.00000E+00	0.00000E+00
103	7.84546E-01	3.59400E+00	8.05286E-01	3.11850E-03	0.00000E+00	0.00000E+00
104	7.83195E-01	3.62517E+00	8.05069E-01	3.09537E-03	0.00000E+00	0.00000E+00
105	8.39004E-01	3.65350E+00	8.05389E-01	3.08180E-03	0.00000E+00	0.00000E+00
106	8.06543E-01	3.68367E+00	8.05400E-01	3.05204E-03	0.00000E+00	0.00000E+00
107	8.19463E-01	3.71400E+00	8.05534E-01	3.02580E-03	0.00000E+00	0.00000E+00
108	8.01206E-01	3.74500E+00	8.05493E-01	2.99740E-03	0.00000E+00	0.00000E+00
109	7.77892E-01	3.77617E+00	8.05235E-01	2.98044E-03	0.00000E+00	0.00000E+00
110	7.64249E-01	3.80633E+00	8.04856E-01	2.97700E-03	0.00000E+00	0.00000E+00
111	7.83489E-01	3.83667E+00	8.04660E-01	2.95607E-03	0.00000E+00	0.00000E+00
112	7.95690E-01	3.86767E+00	8.04578E-01	2.93021E-03	0.00000E+00	0.00000E+00
113	8.34454E-01	3.89800E+00	8.04848E-01	2.91614E-03	0.00000E+00	0.00000E+00
114	8.14258E-01	3.92717E+00	8.04932E-01	2.89120E-03	0.00000E+00	0.00000E+00
115	8.12118E-01	3.95750E+00	8.04995E-01	2.86621E-03	0.00000E+00	0.00000E+00
116	8.12652E-01	3.98767E+00	8.05062E-01	2.84175E-03	0.00000E+00	0.00000E+00
117	8.16646E-01	4.01517E+00	8.05163E-01	2.81873E-03	0.00000E+00	0.00000E+00
118	7.75865E-01	4.04717E+00	8.04910E-01	2.80572E-03	0.00000E+00	0.00000E+00
119	8.03062E-01	4.07733E+00	8.04895E-01	2.78168E-03	0.00000E+00	0.00000E+00
120	8.05484E-01	4.10667E+00	8.04900E-01	2.75801E-03	0.00000E+00	0.00000E+00
121	8.51749E-01	4.13683E+00	8.05293E-01	2.76293E-03	0.00000E+00	0.00000E+00
122	8.49198E-01	4.16617E+00	8.05659E-01	2.76413E-03	0.00000E+00	0.00000E+00
123	8.51824E-01	4.19633E+00	8.06041E-01	2.76761E-03	0.00000E+00	0.00000E+00
124	8.19276E-01	4.22650E+00	8.06149E-01	2.74697E-03	0.00000E+00	0.00000E+00
125	7.72826E-01	4.25683E+00	8.05878E-01	2.73799E-03	0.00000E+00	0.00000E+00
126	7.77407E-01	4.28783E+00	8.05649E-01	2.72550E-03	0.00000E+00	0.00000E+00
127	8.48435E-01	4.31817E+00	8.05991E-01	2.72519E-03	0.00000E+00	0.00000E+00
128	8.14418E-01	4.34833E+00	8.06058E-01	2.70431E-03	0.00000E+00	0.00000E+00
129	7.58884E-01	4.37850E+00	8.05686E-01	2.70852E-03	0.00000E+00	0.00000E+00
130	7.83040E-01	4.40867E+00	8.05510E-01	2.69309E-03	0.00000E+00	0.00000E+00
131	7.73447E-01	4.43983E+00	8.05261E-01	2.68367E-03	0.00000E+00	0.00000E+00
132	8.01253E-01	4.46917E+00	8.05230E-01	2.66312E-03	0.00000E+00	0.00000E+00
133	8.13066E-01	4.49933E+00	8.05290E-01	2.64339E-03	0.00000E+00	0.00000E+00
134	8.24373E-01	4.52950E+00	8.05435E-01	2.62727E-03	0.00000E+00	0.00000E+00
135	8.10658E-01	4.56067E+00	8.05474E-01	2.60774E-03	0.00000E+00	0.00000E+00
136	7.70361E-01	4.59183E+00	8.05212E-01	2.60144E-03	0.00000E+00	0.00000E+00
137	7.79411E-01	4.62300E+00	8.05021E-01	2.58916E-03	0.00000E+00	0.00000E+00
138	8.08704E-01	4.65317E+00	8.05048E-01	2.57019E-03	0.00000E+00	0.00000E+00
139	7.67193E-01	4.68333E+00	8.04771E-01	2.56629E-03	0.00000E+00	0.00000E+00
140	7.80991E-01	4.71450E+00	8.04599E-01	2.55345E-03	0.00000E+00	0.00000E+00
141	8.36822E-01	4.74467E+00	8.04831E-01	2.54559E-03	0.00000E+00	0.00000E+00
142	7.86705E-01	4.77483E+00	8.04701E-01	2.53065E-03	0.00000E+00	0.00000E+00
143	7.81529E-01	4.80517E+00	8.04537E-01	2.51801E-03	0.00000E+00	0.00000E+00
144	7.91742E-01	4.83533E+00	8.04447E-01	2.50184E-03	0.00000E+00	0.00000E+00
145	8.04700E-01	4.86550E+00	8.04449E-01	2.48428E-03	0.00000E+00	0.00000E+00
146	7.93523E-01	4.89567E+00	8.04373E-01	2.46813E-03	0.00000E+00	0.00000E+00
147	7.83499E-01	4.92600E+00	8.04229E-01	2.45528E-03	0.00000E+00	0.00000E+00
148	8.12237E-01	4.95617E+00	8.04284E-01	2.43902E-03	0.00000E+00	0.00000E+00
149	8.40777E-01	4.98733E+00	8.04532E-01	2.43506E-03	0.00000E+00	0.00000E+00
150	8.57578E-01	5.01650E+00	8.04890E-01	2.44496E-03	0.00000E+00	0.00000E+00
151	8.01474E-01	5.04663E+00	8.04867E-01	2.42861E-03	0.00000E+00	0.00000E+00
152	7.89781E-01	5.07700E+00	8.04767E-01	2.41446E-03	0.00000E+00	0.00000E+00
153	8.32128E-01	5.10633E+00	8.04948E-01	2.40525E-03	0.00000E+00	0.00000E+00
154	8.02724E-01	5.13650E+00	8.04933E-01	2.38942E-03	0.00000E+00	0.00000E+00
155	5.62724E-01	5.16583E+00	8.05311E-01	2.40361E-03	0.00000E+00	0.00000E+00
156	8.43748E-01	5.19600E+00	8.05561E-01	2.40096E-03	0.00000E+00	0.00000E+00
157	8.42898E-01	5.22533E+00	8.05802E-01	2.39755E-03	0.00000E+00	0.00000E+00
158	8.27336E-01	5.25467E+00	8.05940E-01	2.38613E-03	0.00000E+00	0.00000E+00
159	8.31212E-01	5.28483E+00	8.06101E-01	2.37634E-03	0.00000E+00	0.00000E+00
160	8.22070E-01	5.31417E+00	8.06202E-01	2.36342E-03	0.00000E+00	0.00000E+00
161	8.47374E-01	5.34333E+00	8.06461E-01	2.36274E-03	0.00000E+00	0.00000E+00
162	7.72563E-01	5.37450E+00	8.06255E-01	2.35691E-03	0.00000E+00	0.00000E+00
163	8.28438E-01	5.40467E+00	8.06393E-01	2.34627E-03	0.00000E+00	0.00000E+00
164	7.84095E-01	5.43500E+00	8.06255E-01	2.33580E-03	0.00000E+00	0.00000E+00
165	7.79844E-01	5.46700E+00	8.06093E-01	2.32708E-03	0.00000E+00	0.00000E+00
166	8.10761E-01	5.49717E+00	8.06122E-01	2.31302E-03	0.00000E+00	0.00000E+00
167	8.59358E-01	5.52650E+00	8.06444E-01	2.32149E-03	0.00000E+00	0.00000E+00

168	8.69515E-01	5.55583E+00	8.06824E-01	2.33853E-03	0.00000E+00	0.00000E+00
169	8.35061E-01	5.58600E+00	8.06993E-01	2.33063E-03	0.00000E+00	0.00000E+00
170	8.07052E-01	5.61617E+00	8.06894E-01	2.31672E-03	0.00000E+00	0.00000E+00
171	7.74453E-01	5.64633E+00	8.06601E-01	2.31100E-03	0.00000E+00	0.00000E+00
172	8.82550E-01	5.67483E+00	8.07247E-01	2.34018E-03	0.00000E+00	0.00000E+00
173	8.16679E-01	5.70500E+00	8.07302E-01	2.32711E-03	0.00000E+00	0.00000E+00
174	8.42197E-01	5.73333E+00	8.07505E-01	2.32242E-03	0.00000E+00	0.00000E+00
175	7.44863E-01	5.76450E+00	8.07143E-01	2.33717E-03	0.00000E+00	0.00000E+00
176	7.76623E-01	5.79567E+00	8.06967E-01	2.33031E-03	0.00000E+00	0.00000E+00
177	8.15792E-01	5.82667E+00	8.07018E-01	2.31751E-03	0.00000E+00	0.00000E+00
178	8.05464E-01	5.85600E+00	8.07009E-01	2.30432E-03	0.00000E+00	0.00000E+00
179	8.04421E-01	5.88617E+00	8.06994E-01	2.29131E-03	0.00000E+00	0.00000E+00
180	8.40447E-01	5.91650E+00	8.07182E-01	2.28614E-03	0.00000E+00	0.00000E+00
181	8.46729E-01	5.94667E+00	8.07403E-01	2.28404E-03	0.00000E+00	0.00000E+00
182	8.06325E-01	5.97683E+00	8.07397E-01	2.27132E-03	0.00000E+00	0.00000E+00
183	8.24680E-01	6.00617E+00	8.07493E-01	2.26076E-03	0.00000E+00	0.00000E+00
184	7.83884E-01	6.03817E+00	8.07363E-01	2.25204E-03	0.00000E+00	0.00000E+00
185	8.08498E-01	6.06833E+00	8.07369E-01	2.23971E-03	0.00000E+00	0.00000E+00
186	8.16651E-01	6.09767E+00	8.07420E-01	2.22808E-03	0.00000E+00	0.00000E+00
187	8.35256E-01	6.12700E+00	8.07570E-01	2.22110E-03	0.00000E+00	0.00000E+00
188	7.99256E-01	6.15717E+00	8.07525E-01	2.20958E-03	0.00000E+00	0.00000E+00
189	7.74893E-01	6.18733E+00	8.07351E-01	2.20465E-03	0.00000E+00	0.00000E+00
190	8.10815E-01	6.21767E+00	8.07369E-01	2.19297E-03	0.00000E+00	0.00000E+00
191	8.38668E-01	6.24683E+00	8.07535E-01	2.18761E-03	0.00000E+00	0.00000E+00
192	7.76145E-01	6.27717E+00	8.07370E-01	2.18233E-03	0.00000E+00	0.00000E+00
193	7.91436E-01	6.30633E+00	8.07286E-01	2.17248E-03	0.00000E+00	0.00000E+00
194	7.71756E-01	6.33567E+00	8.07101E-01	2.16904E-03	0.00000E+00	0.00000E+00
195	7.86135E-01	6.36583E+00	8.06993E-01	2.16050E-03	0.00000E+00	0.00000E+00
196	8.36534E-01	6.39517E+00	8.07145E-01	2.15473E-03	0.00000E+00	0.00000E+00
197	7.78126E-01	6.42633E+00	8.06996E-01	2.14881E-03	0.00000E+00	0.00000E+00
198	8.21092E-01	6.45650E+00	8.07068E-01	2.13903E-03	0.00000E+00	0.00000E+00
199	8.06780E-01	6.48667E+00	8.07066E-01	2.12814E-03	0.00000E+00	0.00000E+00
200	7.93471E-01	6.51783E+00	8.06998E-01	2.11848E-03	0.00000E+00	0.00000E+00
201	8.25068E-01	6.54717E+00	8.07089E-01	2.10976E-03	0.00000E+00	0.00000E+00
202	7.79774E-01	6.57733E+00	8.06952E-01	2.10362E-03	0.00000E+00	0.00000E+00
203	7.99331E-01	6.60750E+00	8.06914E-01	2.09347E-03	0.00000E+00	0.00000E+00
204	8.00386E-01	6.63967E+00	8.06882E-01	2.08334E-03	0.00000E+00	0.00000E+00
205	8.00388E-01	6.66983E+00	8.06850E-01	2.07329E-03	0.00000E+00	0.00000E+00
206	7.93801E-01	6.70100E+00	8.06786E-01	2.06410E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

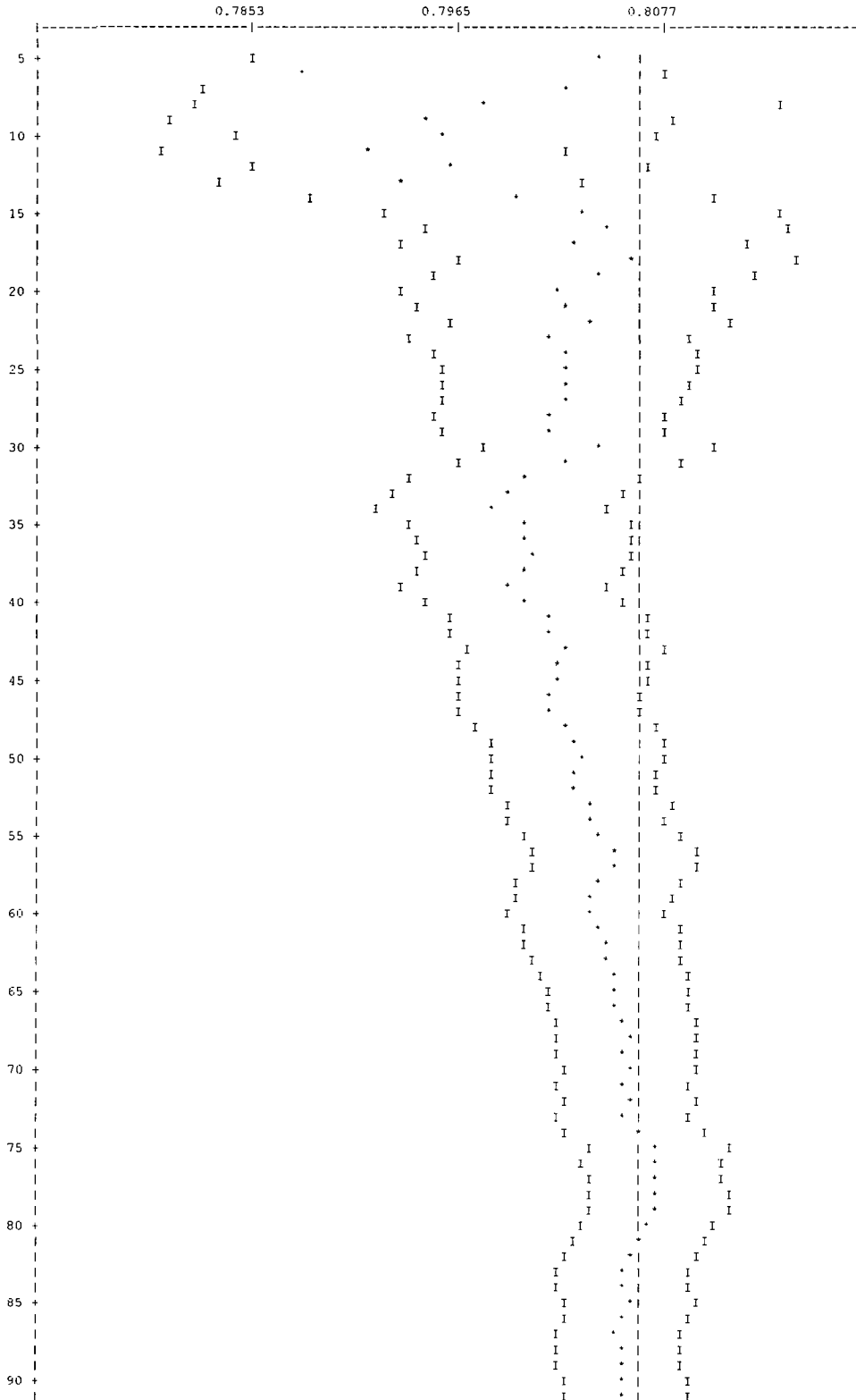
EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

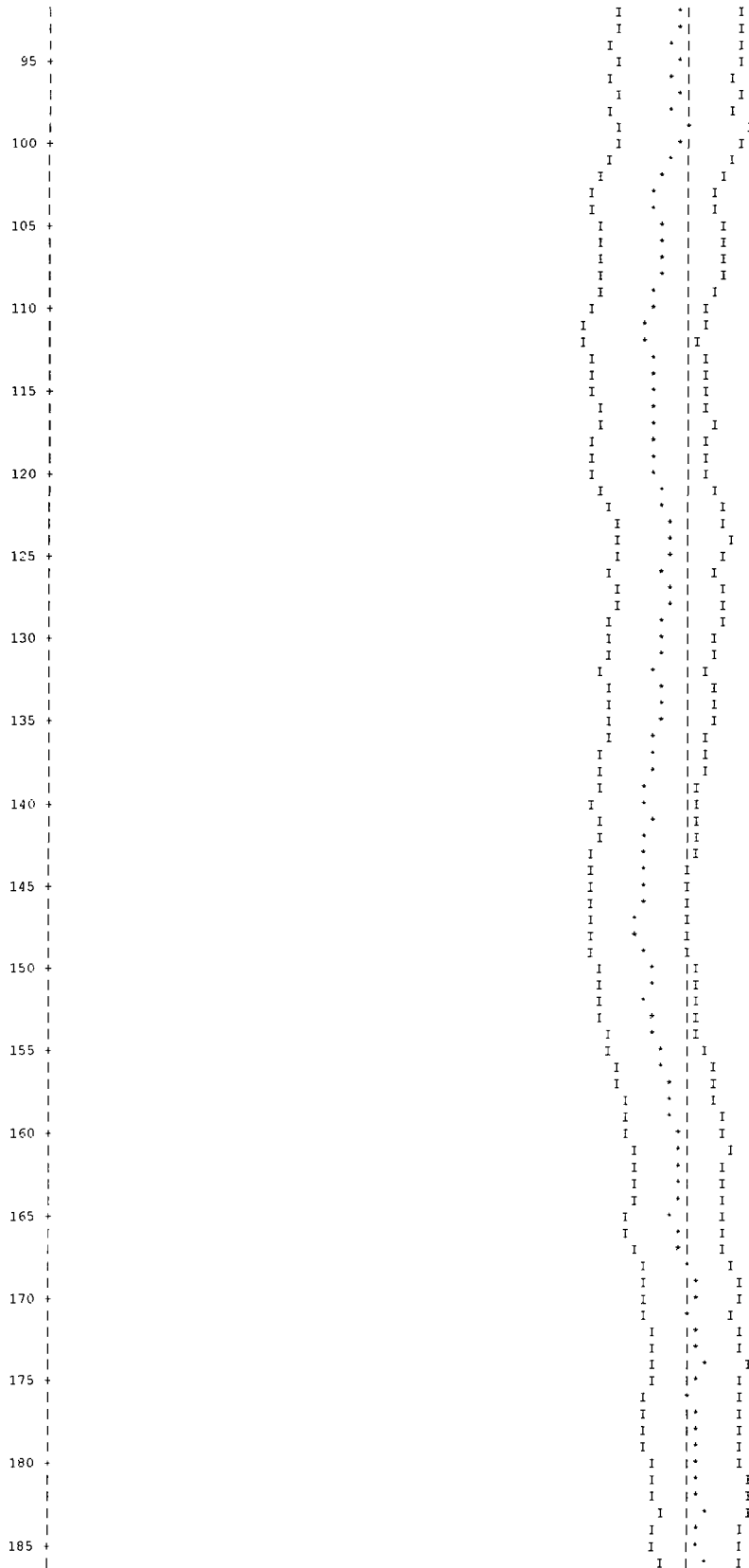
LIFETIME = 9.98934E-05 + OR - 3.46130E-07      GENERATION TIME = 4.27633E-05 + OR - 1.65576E-07  
 NU BAR = 2.42064E+00 + OR - 2.24711E-05      AVERAGE FISSION GROUP = 2.34293E+01 + OR - 9.34937E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 7.08986E-02 + OR - 4.92764E-04

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	0.80666	+ OR - 0.00207	0.80459 TO 0.80874	0.80252 TO 0.81081	0.80045 TO 0.81288	162400
4	0.80677	+ OR - 0.00208	0.80469 TO 0.80885	0.80261 TO 0.81093	0.80054 TO 0.81301	161600
5	0.80669	+ OR - 0.00209	0.80460 TO 0.80877	0.80251 TO 0.81086	0.80042 TO 0.81295	160800
6	0.80694	+ OR - 0.00208	0.80486 TO 0.80902	0.80277 TO 0.81110	0.80069 TO 0.81318	160000
7	0.80674	+ OR - 0.00208	0.80466 TO 0.80883	0.80258 TO 0.81091	0.80049 TO 0.81299	159200
8	0.80688	+ OR - 0.00209	0.80479 TO 0.80897	0.80270 TO 0.81106	0.80061 TO 0.81314	158400
9	0.80703	+ OR - 0.00209	0.80493 TO 0.80912	0.80284 TO 0.81122	0.80074 TO 0.81331	157600
10	0.80705	+ OR - 0.00211	0.80494 TO 0.80915	0.80283 TO 0.81126	0.80073 TO 0.81336	156800
11	0.80728	+ OR - 0.00210	0.80518 TO 0.80938	0.80307 TO 0.81149	0.80097 TO 0.81359	156000
12	0.80714	+ OR - 0.00211	0.80503 TO 0.80925	0.80292 TO 0.81136	0.80081 TO 0.81347	155200
17	0.80692	+ OR - 0.00212	0.80480 TO 0.80904	0.80268 TO 0.81116	0.80056 TO 0.81328	151200
22	0.80696	+ OR - 0.00215	0.80481 TO 0.80912	0.80266 TO 0.81127	0.80051 TO 0.81342	147200
27	0.80724	+ OR - 0.00219	0.80505 TO 0.80943	0.80286 TO 0.81162	0.80067 TO 0.81382	143200
32	0.80770	+ OR - 0.00217	0.80553 TO 0.80987	0.80335 TO 0.81204	0.80118 TO 0.81421	139200
37	0.80789	+ OR - 0.00220	0.80569 TO 0.81009	0.80349 TO 0.81229	0.80130 TO 0.81448	135200
42	0.80781	+ OR - 0.00222	0.80559 TO 0.81003	0.80337 TO 0.81226	0.80115 TO 0.81448	131200
47	0.80803	+ OR - 0.00228	0.80575 TO 0.81031	0.80348 TO 0.81258	0.80120 TO 0.81486	127200
52	0.80789	+ OR - 0.00233	0.80555 TO 0.81022	0.80322 TO 0.81255	0.80089 TO 0.81488	123200
57	0.80719	+ OR - 0.00235	0.80485 TO 0.80954	0.80250 TO 0.81189	0.80015 TO 0.81424	119200
62	0.80748	+ OR - 0.00239	0.80509 TO 0.80987	0.80270 TO 0.81226	0.80031 TO 0.81465	115200
67	0.80703	+ OR - 0.00246	0.80457 TO 0.80949	0.80211 TO 0.81195	0.79965 TO 0.81441	111200
72	0.80693	+ OR - 0.00252	0.80441 TO 0.80945	0.80189 TO 0.81197	0.79937 TO 0.81449	107200
77	0.80621	+ OR - 0.00245	0.80375 TO 0.80866	0.80130 TO 0.81111	0.79885 TO 0.81357	103200
82	0.80702	+ OR - 0.00248	0.80454 TO 0.80951	0.80206 TO 0.81199	0.79958 TO 0.81447	99200
87	0.80750	+ OR - 0.00255	0.80495 TO 0.81005	0.80240 TO 0.81260	0.79985 TO 0.81515	95200
92	0.80707	+ OR - 0.00265	0.80443 TO 0.80972	0.80178 TO 0.81237	0.79913 TO 0.81501	91200

NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE		67 PER CENT		95 PER CENT		99 PER CENT		NUMBER OF HISTORIES
	K-EFFECTIVE	DEVIATION	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	
97	0.80717	+ OR - 0.00274	0.80443	TO 0.80991	0.80169	TO 0.81266	0.79895	TO 0.81540	87200
102	0.80803	+ OR - 0.00270	0.80532	TO 0.81073	0.80262	TO 0.81344	0.79992	TO 0.81614	83200
107	0.80811	+ OR - 0.00280	0.80531	TO 0.81091	0.80251	TO 0.81372	0.79971	TO 0.81652	79200
112	0.80937	+ OR - 0.00288	0.80649	TO 0.81225	0.80362	TO 0.81512	0.80074	TO 0.81800	75200
117	0.80888	+ OR - 0.00302	0.80586	TO 0.81191	0.80284	TO 0.81493	0.79981	TO 0.81795	71200
122	0.80840	+ OR - 0.00310	0.80530	TO 0.81149	0.80220	TO 0.81459	0.79910	TO 0.81769	67200
127	0.80804	+ OR - 0.00315	0.80489	TO 0.81119	0.80174	TO 0.81434	0.79860	TO 0.81749	63200
132	0.80952	+ OR - 0.00324	0.80628	TO 0.81276	0.80304	TO 0.81599	0.79981	TO 0.81923	59200
137	0.81024	+ OR - 0.00339	0.80685	TO 0.81363	0.80346	TO 0.81702	0.80007	TO 0.82041	55200
142	0.81135	+ OR - 0.00352	0.80783	TO 0.81486	0.80431	TO 0.81838	0.80079	TO 0.82190	51200
147	0.81307	+ OR - 0.00372	0.80935	TO 0.81679	0.80564	TO 0.82050	0.80192	TO 0.82422	47200
152	0.81239	+ OR - 0.00391	0.80848	TO 0.81631	0.80457	TO 0.82022	0.80065	TO 0.82413	43200
157	0.80990	+ OR - 0.00405	0.80585	TO 0.81395	0.80180	TO 0.81800	0.79775	TO 0.82205	39200
162	0.80872	+ OR - 0.00430	0.80442	TO 0.81301	0.80013	TO 0.81731	0.79583	TO 0.82160	35200
167	0.80823	+ OR - 0.00454	0.80369	TO 0.81277	0.79916	TO 0.81730	0.79462	TO 0.82184	31200
172	0.80448	+ OR - 0.00410	0.80038	TO 0.80858	0.79628	TO 0.81269	0.79217	TO 0.81679	27200
177	0.80539	+ OR - 0.00397	0.80141	TO 0.80936	0.79744	TO 0.81334	0.79346	TO 0.81731	23200
182	0.80220	+ OR - 0.00418	0.79802	TO 0.80638	0.79384	TO 0.81056	0.78966	TO 0.81474	19200
187	0.79915	+ OR - 0.00462	0.79453	TO 0.80377	0.78992	TO 0.80838	0.78530	TO 0.81300	15200
192	0.79886	+ OR - 0.00496	0.79391	TO 0.80382	0.78895	TO 0.80877	0.78400	TO 0.81373	11200
197	0.80223	+ OR - 0.00466	0.79757	TO 0.80690	0.79291	TO 0.81156	0.78824	TO 0.81622	7200
202	0.79848	+ OR - 0.00158	0.79690	TO 0.80005	0.79532	TO 0.80163	0.79374	TO 0.80321	3200

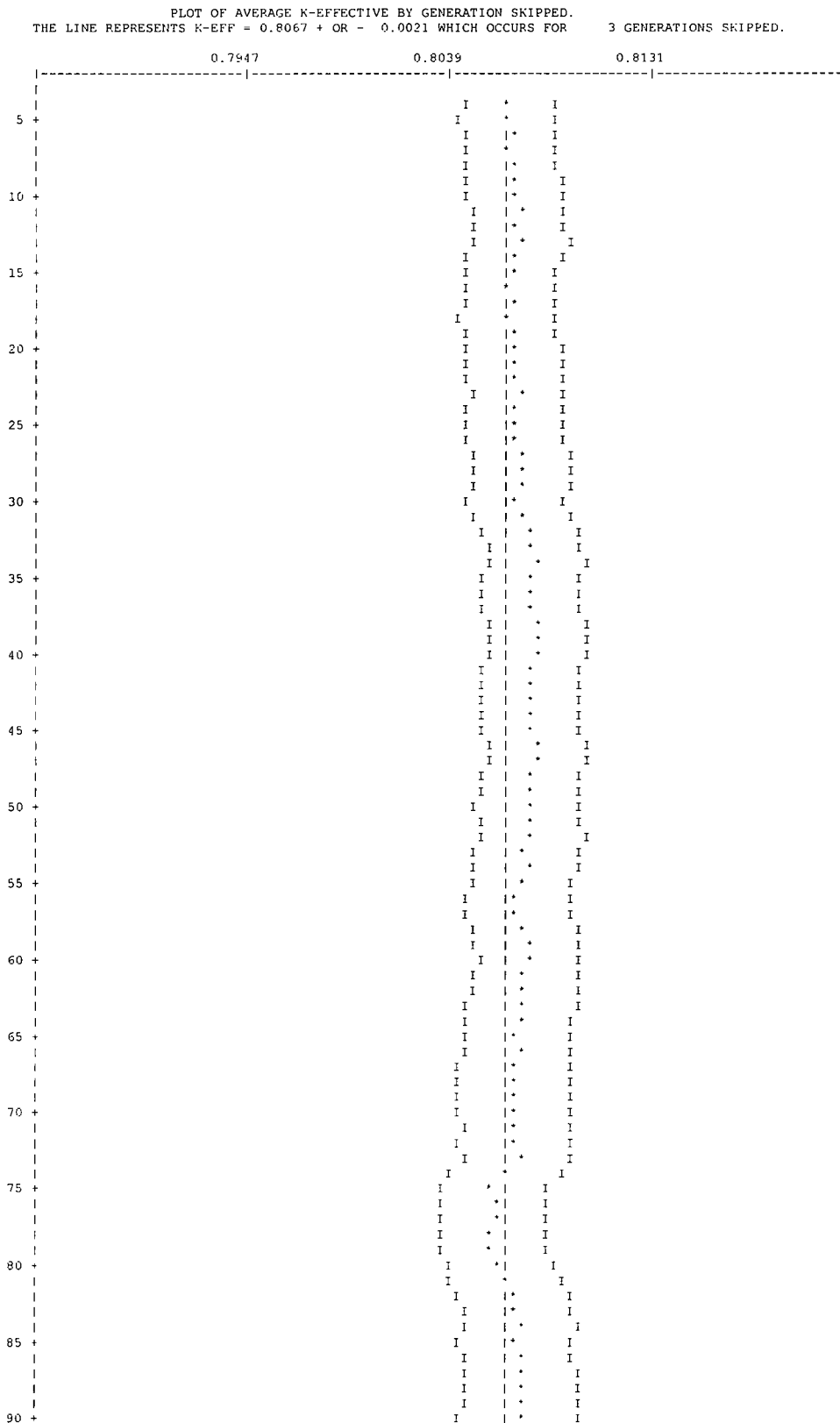
PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS  $K\text{-EFF} = 0.8067 \pm 0.0021$  WHICH OCCURS FOR 206 GENERATIONS RUN.

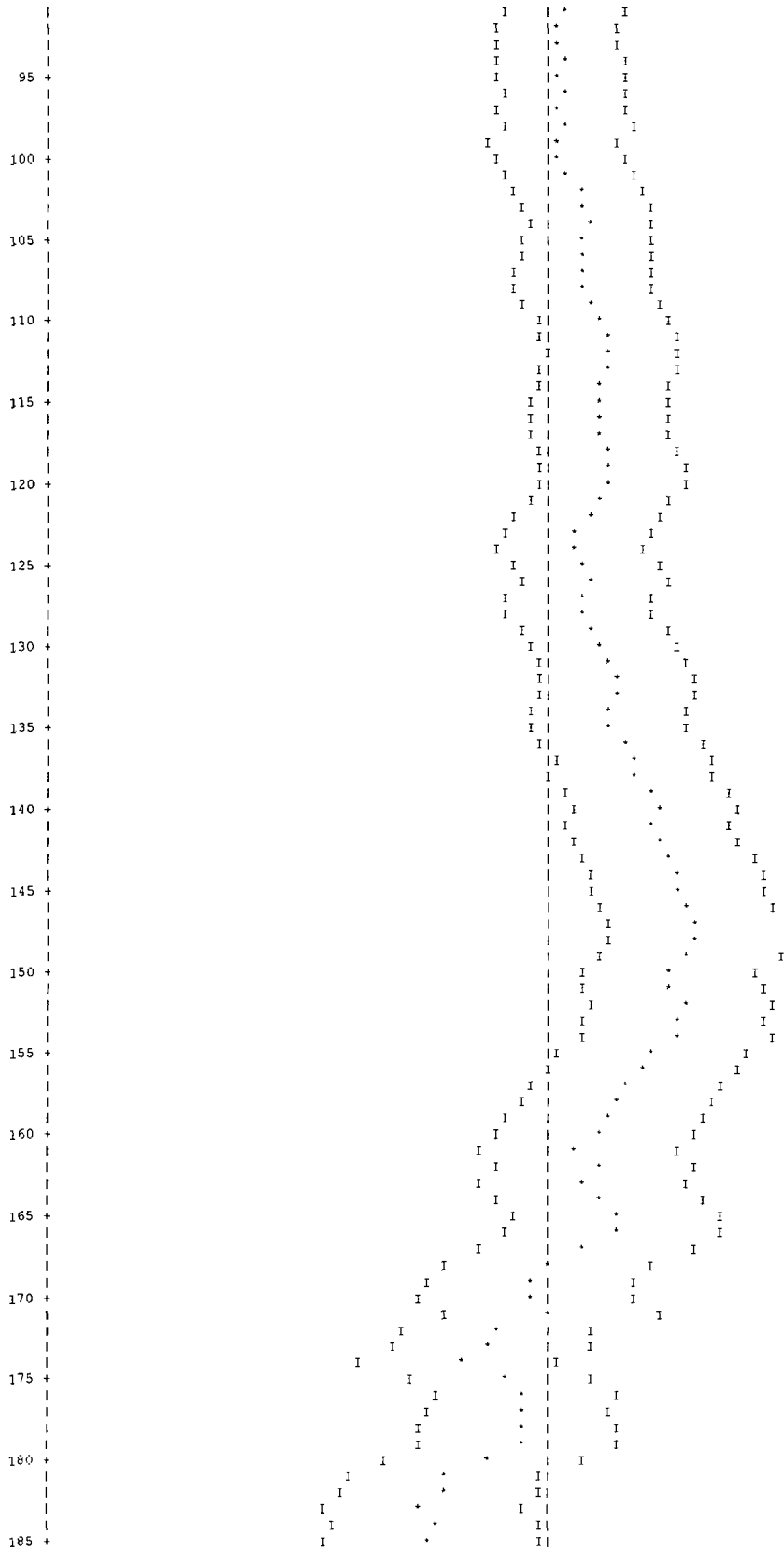


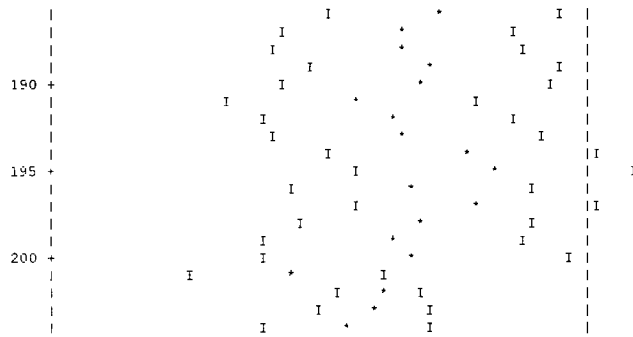


	I		^	I
	I		*	I
	I		*	I
190 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
195 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
200 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
205 +	I		*	I
	I		*	I
	I		*	I









SKIPPING 3 GENERATIONS									
GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0004			2.86476E-04	5.6263	1.52136E-03	2.1427	0.00000E+00	0.0000
2	0.0016			1.31520E-03	1.6881	3.28436E-03	0.6898	0.00000E+00	0.0000
3	0.0020			1.65180E-03	1.3890	1.02449E-03	0.9693	0.00000E+00	0.0000
4	0.0012			9.43977E-04	1.6759	5.32299E-04	1.2734	0.00000E+00	0.0000
5	0.0016			1.30055E-03	1.4876	8.62508E-04	1.0596	0.00000E+00	0.0000
6	0.0022			1.73728E-03	1.1993	1.59844E-03	0.8216	0.00000E+00	0.0000
7	0.0022			1.73932E-03	1.2733	1.82219E-03	0.7980	0.00000E+00	0.0000
8	0.0021			1.70173E-03	1.6759	1.95710E-03	1.0360	0.00000E+00	0.0000
9	0.0028			2.29548E-03	2.1818	2.68646E-03	1.1910	0.00000E+00	0.0000
10	0.0062			4.98683E-03	2.0026	5.54078E-03	1.1600	0.00000E+00	0.0000
11	0.0130			1.04472E-02	1.7934	1.01338E-02	1.2292	0.00000E+00	0.0000
12	0.0178			1.43956E-02	1.7857	1.22652E-02	1.3669	0.00000E+00	0.0000
13	0.0173			1.39667E-02	1.8845	1.47571E-02	1.3520	0.00000E+00	0.0000
14	0.0147			1.18675E-02	1.8872	1.70869E-02	1.1396	0.00000E+00	0.0000
15	0.0028			2.27686E-03	3.6085	7.05768E-03	1.3004	0.00000E+00	0.0000
16	0.0019			1.57102E-03	4.9306	4.44604E-03	1.5434	0.00000E+00	0.0000
17	0.0031			2.48854E-03	4.6242	3.13351E-03	2.2078	0.00000E+00	0.0000
18	0.0041			3.32845E-03	5.0847	3.32257E-03	2.6860	0.00000E+00	0.0000
19	0.0048			3.86190E-03	4.1248	5.22856E-03	1.7409	0.00000E+00	0.0000
20	0.0218			1.76250E-02	1.9493	2.19269E-02	1.0219	0.00000E+00	0.0000
21	0.0122			9.81387E-03	2.8332	9.93820E-03	1.4733	0.00000E+00	0.0000
22	0.0293			2.36442E-02	1.8314	2.35717E-02	0.9757	0.00000E+00	0.0000
23	0.1071			8.63764E-02	0.9656	1.02873E-01	0.4780	0.00000E+00	0.0000
24	0.2203			1.77698E-01	0.6344	2.22769E-01	0.3016	0.00000E+00	0.0000
25	0.1876			1.51351E-01	0.6628	1.94392E-01	0.2872	0.00000E+00	0.0000
26	0.2344			1.89104E-01	0.6734	2.42944E-01	0.2717	0.00000E+00	0.0000
27	0.0854			6.88912E-02	1.0923	8.53098E-02	0.5363	0.00000E+00	0.0000
SYSTEM TOTAL =				8.06665E-01	0.2567	1.00203E+00	0.0566	0.00000E+00	0.0000
ELAPSED TIME 6.70283 MINUTES									
RANDOM NUMBER= 62803D4620D2									

```
                                FREQUENCY FOR GENERATIONS 4 TO 206
0.7335 TO 0.7476  ***
0.7476 TO 0.7617  ****
0.7617 TO 0.7759  *****
0.7759 TO 0.7900  *****
0.7900 TO 0.8042  *****
0.8042 TO 0.8183  *****
0.8183 TO 0.8324  *****
0.8324 TO 0.8466  *****
0.8466 TO 0.8607  *****
0.8607 TO 0.8749  *****
0.8749 TO 0.8890  *
0.8890 TO 0.9032  *
```

```
                                FREQUENCY FOR GENERATIONS 55 TO 206
0.7335 TO 0.7476  **
0.7476 TO 0.7617  *
0.7617 TO 0.7759  *
0.7759 TO 0.7900  *
0.7900 TO 0.8042  *
0.8042 TO 0.8183  *
0.8183 TO 0.8324  *
0.8324 TO 0.8466  *
0.8466 TO 0.8607  *
0.8607 TO 0.8749  *
0.8749 TO 0.8890  *
0.8890 TO 0.9032  *
```

```
                                FREQUENCY FOR GENERATIONS 105 TO 206
0.7335 TO 0.7476  *
0.7476 TO 0.7617  *
0.7617 TO 0.7759  *
0.7759 TO 0.7900  *
0.7900 TO 0.8042  *
0.8042 TO 0.8183  *
0.8183 TO 0.8324  *
0.8324 TO 0.8466  *
0.8466 TO 0.8607  *
0.8607 TO 0.8749  *
0.8749 TO 0.8890  *
0.8890 TO 0.9032  *
```

```
                                FREQUENCY FOR GENERATIONS 156 TO 206
0.7335 TO 0.7476  *
0.7476 TO 0.7617  *
0.7617 TO 0.7759  *
0.7759 TO 0.7900  *
0.7900 TO 0.8042  *
0.8042 TO 0.8183  *
0.8183 TO 0.8324  *
0.8324 TO 0.8466  *
0.8466 TO 0.8607  *
0.8607 TO 0.8749  *
0.8749 TO 0.8890  *
0.8890 TO 0.9032  *
```

```
.....
*
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 6.70283 MINUTES
.....
.
```

Figure 6.6.3-2 CSAS Input/Output for NAC-LWT with Design Basis MTR Fuel - Most Reactive Accident Condition Configuration – 94 wt %, 355 g <sup>235</sup>U

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT HFBR DESIGN U308-AL FUEL 93 W/O U235 PLATES IN CLOSE & PLATES @ FULL PITCH
'MIN BASKET PLATE
27GROUPNDF4 LATTICECELL
URANIUM 1 DEN=3.9912 0.3000 293 92235 94. 92238 6. END
O 1 DEN=3.990 0.0542 293 END
AL 1 DEN=3.990 0.6468 293 END
AL 2 1.0 293.0 END
H2O 3 1.000 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.0E-20 293.0 END
H2O 8 1.0E-20 293.0 END
END COMP
SYMMSLABCELL 0.4572 0.053 1 3 0.127 2 END

READ PARAM RUN=YES PLT=YES RND=2 GEN=206 NPG=800 END PARAM
READ GEOM
UNIT 1
COM='AL PLATE CELL'
CUBOID 2 1 2P3.1250 2P0.127 2P10.0
UNIT 2
COM='HFBR FUEL PLATE CELL 1'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 2P0.2286 2P10.0
UNIT 3
COM='HFBR FUEL PLATE CELL 2'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 2P0.2286 2P10.0
UNIT 4
COM='HFBR FUEL PLATE CELL 3'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 2P0.2286 2P10.0
UNIT 5
COM='HFBR FUEL PLATE CELL 4'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 2P0.2286 2P10.0
UNIT 6
COM='HFBR FUEL PLATE CELL 5'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 2P0.2286 2P10.0
UNIT 7
COM='HFBR FUEL PLATE CELL 6'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 2P0.2286 2P10.0
UNIT 8
COM='HFBR FUEL PLATE CELL 7'
CUBOID 1 1 2P2.8600 2P0.0265 2P10.0
CUBOID 2 1 2P3.1250 2P0.0635 2P10.0
CUBOID 3 1 2P3.1250 2P0.2286 2P10.0
UNIT 81
CUBOID 2 1 2P0.2375 2P4.1 2P10.0
UNIT 83
CUBOID 2 1 2P0.2375 2P4.1 2P10.0
UNIT 90
COM='HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB CENTER'
ARRAY 1 -3.1250 -4.3688 -10.0
CUBOID 3 1 2P4.3688 2P4.3688 2P10.0
HOLE 81 -4.1312 0.0 0.0
HOLE 83 4.1312 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 91
COM='HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT'
ARRAY 1 -3.8935 -4.3688 -10.0
CUBOID 3 1 2P4.3688 2P4.3688 2P10.0
HOLE 81 -4.1312 0.0 0.0
HOLE 83 4.1312 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 92
COM='HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT'
ARRAY 1 -2.3565 -4.3688 -10.0
CUBOID 3 1 2P4.3688 2P4.3688 2P10.0
HOLE 81 -4.1312 0.0 0.0
HOLE 83 4.1312 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 10
COM='HFBR FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK'
ARRAY 1 -2.3565 -4.3688 -10.0
CUBOID 3 1 2P4.3688 2P4.3688 2P10.0
HOLE 81 -4.1312 0.0 0.0
HOLE 83 4.1312 0.0 0.0
```

```
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 101
COM='HFBR FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
ARRAY 1 -2.3565 -4.3688 -10.0
CUBOID 3 1 2P4.3688 2P4.3688 2P10.0
HOLE 81 -4.1312 0.0 0.0
HOLE 83 4.1312 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 11
COM='HFBR FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK'
ARRAY 1 -3.8935 -4.3688 -10.0
CUBOID 3 1 2P4.3688 2P4.3688 2P10.0
HOLE 81 -4.1312 0.0 0.0
HOLE 83 4.1312 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
UNIT 111
COM='HFBR FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 1 -3.8935 -4.3688 -10.0
CUBOID 3 1 2P4.3688 2P4.3688 2P10.0
HOLE 81 -4.1312 0.0 0.0
HOLE 83 4.1312 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
UNIT 12
COM='2 UNIT ARRAY WITH 0.120 IN. PLATE ON TOP AND SIDES'
ARRAY 2 -9.0428 -4.3688 -10.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 13
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 3 -14.1738 -4.3688 -10.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 14
COM='2 UNIT ARRAY WITH 0.120 IN. PLATE ON BOTTOM and SIDES'
ARRAY 4 -9.0428 -4.3688 -10.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
GLOBAL UNIT 15
COM='7 HFBR ASSEMBLIES IN THE LWT'
CYLINDER 3 1 17.0500 2P10.0
HOLE 12 0.0 +9.4489 0.0
HOLE 13 0.0 0.0 0.0
HOLE 14 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 2P10.0
CYLINDER 6 1 33.4963 2P10.0
CYLINDER 5 1 36.5443 2P10.0
CYLINDER 8 1 49.2443 2P10.0
CYLINDER 5 1 49.85390 2P10.0
CUBOID 7 1 4P49.85390 2P10.0
END GEOM
READ ARRAY
APA=1 NUX=1 NUY=00 NUZ=1 FILL 1 8 7 6 1CR5 4 3 2 1 END FILL
ARA=2 NUX=2 NUY=1 NUZ=1 FILL 10 11 END FILL
ARA=3 NUX=3 NUY=1 NUZ=1 FILL 92 90 91 END FILL
ARA=4 NUX=2 NUY=1 NUZ=1 FILL 101 111 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
READ PLOT
TTL='X-Y PLOT OF ASSEMBLY'
NCH=' FCWASPN'
UAX=1.0 VDN=-1.0 NAX=130
XUL=-5.0 YUL=5.0 ZUL=0.0
XLR=5.0 YLR=-5.0 ZLR=0.0 END
TTL='X-Y PLOT OF CASK'
UAX=1.0 VDN=-1.0 NAX=130
XUL=-65.0 YUL=65.0 ZUL=0.0
XLR=65.0 YLR=-65.0 ZLR=0.0 END
TTL='X-Y PLOT OF BASKET'
UAX=1.0 VDN=-1.0 NAX=130
XUL=-17.0 YUL=17.0 ZUL=0.0
XLR=17.0 YLR=-17.0 ZLR=0.0 END
TTL='X-Z PLOT OF BASKET'
VAX=1.0 WDH=-1.0
XUL=0.0 YUL=-5.0 ZUL=10.0
XLR=0.0 YLR=5.0 ZLR=-10.0
END PLOT
END DATA
```

SECONDARY MODULE 000008 HAS BEEN CALLED.

```

CCCCCCCCC      SSSSSSSSSS      AAAAAAAAAA      SSSSSSSSSS      2222222222      555555555555
CCCCCCCCCCCCC  SSSSSSSSSSSS  AAAAAAAAAAAA  SSSSSSSSSSSS  222222222222  5555555555555
CC      CC      SS      SS      AA      AA      SS      SS      22      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SSSSSSSSSS  AAAAAAAAAAAA  SSSSSSSSSS      22      555555555555
CC      SSSSSSSSSS  AAAAAAAAAAAA  SSSSSSSSSS      22      555555555555
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      CC      SS      SS      AA      AA      SS      SS      22      55      55
CCCCCCCCCCCCC  SSSSSSSSSSSS  AA      AA      SSSSSSSSSSSS  22222222222222  55555555555555
CCCCCCCCCCCCC  SSSSSSSSSSSS  AA      AA      SSSSSSSSSSSS  22222222222222  555555555555
    
```

```

SSSSSSSSSSS  CCCCCCCCCC      AAAAAAAAAA      LL      EEEEEEEEEEEE      FPPPPPPPPPP      CCCCCCCCCC
SSSSSSSSSSS  CCCCCCCCCCCCCC  AAAAAAAAAAAA  LL      EEEEEEEEEEEE      FPPPPPPPPPPPP  CCCCCCCCCCCCCC
SS      SS      CC      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC
SSSSSSSSSSS  CC      AAAAAAAAAAAA  LL      EEEEEEEEE      -----  FPPPPPPPPPPPP  CC
SSSSSSSSSSS  CC      AAAAAAAAAAAA  LL      EEEEEEEEE      -----  FPPPPPPPPPPPP  CC
SS      SS      CC      AA      LL      EE      PP      CC
SS      SS      CC      AA      LL      EE      PP      CC
SS      SS      CC      AA      LL      EE      PP      CC
SSSSSSSSSSS  CCCCCCCCCCCCCC  AA      AA      LLLLLLLLLLLL  EEEEEEEEEEEE      PP      CCCCCCCCCCCCCC
SSSSSSSSSSS  CCCCCCCCCC      AA      AA      LLLLLLLLLLLL  EEEEEEEEEEEE      PP      CCCCCCCCCC
    
```

```

0000000      777777777777      //      0000000      2222222222      //      9999999999      8888888888
000000000    777777777777      //      000000000    222222222222  //      999999999999  888888888888
00      00      77      //      00      00      22      //      99      99      88      88
00      00      77      //      00      00      22      //      99      99      88      88
00      00      77      //      00      00      22      //      99      99      88      88
00      00      77      //      00      00      22      //      999999999999  888888888888
00      00      77      //      00      00      22      //      999999999999  888888888888
00      00      77      //      00      00      22      //      99      99      88      88
00      00      77      //      00      00      22      //      99      99      88      88
00      00      77      //      00      00      22      //      99      99      88      88
000000000    77      //      000000000    222222222222  //      999999999999  888888888888
0000000      77      //      0000000      222222222222  //      999999999999  888888888888
    
```

```

11      44      44      777777777777      44      2222222222
111      444      777777777777      444      222222222222
1111      4444      77      77      4444      22      22
11      44 44      :::      44 44      77      44 44      22
11      44 44      :::      44 44      77      44 44      22
11      44 44      :::      44 44      77      44 44      22
11      44 44      :::      44 44      77      44 44      22
11      444444444444      :::      444444444444      77      444444444444      22
11      444444444444      :::      444444444444      77      444444444444      22
11      44      :::      44      77      44      22
11111111      44      44      77      44      22222222222222
11111111      44      44      77      44      22222222222222
    
```





NAC-LWT Cask SAR  
Revision 43

January 2015

LWT HFBR DESIGN U308-AL FUEL 93 W/O U235 PLATES IN CLOSE & PLATES @ FULL PITCH

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
MX 8 MIXTURES  
MSC 10 COMPOSITION SPECIFICATIONS  
LZM 3 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC URANIUM STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.3000 VOLUME FRACTION  
ROTH 3.9912 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 94.000 WT%  
92238 6.000 WT%

END

SC O STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.0542 VOLUME FRACTION  
ROTH 3.9900 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
8016 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.6468 VOLUME FRACTION  
ROTH 3.9900 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC SS304 STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

END

SC PB STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION

ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

CTP SYMMSLABCELL CELL TYPE  
PITCH 0.4572 CM CENTER TO CENTER SPACING  
FUELCD 0.0530 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 3 MIXTURE NO. OF MODERATOR  
CLADGD 0.1270 CM CLAD OUTER DIAMETER  
MCLAD 2 MIXTURE NO. OF CLAD

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL  
ZONE 2 IS CLAD  
ZONE 3 IS MOD

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***
***                               LWT HFBR DESIGN U308-AL FUEL 93 W/O U235 PLATES IN CLOSE & PLATES @ FULL PITCH
***
.....
***                               ***** DATA LIBRARY INFORMATION *****
***
***                               UNIT NUMBER          DATA SET NAME          VOLUME          UNIT FUNCTION
***                               -----          -
***                               89          G:\scale43\DATA LIB\FT89F001          STANDARD COMPOSITION LIBRARY
***                               82          G:\scale43\DATA LIB\FT82F001          CROSS SECTION LIBRARY
***                               11          G:\SHARED\cx1\mtr35\hacx1m_94_355\FT11F001          SHORT CROSS SECTION LIBRARY
***                               90          G:\SHARED\cx1\mtr35\hacx1m_94_355\FT90F001          INPUT DATA DIRECT ACCESS
***
.....
***
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER : 89
***
***                               DATASET NAME : G:\scale43\DATA LIB\FT89F001
***
***                               LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
***                               637 STANDARD COMPOSITIONS, 490 NUCLIDES
***                               90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***                               CREATION DATE: 6/30/95
***
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER : 82
***
***                               DATASET NAME : G:\scale43\DATA LIB\FT82F001
***
***                               LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***                               BASED ON ENDF-B VERSION 4 DATA
***                               COMPILED FOR NRC 1/27/89
***                               LAST UPDATED 08/12/94
***                               L.M.PETRIE - ORNL
***
***
.....

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KK      FK  EEEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEEE  NNN     NN  000000000000    VV      VV
KK      KK  EE             NNNN    NN  00      00    VV      VV
KK      KK  EE             NN  NN   NN  00      00    VV      VV
KK      KK  EE             NN  NN   NN  00      00    VV      VV
KKKKKKK  EEEEEEEEEEEE  NN  NN   NN  00      00    -----  VV      VV
KKKKKKK  EEEEEEEEEEEE  NN  NN   NN  00      00    -----  VV      VV
KK      KK  EE             NN  NN   NN  00      00    VV      VV
KK      KK  EE             NN  NN   NN  00      00    VV      VV
KK      KK  EE             NN  NN   NN  00      00    VV      VV
KK      KK  EEEEEEEEEEEE  NN      NN  000000000000    VVV     VV
KK      KK  EEEEEEEEEEEE  NN      NN  0000000000      V

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SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SSSSSSSSSS  CC      AA      AA  LL      EE             PPPPPPPPPP  CC
SSSSSSSSSS  CC      AA      AA  LL      EE             PPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE             PP      CC
SS      SS  CC      AA      AA  LL      EE             PP      CC
SS      SS  CC      AA      AA  LL      EE             PP      CC      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC

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```

0000000  7777777777  //      0000000  2222222222  //      9999999999  8888888888
00000000  7777777777  //      00000000  222222222222  //      999999999999  888888888888
00      00  77      77  //      00      00  22      22  //      99      99  88      88
00      00  77      77  //      00      00  22      22  //      99      99  88      88
00      00  77      77  //      00      00  22      22  //      99      99  88      88
00      00  77      77  //      00      00  22      22  //      999999999999  888888888888
00      00  77      77  //      00      00  22      22  //      999999999999  888888888888
00      00  77      77  //      00      00  22      22  //      99      99  88      88
00      00  77      77  //      00      00  22      22  //      99      99  88      88
00000000  77      //      00000000  222222222222  //      999999999999  888888888888
0000000  77      //      0000000  222222222222  //      999999999999  888888888888

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11      44      44      777777777777  555555555555  3333333333
111     444     444     777777777777  555555555555  333333333333
1111    4444    4444    77      77      :::  77      77      :::  55      55      33
11      44 44    :::  44 44    77      77      :::  55      55      33
11      44 44    :::  44 44    77      77      :::  55      55      33
11      44 44    :::  44 44    77      77      :::  555555555555  333
11      44 44    :::  44 44    77      77      :::  555555555555  333
11      444444444444  :::  444444444444  77      77      :::  55      55      33
11      444444444444  :::  444444444444  77      77      :::  55      55      33
11      44      44      77      77      :::  55      55      33      33
11111111  44      44      77      77      :::  555555555555  333333333333
11111111  44      44      77      77      :::  555555555555  333333333333

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.....
***
***
*****          NUMERIC PARAMETERS          *****
***
***          TME          MAXIMUM PROBLEM TIME (MIN)          30.00          ***
***          TBA          TIME PER GENERATION (MIN)          0.50          ***
***          GEN          NUMBER OF GENERATIONS          206          ***
***          NPG          NUMBER PER GENERATION          800          ***
***          HSK          NUMBER OF GENERATIONS TO BE SKIPPED          3          ***
***          BEG          BEGINNING GENERATION NUMBER          1          ***
***          RES          GENERATIONS BETWEEN CHECKPOINTS          0          ***
***          X1D          NUMBER OF EXTRA 1-D CROSS SECTIONS          1          ***
***          NBK          NEUTRON BANK SIZE          825          ***
***          XNB          EXTRA POSITIONS IN NEUTRON BANK          0          ***
***          NFB          FISSION BANK SIZE          800          ***
***          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          2          ***
***          HB8          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          ***
.....
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MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD =3.0E-05

MIXTURE =	1	DENSITY (G/CC) =	3.9943			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94	1008016	8.14438E-03	5.41402E-02	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94	1013027	5.76000E-02	6.46096E-01	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED
08/12/94	1092235	2.88373E-03	2.81778E-01	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261
08/12/94	1092238	1.81743E-04	1.79858E-02	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262
08/12/94							UPDATED
MIXTURE =	2	DENSITY (G/CC) =	2.7020			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94	2013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED
MIXTURE =	3	DENSITY (G/CC) =	0.99817			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94	3001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94	3008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94							UPDATED
MIXTURE =	4	DENSITY (G/CC) =	2.7020			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94	4013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED
MIXTURE =	5	DENSITY (G/CC) =	7.9200			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94	5024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED
08/12/94	5025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197
08/12/94	5026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED
08/12/94	5028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED
08/12/94							UPDATED
MIXTURE =	6	DENSITY (G/CC) =	11.344			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94	6082000	3.29690E-02	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K	UPDATED
08/12/94							UPDATED
MIXTURE =	7	DENSITY (G/CC) =	0.99817E-20			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94	7001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94	7008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94							UPDATED
MIXTURE =	8	DENSITY (G/CC) =	0.99817E-20			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94	8001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94	8008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94							UPDATED

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      3 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      7 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      8 WERE CORRECTED FOR BAD MOMENTS.

..... 0 IO'S WERE USED MIXING CROSS-SECTIONS .....

1-D CROSS SECTION ARRAY ID NUMBERS  
 1 2002 1452 27 18 1018

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.....  
***  
***  
.....  
***** ADDITIONAL INFORMATION *****  
***  
*** NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          YES ***  
***  
*** 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 24      NUMBER OF UNITS IN THE GLOBAL Y DIR.  0 ***  
***  
*** ENTRIES/NEUTRON IN THE FISSION BANK 17      NUMBER OF UNITS IN THE GLOBAL Z DIR.  0 ***  
***  
*** NUMBER OF MIXTURES USED              7      USE A GLOBAL REFLECTOR        YES ***  
***  
*** NUMBER OF BIAS ID'S USED             1      USE NESTED HOLES              YES ***  
***  
*** NUMBER OF DIFFERENTIAL ALBEDOS USED  0      NUMBER OF HOLES                17 ***  
***  
*** TOTAL INPUT GEOMETRY REGIONS         58      MAXIMUM HOLE NESTING LEVEL     2 ***  
***  
*** NUMBER OF GEOMETRY REGIONS USED      58      USE NESTED ARRAYS             YES ***  
***  
*** LARGEST GEOMETRY UNIT NUMBER         111     NUMBER OF ARRAYS USED          4 ***  
***  
*** LARGEST ARRAY NUMBER                  4      MAXIMUM ARRAY NESTING LEVEL    2 ***  
***  
***  
*** +X BOUNDARY CONDITION                 MIR     -X BOUNDARY CONDITION          MIR ***  
***  
*** +Y BOUNDARY CONDITION                 MIR     -Y BOUNDARY CONDITION          MIR ***  
***  
*** +Z BOUNDARY CONDITION                 MIR     -Z BOUNDARY CONDITION          MIR ***  
***  
.....
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***
***
***
***** SPACE AND SUPERGROUP INFORMATION *****
***
100000 WORDS IS THE TOTAL SPACE AVAILABLE.
***
37327 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
***
62673 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
***
99750 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
***
62613 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
***
958 WORDS ARE NEEDED FOR THE LARGEST GROUP.
***
38501 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
***
48151 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
***
48288 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.
***
.....
***
SUPERGROUP      STARTING      ENDING      XSEC      ALBEDO      TOTAL
***              GROUP        GROUP        LENGTH    LENGTH      LENGTH
***
          1          1          27          2124          0          10764
***
.....

```

..... 0 IO'S WERE USED IN SUPERGROUPING .....

```

.....
**
** ARPAY      UNITS IN   UNITS IN   UNITS IN   NESTING
** NUMBER     X DIR.    Y DIR.    Z DIR.    LEVEL
**
** 1          1          20         1          2
**
** 2          2          1          1          1
**
** 3          3          1          1          1
**
** 4          2          1          1          1
**
.....

```

..... 0 IO'S WERE USED LOADING THE DATA .....

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			----- UNIT 1 -----					
AL PLATE CELL								
1	CUBOID	2 1	+X = 3.1250	-X = -3.1250	+Y = 0.12700	-Y = -0.12700	+Z = 10.000	-Z = -10.000
			----- UNIT 2 -----					
HFBR FUEL PLATE CELL 1								
1	CUBOID	1 1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2	CUBOID	2 1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3	CUBOID	3 1	+X = 3.1250	-X = -3.1250	+Y = 0.22860	-Y = -0.22860	+Z = 10.000	-Z = -10.000
			----- UNIT 3 -----					
HFBR FUEL PLATE CELL 2								
1	CUBOID	1 1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2	CUBOID	2 1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3	CUBOID	3 1	+X = 3.1250	-X = -3.1250	+Y = 0.22860	-Y = -0.22860	+Z = 10.000	-Z = -10.000
			----- UNIT 4 -----					
HFBR FUEL PLATE CELL 3								
1	CUBOID	1 1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2	CUBOID	2 1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3	CUBOID	3 1	+X = 3.1250	-X = -3.1250	+Y = 0.22860	-Y = -0.22860	+Z = 10.000	-Z = -10.000
			----- UNIT 5 -----					
HFBR FUEL PLATE CELL 4								
1	CUBOID	1 1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2	CUBOID	2 1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3	CUBOID	3 1	+X = 3.1250	-X = -3.1250	+Y = 0.22860	-Y = -0.22860	+Z = 10.000	-Z = -10.000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			----- UNIT 6 -----					
			HFBR FUEL PLATE CELL 5					
1 CUBOID	1	1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2 CUBOID	2	1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3 CUBOID	3	1	+X = 3.1250	-X = -3.1250	+Y = 0.22860	-Y = -0.22860	+Z = 10.000	-Z = -10.000
			----- UNIT 7 -----					
			HFBR FUEL PLATE CELL 6					
1 CUBOID	1	1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2 CUBOID	2	1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3 CUBOID	3	1	+X = 3.1250	-X = -3.1250	+Y = 0.22860	-Y = -0.22860	+Z = 10.000	-Z = -10.000
			----- UNIT 8 -----					
			HFBR FUEL PLATE CELL 7					
1 CUBOID	1	1	+X = 2.8600	-X = -2.8600	+Y = 2.65000E-02	-Y = -2.65000E-02	+Z = 10.000	-Z = -10.000
2 CUBOID	2	1	+X = 3.1250	-X = -3.1250	+Y = 6.35000E-02	-Y = -6.35000E-02	+Z = 10.000	-Z = -10.000
3 CUBOID	3	1	+X = 3.1250	-X = -3.1250	+Y = 0.22860	-Y = -0.22860	+Z = 10.000	-Z = -10.000
			----- UNIT 10 EXTERNAL TO LATTICE 1 -----					
			HFBR FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK					
1 ARRAY NUMBER	1		+X = 3.8935	-X = -2.3565	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2 CUBOID	3	1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
HOLE NUMBER	7		AT X = -4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	81	
HOLE NUMBER	8		AT X = 4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	83	
3 CUBOID	5	1	+X = 4.6736	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			-----	UNIT	11	EXTERNAL TO LATTICE	1	-----
HFBR FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK								
1	ARRAY NUMBER	1	+X = 2.3565	-X = -3.8935	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
	HOLE NUMBER	11	AT X = -4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	81	
	HOLE NUMBER	12	AT X = 4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	83	
3	CUBOID	5 1	+X = 4.3688	-X = -4.6736	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
			-----	UNIT	12	EXTERNAL TO LATTICE	2	-----
2 UNIT ARRAY WITH 0.120 IN. PLATE ON TOP AND SIDES								
1	ARRAY NUMBER	2	+X = 9.0420	-X = -9.0428	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2	CUBOID	5 1	+X = 9.3468	-X = -9.3476	+Y = 4.6736	-Y = -4.3688	+Z = 10.000	-Z = -10.000
			-----	UNIT	13	EXTERNAL TO LATTICE	3	-----
3 UNIT ARRAY WITH REST OF 5/16 WEB								
1	ARRAY NUMBER	3	+X = 14.173	-X = -14.174	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2	CUBOID	5 1	+X = 14.528	-X = -14.529	+Y = 5.0800	-Y = -5.0800	+Z = 10.000	-Z = -10.000
			-----	UNIT	14	EXTERNAL TO LATTICE	4	-----
2 UNIT ARRAY WITH 0.120 IN. PLATE ON BOTTOM AND SIDES								
1	ARRAY NUMBER	4	+X = 9.0420	-X = -9.0428	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2	CUBOID	5 1	+X = 9.3468	-X = -9.3476	+Y = 4.3688	-Y = -4.6736	+Z = 10.000	-Z = -10.000

```

REGION          MEDIA BIAS          GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM
                NUM    ID

                ***** GLOBAL *****
                ----- UNIT    15 -----

7 HFBR ASSEMBLIES IN THE LWT

1 CYLINDER      3 1 RADIUS = 17.050  +Z = 10.000  -Z = -10.000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  HOLE NUMBER   15   AT X = 0.00000  Y = 9.4489   Z = 0.00000  IS UNIT NUMBER 12
  HOLE NUMBER   16   AT X = 0.00000  Y = 0.00000  Z = 0.00000  IS UNIT NUMBER 13
  HOLE NUMBER   17   AT X = 0.00000  Y = -9.4489  Z = 0.00000  IS UNIT NUMBER 14

2 CYLINDER      5 1 RADIUS = 18.891  +Z = 10.000  -Z = -10.000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
3 CYLINDER      6 1 RADIUS = 33.496  +Z = 10.000  -Z = -10.000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
4 CYLINDER      5 1 RADIUS = 36.544  +Z = 10.000  -Z = -10.000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
5 CYLINDER      8 1 RADIUS = 49.244  +Z = 10.000  -Z = -10.000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
6 CYLINDER      5 1 RADIUS = 49.854  +Z = 10.000  -Z = -10.000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
7 CUBOID        7 1  +X = 49.854  -X = -49.854  +Y = 49.854  -Y = -49.854  +Z = 10.000  -Z = -10.000

                ----- UNIT    81 -----

1 CUBOID        2 1  +X = 0.23750  -X = -0.23750  +Y = 4.1000  -Y = -4.1000  +Z = 10.000  -Z = -10.000

                ----- UNIT    83 -----

1 CUBOID        2 1  +X = 0.23750  -X = -0.23750  +Y = 4.1000  -Y = -4.1000  +Z = 10.000  -Z = -10.000

                ----- UNIT    90 EXTERNAL TO LATTICE 1 -----

HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB CENTER

1 ARRAY NUMBER  1  +X = 3.1250  -X = -3.1250  +Y = 4.3688  -Y = -4.3688  +Z = 10.000  -Z = -10.000
2 CUBOID        3 1  +X = 4.3688  -X = -4.3688  +Y = 4.3688  -Y = -4.3688  +Z = 10.000  -Z = -10.000
  HOLE NUMBER   1  AT X = -4.1312  Y = 0.00000  Z = 0.00000  IS UNIT NUMBER 81
  HOLE NUMBER   2  AT X = 4.1312  Y = 0.00000  Z = 0.00000  IS UNIT NUMBER 83
3 CUBOID        5 1  +X = 4.7244  -X = -4.7244  +Y = 4.3688  -Y = -4.3688  +Z = 10.000  -Z = -10.000

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REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			-----	UNIT	91	EXTERNAL TO LATTICE	1	-----
HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT								
1	ARRAY NUMBER	1	+X = 2.3565	-X = -3.8935	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
	HOLE NUMBER	3	AT X = -4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	81	
	HOLE NUMBER	4	AT X = 4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	83	
3	CUBOID	5 1	+X = 4.7244	-X = -4.7244	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
			-----	UNIT	92	EXTERNAL TO LATTICE	1	-----
HFBR FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT								
1	ARRAY NUMBER	1	+X = 3.8935	-X = -2.3565	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
	HOLE NUMBER	5	AT X = -4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	81	
	HOLE NUMBER	6	AT X = 4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	83	
3	CUBOID	5 1	+X = 4.7244	-X = -4.7244	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
			-----	UNIT	101	EXTERNAL TO LATTICE	1	-----
HFBR FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK								
1	ARRAY NUMBER	1	+X = 3.8935	-X = -2.3565	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
	HOLE NUMBER	9	AT X = -4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	81	
	HOLE NUMBER	10	AT X = 4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	83	
3	CUBOID	5 1	+X = 4.6736	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
			-----	UNIT	111	EXTERNAL TO LATTICE	1	-----
HFBR FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK								
1	ARRAY NUMBER	1	+X = 2.3565	-X = -3.8935	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000
	HOLE NUMBER	13	AT X = -4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	81	
	HOLE NUMBER	14	AT X = 4.1312	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	83	
3	CUBOID	5 1	+X = 4.3688	-X = -4.6736	+Y = 4.3688	-Y = -4.3688	+Z = 10.000	-Z = -10.000



VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	3.17500E+01 CM**3	3.17500E+01 CM**3
2	1	2	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	3	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	4	4.12750E+01 CM**3	5.71500E+01 CM**3
3	1	5	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	6	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	7	4.12750E+01 CM**3	5.71500E+01 CM**3
4	1	8	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	9	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	10	4.12750E+01 CM**3	5.71500E+01 CM**3
5	1	11	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	12	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	13	4.12750E+01 CM**3	5.71500E+01 CM**3
6	1	14	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	15	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	16	4.12750E+01 CM**3	5.71500E+01 CM**3
7	1	17	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	18	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	19	4.12750E+01 CM**3	5.71500E+01 CM**3
8	1	20	6.06320E+00 CM**3	6.06320E+00 CM**3
	2	21	9.81180E+00 CM**3	1.58750E+01 CM**3
	3	22	4.12750E+01 CM**3	5.71500E+01 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 34 IS AN ARRAY PLACEMENT BOUNDARY REGION				
10	1	34	1.09220E+03 CM**3	1.09220E+03 CM**3
	2	35	2.78913E+02 CM**3	1.52691E+03 CM**3
	3	36	5.32644E+01 CM**3	1.58018E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 40 IS AN ARRAY PLACEMENT BOUNDARY REGION				
11	1	40	1.09220E+03 CM**3	1.09220E+03 CM**3
	2	41	2.78913E+02 CM**3	1.52691E+03 CM**3
	3	42	5.32644E+01 CM**3	1.58018E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 46 IS AN ARRAY PLACEMENT BOUNDARY REGION				
12	1	46	3.16036E+03 CM**3	3.16036E+03 CM**3
	2	47	2.20490E+02 CM**3	3.38085E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 48 IS AN ARRAY PLACEMENT BOUNDARY REGION				
13	1	48	4.95359E+03 CM**3	4.95359E+03 CM**3
	2	49	9.50914E+02 CM**3	5.90450E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 50 IS AN ARRAY PLACEMENT BOUNDARY REGION				
14	1	50	3.16036E+03 CM**3	3.16036E+03 CM**3
	2	51	2.20490E+02 CM**3	3.38085E+03 CM**3
15	1	52	5.59918E+03 CM**3	1.82654E+04 CM**3
	2	53	4.15813E+03 CM**3	2.24235E+04 CM**3
	3	54	4.80740E+04 CM**3	7.04975E+04 CM**3
	4	55	1.34136E+04 CM**3	8.39110E+04 CM**3
	5	56	6.84563E+04 CM**3	1.52367E+05 CM**3
	6	57	3.79567E+03 CM**3	1.56163E+05 CM**3
	7	58	4.26699E+04 CM**3	1.98833E+05 CM**3
81	1	23	7.79000E+01 CM**3	7.79000E+01 CM**3
83	1	24	7.79000E+01 CM**3	7.79000E+01 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 25 IS AN ARRAY PLACEMENT BOUNDARY REGION				
90	1	25	1.09220E+03 CM**3	1.09220E+03 CM**3
	2	26	2.78913E+02 CM**3	1.52691E+03 CM**3
	3	27	1.24284E+02 CM**3	1.65120E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 28 IS AN ARRAY PLACEMENT BOUNDARY REGION				
91	1	28	1.09220E+03 CM**3	1.09220E+03 CM**3
	2	29	2.78913E+02 CM**3	1.52691E+03 CM**3
	3	30	1.24284E+02 CM**3	1.65120E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 31 IS AN ARRAY PLACEMENT BOUNDARY REGION				
92	1	31	1.09220E+03 CM**3	1.09220E+03 CM**3
	2	32	2.78913E+02 CM**3	1.52691E+03 CM**3
	3	33	1.24284E+02 CM**3	1.65120E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 37 IS AN ARRAY PLACEMENT BOUNDARY REGION				
101	1	37	1.09220E+03 CM**3	1.09220E+03 CM**3
	2	38	2.78913E+02 CM**3	1.52691E+03 CM**3
	3	39	5.32644E+01 CM**3	1.58018E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 43 IS AN ARRAY PLACEMENT BOUNDARY REGION				

111	1	43	1.09220E+03 CM**3	1.09220E+03 CM**3
	2	44	2.78913E+02 CM**3	1.52691E+03 CM**3
	3	45	5.32644E+01 CM**3	1.58018E+03 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	14	1	2	4.44500E+02 CM**3
2	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.88925E+02 CM**3
3	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.88925E+02 CM**3
4	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.88925E+02 CM**3
5	84	1	1	5.09309E+02 CM**3
		2	2	8.24191E+02 CM**3
		3	3	3.46710E+03 CM**3
6	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.88925E+02 CM**3
7	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.88925E+02 CM**3
8	7	1	1	4.24424E+01 CM**3
		2	2	6.86826E+01 CM**3
		3	3	2.88925E+02 CM**3
10	1	1	1	1.09220E+03 CM**3
		2	3	2.78913E+02 CM**3
		3	5	5.32644E+01 CM**3
11	1	1	1	1.09220E+03 CM**3
		2	3	2.78913E+02 CM**3
		3	5	5.32644E+01 CM**3
12	1	1	1	3.16036E+03 CM**3
		2	5	2.20490E+02 CM**3
13	1	1	1	4.95359E+03 CM**3
		2	5	9.50914E+02 CM**3
14	1	1	1	3.16036E+03 CM**3
		2	5	2.20490E+02 CM**3
15	1	1	3	5.59918E+03 CM**3
		2	5	4.15813E+03 CM**3
		3	6	4.80740E+04 CM**3
		4	5	1.34136E+04 CM**3
		5	8	6.84563E+04 CM**3
		6	5	3.79567E+03 CM**3
		7	7	4.26699E+04 CM**3
81	7	1	2	5.45300E+02 CM**3
93	7	1	2	5.45300E+02 CM**3
90	1	1	1	1.09220E+03 CM**3
		2	3	2.78913E+02 CM**3
		3	5	1.24284E+02 CM**3
91	1	1	1	1.09220E+03 CM**3
		2	3	2.78913E+02 CM**3
		3	5	1.24284E+02 CM**3
92	1	1	1	1.09220E+03 CM**3
		2	3	2.78913E+02 CM**3
		3	5	1.24284E+02 CM**3
101	1	1	1	1.09220E+03 CM**3
		2	3	2.78913E+02 CM**3
		3	5	5.32644E+01 CM**3
111	1	1	1	1.09220E+03 CM**3
		2	3	2.78913E+02 CM**3
		3	5	5.32644E+01 CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	7.63963E+02 CM**3	3.05153E+03
2	2.77139E+03 CM**3	7.48828E+03
3	1.27522E+04 CM**3	1.27289E+04
5	2.33452E+04 CM**3	1.84894E+05
6	4.80740E+04 CM**3	5.45351E+05
7	4.26699E+04 CM**3	4.25919E+16
8	6.84563E+04 CM**3	6.83311E-16

.....  
...  
... 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 .....

..... 0.02017 MINUTES WERE USED PROCESSING DATA. ....

VOLUME FRACTION OF FISSIONABLE MATERIAL IN THE CORE= 6.03151E-02

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:  
+X= 4.96539E+01 -X=-4.96539E+01 +Y= 4.98539E+01 -Y=-4.98539E+01 +Z= 1.00000E+01 -Z=-1.00000E+01

THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

0.38617 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.40533 MINUTES.

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	770 INDEPENDENT	FISSION POINTS WERE	GENERATED	
1	8.64733E-01	4.39500E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.07119E-01	4.72500E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132		WARNING...ONLY	773 INDEPENDENT	FISSION POINTS WERE	GENERATED	
3	8.54140E-01	5.05333E-01	8.54140E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.38616E-01	5.37333E-01	8.96378E-01	4.22379E-02	0.00000E+00	0.00000E+00
5	9.22249E-01	5.69500E-01	9.05002E-01	2.58659E-02	0.00000E+00	0.00000E+00
6	8.79528E-01	6.01500E-01	8.98633E-01	1.93669E-02	0.00000E+00	0.00000E+00
7	8.98732E-01	6.34500E-01	8.98653E-01	1.50016E-02	0.00000E+00	0.00000E+00
8	9.11786E-01	6.67333E-01	9.00842E-01	1.24428E-02	0.00000E+00	0.00000E+00
9	8.87381E-01	6.99500E-01	8.98919E-01	1.06904E-02	0.00000E+00	0.00000E+00
10	9.20980E-01	7.30500E-01	9.01676E-01	9.66016E-03	0.00000E+00	0.00000E+00
11	8.91180E-01	7.62667E-01	9.00510E-01	8.59892E-03	0.00000E+00	0.00000E+00
12	9.06228E-01	7.93667E-01	9.01082E-01	7.71233E-03	0.00000E+00	0.00000E+00
13	9.05461E-01	8.25833E-01	9.01480E-01	6.98741E-03	0.00000E+00	0.00000E+00
14	8.42903E-01	8.58667E-01	8.96590E-01	8.03719E-03	0.00000E+00	0.00000E+00
15	9.41479E-01	8.89833E-01	9.00043E-01	8.15975E-03	0.00000E+00	0.00000E+00
16	8.65977E-01	9.21833E-01	8.97610E-01	7.93666E-03	0.00000E+00	0.00000E+00
17	8.83131E-01	9.55833E-01	8.96645E-01	7.45142E-03	0.00000E+00	0.00000E+00
18	8.92163E-01	9.87833E-01	8.96365E-01	6.97579E-03	0.00000E+00	0.00000E+00
19	9.28505E-01	1.01993E+00	8.98255E-01	6.81991E-03	0.00000E+00	0.00000E+00
20	9.26201E-01	1.05293E+00	8.99808E-01	6.61465E-03	0.00000E+00	0.00000E+00
21	8.97280E-01	1.08583E+00	8.99675E-01	6.25825E-03	0.00000E+00	0.00000E+00
22	9.39284E-01	1.11683E+00	9.01655E-01	6.25871E-03	0.00000E+00	0.00000E+00
23	9.00410E-01	1.14900E+00	9.01596E-01	5.95351E-03	0.00000E+00	0.00000E+00
24	9.47855E-01	1.18100E+00	9.03699E-01	6.05338E-03	0.00000E+00	0.00000E+00
25	8.96969E-01	1.21300E+00	9.03406E-01	5.79180E-03	0.00000E+00	0.00000E+00
26	9.50013E-01	1.24500E+00	9.05348E-01	5.87526E-03	0.00000E+00	0.00000E+00
27	8.87597E-01	1.27700E+00	9.04638E-01	5.67990E-03	0.00000E+00	0.00000E+00
28	8.42086E-01	1.31000E+00	9.02322E-01	5.96387E-03	0.00000E+00	0.00000E+00
29	9.09666E-01	1.34017E+00	9.02508E-01	5.74538E-03	0.00000E+00	0.00000E+00
30	9.01398E-01	1.37133E+00	9.02468E-01	5.53653E-03	0.00000E+00	0.00000E+00
31	9.13198E-01	1.40433E+00	9.02838E-01	5.35500E-03	0.00000E+00	0.00000E+00
32	9.38927E-01	1.43633E+00	9.04041E-01	5.31143E-03	0.00000E+00	0.00000E+00
33	8.62282E-01	1.47017E+00	9.02698E-01	5.31010E-03	0.00000E+00	0.00000E+00
34	8.79410E-01	1.50233E+00	9.01970E-01	5.19273E-03	0.00000E+00	0.00000E+00
35	8.92716E-01	1.53433E+00	9.01689E-01	5.04072E-03	0.00000E+00	0.00000E+00
36	8.98063E-01	1.56733E+00	9.01583E-01	4.89138E-03	0.00000E+00	0.00000E+00
37	8.71316E-01	1.60117E+00	9.00718E-01	4.82766E-03	0.00000E+00	0.00000E+00
38	9.11996E-01	1.63317E+00	9.01031E-01	4.70209E-03	0.00000E+00	0.00000E+00
39	9.15148E-01	1.66617E+00	9.01413E-01	4.58913E-03	0.00000E+00	0.00000E+00
40	8.98372E-01	1.69817E+00	9.01333E-01	4.46744E-03	0.00000E+00	0.00000E+00
41	8.70585E-01	1.73017E+00	9.00544E-01	4.42223E-03	0.00000E+00	0.00000E+00
42	9.05086E-01	1.76233E+00	9.00658E-01	4.31175E-03	0.00000E+00	0.00000E+00
43	8.90824E-01	1.79333E+00	9.00418E-01	4.21211E-03	0.00000E+00	0.00000E+00
44	9.25132E-01	1.82633E+00	9.01006E-01	4.15250E-03	0.00000E+00	0.00000E+00
45	8.42242E-01	1.85933E+00	8.99640E-01	4.27889E-03	0.00000E+00	0.00000E+00
46	9.37250E-01	1.89500E+00	9.00495E-01	4.26700E-03	0.00000E+00	0.00000E+00
47	8.61176E-01	1.92250E+00	8.99621E-01	4.26164E-03	0.00000E+00	0.00000E+00
48	9.01697E-01	1.95450E+00	8.99666E-01	4.16821E-03	0.00000E+00	0.00000E+00
49	8.79237E-01	1.98650E+00	8.99231E-01	4.10165E-03	0.00000E+00	0.00000E+00
50	8.96693E-01	2.01850E+00	8.99178E-01	4.01564E-03	0.00000E+00	0.00000E+00
51	8.91902E-01	2.05067E+00	8.99030E-01	3.93564E-03	0.00000E+00	0.00000E+00
52	9.47823E-01	2.08350E+00	9.00006E-01	3.87768E-03	0.00000E+00	0.00000E+00
53	9.14853E-01	2.11567E+00	9.00297E-01	3.90976E-03	0.00000E+00	0.00000E+00
54	9.02976E-01	2.14767E+00	9.00348E-01	3.83419E-03	0.00000E+00	0.00000E+00
55	9.32633E-01	2.18067E+00	9.00958E-01	3.81015E-03	0.00000E+00	0.00000E+00
56	8.62429E-01	2.21350E+00	9.00244E-01	3.80640E-03	0.00000E+00	0.00000E+00
57	8.78213E-01	2.24567E+00	8.99844E-01	3.75796E-03	0.00000E+00	0.00000E+00
58	9.29261E-01	2.27667E+00	9.00371E-01	3.72770E-03	0.00000E+00	0.00000E+00
59	9.52866E-01	2.30700E+00	9.01292E-01	3.77575E-03	0.00000E+00	0.00000E+00
60	9.43472E-01	2.33800E+00	9.02019E-01	3.78069E-03	0.00000E+00	0.00000E+00
61	8.91892E-01	2.37100E+00	9.01847E-01	3.72002E-03	0.00000E+00	0.00000E+00
62	9.24170E-01	2.40300E+00	9.02219E-01	3.67637E-03	0.00000E+00	0.00000E+00
63	9.90868E-01	2.43517E+00	9.02033E-01	3.62038E-03	0.00000E+00	0.00000E+00
64	8.44533E-01	2.46800E+00	9.01106E-01	3.68028E-03	0.00000E+00	0.00000E+00
65	9.19200E-01	2.50017E+00	9.01393E-01	3.63276E-03	0.00000E+00	0.00000E+00
66	9.68369E-01	2.53217E+00	9.00877E-01	3.61259E-03	0.00000E+00	0.00000E+00
67	8.64434E-01	2.56500E+00	9.00316E-01	3.60050E-03	0.00000E+00	0.00000E+00
68	8.77680E-01	2.59800E+00	8.99973E-01	3.56208E-03	0.00000E+00	0.00000E+00
69	9.24317E-01	2.63000E+00	9.00337E-01	3.52727E-03	0.00000E+00	0.00000E+00
70	9.11875E-01	2.66300E+00	9.00595E-01	3.47915E-03	0.00000E+00	0.00000E+00
71	9.00279E-01	2.69417E+00	9.00503E-01	3.42836E-03	0.00000E+00	0.00000E+00
72	9.37083E-01	2.72533E+00	9.01026E-01	3.41920E-03	0.00000E+00	0.00000E+00
73	8.71045E-01	2.75817E+00	9.00603E-01	3.39704E-03	0.00000E+00	0.00000E+00
74	8.95938E-01	2.79033E+00	9.00539E-01	3.35015E-03	0.00000E+00	0.00000E+00
75	8.91734E-01	2.82317E+00	9.00418E-01	3.30614E-03	0.00000E+00	0.00000E+00
76	9.07862E-01	2.85533E+00	9.00520E-01	3.26275E-03	0.00000E+00	0.00000E+00

77	9.00078E-01	2.88817E+00	9.00514E-01	3.21896E-03	0.00000E+00	0.00000E+00
78	9.26636E-01	2.91933E+00	9.00858E-01	3.19486E-03	0.00000E+00	0.00000E+00
79	9.14409E-01	2.95133E+00	9.01034E-01	3.15801E-03	0.00000E+00	0.00000E+00
80	8.93065E-01	2.98250E+00	9.00932E-01	3.11893E-03	0.00000E+00	0.00000E+00
81	9.39654E-01	3.01550E+00	9.01422E-01	3.11796E-03	0.00000E+00	0.00000E+00
82	8.68000E-01	3.04933E+00	9.01004E-01	3.10696E-03	0.00000E+00	0.00000E+00
83	8.77484E-01	3.08233E+00	9.00714E-01	3.08207E-03	0.00000E+00	0.00000E+00
84	9.09180E-01	3.11433E+00	9.00817E-01	3.04600E-03	0.00000E+00	0.00000E+00
85	8.63521E-01	3.14733E+00	9.00368E-01	3.04244E-03	0.00000E+00	0.00000E+00
86	9.10772E-01	3.18017E+00	9.00491E-01	3.00856E-03	0.00000E+00	0.00000E+00
87	8.64429E-01	3.21233E+00	9.00067E-01	3.00307E-03	0.00000E+00	0.00000E+00
88	9.44313E-01	3.24333E+00	9.00582E-01	3.01221E-03	0.00000E+00	0.00000E+00
89	9.37499E-01	3.27450E+00	9.01006E-01	3.00747E-03	0.00000E+00	0.00000E+00
90	8.76285E-01	3.30650E+00	9.00725E-01	2.98636E-03	0.00000E+00	0.00000E+00
91	8.53479E-01	3.33767E+00	9.00194E-01	2.99996E-03	0.00000E+00	0.00000E+00
92	8.75077E-01	3.36883E+00	8.99915E-01	2.97954E-03	0.00000E+00	0.00000E+00
93	9.21511E-01	3.40083E+00	9.00152E-01	2.95616E-03	0.00000E+00	0.00000E+00
94	8.75894E-01	3.43383E+00	8.99888E-01	2.93572E-03	0.00000E+00	0.00000E+00
95	9.72366E-01	3.46500E+00	9.00677E-01	3.00918E-03	0.00000E+00	0.00000E+00
96	8.80701E-01	3.49783E+00	9.00571E-01	2.97888E-03	0.00000E+00	0.00000E+00
97	8.76098E-01	3.53000E+00	9.00313E-01	2.95860E-03	0.00000E+00	0.00000E+00
98	9.14973E-01	3.56283E+00	9.00466E-01	2.93160E-03	0.00000E+00	0.00000E+00
99	8.84076E-01	3.59500E+00	9.00400E-01	2.90196E-03	0.00000E+00	0.00000E+00
100	8.91300E-01	3.62700E+00	9.00307E-01	2.87370E-03	0.00000E+00	0.00000E+00
101	9.34534E-01	3.65900E+00	9.00653E-01	2.86546E-03	0.00000E+00	0.00000E+00
102	9.36717E-01	3.69017E+00	9.01014E-01	2.85949E-03	0.00000E+00	0.00000E+00
103	8.92327E-01	3.72317E+00	9.00928E-01	2.83234E-03	0.00000E+00	0.00000E+00
104	8.66639E-01	3.75600E+00	9.00592E-01	2.82451E-03	0.00000E+00	0.00000E+00
105	9.69759E-01	3.78817E+00	9.01263E-01	2.87644E-03	0.00000E+00	0.00000E+00
106	9.43452E-01	3.81833E+00	9.01669E-01	2.87739E-03	0.00000E+00	0.00000E+00
107	8.76250E-01	3.85133E+00	9.01427E-01	2.86012E-03	0.00000E+00	0.00000E+00
108	9.13006E-01	3.88417E+00	9.01536E-01	2.83511E-03	0.00000E+00	0.00000E+00
109	8.85045E-01	3.91617E+00	9.01382E-01	2.81272E-03	0.00000E+00	0.00000E+00
110	8.83914E-01	3.94917E+00	9.01313E-01	2.78741E-03	0.00000E+00	0.00000E+00
111	9.25573E-01	3.98117E+00	9.01535E-01	2.77067E-03	0.00000E+00	0.00000E+00
112	8.95593E-01	4.01333E+00	9.01481E-01	2.74590E-03	0.00000E+00	0.00000E+00
113	8.69591E-01	4.04617E+00	9.01194E-01	2.73617E-03	0.00000E+00	0.00000E+00
114	8.97932E-01	4.07833E+00	9.01165E-01	2.71179E-03	0.00000E+00	0.00000E+00
115	8.74422E-01	4.11217E+00	9.00928E-01	2.69808E-03	0.00000E+00	0.00000E+00
116	8.98152E-01	4.14417E+00	9.00904E-01	2.67442E-03	0.00000E+00	0.00000E+00
117	8.69339E-01	4.17717E+00	9.00629E-01	2.66524E-03	0.00000E+00	0.00000E+00
118	9.22756E-01	4.20733E+00	9.00820E-01	2.64904E-03	0.00000E+00	0.00000E+00
119	9.30999E-01	4.23850E+00	9.01078E-01	2.63893E-03	0.00000E+00	0.00000E+00
120	9.49007E-01	4.26967E+00	9.01484E-01	2.64781E-03	0.00000E+00	0.00000E+00
121	9.04560E-01	4.30167E+00	9.01510E-01	2.62560E-03	0.00000E+00	0.00000E+00
122	9.66280E-01	4.33183E+00	9.02050E-01	2.65898E-03	0.00000E+00	0.00000E+00
123	8.53077E-01	4.36383E+00	9.01645E-01	2.66780E-03	0.00000E+00	0.00000E+00
124	9.58663E-01	4.39500E+00	9.02112E-01	2.68680E-03	0.00000E+00	0.00000E+00
125	8.70734E-01	4.42700E+00	9.01857E-01	2.67705E-03	0.00000E+00	0.00000E+00
126	9.45178E-01	4.45817E+00	9.02207E-01	2.67826E-03	0.00000E+00	0.00000E+00
127	9.16217E-01	4.49017E+00	9.02319E-01	2.65911E-03	0.00000E+00	0.00000E+00
128	9.42022E-01	4.52133E+00	9.02634E-01	2.65667E-03	0.00000E+00	0.00000E+00
129	9.05724E-01	4.55433E+00	9.02658E-01	2.63578E-03	0.00000E+00	0.00000E+00
130	8.73590E-01	4.58550E+00	9.02431E-01	2.62495E-03	0.00000E+00	0.00000E+00
131	9.25854E-01	4.61650E+00	9.02613E-01	2.61084E-03	0.00000E+00	0.00000E+00
132	8.99176E-01	4.64950E+00	9.02586E-01	2.59082E-03	0.00000E+00	0.00000E+00
133	9.47677E-01	4.68150E+00	9.02930E-01	2.59390E-03	0.00000E+00	0.00000E+00
134	8.65875E-01	4.71367E+00	9.02650E-01	2.58944E-03	0.00000E+00	0.00000E+00
135	8.93745E-01	4.74650E+00	9.02507E-01	2.57382E-03	0.00000E+00	0.00000E+00
136	8.93197E-01	4.77950E+00	9.02438E-01	2.55549E-03	0.00000E+00	0.00000E+00
137	8.86474E-01	4.81150E+00	9.02220E-01	2.53924E-03	0.00000E+00	0.00000E+00
138	9.50594E-01	4.84167E+00	9.02675E-01	2.54538E-03	0.00000E+00	0.00000E+00
139	9.30560E-01	4.87200E+00	9.02878E-01	2.53491E-03	0.00000E+00	0.00000E+00
140	9.10665E-01	4.90483E+00	9.02935E-01	2.51711E-03	0.00000E+00	0.00000E+00
141	8.51616E-01	4.93783E+00	9.02565E-01	2.52606E-03	0.00000E+00	0.00000E+00
142	8.82287E-01	4.97083E+00	9.02421E-01	2.51213E-03	0.00000E+00	0.00000E+00
143	9.37502E-01	5.00283E+00	9.02668E-01	2.50663E-03	0.00000E+00	0.00000E+00
144	9.22113E-01	5.03400E+00	9.02806E-01	2.49268E-03	0.00000E+00	0.00000E+00
145	9.65204E-01	5.06700E+00	9.03243E-01	2.51336E-03	0.00000E+00	0.00000E+00
146	8.92216E-01	5.09983E+00	9.03166E-01	2.49702E-03	0.00000E+00	0.00000E+00
147	8.90569E-01	5.13200E+00	9.03079E-01	2.48126E-03	0.00000E+00	0.00000E+00
148	8.94205E-01	5.16400E+00	9.03019E-01	2.46495E-03	0.00000E+00	0.00000E+00
149	9.01752E-01	5.19600E+00	9.03010E-01	2.44814E-03	0.00000E+00	0.00000E+00
150	8.96245E-01	5.22900E+00	9.02964E-01	2.43198E-03	0.00000E+00	0.00000E+00
151	9.03029E-01	5.26017E+00	9.02965E-01	2.41560E-03	0.00000E+00	0.00000E+00
152	9.25901E-01	5.29300E+00	9.03118E-01	2.40431E-03	0.00000E+00	0.00000E+00
153	9.19935E-01	5.32517E+00	9.03229E-01	2.39093E-03	0.00000E+00	0.00000E+00
154	9.25819E-01	5.35617E+00	9.03378E-01	2.37979E-03	0.00000E+00	0.00000E+00
155	9.06503E-01	5.38833E+00	9.03398E-01	2.36427E-03	0.00000E+00	0.00000E+00
156	8.54453E-01	5.42117E+00	9.03080E-01	2.37028E-03	0.00000E+00	0.00000E+00
157	9.18177E-01	5.45317E+00	9.03178E-01	2.35695E-03	0.00000E+00	0.00000E+00
158	8.97244E-01	5.48433E+00	9.03140E-01	2.34210E-03	0.00000E+00	0.00000E+00
159	8.88518E-01	5.51633E+00	9.03046E-01	2.32900E-03	0.00000E+00	0.00000E+00
160	9.01194E-01	5.54933E+00	9.03035E-01	2.31424E-03	0.00000E+00	0.00000E+00
161	8.86233E-01	5.58133E+00	9.02929E-01	2.30206E-03	0.00000E+00	0.00000E+00
162	8.50260E-01	5.61350E+00	9.02600E-01	2.31110E-03	0.00000E+00	0.00000E+00
163	8.91907E-01	5.64633E+00	9.02534E-01	2.29766E-03	0.00000E+00	0.00000E+00
164	8.84833E-01	5.67850E+00	9.02425E-01	2.28605E-03	0.00000E+00	0.00000E+00
165	9.40537E-01	5.70867E+00	9.02659E-01	2.28398E-03	0.00000E+00	0.00000E+00
166	9.41814E-01	5.73983E+00	9.02904E-01	2.28318E-03	0.00000E+00	0.00000E+00
167	8.92170E-01	5.77267E+00	9.02838E-01	2.27023E-03	0.00000E+00	0.00000E+00
168	8.82412E-01	5.80567E+00	9.02715E-01	2.25986E-03	0.00000E+00	0.00000E+00
169	9.23368E-01	5.83767E+00	9.02653E-01	2.24715E-03	0.00000E+00	0.00000E+00
170	9.25805E-01	5.86983E+00	9.02791E-01	2.23798E-03	0.00000E+00	0.00000E+00
171	9.07353E-01	5.90267E+00	9.02818E-01	2.22486E-03	0.00000E+00	0.00000E+00

172	8.51698E-01	5.93483E+00	9.02518E-01	2.23208E-03	0.00000E+00	0.00000E+00
173	8.89087E-01	5.96583E+00	9.02439E-01	2.22038E-03	0.00000E+00	0.00000E+00
174	9.33412E-01	5.99883E+00	9.02619E-01	2.21476E-03	0.00000E+00	0.00000E+00
175	8.92776E-01	6.03183E+00	9.02562E-01	2.20266E-03	0.00000E+00	0.00000E+00
176	9.06610E-01	6.06300E+00	9.02585E-01	2.19009E-03	0.00000E+00	0.00000E+00
177	9.14163E-01	6.09583E+00	9.02652E-01	2.17854E-03	0.00000E+00	0.00000E+00
178	8.62825E-01	6.12783E+00	9.02425E-01	2.17792E-03	0.00000E+00	0.00000E+00
179	9.10867E-01	6.15900E+00	9.02473E-01	2.16610E-03	0.00000E+00	0.00000E+00
180	9.67527E-01	6.19017E+00	9.02839E-01	2.18469E-03	0.00000E+00	0.00000E+00
181	9.26899E-01	6.22133E+00	9.02973E-01	2.17660E-03	0.00000E+00	0.00000E+00
182	9.44357E-01	6.25417E+00	9.03203E-01	2.17665E-03	0.00000E+00	0.00000E+00
183	9.04451E-01	6.28533E+00	9.03210E-01	2.16460E-03	0.00000E+00	0.00000E+00
184	8.61304E-01	6.31917E+00	9.02979E-01	2.16496E-03	0.00000E+00	0.00000E+00
185	8.58905E-01	6.35133E+00	9.02739E-01	2.16652E-03	0.00000E+00	0.00000E+00
186	8.43845E-01	6.38333E+00	9.02419E-01	2.17836E-03	0.00000E+00	0.00000E+00
187	9.00057E-01	6.41533E+00	9.02406E-01	2.16659E-03	0.00000E+00	0.00000E+00
188	8.91287E-01	6.44650E+00	9.02346E-01	2.15574E-03	0.00000E+00	0.00000E+00
189	8.87537E-01	6.48033E+00	9.02267E-01	2.14564E-03	0.00000E+00	0.00000E+00
190	8.77943E-01	6.51150E+00	9.02137E-01	2.13811E-03	0.00000E+00	0.00000E+00
191	8.85705E-01	6.54167E+00	9.02051E-01	2.12855E-03	0.00000E+00	0.00000E+00
192	9.03397E-01	6.57367E+00	9.02058E-01	2.11733E-03	0.00000E+00	0.00000E+00
193	8.93692E-01	6.60583E+00	9.02014E-01	2.10667E-03	0.00000E+00	0.00000E+00
194	9.00854E-01	6.63967E+00	9.02008E-01	2.09568E-03	0.00000E+00	0.00000E+00
195	8.96094E-01	6.67167E+00	9.01977E-01	2.08501E-03	0.00000E+00	0.00000E+00
196	8.86010E-01	6.70367E+00	9.01895E-01	2.07587E-03	0.00000E+00	0.00000E+00
197	8.92024E-01	6.73483E+00	9.01844E-01	2.06582E-03	0.00000E+00	0.00000E+00
198	8.68306E-01	6.76600E+00	9.01673E-01	2.06236E-03	0.00000E+00	0.00000E+00
199	9.07466E-01	6.79800E+00	9.01702E-01	2.05208E-03	0.00000E+00	0.00000E+00
200	9.32423E-01	6.82917E+00	9.01858E-01	2.04757E-03	0.00000E+00	0.00000E+00
201	9.20243E-01	6.86217E+00	9.01950E-01	2.03935E-03	0.00000E+00	0.00000E+00
202	8.43867E-01	6.89500E+00	9.01660E-01	2.04974E-03	0.00000E+00	0.00000E+00
203	9.18508E-01	6.92617E+00	9.01744E-01	2.04124E-03	0.00000E+00	0.00000E+00
204	9.21690E-01	6.95917E+00	9.01843E-01	2.03350E-03	0.00000E+00	0.00000E+00
205	8.85344E-01	6.99200E+00	9.01761E-01	2.02509E-03	0.00000E+00	0.00000E+00
206	9.25774E-01	7.02317E+00	9.01879E-01	2.01858E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

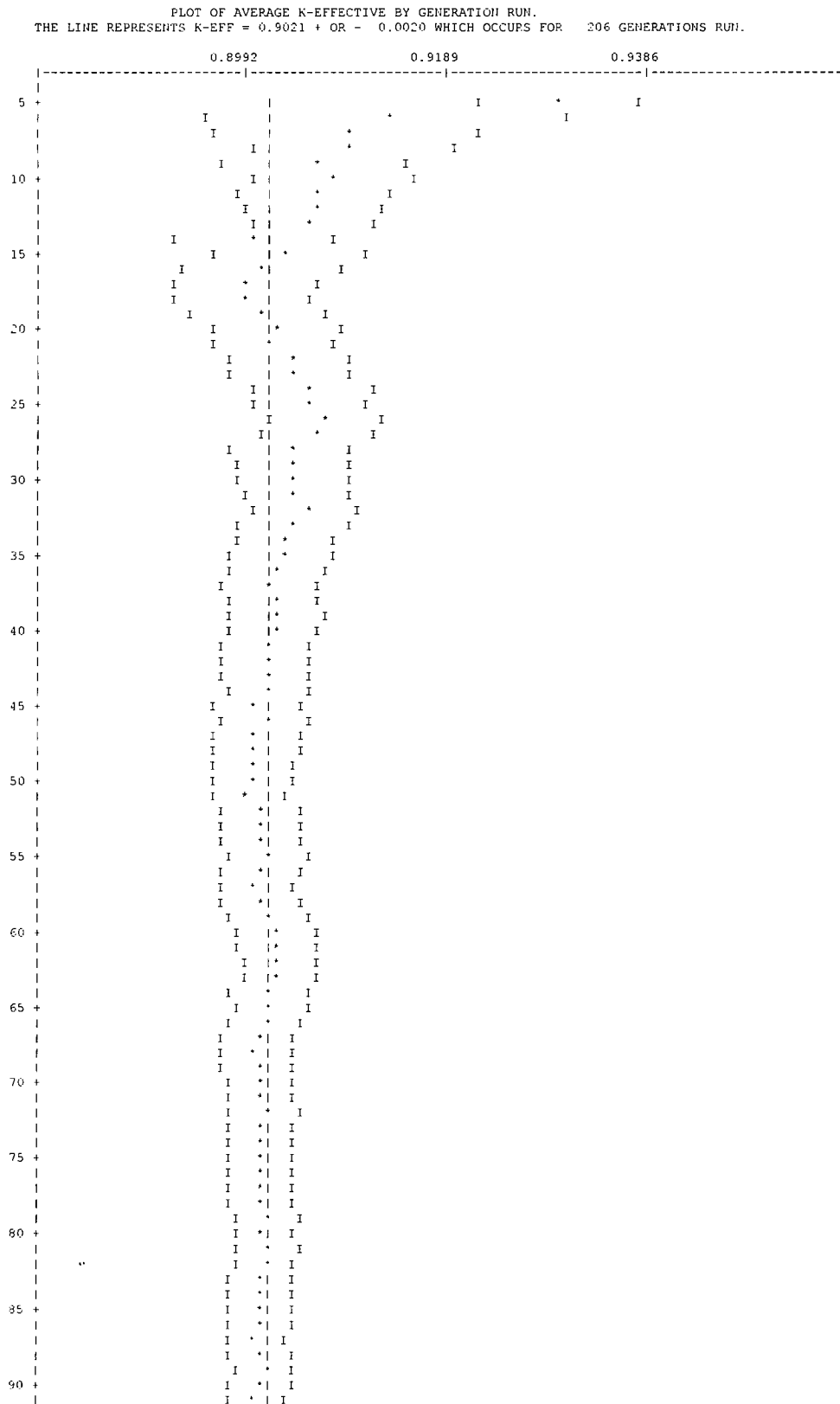
EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.



LIFETIME = 6.34755E-05 + OR - 2.90697E-07      GENERATION TIME = 4.14031E-05 + OR - 1.44102E-07  
 NU BAR = 2.42026E+00 + OR - 1.85916E-05      AVERAGE FISSION GROUP = 2.35537E+01 + OR - 8.36356E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 6.47922E-02 + OR - 4.37889E-04

NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBEP OF HISTORIES
3	0.90211	+ OR - 0.00201	0.90010 TO 0.90413	0.89808 TO 0.90614	0.89607 TO 0.90816	162400
4	0.90193	+ OR - 0.00202	0.89992 TO 0.90395	0.89790 TO 0.90597	0.89588 TO 0.90798	161600
5	0.90183	+ OR - 0.00202	0.89981 TO 0.90386	0.89778 TO 0.90588	0.89576 TO 0.90790	160800
6	0.90194	+ OR - 0.00203	0.89991 TO 0.90398	0.89788 TO 0.90601	0.89585 TO 0.90804	160000
7	0.90196	+ OR - 0.00204	0.89992 TO 0.90400	0.89788 TO 0.90604	0.89584 TO 0.90808	159200
8	0.90191	+ OR - 0.00205	0.89986 TO 0.90396	0.89781 TO 0.90601	0.89576 TO 0.90806	158400
9	0.90198	+ OR - 0.00206	0.89992 TO 0.90404	0.89786 TO 0.90610	0.89580 TO 0.90816	157600
10	0.90189	+ OR - 0.00207	0.89982 TO 0.90396	0.89775 TO 0.90602	0.89568 TO 0.90809	156800
11	0.90194	+ OR - 0.00208	0.89986 TO 0.90402	0.89779 TO 0.90610	0.89571 TO 0.90818	156000
12	0.90192	+ OR - 0.00209	0.89983 TO 0.90401	0.89774 TO 0.90610	0.89565 TO 0.90819	155200
17	0.90229	+ OR - 0.00210	0.90019 TO 0.90439	0.89810 TO 0.90649	0.89600 TO 0.90859	151200
22	0.90190	+ OR - 0.00214	0.89977 TO 0.90404	0.89763 TO 0.90618	0.89549 TO 0.90832	147200
27	0.90149	+ OR - 0.00216	0.89933 TO 0.90366	0.89717 TO 0.90582	0.89500 TO 0.90798	143200
32	0.90151	+ OR - 0.00219	0.89932 TO 0.90369	0.89713 TO 0.90588	0.89494 TO 0.90807	139200
37	0.90212	+ OR - 0.00223	0.89989 TO 0.90435	0.89766 TO 0.90658	0.89544 TO 0.90880	135200
42	0.90218	+ OR - 0.00229	0.89989 TO 0.90446	0.89761 TO 0.90675	0.89532 TO 0.90903	131200
47	0.90252	+ OR - 0.00230	0.90022 TO 0.90481	0.89793 TO 0.90711	0.89563 TO 0.90941	127200
52	0.90249	+ OR - 0.00235	0.90014 TO 0.90483	0.89779 TO 0.90718	0.89545 TO 0.90953	123200
57	0.90263	+ OR - 0.00239	0.90024 TO 0.90503	0.89784 TO 0.90742	0.89545 TO 0.90982	119200
62	0.90174	+ OR - 0.00242	0.89931 TO 0.90416	0.89689 TO 0.90658	0.89447 TO 0.90901	115200
67	0.90261	+ OR - 0.00244	0.90017 TO 0.90505	0.89772 TO 0.90750	0.89528 TO 0.90994	111200
72	0.90232	+ OR - 0.00251	0.89982 TO 0.90483	0.89731 TO 0.90734	0.89480 TO 0.90985	107200
77	0.90267	+ OR - 0.00259	0.90008 TO 0.90527	0.89749 TO 0.90786	0.89489 TO 0.91045	103200
82	0.90244	+ OR - 0.00266	0.89979 TO 0.90510	0.89713 TO 0.90776	0.89447 TO 0.91041	99200
87	0.90317	+ OR - 0.00272	0.90045 TO 0.90589	0.89773 TO 0.90861	0.89501 TO 0.91133	95200
92	0.90343	+ OR - 0.00274	0.90069 TO 0.90617	0.89794 TO 0.90892	0.89520 TO 0.91166	91200

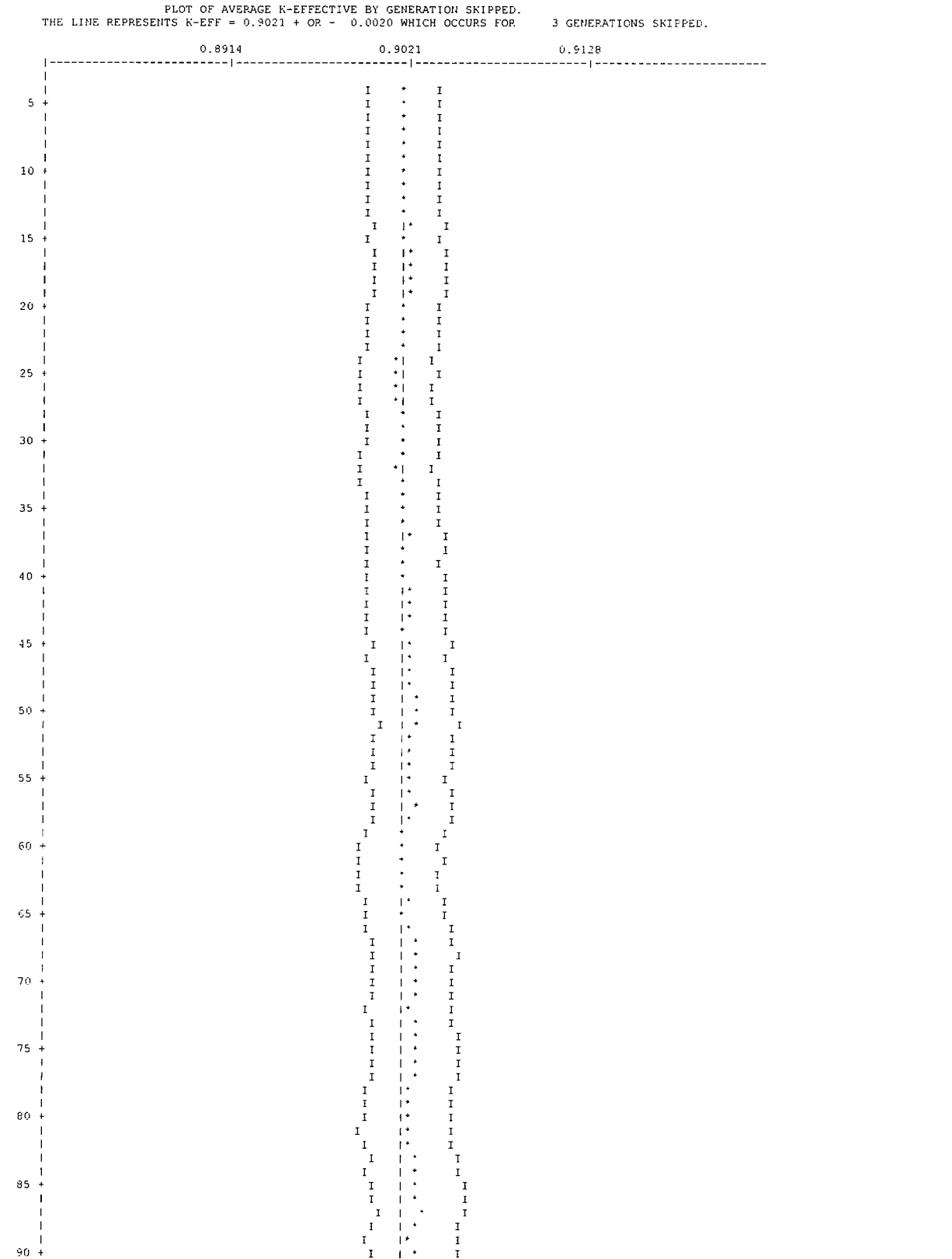
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
97	0.90324	+ OR - 0.00277	0.90048 TO 0.90601	0.89771 TO 0.90878	0.89494 TO 0.91155	87200
102	0.90271	+ OR - 0.00286	0.89985 TO 0.90557	0.89699 TO 0.90843	0.89413 TO 0.91129	83200
107	0.90236	+ OR - 0.00286	0.89950 TO 0.90522	0.89664 TO 0.90808	0.89378 TO 0.91094	79200
112	0.90234	+ OR - 0.00299	0.89935 TO 0.90534	0.89636 TO 0.90833	0.89337 TO 0.91132	75200
117	0.90249	+ OR - 0.00310	0.90040 TO 0.90659	0.89730 TO 0.90969	0.89420 TO 0.91279	71200
122	0.90164	+ OR - 0.00312	0.89852 TO 0.90475	0.89540 TO 0.90787	0.89228 TO 0.91099	67200
127	0.90118	+ OR - 0.00310	0.89809 TO 0.90428	0.89499 TO 0.90738	0.89189 TO 0.91047	63200
132	0.90064	+ OR - 0.00322	0.89742 TO 0.90386	0.89420 TO 0.90708	0.89098 TO 0.91030	59200
137	0.90102	+ OR - 0.00333	0.89769 TO 0.90435	0.89436 TO 0.90768	0.89103 TO 0.91101	55200
142	0.90069	+ OR - 0.00337	0.89732 TO 0.90406	0.89395 TO 0.90744	0.89058 TO 0.91081	51200
147	0.89893	+ OR - 0.00340	0.89553 TO 0.90233	0.89214 TO 0.90572	0.88874 TO 0.90912	47200
152	0.89844	+ OR - 0.00368	0.89476 TO 0.90211	0.89109 TO 0.90579	0.88741 TO 0.90947	43200
157	0.89777	+ OR - 0.00386	0.89391 TO 0.90163	0.89005 TO 0.90549	0.88619 TO 0.90935	39200
162	0.89926	+ OR - 0.00414	0.89511 TO 0.90340	0.89097 TO 0.90754	0.88683 TO 0.91168	35200
167	0.89782	+ OR - 0.00438	0.89344 TO 0.90220	0.88905 TO 0.90659	0.88467 TO 0.91097	31200
172	0.89869	+ OR - 0.00474	0.89395 TO 0.90342	0.88921 TO 0.90816	0.88447 TO 0.91290	27200
177	0.89722	+ OR - 0.00538	0.89184 TO 0.90260	0.88646 TO 0.90797	0.88108 TO 0.91335	23200
182	0.89195	+ OR - 0.00493	0.88702 TO 0.89688	0.88209 TO 0.90181	0.87717 TO 0.90674	19200
187	0.89675	+ OR - 0.00496	0.89179 TO 0.90171	0.88684 TO 0.90666	0.88188 TO 0.91162	15200
192	0.89946	+ OR - 0.00649	0.89297 TO 0.90595	0.88648 TO 0.91244	0.87999 TO 0.91892	11200
197	0.90264	+ OR - 0.01006	0.89257 TO 0.91270	0.88251 TO 0.92276	0.87245 TO 0.93282	7200
202	0.91283	+ OR - 0.00928	0.90355 TO 0.92211	0.89427 TO 0.93139	0.88498 TO 0.94067	3200

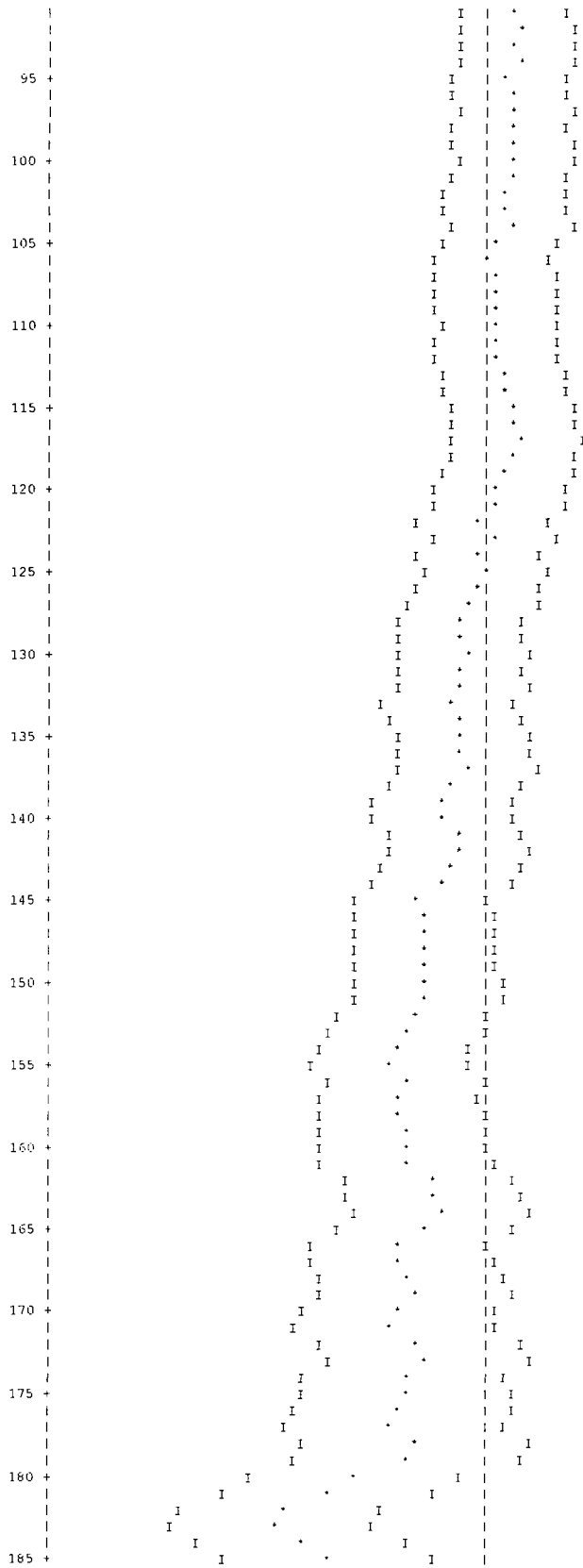


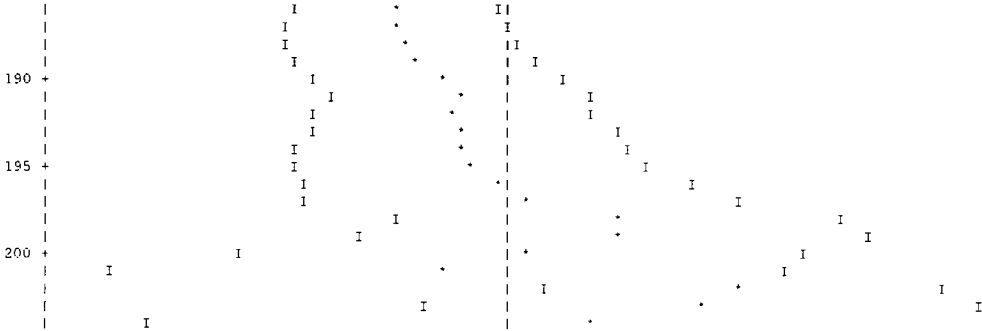
	I	*	I
	I	*	I
	I	*	I
95 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
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100 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
105 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
110 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
115 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
120 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
125 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
130 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
135 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
140 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
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145 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
150 +	I	*	I
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	I	*	I
	I	*	I
	I	*	I
155 +	I	*	I
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	I	*	I
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160 +	I	*	I
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165 +	I	*	I
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170 +	I	*	I
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	I	*	I
175 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
180 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
185 +	I	*	I
	I	*	I

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|          | I |* | I  
|          | I |* | I  
190 +     | I |* | I  
|          | I |* | I  
|          | I * | I  
|          | I * | I  
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195 +     | I * | I  
|          | I * | I  
|          | I * | I  
|          | I * | I  
|          | I * | I  
200 +     | I * | I  
|          | I * | I  
|          | I * | I  
|          | I * | I  
|          | I * | I  
205 +     | I * | I  
|          | I * | I
```









SKIPPING 3 GENERATIONS									
GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0003			2.56035E-04	5.4573	1.50773E-03	2.1757	0.00000E+00	0.0000
2	0.0013			1.19711E-03	1.7824	3.23043E-03	0.6837	0.00000E+00	0.0000
3	0.0017			1.52498E-03	1.4960	1.03787E-03	1.0080	0.00000E+00	0.0000
4	0.0010			9.21900E-04	1.7058	5.67407E-04	1.2742	0.00000E+00	0.0000
5	0.0014			1.25991E-03	1.4508	1.02450E-03	0.9580	0.00000E+00	0.0000
6	0.0018			1.65059E-03	1.1540	2.63366E-03	0.8416	0.00000E+00	0.0000
7	0.0019			1.70295E-03	1.1907	4.22649E-03	0.8983	0.00000E+00	0.0000
8	0.0020			1.79592E-03	1.8803	3.80393E-03	1.0126	0.00000E+00	0.0000
9	0.0027			2.41033E-03	1.9931	4.26692E-03	1.0242	0.00000E+00	0.0000
10	0.0058			5.23952E-03	1.9873	9.84187E-03	1.0582	0.00000E+00	0.0000
11	0.0122			1.10506E-02	1.7951	1.50933E-02	1.0254	0.00000E+00	0.0000
12	0.0166			1.49499E-02	1.8439	1.56324E-02	1.2484	0.00000E+00	0.0000
13	0.0162			1.46159E-02	1.7701	1.92808E-02	1.0976	0.00000E+00	0.0000
14	0.0137			1.23654E-02	1.8835	2.24392E-02	1.0243	0.00000E+00	0.0000
15	0.0027			2.41279E-03	3.3935	1.01851E-02	1.1256	0.00000E+00	0.0000
16	0.0019			1.67969E-03	4.3603	6.19063E-03	1.3070	0.00000E+00	0.0000
17	0.0029			2.65759E-03	4.7425	3.98055E-03	2.0496	0.00000E+00	0.0000
18	0.0041			3.68149E-03	4.6778	4.09399E-03	2.2997	0.00000E+00	0.0000
19	0.0049			4.46071E-03	3.9852	6.55610E-03	1.5972	0.00000E+00	0.0000
20	0.0208			1.87417E-02	1.8909	2.46814E-02	0.9581	0.00000E+00	0.0000
21	0.0115			1.03529E-02	2.7066	1.06895E-02	1.4122	0.00000E+00	0.0000
22	0.0277			2.49519E-02	1.9069	2.45621E-02	1.1086	0.00000E+00	0.0000
23	0.1056			9.52794E-02	0.9464	1.01529E-01	0.5113	0.00000E+00	0.0000
24	0.2186			1.97206E-01	0.6778	2.12961E-01	0.3258	0.00000E+00	0.0000
25	0.1915			1.72761E-01	0.6087	1.83980E-01	0.3180	0.00000E+00	0.0000
26	0.2416			2.17928E-01	0.5720	2.28888E-01	0.3164	0.00000E+00	0.0000
27	0.0876			7.90606E-02	1.0865	7.84555E-02	0.6611	0.00000E+00	0.0000
SYSTEM TOTAL =				9.02114E-01	0.2233	1.00134E+00	0.0542	0.00000E+00	0.0000
ELAPSED TIME	7.02500 MINUTES								
RANDOM NUMBER=	781A56DD44CA								

```
                                FREQUENCY FOR GENERATIONS    4 TO 206
0.8419 TO 0.8561 *****
0.8561 TO 0.8702 *****
0.8702 TO 0.8843 *****
0.8843 TO 0.8985 *****
0.8985 TO 0.9126 *****
0.9126 TO 0.9268 *****
0.9268 TO 0.9409 *****
0.9409 TO 0.9551 *****
0.9551 TO 0.9692 *****
0.9692 TO 0.9833 *****
```

```
                                FREQUENCY FOR GENERATIONS    55 TO 206
0.8419 TO 0.8561 *****
0.8561 TO 0.8702 *****
0.8702 TO 0.8843 *****
0.8843 TO 0.8985 *****
0.8985 TO 0.9126 *****
0.9126 TO 0.9268 *****
0.9268 TO 0.9409 *****
0.9409 TO 0.9551 *****
0.9551 TO 0.9692 *****
0.9692 TO 0.9833 *****
```

```
                                FREQUENCY FOR GENERATIONS   105 TO 206
0.8419 TO 0.8561 *****
0.8561 TO 0.8702 *****
0.8702 TO 0.8843 *****
0.8843 TO 0.8985 *****
0.8985 TO 0.9126 *****
0.9126 TO 0.9268 *****
0.9268 TO 0.9409 *****
0.9409 TO 0.9551 *****
0.9551 TO 0.9692 *****
0.9692 TO 0.9833 *****
```

```
                                FREQUENCY FOR GENERATIONS   156 TO 206
0.8419 TO 0.8561 *****
0.8561 TO 0.8702 *****
0.8702 TO 0.8843 *****
0.8843 TO 0.8985 *****
0.8985 TO 0.9126 *****
0.9126 TO 0.9268 *****
0.9268 TO 0.9409 *****
0.9409 TO 0.9551 *****
0.9551 TO 0.9692 *****
0.9692 TO 0.9833 *****
```

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 7.02500 MINUTES  
\*  
.....

6.6.4 Intact PWR and BWR Fuel Rods in a Rod Holder or Fuel Assembly Lattice

This section contains abbreviated output files from the most reactive normal condition and accident condition moderator density variation cases.

**Figure 6.6.4-1 CSAS Input/Output for NAC-LWT with 25 PWR Rods – Most Reactive Normal Condition Configuration**

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
PWR RODS, NO BASKET, VOID EXTERIOR, GAP VOID
27GROUHFDF4 LATTICECELL
UO2 1 0.95 293.0 92235 5.0 92238 95.0 END
ZIRCALLOY 2 1.0 293.0 END
H2O 3 1.000 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.0 293.0 END
H2O 8 1.000 293.0 END
H2O 9 1.0E-20 293.0 END
END COMP
TRIANGPITCH 2.92169 0.9564 1 3 1.1175 2 0.9753 9 END
"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"
READ FAPAM RUN=YES FLT=NO GEN=103 NPG=400 END PARAM
READ GEOM
UNIT 1
COM="PWR FUEL ROD"
CYLINDER 1 1 0.4781 2P10.0
CYLINDER 9 1 0.4876 2P10.0
CYLINDER 2 1 0.5588 2P10.0
GLOBAL UNIT 2
CYLINDER 3 1 16.9963 2P10.0
HOLE 1 .0000 .0000 .0000
HOLE 1 .0000 2.9216 .0000
HOLE 1 2.5301 1.4608 .0000
HOLE 1 2.5301 -1.4608 .0000
HOLE 1 .0000 -2.9216 .0000
HOLE 1 -2.5301 -1.4608 .0000
HOLE 1 -2.5301 1.4608 .0000
HOLE 1 -2.5301 4.3825 .0000
HOLE 1 .0000 5.8433 .0000
HOLE 1 2.5301 4.3825 .0000
HOLE 1 5.0603 2.9216 .0000
HOLE 1 5.0603 .0000 .0000
HOLE 1 5.0603 -2.9216 .0000
HOLE 1 2.5301 -4.3825 .0000
HOLE 1 .0000 -5.8433 .0000
HOLE 1 -2.5301 -4.3825 .0000
HOLE 1 -5.0603 -2.9216 .0000
HOLE 1 -5.0603 .0000 .0000
HOLE 1 -5.0603 2.9216 .0000
HOLE 1 -5.0603 5.8433 .0000
HOLE 1 2.5301 7.3041 .0000
HOLE 1 7.5904 1.4608 .0000
HOLE 1 5.0603 -5.8433 .0000
HOLE 1 -2.5301 -7.3041 .0000
HOLE 1 -7.5904 -1.4608 .0000
CYLINDER 5 1 18.8913 2P10.0
CYLINDER 6 1 33.4963 2P10.0
CYLINDER 5 1 36.5443 2P10.0
CYLINDER 7 1 49.2443 2P10.0
CYLINDER 5 1 49.8539 2P10.0
CUBOID 8 1 4P49.8539 2P10.0
END GEOM
READ BOUNDS ALL=MIR END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.60 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 5.93 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 262.93 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 271.12 (SECONDS).

```

```

CCCCCCCCC      SSSSSSSSSS      AAAAAAAAA      SSSSSSSSSS      2222222222      555555555555
CCCCCCCCCCCCC  SSSSSSSSSSSS    AAAAAAAAAAAAA  SSSSSSSSSSSS    222222222222    555555555555
CC      CC      SS      SS      AA      AA      SS      SS      22      22      55
CC      SS      SS      AA      AA      SS      SS      22      55
CC      SSSSSSSSSS  AAAAAAAAAAAAA  SSSSSSSSSS      22      555555555555
CC      SSSSSSSSSS  AAAAAAAAAAAAA  SSSSSSSSSS      22      555555555555
CC      SS      SS      AA      AA      SS      SS      22      55
CC      CC      SS      SS      AA      AA      SS      SS      22      55
CCCCCCCCCCCCC  SSSSSSSSSSSS    AA      AA      SSSSSSSSSSSS    222222222222    555555555555
CCCCCCCCC      SSSSSSSSSS      AA      AA      SSSSSSSSSS      222222222222      555555555555
    
```

```

SSSSSSSSSSS    CCCCCCCCCC      AAAAAAAAA      LL      EEEEEEEEEEEE      FPPPPPPPPPP    CCCCCCCCCC
SSSSSSSSSSS    CCCCCCCCCC      AAAAAAAAAAAAA  LL      EEEEEEEEEEEE      FPPPPPPPPPP    CCCCCCCCCC
SS      SS      CC      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PF      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC
SSSSSSSSSSS    CC      AAAAAAAAAAAAA  LL      EEEEEEEE      FPPPPPPPPPP    CC
SSSSSSSSSSS    CC      AAAAAAAAAAAAA  LL      EEEEEEEE      FPPPPPPPPPP    CC
SS      SS      CC      AA      AA      LL      EE      PP      CC
SS      SS      CC      AA      AA      LL      EE      PP      CC
SS      SS      CC      AA      AA      LL      EE      PP      CC
SSSSSSSSSSS    CCCCCCCCCC      AA      AA      LLLLLLLLLLLL  EEEEEEEEEEEE      PP      CCCCCCCCCC
SSSSSSSSSSS    CCCCCCCCCC      AA      AA      LLLLLLLLLLLL  EEEEEEEEEEEE      PP      CCCCCCCCCC
    
```

```

0000000      8888888888      //      0000000      555555555555      //      9999999999      8888888888
000000000    88888888888888    //      000000000    555555555555      //      999999999999    888888888888
00      00      88      88      //      00      00      55      55      //      99      99      88      88
00      00      88      88      //      00      00      55      55      //      99      99      88      88
00      00      888888888888    //      00      00      555555555555    //      999999999999    888888888888
00      00      888888888888    //      00      00      555555555555    //      999999999999    888888888888
00      00      98      88      //      00      00      55      55      //      99      99      88      88
00      00      88      88      //      00      00      55      55      //      99      99      88      88
00      00      88      88      //      00      00      55      55      //      99      99      88      88
00      00      88      88      //      00      00      55      55      //      99      99      88      88
000000000    88888888888888    //      000000000    555555555555      //      999999999999    888888888888
0000000      888888888888      //      0000000      555555555555      //      999999999999    888888888888
    
```

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0000000      888888888888      //      11      0000000      44      44
000000000    88888888888888    //      111      000000000    444      444
00      00      98      88      //      1111     00      00      //      4444     4444
00      00      88      88      //      11      00      00      //      44      44      44      44
00      00      888888888888    //      11      00      00      //      44      44      44      44
00      00      888888888888    //      11      00      00      //      44      44      44      44
00      00      88      88      //      11      00      00      //      444444444444    444444444444
00      00      88      88      //      11      00      00      //      444444444444    444444444444
00      00      88      88      //      11      00      00      //      44      44      44      44
000000000    88888888888888    //      11111111    000000000    44      44
0000000      888888888888      //      11111111    0000000      44      44
    
```



PWR RODS, NO BASKET, VOID EXTERIOR, GAP VOID

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPHDF4 LIBRARY  
MX 9 MIXTURES  
MSC 9 COMPOSITION SPECIFICATIONS  
IZM 4 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.9500 VOLUME FRACTION  
ROTH 10.9600 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 5.000 WT%  
92238 95.000 WT%  
8016 2.00 ATOMS/MOLECULE  
END

SC ZIRCALLOY STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 6.5600 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
40302 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC AL STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE  
END

SC SS304 STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%  
END

SC PB STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION

```
MX      8 MIXTURE NO.  
VF      1.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL     2 NO. ELEMENTS  
ICP     1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001    2.00 ATOMS/MOLECULE  
        8016    1.00 ATOM/MOLECULE  
END
```

```
SC H2O      STANDARD COMPOSITION  
MX      9 MIXTURE NO.  
VF      0.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL     2 NO. ELEMENTS  
ICP     1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001    2.00 ATOMS/MOLECULE  
        8016    1.00 ATOM/MOLECULE  
END
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP TRIANGPITCH CELL TYPE  
PITCH   2.9217 CM CENTER TO CENTER SPACING  
FUELOD  0.9564 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL   1 MIXTURE NO. OF FUEL  
MMOD    3 MIXTURE NO. OF MODERATOR  
CLADOD  1.1175 CM CLAD OUTER DIAMETER  
MCLAD   2 MIXTURE NO. OF CLAD  
GAPOD   0.9753 CM GAP OUTER DIAMETER  
MGAP    9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```



```
.....  
***  
***          PWR RODS, NO BASKET, VOID EXTERIOR, GAP VOID          ***  
***  
.....  
***          ***** DATA LIBRARY INFORMATION *****          ***  
***  
***          UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION          ***  
***          NUMBER          -----          NAME          -----          ***  
***  
***          89          G:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY          ***  
***  
***          82          G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY          ***  
***  
***          11          D:\PROJECTS\BU85-C-1\rods9\RONX3M\FT11F001          SHORT CROSS SECTION LIBRARY          ***  
***  
***          90          D:\PROJECTS\BU85-C-1\rods9\RONX3M\FT90F001          INPUT DATA DIRECT ACCESS          ***  
***  
.....  
***  
***          STANDARD COMPOSITION LIBRARY DATA          ***  
***          -----          ***  
***  
***          UNIT NUMBER : 89          ***  
***  
***          DATASET NAME : G:\scale43\DATALIB\FT89F001          ***  
***  
***          LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY          ***  
***          637 STANDARD COMPOSITIONS, 490 NUCLIDES          ***  
***          90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRBUTIONS.          ***  
***  
***          CREATION DATE: 6/30/95          ***  
***  
***          CROSS SECTION LIBRARY DATA          ***  
***          -----          ***  
***  
***          UNIT NUMBER : 82          ***  
***  
***          DATASET NAME : G:\scale43\DATALIB\FT82F001          ***  
***  
***          LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY          ***  
***          BASED ON ENDF-B VERSION 4 DATA          ***  
***          COMPILED FOR NRC 1/27/89          ***  
***          LAST UPDATED          08/12/94          ***  
***          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.

```

KK      KK  EEEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEEE  NNN     NN  000000000000     VV      VV
KK      KK  EE            IHHH    IH  00      00     VV      VV
KK      KK  EE            NH  NN    NN  00      00     VV      VV
KK      KK  EE            NN  NN    NN  00      00     VV      VV
KKKKKKKK EEEEEEEEE     NN      NN  00      00     ----- VV      VV
KKKKKKKK EEEEEEEEE     NN      NN  00      00     ----- VV      VV
KK      KK  EE            NN      NN  00      00     VV      VV
KK      KK  EE            NN      NN  00      00     VV      VV
KK      KK  EE            NN      NN  00      00     VV      VV
KK      KK  EE            NN      NN  00      00     VV      VV
KK      KK  EEEEEEEEEEEE  NN      NN  0000000000     VVV
KK      KK  EEEEEEEEEEEE  NN      NN  0000000000     V
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE            PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE            PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE            PP      PP  CC      CC
SSSSSSSSSS  CC      AA      AA  LL      EEEEEEEEE     ----- PPPPPPPPPPP  CC
SSSSSSSSSS  CC      AA      AA  LL      EEEEEEEEE     ----- PPPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE            PP      CC
SS      SS  CC      AA      AA  LL      EE            PP      CC
SS      SS  CC      AA      AA  LL      EE            PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CC      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

0000000  8888888888  //      0000000  55555555555  //      9999999999  8888888888
00000000 888888888888  //      000000000 55555555555  //      99999999999 88888888888
00      00  88      88  //      00      00  55      55  //      99      99  88      88
00      00  88      88  //      00      00  55      55  //      99      99  88      88
00      00  88      88  //      00      00  55      55  //      99      99  88      88
00      00  8888888888  //      00      00  5555555555  //      99999999999 88888888888
00      00  8888888888  //      00      00  5555555555  //      99999999999 88888888888
00      00  88      88  //      00      00  55      55  //      99      99  88      88
00      00  88      88  //      00      00  55      55  //      99      99  88      88
00      00  88      88  //      00      00  55      55  //      99      99  88      88
00000000 888888888888  //      000000000 55555555555  //      99999999999 88888888888
0000000  8888888888  //      0000000  5555555555  //      99999999999 88888888888
    
```

```

0000000  88888888888  //      11      0000000  55555555555  2222222222
00000000 888888888888  //      111     000000000 55555555555 22222222222
00      00  88      88  :::      1111    00      00      :::      55      22
00      00  88      88  :::      11      00      00      :::      55      22
00      00  88      88  :::      11      00      00      :::      55      22
00      00  8888888888  //      11      00      00      :::      55555555555  22
00      00  8888888888  //      11      00      00      :::      55555555555  22
00      00  88      88  :::      11      00      00      :::      55      22
00      00  88      88  :::      11      00      00      :::      55      22
00      00  88      88  :::      11      00      00      :::      55      22
00000000 888888888888  //      1111111  000000000 55555555555 22222222222
0000000  8888888888  //      1111111  0000000  5555555555 22222222222
    
```

```

.....
***
***          "LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"
***
.....
***          *****          NUMERIC PARAMETERS          *****
***
***          TME          MAXIMUM PROBLEM TIME (MIN)          30.00
***
***          TBA          TIME PER GENERATION (MIN)          0.50
***
***          GEN          NUMBER OF GENERATIONS          103
***
***          NPG          NUMBER PER GENERATION          400
***
***          NSK          NUMBER OF GENERATIONS TO BE SKIPPED          3
***
***          BEG          BEGINNING GENERATION NUMBER          1
***
***          RES          GENERATIONS BETWEEN CHECKPOINTS          0
***
***          X1D          NUMBER OF EXTRA 1-D CROSS SECTIONS          1
***
***          NBK          NEUTRON BANK SIZE          425
***
***          XNB          EXTRA POSITIONS IN NEUTRON BANK          0
***
***          NFB          FISSION BANK SIZE          400
***
***          YFB          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          BB827100001
***
***          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
***
.....

```

```

.....
" LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"
.....
***** 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 YES ***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO FMF PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO ***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO PWT PRINT WEIGHT AVERAGE ARRAY NO ***
*** PKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO ***
*** PID PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO ***
*** TRK PRINT TRACKING INFORMATION NO ***
.....
PARAMETER INPUT COMPLETED

```

..... 0 IO'S WERE USED READING THE PARAMETER DATA .....

\*\*\*\*\* DATA READING COMPLETED \*\*\*\*\*

```

.....
***
***          "LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"
***
.....
***
***          ***** 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 17      NUMBER OF UNITS IN THE GLOBAL Y DIR.  0 ***
***
*** ENTRIES/NEUTRON IN THE FISSION BANK 10      NUMBER OF UNITS IN THE GLOBAL Z DIR.  0 ***
***
*** NUMBER OF MIXTURES USED             8      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                 25 ***
***
*** TOTAL INPUT GEOMETRY REGIONS        10      MAXIMUM HOLE NESTING LEVEL      1 ***
***
*** NUMBER OF GEOMETRY REGIONS USED     10      USE NESTED ARRAYS               NO ***
***
*** LARGEST GEOMETRY UNIT NUMBER        2      NUMBER OF ARRAYS USED           0 ***
***
*** LARGEST ARRAY NUMBER                 1      MAXIMUM ARRAY NESTING LEVEL     0 ***
***
***
*** +X BOUNDARY CONDITION                MIR     -X BOUNDARY CONDITION          MIR ***
***
*** +Y BOUNDARY CONDITION                MIR     -Y BOUNDARY CONDITION          MIR ***
***
*** +Z BOUNDARY CONDITION                MIR     -Z BOUNDARY CONDITION          MIR ***
***
.....

```

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM			
			----- UNIT 1 -----			
PWR FUEL ROD						
1	1	1	RADIUS = 0.47810	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
2	1	1	RADIUS = 0.48760	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
3	1	1	RADIUS = 0.55880	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM			
			***** GLOBAL ***** ----- UNIT 2 -----			
1	3	1	RADIUS = 16.986	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
	HOLE NUMBER		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	2	AT X = 0.00000	Y = 2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	3	AT X = 2.5301	Y = 1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	4	AT X = 2.5301	Y = -1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	5	AT X = 0.00000	Y = -2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	6	AT X = -2.5301	Y = -1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	7	AT X = -2.5301	Y = 1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	8	AT X = -2.5301	Y = 4.3825	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	9	AT X = 0.00000	Y = 5.8433	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	10	AT X = 2.5301	Y = 4.3825	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	11	AT X = 5.0603	Y = 2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	12	AT X = 5.0603	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	13	AT X = 5.0603	Y = -2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	14	AT X = 2.5301	Y = -4.3825	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	15	AT X = 0.00000	Y = -5.8433	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	16	AT X = -2.5301	Y = -4.3825	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	17	AT X = -5.0603	Y = -2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	18	AT X = -5.0603	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	19	AT X = -5.0603	Y = 2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	20	AT X = -5.0603	Y = 5.8433	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	21	AT X = 2.5301	Y = 7.3041	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	22	AT X = 7.5904	Y = 1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	23	AT X = 5.0603	Y = -5.8433	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	24	AT X = -2.5301	Y = -7.3041	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	25	AT X = -7.5904	Y = -1.4608	Z = 0.00000	IS UNIT NUMBER 1
2	5	1	RADIUS = 18.891	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
3	6	1	RADIUS = 33.496	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
4	5	1	RADIUS = 36.544	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
5	7	1	RADIUS = 49.244	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
6	5	1	RADIUS = 49.854	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
7	8	1	+X = 49.854	-X = -49.854	+Y = 49.854	-Y = -49.854 +Z = 10.000 -Z = -10.000

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	1.43621E+01 CM**3	1.43621E+01 CM**3
	2	2	5.76429E-01 CM**3	1.49385E+01 CM**3
	3	3	4.68120E+00 CM**3	1.96197E+01 CM**3
2	1	4	1.76387E+04 CM**3	1.81291E+04 CM**3
	2	5	4.29436E+03 CM**3	2.24235E+04 CM**3
	3	6	4.80740E+04 CM**3	7.04975E+04 CM**3
	4	7	1.34136E+04 CM**3	8.39110E+04 CM**3
	5	8	6.84563E+04 CM**3	1.52367E+05 CM**3
	6	9	3.79567E+03 CM**3	1.56163E+05 CM**3
	7	10	4.26699E+04 CM**3	1.98833E+05 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	25	1	1	3.59052E+02 CM**3
		2	9	1.44107E+01 CM**3
		3	2	1.17030E+02 CM**3
2	1	1	3	1.76387E+04 CM**3
		2	5	4.29436E+03 CM**3
		3	6	4.80740E+04 CM**3
		4	5	1.34136E+04 CM**3
		5	7	6.84563E+04 CM**3
		6	5	3.79567E+03 CM**3
		7	8	4.26699E+04 CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	3.59052E+02 CM**3	3.73844E+03
2	1.17030E+02 CM**3	7.67717E+02
3	1.76387E+04 CM**3	1.76064E+04
5	2.15036E+04 CM**3	1.70309E+05
6	4.80740E+04 CM**3	5.45351E+05
7	6.84563E+04 CM**3	6.83311E+04
8	4.26699E+04 CM**3	4.25919E+04
9	1.44107E+01 CM**3	1.43844E-19

```

.....
***
***          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 .....
..... 0.00733 MINUTES WERE USED PROCESSING DATA. ....

```

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 1.60580E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED UNIFORMLY THROUGHOUT THE ENTIRE VOLUME DEFINED BY THE OUTERMOST GEOMETRY CARD.  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 49 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

351 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

0.45350 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.46933 MINUTES.

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

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	292	INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
1	6.50062E-01	5.01667E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	279	INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
2	5.88790E-01	5.39167E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	274	INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
3	5.83844E-01	5.75833E-01	5.83844E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	6.88844E-01	6.13333E-01	6.36344E-01	5.25002E-02	0.00000E+00	0.00000E+00
5	6.44585E-01	6.51667E-01	6.39091E-01	3.04352E-02	0.00000E+00	0.00000E+00
6	5.62068E-01	6.91167E-01	6.19835E-01	2.88780E-02	0.00000E+00	0.00000E+00
7	5.91573E-01	7.29500E-01	6.14183E-01	2.30719E-02	0.00000E+00	0.00000E+00
8	6.00952E-01	7.66167E-01	6.11978E-01	1.89668E-02	0.00000E+00	0.00000E+00
9	5.94883E-01	8.05500E-01	6.09535E-01	1.62148E-02	0.00000E+00	0.00000E+00
10	5.68206E-01	8.43000E-01	6.04369E-01	1.49626E-02	0.00000E+00	0.00000E+00
11	5.68268E-01	8.81500E-01	6.00358E-01	1.37919E-02	0.00000E+00	0.00000E+00
12	6.39110E-01	9.18167E-01	6.04233E-01	1.29303E-02	0.00000E+00	0.00000E+00
13	6.16368E-01	9.56667E-01	6.05326E-01	1.17478E-02	0.00000E+00	0.00000E+00
14	6.31496E-01	9.95000E-01	6.07516E-01	1.09435E-02	0.00000E+00	0.00000E+00
15	6.40650E-01	1.03167E+00	6.10065E-01	1.03842E-02	0.00000E+00	0.00000E+00
16	6.11881E-01	1.07100E+00	6.11045E-01	9.61479E-03	0.00000E+00	0.00000E+00
17	5.87702E-01	1.11033E+00	6.08695E-01	9.07561E-03	0.00000E+00	0.00000E+00
18	6.06461E-01	1.14783E+00	6.08556E-01	8.49061E-03	0.00000E+00	0.00000E+00
19	6.06772E-01	1.18550E+00	6.08451E-01	7.97623E-03	0.00000E+00	0.00000E+00
20	6.11538E-01	1.22383E+00	6.08622E-01	7.52201E-03	0.00000E+00	0.00000E+00
21	6.15649E-01	1.26333E+00	6.08992E-01	7.12472E-03	0.00000E+00	0.00000E+00
22	5.94314E-01	1.29983E+00	6.08258E-01	6.79883E-03	0.00000E+00	0.00000E+00
23	6.27934E-01	1.33733E+00	6.09195E-01	6.53450E-03	0.00000E+00	0.00000E+00
24	6.25886E-01	1.37683E+00	6.09954E-01	6.27642E-03	0.00000E+00	0.00000E+00
25	6.02958E-01	1.41433E+00	6.09650E-01	6.00503E-03	0.00000E+00	0.00000E+00
26	6.47925E-01	1.45450E+00	6.11245E-01	5.96648E-03	0.00000E+00	0.00000E+00
27	5.22236E-01	1.49400E+00	6.07684E-01	6.73995E-03	0.00000E+00	0.00000E+00
28	5.79080E-01	1.53333E+00	6.06584E-01	6.56832E-03	0.00000E+00	0.00000E+00
29	6.35278E-01	1.56900E+00	6.07647E-01	6.40910E-03	0.00000E+00	0.00000E+00
30	6.28571E-01	1.60750E+00	6.08394E-01	6.22101E-03	0.00000E+00	0.00000E+00
31	6.10947E-01	1.64500E+00	6.08482E-01	6.00330E-03	0.00000E+00	0.00000E+00
32	6.08800E-01	1.68067E+00	6.08493E-01	5.79975E-03	0.00000E+00	0.00000E+00
33	6.17914E-01	1.71917E+00	6.08797E-01	5.61777E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	396	INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
34	5.28187E-01	1.75750E+00	6.06278E-01	5.99438E-03	0.00000E+00	0.00000E+00
35	5.88405E-01	1.79700E+00	6.05736E-01	5.83508E-03	0.00000E+00	0.00000E+00
36	5.79583E-01	1.83633E+00	6.04967E-01	5.71288E-03	0.00000E+00	0.00000E+00
37	6.11891E-01	1.87483E+00	6.05165E-01	5.55078E-03	0.00000E+00	0.00000E+00
38	5.52803E-01	1.91317E+00	6.03710E-01	5.58703E-03	0.00000E+00	0.00000E+00
39	6.43414E-01	1.95067E+00	6.04783E-01	5.53887E-03	0.00000E+00	0.00000E+00
40	6.75353E-01	1.98650E+00	6.06640E-01	5.70204E-03	0.00000E+00	0.00000E+00
41	6.05556E-01	2.02483E+00	6.06612E-01	5.55398E-03	0.00000E+00	0.00000E+00
42	6.21874E-01	2.06333E+00	6.06994E-01	5.42678E-03	0.00000E+00	0.00000E+00
43	6.17653E-01	2.10083E+00	6.07254E-01	5.29914E-03	0.00000E+00	0.00000E+00
44	5.88315E-01	2.14117E+00	6.06803E-01	5.19106E-03	0.00000E+00	0.00000E+00
45	6.10426E-01	2.17867E+00	6.06887E-01	5.06960E-03	0.00000E+00	0.00000E+00
46	6.11801E-01	2.21717E+00	6.06999E-01	4.95430E-03	0.00000E+00	0.00000E+00
47	6.77640E-01	2.25183E+00	6.08569E-01	5.09102E-03	0.00000E+00	0.00000E+00
48	5.29465E-01	2.29133E+00	6.06849E-01	5.26771E-03	0.00000E+00	0.00000E+00
49	5.89260E-01	2.32883E+00	6.06475E-01	5.16798E-03	0.00000E+00	0.00000E+00
50	6.09912E-01	2.36817E+00	6.06547E-01	5.05967E-03	0.00000E+00	0.00000E+00
51	6.27383E-01	2.40483E+00	6.06972E-01	4.97355E-03	0.00000E+00	0.00000E+00
52	6.12326E-01	2.44233E+00	6.07079E-01	4.87424E-03	0.00000E+00	0.00000E+00
53	5.84348E-01	2.47983E+00	6.06633E-01	4.79846E-03	0.00000E+00	0.00000E+00
54	5.59227E-01	2.51917E+00	6.05721E-01	4.79278E-03	0.00000E+00	0.00000E+00
55	5.75477E-01	2.55850E+00	6.05151E-01	4.73598E-03	0.00000E+00	0.00000E+00
56	5.74959E-01	2.59882E+00	6.04590E-01	4.68119E-03	0.00000E+00	0.00000E+00
57	5.67444E-01	2.63817E+00	6.02914E-01	4.64465E-03	0.00000E+00	0.00000E+00
58	6.45415E-01	2.67583E+00	6.04656E-01	4.62077E-03	0.00000E+00	0.00000E+00
59	5.95972E-01	2.71517E+00	6.04503E-01	4.54154E-03	0.00000E+00	0.00000E+00
60	6.03708E-01	2.75533E+00	6.04490E-01	4.46257E-03	0.00000E+00	0.00000E+00
61	5.57989E-01	2.79483E+00	6.03701E-01	4.45653E-03	0.00000E+00	0.00000E+00
62	6.24697E-01	2.83317E+00	6.04051E-01	4.39557E-03	0.00000E+00	0.00000E+00
63	6.29967E-01	2.87167E+00	6.04476E-01	4.34374E-03	0.00000E+00	0.00000E+00
64	6.46987E-01	2.90733E+00	6.05162E-01	4.32777E-03	0.00000E+00	0.00000E+00
65	6.05749E-01	2.94400E+00	6.05171E-01	4.25853E-03	0.00000E+00	0.00000E+00
66	6.35054E-01	2.98250E+00	6.05638E-01	4.21739E-03	0.00000E+00	0.00000E+00
67	7.15795E-01	3.01817E+00	6.07233E-01	4.48455E-03	0.00000E+00	0.00000E+00
68	5.59694E-01	3.05750E+00	6.06611E-01	4.47468E-03	0.00000E+00	0.00000E+00
69	5.57212E-01	3.09683E+00	6.05874E-01	4.46863E-03	0.00000E+00	0.00000E+00
70	6.06157E-01	3.13350E+00	6.05878E-01	4.40243E-03	0.00000E+00	0.00000E+00
71	6.20951E-01	3.17100E+00	6.06097E-01	4.34365E-03	0.00000E+00	0.00000E+00
72	5.86138E-01	3.20850E+00	6.05812E-01	4.29064E-03	0.00000E+00	0.00000E+00
73	6.15314E-01	3.24600E+00	6.05946E-01	4.23189E-03	0.00000E+00	0.00000E+00
74	6.49943E-01	3.28450E+00	6.06557E-01	4.21721E-03	0.00000E+00	0.00000E+00
75	6.17206E-01	3.32382E+00	6.06703E-01	4.16159E-03	0.00000E+00	0.00000E+00
76	6.31617E-01	3.35950E+00	6.07039E-01	4.11875E-03	0.00000E+00	0.00000E+00
77	5.38890E-01	3.39800E+00	6.06131E-01	4.16382E-03	0.00000E+00	0.00000E+00
78	6.39127E-01	3.43467E+00	6.06565E-01	4.13154E-03	0.00000E+00	0.00000E+00
79	6.26966E-01	3.47217E+00	6.06930E-01	4.08613E-03	0.00000E+00	0.00000E+00
80	5.73256E-01	3.50967E+00	6.06400E-01	4.05625E-03	0.00000E+00	0.00000E+00
81	6.21337E-01	3.54633E+00	6.06589E-01	4.00904E-03	0.00000E+00	0.00000E+00
82	5.88458E-01	3.58300E+00	6.06362E-01	3.96509E-03	0.00000E+00	0.00000E+00
83	6.20492E-01	3.62050E+00	6.06537E-01	3.91972E-03	0.00000E+00	0.00000E+00
84	5.68290E-01	3.65800E+00	6.06070E-01	3.89962E-03	0.00000E+00	0.00000E+00
85	6.35831E-01	3.69467E+00	6.06429E-01	3.86900E-03	0.00000E+00	0.00000E+00
86	5.45458E-01	3.73482E+00	6.05703E-01	3.89096E-03	0.00000E+00	0.00000E+00
87	6.36212E-01	3.77250E+00	6.06062E-01	3.86163E-03	0.00000E+00	0.00000E+00



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88	5.97694E-01	3.80900E+00	6.05965E-01	3.81770E-03	0.00000E+00	0.00000E+00
89	6.40220E-01	3.84650E+00	6.06358E-01	3.79405E-03	0.00000E+00	0.00000E+00
90	5.96305E-01	3.88600E+00	6.06244E-01	3.75243E-03	0.00000E+00	0.00000E+00
91	6.06641E-01	3.92350E+00	6.06249E-01	3.71003E-03	0.00000E+00	0.00000E+00
92	5.96472E-01	3.96100E+00	6.06140E-01	3.67019E-03	0.00000E+00	0.00000E+00
93	6.39682E-01	4.00033E+00	6.06508E-01	3.64830E-03	0.00000E+00	0.00000E+00
94	6.01010E-01	4.03883E+00	6.06449E-01	3.60892E-03	0.00000E+00	0.00000E+00
95	6.31734E-01	4.07733E+00	6.06721E-01	3.58024E-03	0.00000E+00	0.00000E+00
96	6.48617E-01	4.11383E+00	6.07166E-01	3.56988E-03	0.00000E+00	0.00000E+00
97	6.37762E-01	4.15150E+00	6.07488E-01	3.54676E-03	0.00000E+00	0.00000E+00
98	6.23961E-01	4.18983E+00	6.07660E-01	3.51381E-03	0.00000E+00	0.00000E+00
99	5.81891E-01	4.22733E+00	6.07394E-01	3.48753E-03	0.00000E+00	0.00000E+00
100	6.24901E-01	4.26583E+00	6.07573E-01	3.45638E-03	0.00000E+00	0.00000E+00
101	6.07566E-01	4.30333E+00	6.07573E-01	3.42129E-03	0.00000E+00	0.00000E+00
102	6.08627E-01	4.34000E+00	6.07593E-01	3.38692E-03	0.00000E+00	0.00000E+00
103	6.08048E-01	4.37667E+00	6.07598E-01	3.35322E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

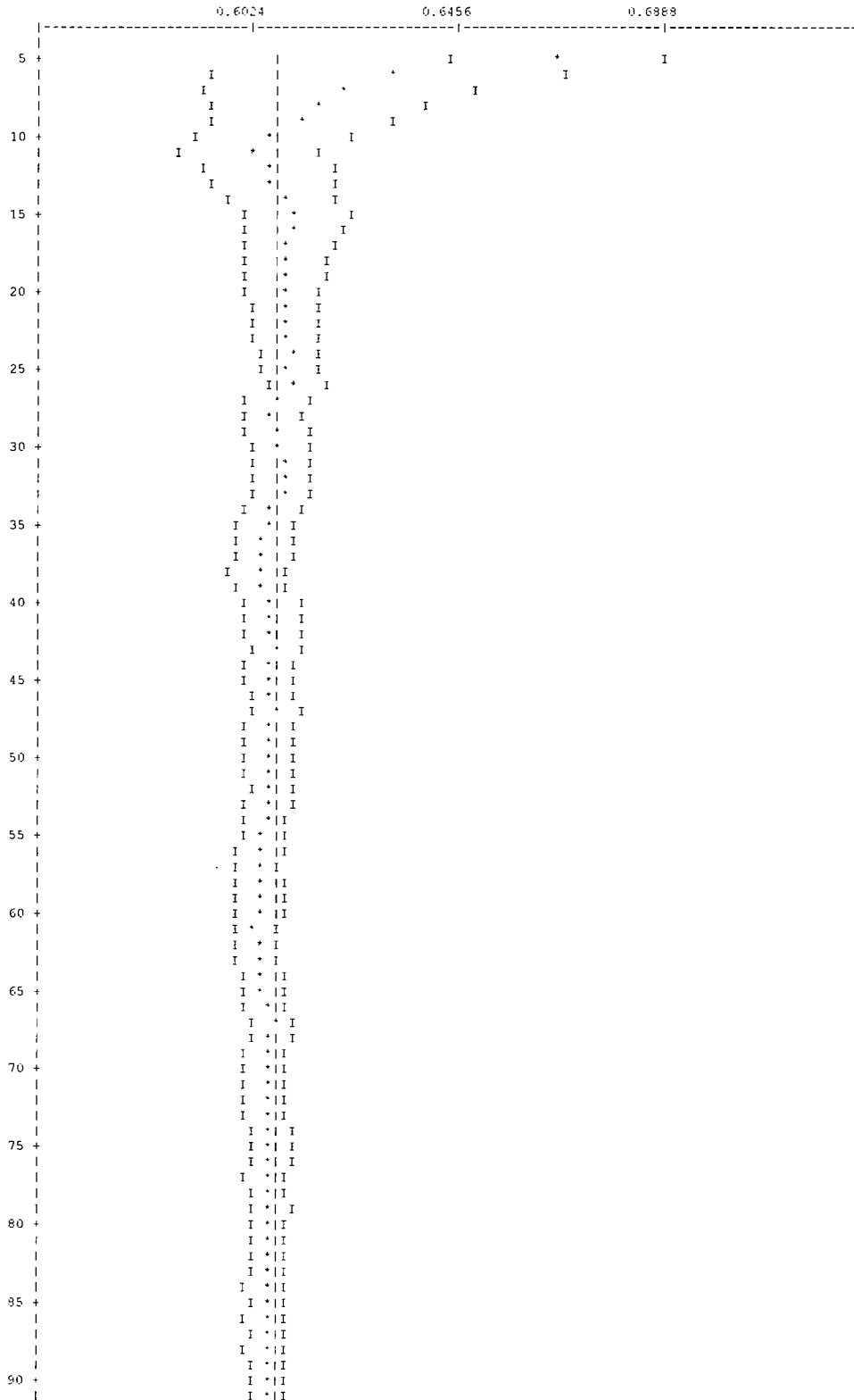
"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

LIFETIME = 2.21135E-04 + OR - 1.12274E-06      GENERATION TIME = 1.16931E-04 + OR - 8.33192E-07  
 NU BAR = 2.42948E+00 + OR - 2.62739E-04      AVERAGE FISSION GROUP = 2.38394E+01 + OR - 1.55874E-02  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 6.34530E-02 + OR - 9.03504E-04

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	0.60783	+ OR - 0.00338	0.60445 TO 0.61120	0.60107 TO 0.61458	0.59769 TO 0.61796	40000
4	0.60701	+ OR - 0.00331	0.60370 TO 0.61032	0.60038 TO 0.61363	0.59707 TO 0.61694	39600
5	0.60662	+ OR - 0.00332	0.60330 TO 0.60995	0.59998 TO 0.61327	0.59666 TO 0.61659	39200
6	0.60708	+ OR - 0.00332	0.60376 TO 0.61041	0.60043 TO 0.61373	0.59711 TO 0.61706	38800
7	0.60724	+ OR - 0.00336	0.60389 TO 0.61060	0.60053 TO 0.61396	0.59718 TO 0.61731	38400
8	0.60731	+ OR - 0.00339	0.60392 TO 0.61070	0.60053 TO 0.61409	0.59714 TO 0.61748	38000
9	0.60744	+ OR - 0.00342	0.60402 TO 0.61087	0.60059 TO 0.61429	0.59717 TO 0.61772	37600
10	0.60786	+ OR - 0.00343	0.60443 TO 0.61130	0.60100 TO 0.61473	0.59756 TO 0.61817	37200
11	0.60830	+ OR - 0.00344	0.60485 TO 0.61174	0.60141 TO 0.61519	0.59796 TO 0.61863	36800
12	0.60796	+ OR - 0.00347	0.60449 TO 0.61142	0.60102 TO 0.61489	0.59756 TO 0.61835	36400
17	0.60739	+ OR - 0.00363	0.60377 TO 0.61102	0.60014 TO 0.61465	0.59651 TO 0.61828	34400
22	0.60742	+ OR - 0.00385	0.60357 TO 0.61127	0.59972 TO 0.61512	0.59588 TO 0.61897	32400
27	0.60756	+ OR - 0.00389	0.60367 TO 0.61145	0.59977 TO 0.61534	0.59588 TO 0.61923	30400
32	0.60721	+ OR - 0.00412	0.60309 TO 0.61132	0.59897 TO 0.61544	0.59485 TO 0.61956	28400
37	0.60887	+ OR - 0.00423	0.60465 TO 0.61310	0.60042 TO 0.61732	0.59620 TO 0.62155	26400
42	0.60798	+ OR - 0.00430	0.60368 TO 0.61228	0.59938 TO 0.61657	0.59508 TO 0.62087	24400
47	0.60680	+ OR - 0.00449	0.60231 TO 0.61129	0.59781 TO 0.61579	0.59332 TO 0.62028	22400
52	0.60809	+ OR - 0.00466	0.60343 TO 0.61275	0.59877 TO 0.61740	0.59411 TO 0.62206	20400
57	0.61198	+ OR - 0.00481	0.60717 TO 0.61679	0.60236 TO 0.62160	0.59755 TO 0.62641	18400
62	0.61276	+ OR - 0.00514	0.60762 TO 0.61790	0.60248 TO 0.62304	0.59735 TO 0.62818	16400
67	0.60805	+ OR - 0.00487	0.60318 TO 0.61292	0.59831 TO 0.61779	0.59344 TO 0.62266	14400
72	0.61160	+ OR - 0.00507	0.60653 TO 0.61667	0.60145 TO 0.62174	0.59638 TO 0.62682	12400
77	0.61179	+ OR - 0.00507	0.60672 TO 0.61686	0.60165 TO 0.62194	0.59658 TO 0.62701	10400
82	0.61226	+ OR - 0.00570	0.60656 TO 0.61795	0.60087 TO 0.62365	0.59517 TO 0.62934	8400
87	0.61570	+ OR - 0.00493	0.61076 TO 0.62063	0.60583 TO 0.62556	0.60089 TO 0.63050	6400
92	0.61944	+ OR - 0.00598	0.61345 TO 0.62542	0.60747 TO 0.63140	0.60149 TO 0.63738	4400
97	0.60917	+ OR - 0.00636	0.60280 TO 0.61553	0.59644 TO 0.62189	0.59008 TO 0.62825	2400

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS  $K-EFF = 0.6078 + GR - 0.0034$  WHICH OCCURS FOR 103 GENERATIONS RUN.



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|          | I * I I  
|          | I * I I  
|          | I * I I  
95 +      | I * I I  
|          | I * I I  
|          | I * I  
|          | I * I  
|          | I * I  
100 +     | I * I  
|          | I * I  
|          | I * I  
|          | I * I
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"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0026			1.57985E-03	8.7976	1.46109E-03	4.6127	0.00000E+00	0.0000
2	0.0115			7.00679E-03	2.7598	4.70633E-03	1.7867	0.00000E+00	0.0000
3	0.0117			7.09670E-03	2.4508	2.94741E-03	2.3817	0.00000E+00	0.0000
4	0.0050			3.04076E-03	2.7124	1.44708E-03	2.5780	0.00000E+00	0.0000
5	0.0017			1.05042E-03	2.2811	9.71530E-04	2.0226	0.00000E+00	0.0000
6	0.0013			8.01924E-04	1.8786	1.27437E-03	1.5946	0.00000E+00	0.0000
7	0.0011			6.58599E-04	2.2485	1.13115E-03	1.8620	0.00000E+00	0.0000
8	0.0009			5.46337E-04	2.7318	1.38799E-03	2.3369	0.00000E+00	0.0000
9	0.0011			6.88145E-04	3.2905	2.04965E-03	2.8429	0.00000E+00	0.0000
10	0.0023			1.37228E-03	4.0690	3.08278E-03	3.1438	0.00000E+00	0.0000
11	0.0050			3.01285E-03	3.2726	5.58792E-03	2.7255	0.00000E+00	0.0000
12	0.0068			4.14269E-03	4.1673	6.55793E-03	3.5414	0.00000E+00	0.0000
13	0.0061			3.70803E-03	4.2331	6.66073E-03	3.2560	0.00000E+00	0.0000
14	0.0052			3.14150E-03	3.9860	1.00693E-02	2.9291	0.00000E+00	0.0000
15	0.0010			5.92258E-04	6.9217	2.66806E-03	3.6113	0.00000E+00	0.0000
16	0.0008			4.92749E-04	8.2799	1.72052E-03	4.2351	0.00000E+00	0.0000
17	0.0011			6.58539E-04	11.8002	1.10648E-03	5.0772	0.00000E+00	0.0000
18	0.0015			9.35353E-04	13.1549	1.20556E-03	5.5875	0.00000E+00	0.0000
19	0.0020			1.22599E-03	9.2968	2.04936E-03	3.7905	0.00000E+00	0.0000
20	0.0084			5.09529E-03	5.8262	8.23197E-03	2.6286	0.00000E+00	0.0000
21	0.0050			3.03201E-03	7.8495	3.81663E-03	4.1344	0.00000E+00	0.0000
22	0.0132			8.02532E-03	4.6382	9.93741E-03	2.4315	0.00000E+00	0.0000
23	0.0855			5.19793E-02	2.0678	7.77471E-02	0.8462	0.00000E+00	0.0000
24	0.2422			1.47194E-01	1.2481	2.28032E-01	0.4439	0.00000E+00	0.0000
25	0.2248			1.36621E-01	1.1692	2.18870E-01	0.4151	0.00000E+00	0.0000
26	0.2717			1.65140E-01	1.0707	2.89862E-01	0.3604	0.00000E+00	0.0000
27	0.0806			4.89865E-02	2.5235	1.07785E-01	0.6253	0.00000E+00	0.0000
SYSTEM TOTAL =				6.07825E-01	0.5558	1.00237E+00	0.1147	0.00000E+00	0.0000

ELAPSED TIME 4.37750 MINUTES

RANDOM NUMBER= 141C1CDC4912

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

```
FREQUENCY FOR GENERATIONS 4 TO 103
0.5183 TO 0.5383 ***
0.5383 TO 0.5583 *****
0.5583 TO 0.5783 *****
0.5783 TO 0.5983 *****
0.5983 TO 0.6183 *****
0.6183 TO 0.6383 *****
0.6383 TO 0.6583 *****
0.6583 TO 0.6783 **
0.6783 TO 0.6983 *
0.6983 TO 0.7183 *
```

```
FREQUENCY FOR GENERATIONS 29 TO 103
0.5183 TO 0.5383 **
0.5383 TO 0.5583 *****
0.5583 TO 0.5783 *****
0.5783 TO 0.5983 *****
0.5983 TO 0.6183 *****
0.6183 TO 0.6383 *****
0.6383 TO 0.6583 *****
0.6583 TO 0.6783 **
0.6783 TO 0.6983 *
0.6983 TO 0.7183 *
```

```
FREQUENCY FOR GENERATIONS 54 TO 103
0.5183 TO 0.5383 ****
0.5383 TO 0.5583 *****
0.5583 TO 0.5783 *****
0.5783 TO 0.5983 *****
0.5983 TO 0.6183 *****
0.6183 TO 0.6383 *****
0.6383 TO 0.6583 *****
0.6583 TO 0.6783 **
0.6783 TO 0.6983 *
0.6983 TO 0.7183 *
```

```
FREQUENCY FOR GENERATIONS 79 TO 103
0.5183 TO 0.5383 *
0.5383 TO 0.5583 **
0.5583 TO 0.5783 ****
0.5783 TO 0.5983 *****
0.5983 TO 0.6183 *****
0.6183 TO 0.6383 *****
0.6383 TO 0.6583 ****
0.6583 TO 0.6783 ***
0.6783 TO 0.6983 **
0.6983 TO 0.7183 *
```

.....

CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 4.37750 MINUTES

.....

-

Figure 6.6.4-2 CSAS Input/Output for NAC-LWT with 25 PWR Rods – Most Reactive Accident Condition Configuration

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
PWR RODS, NO BASKET, VOID EXTERIOR, GAP FULL
27GROUPNDF4 LATTICECELL
UO2 1 0.95 293.0 92235 5.0 92238 95.0 END
ZIRCALLOY 2 1.0 293.0 END
H2O 3 1.000 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
FB 6 1.0 293.0 END
H2O 7 1.000 293.0 END
H2O 8 1.000 293.0 END
H2O 9 1.0 293.0 END
END COMP
TRIANGPITCH 2.92169 0.9564 1 3 1.1175 2 0.9753 9 END
"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"
READ PARAM RUN=YES PLT=NO GEN=103 NFG=400 END PARAM
READ GEOM
UNIT 1
COM="PWR FUEL ROD"
CYLINDER 1 1 0.4781 2P10.0
CYLINDER 9 1 0.4876 2P10.0
CYLINDER 2 1 0.5588 2P10.0
GLOBAL UNIT 2
CYLINDER 3 1 16.9863 2P10.0
HOLE 1 .0000 .0000 .0000
HOLE 1 .0000 2.9216 .0000
HOLE 1 2.5301 1.4608 .0000
HOLE 1 2.5301 -1.4608 .0000
HOLE 1 .0000 -2.9216 .0000
HOLE 1 -2.5301 -1.4608 .0000
HOLE 1 -2.5301 1.4608 .0000
HOLE 1 -2.5301 4.3825 .0000
HOLE 1 .0000 5.8433 .0000
HOLE 1 2.5301 4.3825 .0000
HOLE 1 5.0603 2.9216 .0000
HOLE 1 5.0603 .0000 .0000
HOLE 1 5.0603 -2.9216 .0000
HOLE 1 2.5301 -4.3825 .0000
HOLE 1 .0000 -5.8433 .0000
HOLE 1 -2.5301 -4.3825 .0000
HOLE 1 -5.0603 -2.9216 .0000
HOLE 1 -5.0603 .0000 .0000
HOLE 1 -5.0603 2.9216 .0000
HOLE 1 -5.0603 5.8433 .0000
HOLE 1 2.5301 7.3041 .0000
HOLE 1 7.5904 1.4608 .0000
HOLE 1 5.0603 -5.8433 .0000
HOLE 1 -2.5301 -7.3041 .0000
HOLE 1 -7.5904 -1.4608 .0000
CYLINDER 5 1 18.8913 2P10.0
CYLINDER 6 1 33.4963 2P10.0
CYLINDER 5 1 36.5443 2P10.0
CYLINDER 7 1 49.2443 2P10.0
CYLINDER 5 1 49.8539 2P10.0
CUBOID 8 1 4P49.8539 2P10.0
END GEOM
READ BOUNDS ALL=MIR END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.04 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 11.46 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 472.53 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 488.18 (SECONDS).

```







PWR RODS, NO BASKET, VOID EXTERIOR, GAP FULL

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
 MX 9 MIXTURES  
 MSC 9 COMPOSITION SPECIFICATIONS  
 IZM 4 MATERIAL ZONES  
 GE LATTICECELL GEOMETRY  
 MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
 MSLH 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
 MX 1 MIXTURE NO.  
 VF 0.9500 VOLUME FRACTION  
 ROTH 10.9600 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 92000 1.00 ATOM/MOLECULE  
 92235 5.000 WT%  
 92238 95.000 WT%  
 8016 2.00 ATOMS/MOLECULE  
 END

SC ZIRCALLOY STANDARD COMPOSITION  
 MX 2 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 6.5600 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 40302 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 3 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC AL STANDARD COMPOSITION  
 MX 4 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 2.7020 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 13027 1.00 ATOM/MOLECULE  
 END

SC SS304 STANDARD COMPOSITION  
 MX 5 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 7.9200 THEORETICAL DENSITY  
 NEL 4 NO. ELEMENTS  
 ICP 0 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 24304 19.000 WT%  
 25055 2.000 WT%  
 26304 69.500 WT%  
 28304 9.500 WT%  
 END

SC PB STANDARD COMPOSITION  
 MX 6 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 11.3440 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 82000 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 7 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION

```
MX          8 MIXTURE NO.  
VF          1.0000 VOLUME FRACTION  
ROTH        0.9982 THEORETICAL DENSITY  
NEL         2 NO. ELEMENTS  
ICP         1 0/1 MIXTURE/COMPOUND  
TEMP        293.0 DEG KELVIN  
           1001 2.00 ATOMS/MOLECULE  
           8016 1.00 ATOM/MOLECULE  
END
```

```
SC H2O      STANDARD COMPOSITION  
MX          9 MIXTURE NO.  
VF          1.0000 VOLUME FRACTION  
ROTH        0.9982 THEORETICAL DENSITY  
NEL         2 NO. ELEMENTS  
ICP         1 0/1 MIXTURE/COMPOUND  
TEMP        293.0 DEG KELVIN  
           1001 2.00 ATOMS/MOLECULE  
           8016 1.00 ATOM/MOLECULE  
END
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP TRIANGPITCH CELL TYPE  
PITCH       2.9217 CM CENTER TO CENTER SPACING  
FUELOD      0.9564 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL       1 MIXTURE NO. OF FUEL  
MMOD        3 MIXTURE NO. OF MODERATOR  
CLADOD      1.1175 CM CLAD OUTER DIAMETER  
MCLAD       2 MIXTURE NO. OF CLAD  
GAPOD       0.9753 CM GAP OUTER DIAMETER  
MGAP        9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```

```

.....
***
***                               PWR RODS, NO BASKET, VOID EXTERIOR, GAP FULL
***
.....
***
***                               ***** DATA LIBRARY INFORMATION *****
***
***                               UNIT          VOLUME          UNIT FUNCTION
***                               NUMBER        NAME              NAME
***                               -----
***
***                               89          G:\scale43\DATA
LIB\FT89F001          STANDARD COMPOSITION LIBRARY
***
***                               82          G:\scale43\DATA
LIB\FT82F001          CROSS SECTION LIBRARY
***
***                               11          D:\PROJECTS\BU85-C-1\rods8\ROHX3M\FT11F001
          SHORT CROSS SECTION LIBRARY
***
***                               90          D:\PROJECTS\BU85-C-1\rods8\ROHX3M\FT90F001
          INPUT DATA DIRECT ACCESS
***
.....
***
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER : 89
***
***                               DATASET NAME : G:\scale43\DATA
LIB\FT89F001
***
***                               LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
          637 STANDARD COMPOSITIONS, 490 NUCLIDES
          90 ELEMENTS WITH VARIABLE ISOTOPIIC DISTRIBUTIONS.
***
***                               CREATION DATE: 6/30/95
***
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER : 82
***
***                               DATASET NAME : G:\scale43\DATA
LIB\FT82F001
***
***                               LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
          BASED ON ENDF-B VERSION 4 DATA
          COMPILED FOR NRC      1/27/89
          LAST UPDATED
          L.M.PETRIE - ORNL
***
***                               08/12/94
***
.....

```

```

..... 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.

```

KK      KK  EEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEE  NNN     NN  000000000000     VV      VV
KK      KK  EE           NNNN    NN  00      00      VV      VV
KK      KK  EE           NN  NN   NN  00      00      VV      VV
KK      KK  EE           NN  NN   NI  00      00      VV      VV
KKKKKKKK EEEEEEEEE   NI      NN  NN  00      00      VV      VV
KKKKKKKK EEEEEEEEE   NN     NN  NN  00      00      VV      VV
KK      KK  EE           NN     NN  NN  00      00      VV      VV
KK      KK  EE           NI      NN  NN  00      00      VV      VV
KK      KK  EE           NI      NN  NN  00      00      VV      VV
KK      KK  EEEEEEEEEEE  NI      NN  0000000000     VVV     VV
KK      KK  EEEEEEEEEEE  NN      NN  0000000000     V      V
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE   PPPPPPPPPPP  CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE   PPPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE           PP      CC
SS      SS  CC      AA      AA  LL      EE           PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

0000000  777777777777  //  3333333333  0000000  //  9999999999  8888888888
00000000  77777777777  //  33333333333  00000000  //  99999999999  88888888888
00      00  77      77  //  33      33  00      00  //  99      99  88      88
00      00  77      77  //  33      33  00      00  //  99      99  88      88
00      00  77      77  //  33      33  00      00  //  99999999999  88888888888
00      00  77      77  //  33      33  00      00  //  99999999999  88888888888
00      00  77      77  //  33      33  00      00  //  99      99  88      88
00      00  77      77  //  33      33  00      00  //  99      99  88      88
00000000  77      //  33333333333  00000000  //  99999999999  88888888888
0000000  77      //  3333333333  0000000  //  99999999999  88888888888
    
```

```

11      9999999999  //  11      5555555555  //  11      222222222
111     99999999999  //  111     55555555555  //  111     22222222222
1111    99      99  //  1111    55      55  //  1111    22      22
11      99      99  //  11      55      55  //  11      22      22
11      99      99  //  11      55      55  //  11      22      22
11      99999999999  //  11      55555555555  //  11      22      22
11      99999999999  //  11      55555555555  //  11      22      22
11      99      99  //  11      55      55  //  11      22      22
11      99      99  //  11      55      55  //  11      22      22
11      99      99  //  11      55      55  //  11      22      22
1111111  99999999999  //  1111111  55555555555  //  1111111  22222222222
1111111  99999999999  //  1111111  55555555555  //  1111111  22222222222
    
```

```
.....  
***  
*** "LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"  
***  
.....  
***          ***** NUMERIC PARAMETERS *****  
.....  
***  
*** TME          MAXIMUM PROBLEM TIME (MIN)          30.00  
***  
*** TBA          TIME PER GENERATION (MIN)           0.50  
***  
*** GEN          NUMBER OF GENERATIONS              103  
***  
*** NPG          NUMBER PER GENERATION              400  
***  
*** NSK          NUMBER OF GENERATIONS TO BE SKIPPED 3  
***  
*** BEG          BEGINNING GENERATION NUMBER        1  
***  
*** RES          GENERATIONS BETWEEN CHECKPOINTS    0  
***  
*** X1D          NUMBER OF EXTRA 1-D CROSS SECTIONS 1  
***  
*** NBK          NEUTRON BANK SIZE                  425  
***  
*** XNB          EXTRA POSITIONS IN NEUTRON BANK    0  
***  
*** NFB          FISSION BANK SIZE                  400  
***  
*** 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             BB827100001  
***  
*** 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  
***  
.....
```



```

.....
***
*** "LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"
***
.....
***
***          ***** 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 17     NUMBER OF UNITS IN THE GLOBAL Y DIR. 0 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK 10     NUMBER OF UNITS IN THE GLOBAL Z DIR. 0 ***
*** NUMBER OF MIXTURES USED              8      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                 25 ***
*** TOTAL INPUT GEOMETRY REGIONS         10     MAXIMUM HOLE NESTING LEVEL      1 ***
*** NUMBER OF GEOMETRY REGIONS USED      10     USE NESTED ARRAYS              NO ***
*** LARGEST GEOMETRY UNIT NUMBER         2      NUMBER OF ARRAYS USED          0 ***
*** LARGEST ARRAY NUMBER                 1      MAXIMUM ARRAY NESTING LEVEL    0 ***
***
*** +X BOUNDARY CONDITION                MIR    -X BOUNDARY CONDITION          MIR ***
*** +Y BOUNDARY CONDITION                MIR    -Y BOUNDARY CONDITION          MIR ***
*** +Z BOUNDARY CONDITION                MIR    -Z BOUNDARY CONDITION          MIR ***
***
.....

```

```

.....
***
*** "LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"
***
.....
***
***          ***** SPACE AND SUPERGROUP INFORMATION *****
***
*** 100000 WORDS IS THE TOTAL SPACE AVAILABLE.
***
*** 12479 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
***
*** 87521 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
***
*** 99784 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
***
*** 87461 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
***
*** 1165 WORDS ARE NEEDED FOR THE LARGEST GROUP.
***
*** 13860 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
***
*** 25594 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
***
*** 25760 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.
***
.....

```

```

.....
***
***          STARTING      ENDING      XSEC      ALBEDO      TOTAL
*** SUPERGROUP      GROUP        GROUP      LENGTH     LENGTH     LENGTH
***
***          1          1          27        2636        0        13055
***
.....

```

```

.....
***          0 IO'S WERE USED IN SUPERGROUPING .....
***          0 IO'S WERE USED LOADING THE DATA .....
***
.....

```



"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
			----	UNIT	1	----	
PWR FUEL ROD							
1	CYLINDER	1	1	RADIUS = 0.47610	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
2	CYLINDER	1	1	RADIUS = 0.48760	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
3	CYLINDER	1	1	RADIUS = 0.55980	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
			*****	GLOBAL	*****		
			----	UNIT	2	----	
1	CYLINDER	3	1	RADIUS = 16.986	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
	HOLE NUMBER	1		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	2		AT X = 0.00000	Y = 2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	3		AT X = 2.5301	Y = 1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	4		AT X = 2.5301	Y = -1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	5		AT X = 0.00000	Y = -2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	6		AT X = -2.5301	Y = -1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	7		AT X = -2.5301	Y = 1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	8		AT X = -2.5301	Y = 4.3825	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	9		AT X = 0.00000	Y = 5.8433	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	10		AT X = 2.5301	Y = 4.3825	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	11		AT X = 5.0603	Y = 2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	12		AT X = 5.0603	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	13		AT X = 5.0603	Y = -2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	14		AT X = 2.5301	Y = -4.3825	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	15		AT X = 0.00000	Y = -5.8433	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	16		AT X = -2.5301	Y = -4.3825	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	17		AT X = -5.0603	Y = -2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	18		AT X = -5.0603	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	19		AT X = -5.0603	Y = 2.9216	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	20		AT X = -5.0603	Y = 5.8433	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	21		AT X = 2.5301	Y = 7.3041	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	22		AT X = 7.5904	Y = 1.4608	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	23		AT X = 5.0603	Y = -5.8433	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	24		AT X = -2.5301	Y = -7.3041	Z = 0.00000	IS UNIT NUMBER 1
	HOLE NUMBER	25		AT X = -7.5904	Y = -1.4608	Z = 0.00000	IS UNIT NUMBER 1
2	CYLINDER	5	1	RADIUS = 18.891	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
3	CYLINDER	6	1	RADIUS = 33.496	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
4	CYLINDER	5	1	RADIUS = 36.544	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
5	CYLINDER	7	1	RADIUS = 49.244	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
6	CYLINDER	5	1	RADIUS = 49.854	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000
7	CUBOID	8	1	+X = 49.854	-X = -49.854	+Y = 49.854	-Y = -49.854 +Z = 10.000 -Z = -10.000

"LWT CASK, 25 FWR RODS, NO FWR BASKET, 5 W/O U235 VARIABLE PITCH"  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	1.43621E+01 CM**3	1.43621E+01 CM**3
	2	2	5.76429E+01 CM**3	1.49385E+01 CM**3
	3	3	4.68120E+00 CM**3	1.96197E+01 CM**3
2	1	4	1.76387E+04 CM**3	1.81291E+04 CM**3
	2	5	4.29436E+03 CM**3	2.24235E+04 CM**3
	3	6	4.80740E+04 CM**3	7.04975E+04 CM**3
	4	7	1.34136E+04 CM**3	8.39110E+04 CM**3
	5	8	6.84563E+04 CM**3	1.52367E+05 CM**3
	6	9	3.79567E+03 CM**3	1.56163E+05 CM**3
	7	10	4.26699E+04 CM**3	1.98833E+05 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	25	1	1	3.59052E+02 CM**3
		2	9	1.44107E+01 CM**3
		3	2	1.17030E+02 CM**3
2	1	1	3	1.76387E+04 CM**3
		2	5	4.29436E+03 CM**3
		3	6	4.80740E+04 CM**3
		4	5	1.34136E+04 CM**3
		5	7	6.84563E+04 CM**3
		6	5	3.79567E+03 CM**3
		7	8	4.26699E+04 CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	3.59052E+02 CM**3	3.73844E+03
2	1.17030E+02 CM**3	7.67717E+02
3	1.76387E+04 CM**3	1.76064E+04
5	2.15036E+04 CM**3	1.70309E+05
6	4.80740E+04 CM**3	5.45351E+05
7	6.84563E+04 CM**3	6.83311E+04
8	4.26699E+04 CM**3	4.25919E+04
9	1.44107E+01 CM**3	1.43844E+01

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.....
***
***          BIASING INFORMATION          ***
***
***  A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S.  ***
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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....
..... 0.01550 MINUTES WERE USED PROCESSING DATA. ....

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VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 1.80590E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED UNIFORMLY THROUGHOUT THE ENTIRE VOLUME DEFINED BY THE OUTERMOST GEOMETRY CARD.  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 26 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

374 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

0.45333 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.46933 MINUTES.

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

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	307 INDEPENDENT	FISSION POINTS WERE	0.00000E+00	0.00000E+00	0.00000E+00
1	6.17738E-01	5.35500E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	281 INDEPENDENT	FISSION POINTS WERE	0.00000E+00	0.00000E+00	0.00000E+00
2	5.93025E-01	6.09667E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	282 INDEPENDENT	FISSION POINTS WERE	0.00000E+00	0.00000E+00	0.00000E+00
3	5.90939E-01	6.82000E-01	5.90939E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	5.62855E-01	7.58833E-01	5.76897E-01	1.40421E-02	0.00000E+00	0.00000E+00
5	6.03062E-01	8.32000E-01	5.85619E-01	1.19079E-02	0.00000E+00	0.00000E+00
6	6.08147E-01	9.02500E-01	5.91251E-01	1.01301E-02	0.00000E+00	0.00000E+00
7	5.88029E-01	9.74833E-01	5.90606E-01	7.87316E-03	0.00000E+00	0.00000E+00
8	5.65290E-01	1.05083E+00	5.86387E-01	7.68943E-03	0.00000E+00	0.00000E+00
9	6.54057E-01	1.11767E+00	5.96054E-01	1.16484E-02	0.00000E+00	0.00000E+00
10	6.16864E-01	1.19467E+00	5.98668E-01	1.04209E-02	0.00000E+00	0.00000E+00
11	6.46536E-01	1.26600E+00	6.03987E-01	1.06185E-02	0.00000E+00	0.00000E+00
12	6.84139E-01	1.33917E+00	6.12002E-01	1.24276E-02	0.00000E+00	0.00000E+00
13	6.15014E-01	1.41333E+00	6.12276E-01	1.12445E-02	0.00000E+00	0.00000E+00
14	6.19643E-01	1.48383E+00	6.12890E-01	1.02831E-02	0.00000E+00	0.00000E+00
15	6.40168E-01	1.55250E+00	6.14988E-01	9.68907E-03	0.00000E+00	0.00000E+00
16	6.32312E-01	1.62033E+00	6.16225E-01	9.05528E-03	0.00000E+00	0.00000E+00
17	5.78563E-01	1.69800E+00	6.13715E-01	8.79599E-03	0.00000E+00	0.00000E+00
18	5.70044E-01	1.77317E+00	6.10985E-01	8.66878E-03	0.00000E+00	0.00000E+00
19	6.15171E-01	1.84183E+00	6.11231E-01	8.14663E-03	0.00000E+00	0.00000E+00
20	6.43842E-01	1.91050E+00	6.13049E-01	7.89277E-03	0.00000E+00	0.00000E+00
21	6.52849E-01	1.98100E+00	6.15143E-01	7.75412E-03	0.00000E+00	0.00000E+00
22	6.00828E-01	2.04967E+00	6.14428E-01	7.39094E-03	0.00000E+00	0.00000E+00
23	6.41552E-01	2.12183E+00	6.15719E-01	7.14786E-03	0.00000E+00	0.00000E+00
24	6.32890E-01	2.19050E+00	6.16500E-01	6.85976E-03	0.00000E+00	0.00000E+00
25	6.27317E-01	2.26467E+00	6.16970E-01	6.57158E-03	0.00000E+00	0.00000E+00
26	6.23046E-01	2.33617E+00	6.17223E-01	6.29690E-03	0.00000E+00	0.00000E+00
27	5.82499E-01	2.40850E+00	6.15834E-01	6.19743E-03	0.00000E+00	0.00000E+00
28	6.21451E-01	2.48167E+00	6.16050E-01	5.95821E-03	0.00000E+00	0.00000E+00
29	6.11586E-01	2.55667E+00	6.15885E-01	5.73568E-03	0.00000E+00	0.00000E+00
30	5.99803E-01	2.62717E+00	6.15311E-01	5.55680E-03	0.00000E+00	0.00000E+00
31	5.79691E-01	2.70050E+00	6.14082E-01	5.50065E-03	0.00000E+00	0.00000E+00
32	5.81116E-01	2.77183E+00	6.12984E-01	5.42656E-03	0.00000E+00	0.00000E+00
33	5.97332E-01	2.84233E+00	6.12479E-01	5.27282E-03	0.00000E+00	0.00000E+00
34	5.84740E-01	2.91467E+00	6.11612E-01	5.17845E-03	0.00000E+00	0.00000E+00
35	6.17649E-01	2.98333E+00	6.11795E-01	5.02241E-03	0.00000E+00	0.00000E+00
36	5.60931E-01	3.05933E+00	6.10299E-01	5.09693E-03	0.00000E+00	0.00000E+00
37	5.93069E-01	3.12983E+00	6.09806E-01	4.97359E-03	0.00000E+00	0.00000E+00
38	5.93479E-01	3.20400E+00	6.09353E-01	4.85469E-03	0.00000E+00	0.00000E+00
39	6.36434E-01	3.27633E+00	6.10085E-01	4.77805E-03	0.00000E+00	0.00000E+00
40	6.22092E-01	3.34583E+00	6.10401E-01	4.66134E-03	0.00000E+00	0.00000E+00
41	6.21971E-01	3.41717E+00	6.10698E-01	4.54993E-03	0.00000E+00	0.00000E+00
42	6.35092E-01	3.48400E+00	6.11307E-01	4.47646E-03	0.00000E+00	0.00000E+00
43	6.37146E-01	3.55450E+00	6.11938E-01	4.41116E-03	0.00000E+00	0.00000E+00
44	5.55148E-01	3.63233E+00	6.10585E-01	4.51220E-03	0.00000E+00	0.00000E+00
45	6.02323E-01	3.70650E+00	6.10393E-01	4.41021E-03	0.00000E+00	0.00000E+00
46	5.85122E-01	3.77967E+00	6.09819E-01	4.34692E-03	0.00000E+00	0.00000E+00
47	6.17823E-01	3.85567E+00	6.09997E-01	4.25294E-03	0.00000E+00	0.00000E+00
48	6.50272E-01	3.92717E+00	6.10872E-01	4.25061E-03	0.00000E+00	0.00000E+00
49	6.48568E-01	3.99583E+00	6.11674E-01	4.23581E-03	0.00000E+00	0.00000E+00
50	6.21761E-01	4.06633E+00	6.11895E-01	4.15195E-03	0.00000E+00	0.00000E+00
51	6.32914E-01	4.13867E+00	6.12314E-01	4.08892E-03	0.00000E+00	0.00000E+00
52	5.92216E-01	4.21000E+00	6.11912E-01	4.02642E-03	0.00000E+00	0.00000E+00
53	5.74569E-01	4.28133E+00	6.11180E-01	4.01403E-03	0.00000E+00	0.00000E+00
54	6.21663E-01	4.35000E+00	6.11381E-01	3.94124E-03	0.00000E+00	0.00000E+00
55	6.18352E-01	4.41967E+00	6.11513E-01	3.86840E-03	0.00000E+00	0.00000E+00
56	6.14087E-01	4.49567E+00	6.11560E-01	3.79638E-03	0.00000E+00	0.00000E+00
57	6.45562E-01	4.56883E+00	6.12179E-01	3.77765E-03	0.00000E+00	0.00000E+00
58	6.83629E-01	4.63483E+00	6.13454E-01	3.92286E-03	0.00000E+00	0.00000E+00
59	5.84007E-01	4.70983E+00	6.12938E-01	3.88790E-03	0.00000E+00	0.00000E+00
60	6.02552E-01	4.78033E+00	6.12759E-01	3.82448E-03	0.00000E+00	0.00000E+00
61	6.55602E-01	4.85167E+00	6.13485E-01	3.82859E-03	0.00000E+00	0.00000E+00
62	5.56112E-01	4.92317E+00	6.12529E-01	3.88379E-03	0.00000E+00	0.00000E+00
63	6.06527E-01	4.99550E+00	6.12430E-01	3.82086E-03	0.00000E+00	0.00000E+00
64	6.12000E-01	5.06683E+00	6.12423E-01	3.75873E-03	0.00000E+00	0.00000E+00
65	6.24962E-01	5.14000E+00	6.12622E-01	3.70394E-03	0.00000E+00	0.00000E+00
66	5.48012E-01	5.21700E+00	6.11613E-01	3.78281E-03	0.00000E+00	0.00000E+00
67	5.62255E-01	5.28933E+00	6.10854E-01	3.80078E-03	0.00000E+00	0.00000E+00
68	5.93111E-01	5.36167E+00	6.10585E-01	3.75239E-03	0.00000E+00	0.00000E+00
69	5.80987E-01	5.43117E+00	6.10143E-01	3.72227E-03	0.00000E+00	0.00000E+00
70	6.00007E-01	5.50533E+00	6.09994E-01	3.67015E-03	0.00000E+00	0.00000E+00
71	6.45326E-01	5.57300E+00	6.10506E-01	3.65264E-03	0.00000E+00	0.00000E+00
72	6.32962E-01	5.64267E+00	6.10827E-01	3.61435E-03	0.00000E+00	0.00000E+00
73	5.79951E-01	5.71217E+00	6.10392E-01	3.58952E-03	0.00000E+00	0.00000E+00
74	5.69347E-01	5.78267E+00	6.09822E-01	3.58493E-03	0.00000E+00	0.00000E+00
75	6.21438E-01	5.85233E+00	6.09981E-01	3.53905E-03	0.00000E+00	0.00000E+00
76	5.52810E-01	5.93000E+00	6.09208E-01	3.57537E-03	0.00000E+00	0.00000E+00
77	5.94247E-01	5.99967E+00	6.09010E-01	3.53294E-03	0.00000E+00	0.00000E+00
78	6.16649E-01	6.07283E+00	6.09111E-01	3.48759E-03	0.00000E+00	0.00000E+00
79	6.16676E-01	6.14517E+00	6.09209E-01	3.44340E-03	0.00000E+00	0.00000E+00
80	5.91369E-01	6.21750E+00	6.08980E-01	3.40665E-03	0.00000E+00	0.00000E+00
81	5.93922E-01	6.29167E+00	6.08790E-01	3.36865E-03	0.00000E+00	0.00000E+00
82	6.17036E-01	6.36400E+00	6.08893E-01	3.32787E-03	0.00000E+00	0.00000E+00
83	5.64033E-01	6.44083E+00	6.08339E-01	3.33287E-03	0.00000E+00	0.00000E+00
84	6.18586E-01	6.51317E+00	6.08464E-01	3.29434E-03	0.00000E+00	0.00000E+00
85	5.97377E-01	6.58833E+00	6.08330E-01	3.25715E-03	0.00000E+00	0.00000E+00
86	6.07878E-01	6.66417E+00	6.08325E-01	3.21815E-03	0.00000E+00	0.00000E+00
87	6.82650E-01	6.73100E+00	6.09199E-01	3.29809E-03	0.00000E+00	0.00000E+00
88	6.42184E-01	6.79783E+00	6.09582E-01	3.28200E-03	0.00000E+00	0.00000E+00

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89	5.55622E-01	6.87567E+00	6.08963E-01	3.30282E-03	0.00000E+00	0.00000E+00
90	6.06546E-01	6.94617E+00	6.08935E-01	3.26518E-03	0.00000E+00	0.00000E+00
91	5.78921E-01	7.02133E+00	6.08597E-01	3.24597E-03	0.00000E+00	0.00000E+00
92	5.66679E-01	7.09083E+00	6.08131E-01	3.24332E-03	0.00000E+00	0.00000E+00
93	6.20164E-01	7.16500E+00	6.08263E-01	3.21020E-03	0.00000E+00	0.00000E+00
94	6.06480E-01	7.23550E+00	6.08244E-01	3.17518E-03	0.00000E+00	0.00000E+00
95	5.78361E-01	7.30233E+00	6.07923E-01	3.15724E-03	0.00000E+00	0.00000E+00
96	5.98211E-01	7.37650E+00	6.07819E-01	3.12518E-03	0.00000E+00	0.00000E+00
97	5.80272E-01	7.44783E+00	6.07529E-01	3.10568E-03	0.00000E+00	0.00000E+00
98	6.13701E-01	7.51750E+00	6.07594E-01	3.07383E-03	0.00000E+00	0.00000E+00
99	6.02988E-01	7.58700E+00	6.07546E-01	3.04235E-03	0.00000E+00	0.00000E+00
100	6.10898E-01	7.65383E+00	6.07580E-01	3.01134E-03	0.00000E+00	0.00000E+00
101	5.52344E-01	7.72700E+00	6.07022E-01	3.03253E-03	0.00000E+00	0.00000E+00
102	6.13199E-01	7.79567E+00	6.07094E-01	3.00269E-03	0.00000E+00	0.00000E+00
103	6.08742E-01	7.86433E+00	6.07101E-01	2.97286E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

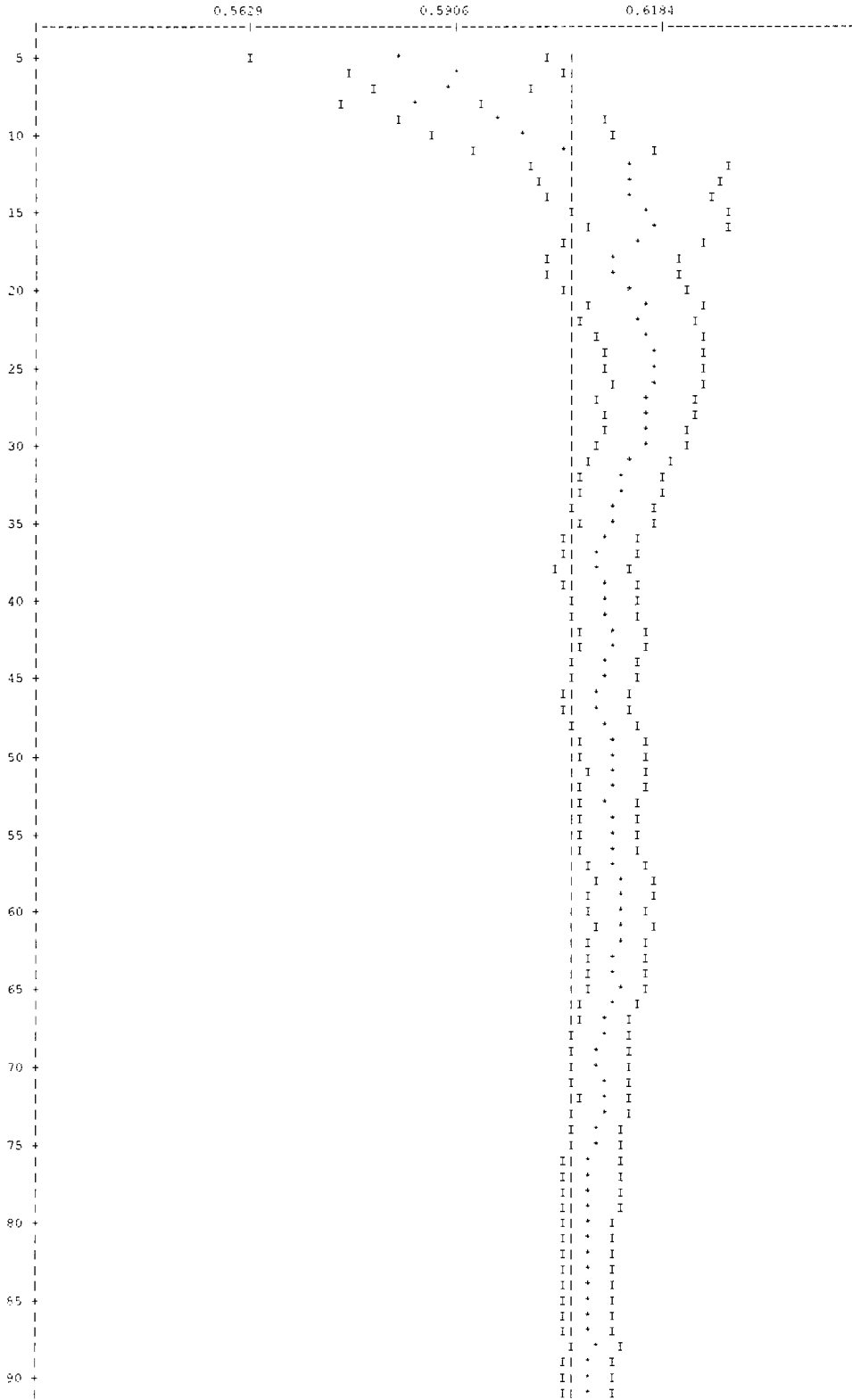
"LWT CASK, 25 PWR ROES, NO PWR BASKET, 5 W/O U235 VARIABLE FITCH"

LIFETIME = 2.18556E-04 + OR - 1.10041E-06      GENERATION TIME = 1.16144E-04 + OR - 8.15332E-07  
 NU BAR = 2.42957E+00 + OR - 2.50942E-04      AVERAGE FISSION GROUP = 2.38494E+01 + OR - 1.41599E-02  
 ENERGY(EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 6.26896E-02 + OR - 8.45492E-04

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	0.60726	+ OR - 0.00300	0.60426 TO 0.61026	0.60127 TO 0.61326	0.59827 TO 0.61626	40000
4	0.60771	+ OR - 0.00299	0.60472 TO 0.61071	0.60172 TO 0.61370	0.59873 TO 0.61669	29600
5	0.60776	+ OR - 0.00302	0.60473 TO 0.61078	0.60171 TO 0.61381	0.59868 TO 0.61683	39200
6	0.60775	+ OR - 0.00306	0.60470 TO 0.61081	0.60164 TO 0.61387	0.59859 TO 0.61692	38800
7	0.60796	+ OR - 0.00308	0.60488 TO 0.61104	0.60180 TO 0.61412	0.59872 TO 0.61720	38400
8	0.60841	+ OR - 0.00308	0.60533 TO 0.61149	0.60225 TO 0.61457	0.59917 TO 0.61765	38000
9	0.60792	+ OR - 0.00307	0.60485 TO 0.61100	0.60177 TO 0.61407	0.59870 TO 0.61715	37600
10	0.60783	+ OR - 0.00311	0.60472 TO 0.61093	0.60161 TO 0.61404	0.59851 TO 0.61715	37200
11	0.60741	+ OR - 0.00311	0.60429 TO 0.61052	0.60118 TO 0.61363	0.59807 TO 0.61674	36800
12	0.60656	+ OR - 0.00303	0.60353 TO 0.60959	0.60051 TO 0.61262	0.59748 TO 0.61565	36400
17	0.60595	+ OR - 0.00314	0.60290 TO 0.60909	0.59966 TO 0.61223	0.59652 TO 0.61538	34400
22	0.60529	+ OR - 0.00322	0.60207 TO 0.60851	0.59885 TO 0.61173	0.59563 TO 0.61495	32400
27	0.60423	+ OR - 0.00334	0.60089 TO 0.60757	0.59754 TO 0.61091	0.59420 TO 0.61426	30400
32	0.60461	+ OR - 0.00354	0.60108 TO 0.60815	0.59754 TO 0.61169	0.59400 TO 0.61522	28400
37	0.60567	+ OR - 0.00372	0.60194 TO 0.60939	0.59822 TO 0.61311	0.59450 TO 0.61683	26400
42	0.60434	+ OR - 0.00394	0.60040 TO 0.60828	0.59646 TO 0.61222	0.59252 TO 0.61616	24400
47	0.60477	+ OR - 0.00414	0.60063 TO 0.60891	0.59649 TO 0.61305	0.59236 TO 0.61719	22400
52	0.60238	+ OR - 0.00430	0.59808 TO 0.60669	0.59377 TO 0.61099	0.58947 TO 0.61530	20400
57	0.60103	+ OR - 0.00460	0.59643 TO 0.60563	0.59183 TO 0.61023	0.58723 TO 0.61482	18400
62	0.59916	+ OR - 0.00438	0.59477 TO 0.60354	0.59039 TO 0.60792	0.58601 TO 0.61231	16400
67	0.60032	+ OR - 0.00459	0.59573 TO 0.60492	0.59114 TO 0.60951	0.58654 TO 0.61411	14400
72	0.59869	+ OR - 0.00497	0.59371 TO 0.60366	0.58874 TO 0.60863	0.58377 TO 0.61361	12400
77	0.60159	+ OR - 0.00540	0.59620 TO 0.60699	0.59080 TO 0.61238	0.58540 TO 0.61778	10400
82	0.60027	+ OR - 0.00655	0.59372 TO 0.60683	0.58717 TO 0.61238	0.58061 TO 0.61993	8400
87	0.59895	+ OR - 0.00620	0.58975 TO 0.60215	0.58354 TO 0.60836	0.57734 TO 0.61456	6400
92	0.59867	+ OR - 0.00613	0.59254 TO 0.60479	0.58642 TO 0.61092	0.58029 TO 0.61704	4400
97	0.60031	+ OR - 0.00972	0.59059 TO 0.61004	0.58086 TO 0.61976	0.57114 TO 0.62948	2400

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS K-EFF = 0.6073 + OR - 0.0030 WHICH OCCURS FOR 103 GENERATIONS RUN.



---

	I	*	I
	I	*	I
	I	*	I
95 +	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
	I	*	I
100 +	I	*	I
	I	*	I
	I	*	I
	I	*	I

"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE FITCH"

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0026			1.58113E-03	8.8616	1.46856E-03	4.5943	0.00000E+00	0.0000
2	0.0115			7.01126E-03	2.7409	4.68199E-03	1.7423	0.00000E+00	0.0000
3	0.0117			7.11948E-03	2.6033	2.96074E-03	2.5228	0.00000E+00	0.0000
4	0.0047			2.82935E-03	3.1388	1.34864E-03	3.0296	0.00000E+00	0.0000
5	0.0017			1.01685E-03	2.3549	9.47995E-04	2.0780	0.00000E+00	0.0000
6	0.0013			7.72662E-04	1.9853	1.22786E-03	1.6528	0.00000E+00	0.0000
7	0.0010			6.27492E-04	2.3255	1.08055E-03	1.9573	0.00000E+00	0.0000
8	0.0009			5.24207E-04	3.1331	1.32918E-03	2.5888	0.00000E+00	0.0000
9	0.0011			6.47597E-04	3.4079	1.99941E-03	2.8600	0.00000E+00	0.0000
10	0.0024			1.44552E-03	3.5593	3.33204E-03	2.9680	0.00000E+00	0.0000
11	0.0051			3.11237E-03	3.6134	5.75020E-03	3.0300	0.00000E+00	0.0000
12	0.0062			3.75062E-03	4.0647	6.04935E-03	3.3493	0.00000E+00	0.0000
13	0.0063			3.84031E-03	4.3839	6.85260E-03	3.4473	0.00000E+00	0.0000
14	0.0052			3.15665E-03	4.1710	1.01914E-02	3.0251	0.00000E+00	0.0000
15	0.0010			5.91114E-04	7.7815	2.56756E-03	3.7314	0.00000E+00	0.0000
16	0.0009			5.41851E-04	8.1764	1.74955E-03	3.8844	0.00000E+00	0.0000
17	0.0013			8.03768E-04	11.7890	1.25184E-03	6.1496	0.00000E+00	0.0000
18	0.0015			9.01252E-04	13.2285	1.15433E-03	6.4656	0.00000E+00	0.0000
19	0.0020			1.22418E-03	10.4069	1.99020E-03	4.6794	0.00000E+00	0.0000
20	0.0081			4.88855E-03	5.3486	8.15507E-03	2.6046	0.00000E+00	0.0000
21	0.0049			2.95337E-03	7.9215	3.74379E-03	3.8325	0.00000E+00	0.0000
22	0.0133			8.08212E-03	5.1373	9.89744E-03	2.5451	0.00000E+00	0.0000
23	0.0851			5.16556E-02	1.6624	7.75125E-02	0.7161	0.00000E+00	0.0000
24	0.2434			1.47805E-01	1.0804	2.28168E-01	0.4195	0.00000E+00	0.0000
25	0.2251			1.36676E-01	1.0379	2.18079E-01	0.3868	0.00000E+00	0.0000
26	0.2699			1.63912E-01	1.2141	2.88964E-01	0.4041	0.00000E+00	0.0000
27	0.0820			4.97920E-02	2.2489	1.07512E-01	0.6855	0.00000E+00	0.0000
SYSTEM TOTAL =				6.07262E-01	0.4937	9.99966E-01	0.1233	0.00000E+00	0.0000

ELAPSED TIME 7.86533 MINUTES

RANDOM NUMBER= 16DE4F176E87



"LWT CASK, 25 PWR RODS, NO PWR BASKET, 5 W/O U235 VARIABLE PITCH"

FREQUENCY FOR GENERATIONS 4 TO 103  
0.5410 TO 0.5610 \*\*\*\*\*  
0.5610 TO 0.5810 \*\*\*\*\*  
0.5810 TO 0.6010 \*\*\*\*\*  
0.6010 TO 0.6210 \*\*\*\*\*  
0.6210 TO 0.6410 \*\*\*\*\*  
0.6410 TO 0.6610 \*\*\*\*\*  
0.6610 TO 0.6810 \*\*\*\*\*  
0.6810 TO 0.7010 \*\*\*

FREQUENCY FOR GENERATIONS 29 TO 103  
0.5410 TO 0.5610 \*\*\*\*\*  
0.5610 TO 0.5810 \*\*\*\*\*  
0.5810 TO 0.6010 \*\*\*\*\*  
0.6010 TO 0.6210 \*\*\*\*\*  
0.6210 TO 0.6410 \*\*\*\*\*  
0.6410 TO 0.6610 \*\*\*\*\*  
0.6610 TO 0.6810 \*\*\*\*\*  
0.6810 TO 0.7010 \*\*

FREQUENCY FOR GENERATIONS 54 TO 103  
0.5410 TO 0.5610 \*\*\*\*\*  
0.5610 TO 0.5810 \*\*\*\*\*  
0.5810 TO 0.6010 \*\*\*\*\*  
0.6010 TO 0.6210 \*\*\*\*\*  
0.6210 TO 0.6410 \*\*\*\*\*  
0.6410 TO 0.6610 \*\*\*\*\*  
0.6610 TO 0.6810 \*\*\*\*\*  
0.6810 TO 0.7010 \*\*

FREQUENCY FOR GENERATIONS 79 TO 103  
0.5410 TO 0.5610 \*\*  
0.5610 TO 0.5810 \*\*\*\*\*  
0.5810 TO 0.6010 \*\*\*\*\*  
0.6010 TO 0.6210 \*\*\*\*\*  
0.6210 TO 0.6410 \*\*\*\*\*  
0.6410 TO 0.6610 \*  
0.6610 TO 0.6810 \*  
0.6810 TO 0.7010 \*

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 7.86533 MINUTES  
.....  
\*

Figure 6.6.4-3 CSAS Input/Output for NAC-LWT with 25 BWR Rods – Most Reactive Normal Condition Configuration

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
BWR RODS, NO BASKET, VOID EXTERIOR, GAP VOID
27GROUPHDF4 LATTICECELL
UO2 1 0.95 293.0 92235 5.0 92238 95.0 END
ZIRCALLOY 2 1.0 293.0 END
H2O 3 1.0 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.0 293.0 END
H2O 8 0.025 293.0 END
H2O 9 1.0E-20 293.0 END
END COMP
TRIANGPITCH 3.69059 1.2446 1 3 1.4478 2 1.2650 9 END
"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"
READ PARAM RUN=YES PLT=NO GEN=103 NPG=400 END PARAM
READ GEOM
UNIT 1
COM="BWR FUEL ROD"
CYLINDER 1 1 0.62230 2P10.0
CYLINDER 9 1 0.63250 2P10.0
CYLINDER 2 1 0.72390 2P10.0
GLOBAL UNIT 2
CYLINDER 3 1 16.9863 2P10.0
HOLE 1 .0000 .0000 .0000
HOLE 1 .0000 3.6905 .0000
HOLE 1 3.1960 1.8453 .0000
HOLE 1 3.1960 -1.8453 .0000
HOLE 1 .0000 -3.6905 .0000
HOLE 1 -3.1960 -1.8453 .0000
HOLE 1 -3.1960 1.8453 .0000
HOLE 1 -3.1960 5.5358 .0000
HOLE 1 .0000 7.3810 .0000
HOLE 1 3.1960 5.5358 .0000
HOLE 1 6.3920 3.6905 .0000
HOLE 1 6.3920 .0000 .0000
HOLE 1 6.3920 -3.6905 .0000
HOLE 1 3.1960 -5.5358 .0000
HOLE 1 .0000 -7.3810 .0000
HOLE 1 -3.1960 -5.5358 .0000
HOLE 1 -6.3920 -3.6905 .0000
HOLE 1 -6.3920 .0000 .0000
HOLE 1 -6.3920 3.6905 .0000
HOLE 1 -6.3920 7.3810 .0000
HOLE 1 3.1960 9.2263 .0000
HOLE 1 9.5879 1.8453 .0000
HOLE 1 6.3920 -7.3810 .0000
HOLE 1 -3.1960 -9.2263 .0000
HOLE 1 -9.5879 -1.8453 .0000
CYLINDER 5 1 18.8913 2P10.0
CYLINDER 6 1 33.4963 2P10.0
CYLINDER 5 1 36.5443 2P10.0
CYLINDER 7 1 49.2443 2P10.0
CYLINDER 5 1 49.8539 2P10.0
CUBOID 8 1 4P121.92 2P10.0
END GEOM
READ BOUNDS ALL=MIR END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.71 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 7.03 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 231.51 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 242.27 (SECONDS).

```

```
CCCCCCCCCC SSSSSSSSSS AAAAAAAAAA SSSSSSSSSS 2222222222 555555555555
CCCCCCCCCCCC SSSSSSSSSSSS AAAAAAAAAAAA SSSSSSSSSSSS 222222222222 55555555555555
CC CC SS SS AA AA SS SS 22 22 55
CC SS AA AA SS 22 55
CC SS AA AA SS 22 55
CC SSSSSSSSSS AAAAAAAAAAAA SSSSSSSSSS 22 555555555555
CC SSSSSSSSSS AAAAAAAAAAAA SSSSSSSSSS 22 555555555555
CC SS AA AA SS 22 55
CC SS AA AA SS 22 55
CC CC SS SS AA AA SS SS 22 55 55
CCCCCCCCCCCC SSSSSSSSSSSS AA AA SSSSSSSSSSSS 222222222222 55555555555555
CCCCCCCCCCCC SSSSSSSSSSSS AA AA SSSSSSSSSSSS 222222222222 555555555555
```

```
SSSSSSSSSS CCCCCCCCCC AAAAAAAAAA LL EEEEEEEEEEE PFFFFFFFFPPP CCCCCCCCCC
SSSSSSSSSSS CCCCCCCCCCCCC AAAAAAAAAAAA LL EEEEEEEEEEE PFFFFFFFFPPP CCCCCCCCCCCCC
SS SS CC CC AA AA LL EE P P CC CC
SS CC AA AA LL EE P P CC CC
SS CC AA AA LL EE P P CC CC
SSSSSSSSSSS CC AAAAAAAAAAAA LL EEEEEEEE ----- PFFFFFFFFPPP CC
SSSSSSSSSSS CC AAAAAAAAAAAA LL EEEEEEEE ----- PFFFFFFFFPPP CC
SS SS CC AA AA LL EE P P CC CC
SS SS CC CC AA AA LL EE P P CC CC
SSSSSSSSSSS CCCCCCCCCCCCC AA AA LLLLLLLLLLLL EEEEEEEEEEE P P CCCCCCCCCCCCC
SSSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLLL EEEEEEEEEEE P P CCCCCCCCCC
```

```
0000000 11 // 0000000 6666666666 // 0000000 0000000
000000000 111 // 000000000 666666666666 // 000000000 000000000
00 00 1111 // 00 00 66 // 00 00 00 00
00 00 11 // 00 00 66 // 00 00 00 00
00 00 11 // 00 00 66 // 00 00 00 00
00 00 11 // 00 00 66 // 00 00 00 00
00 00 11 // 00 00 66 // 00 00 00 00
00 00 11 // 00 00 66 // 00 00 00 00
00 00 11 // 00 00 66 // 00 00 00 00
000000000 11111111 // 000000000 666666666666 // 000000000 000000000
0000000 11111111 // 0000000 6666666666 // 00000000 00000000
```

```
11 44 555555555555 3333333333 44 11
111 444 555555555555 333333333333 444 111
1111 4444 55 33 4444 1111
11 44 44 55 33 44 44 11
11 44 44 55 33 44 44 11
11 44 44 55 33 44 44 11
11 444444444444 55 33 44 44 11
11 44444444444444 55 33 444444444444 11
11 44 55 33 44 11
11111111 44 555555555555 333333333333 44 11111111
11111111 44 555555555555 333333333333 44 11111111
```



EWR RODS, NO BASKET, VOID EXTERIOR, GAP VOID

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPHDF4 LIBRARY  
 MIX 9 MIXTURES  
 MSC 9 COMPOSITION SPECIFICATIONS  
 IZM 4 MATERIAL ZONES  
 GE LATTICECELL GEOMETRY  
 MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
 MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
 MX 1 MIXTURE NO.  
 VF 0.9500 VOLUME FRACTION  
 ROTH 10.9600 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 92000 1.00 ATOM/MOLECULE  
 92235 5.000 WT%  
 92238 95.000 WT%  
 8016 2.00 ATOMS/MOLECULE  
 END

SC ZIRCALLOY STANDARD COMPOSITION  
 MX 2 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 6.5600 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 40302 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 3 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC AL STANDARD COMPOSITION  
 MX 4 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 2.7020 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 13027 1.00 ATOM/MOLECULE  
 END

SC SS304 STANDARD COMPOSITION  
 MX 5 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 7.9200 THEORETICAL DENSITY  
 NEL 4 NO. ELEMENTS  
 ICP 0 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 24304 19.000 WT%  
 25055 2.000 WT%  
 26304 69.500 WT%  
 28304 9.500 WT%  
 END

SC FB STANDARD COMPOSITION  
 MX 6 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 11.3440 THEORETICAL DENSITY  
 NEL 1 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 82000 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION  
 MX 7 MIXTURE NO.  
 VF 1.0000 VOLUME FRACTION  
 ROTH 0.9982 THEORETICAL DENSITY  
 NEL 2 NO. ELEMENTS  
 ICP 1 0/1 MIXTURE/COMPOUND  
 TEMP 293.0 DEG KELVIN  
 1001 2.00 ATOMS/MOLECULE  
 8016 1.00 ATOM/MOLECULE  
 END

SC H2O STANDARD COMPOSITION

```
MY      8 MIXTURE NO.  
VF      0.0250 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL     2 NO. ELEMENTS  
ICP     1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001 2.00 ATOMS/MOLECULE  
        8016 1.00 ATOM/MOLECULE  
END
```

```
SC H2O   STANDARD COMPOSITION  
MY      9 MIXTURE NO.  
VF      0.0000 VOLUME FRACTION  
ROTH    0.9982 THEORETICAL DENSITY  
NEL     2 NO. ELEMENTS  
ICP     1 0/1 MIXTURE/COMPOUND  
TEMP    293.0 DEG KELVIN  
        1001 2.00 ATOMS/MOLECULE  
        8016 1.00 ATOM/MOLECULE  
END
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP TRIANGPITCH CELL TYPE  
PITCH   3.6906 CM CENTER TO CENTER SPACING  
FUELOD  1.2446 CM FUEL DIAMETER OR SLAB THICKNESS  
MPUEL   1 MIXTURE NO. OF FUEL  
MMOD    3 MIXTURE NO. OF MODERATOR  
CLADOD  1.4478 CM CLAD OUTER DIAMETER  
MCLAD   2 MIXTURE NO. OF CLAD  
GAPOD   1.2650 CM GAP OUTER DIAMETER  
MGAP    9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```

```

.....
***
***                               BWR RODS, NO BASKET, VOID EXTERIOR, GAP VOID
***
.....
***                               ***** DATA LIBRARY INFORMATION *****
***
***                               UNIT          VOLUME          UNIT FUNCTION
***                               NUMBER        NAME                -----
***                               -----
***                               89  G:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***                               82  G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***                               11  D:\dcn\326023-1.3_R\BRONZ2D\FT11F001  SHORT CROSS SECTION LIBRARY
***                               90  D:\dcn\326023-1.3_R\BRONZ2D\FT90F001  INPUT DATA DIRECT ACCESS
***
.....
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER : 89
***
***                               DATASET NAME : G:\scale43\DATALIB\FT89F001
***
***                               LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
***                               637 STANDARD COMPOSITIONS, 490 NUCLIDES
***                               90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***                               CREATION DATE: 6/30/95
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER : 82
***
***                               DATASET NAME : G:\scale43\DATALIB\FT82F001
***
***                               LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***                               BASED ON ENDF-B VERSION 4 DATA
***                               COMPILED FOR NRC 1/27/89
***                               LAST UPDATED
***                               L.M.PETRIE - ORNL
***                               08/12/94
***
.....

```

```

..... 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.





```

.....
***
***          "LWT CASK, 15 BWR RODS, NO BWR BASKET, 5 W/O UC35 VARIABLE PITCH"
***
.....
***          *****      NUMERIC PARAMETERS      *****
***
***          TME          MAXIMUM PROBLEM TIME (MIN)          30.00
***
***          TBA          TIME PER GENERATION (MIN)           0.50
***
***          GEN          NUMBER OF GENERATIONS              103
***
***          NPG          NUMBER PER GENERATION              400
***
***          HSK          NUMBER OF GENERATIONS TO BE SKIPPED 3
***
***          BEG          BEGINNING GENERATION NUMBER         1
***
***          RES          GENERATIONS BETWEEN CHECKPOINTS     0
***
***          X1D          NUMBER OF EXTRA 1-D CROSS SECTIONS  1
***
***          NBK          NEUTRON BANK SIZE                   425
***
***          XNB          EXTRA POSITIONS IN NEUTRON BANK     0
***
***          NFB          FISSION BANK SIZE                   400
***
***          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              BB827100001
***
***          NBS          NUMBER OF D.A. BLOCKS ON UNIT 8     100
***
***          NLS          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
***
.....

```

```

.....
***
***               "LWT CASK, 25 BWR PODS, NO BWR BASKET, 5 W/O U235 VARIABLE FITCH"
***
.....
***               ***** LOGICAL PARAMETERS *****
***
*** RUN EXECUTE PROBLEM AFTAP 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          HUB COMPUTE HU-BAR & AVG FISSION GROUP YES ***
***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO     FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO     FMA PRINT FISSION 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                 GAS PRINT FAR BY GROUP NO ***
***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO                 FAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***
***
*** NAP PRINT MIXTURE ANGLES & PROBABILITIES NO        PWT PRINT WEIGHT AVERAGE ARRAY NO ***
***
*** FKI PRINT FISSION SPECTRUM NO                       PGM PRINT INPUT GEOMETRY NO ***
***
*** P1D PRINT EXTRA 1-D CROSS SECTIONS NO              BUG PRINT DEBUG INFORMATION NO ***
***
***                                                     TEK PRINT TRACKING INFORMATION NO ***
***
.....
***
***               PARAMETER INPUT COMPLETED
***
.....
***               0 10'S WERE USED READING THE PARAMETER DATA
***
.....
***               ***** DATA READING COMPLETED *****

```

```

.....
***          "LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE FITCH"
***
.....
***          ***** 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 17     NUMBER OF UNITS IN THE GLOBAL Y DIR.  0
*** ENTRIES/NEUTRON IN THE FISSION BANK 10     NUMBER OF UNITS IN THE GLOBAL Z DIR.  0
*** NUMBER OF MIXTURES USED             8      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                 25
*** TOTAL INPUT GEOMETRY REGIONS        10     MAXIMUM HOLE NESTING LEVEL       1
*** NUMBER OF GEOMETRY REGIONS USED     10     USE NESTED ARRAYS                NO
*** LARGEST GEOMETRY UNIT NUMBER        2      NUMBER OF ARRAYS USED           0
*** LARGEST ARRAY NUMBER                1      MAXIMUM ARRAY NESTING LEVEL     0
***
*** +X BOUNDARY CONDITION                MIR    -X BOUNDARY CONDITION          MIR
*** +Y BOUNDARY CONDITION                MIR    -Y BOUNDARY CONDITION          MIR
*** +Z BOUNDARY CONDITION                MIR    -Z BOUNDARY CONDITION          MIR
.....

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```

.....
***          "LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE FITCH"
***
.....
***          ***** SPACE AND SUPERGROUP INFORMATION *****
***
*** 100000 WORDS IS THE TOTAL SPACE AVAILABLE.
***
*** 12479 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
***
*** 87521 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
***
*** 99784 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
***
*** 87461 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
***
*** 1165 WORDS ARE NEEDED FOR THE LARGEST GROUP.
***
*** 13860 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
***
*** 25594 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
***
*** 25760 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.
.....

```

SUPERGROUP	STARTING GROUP	ENDING GROUP	XSEC LENGTH	ALBEDO LENGTH	TOTAL LENGTH
1	1	27	2636	0	13055

```

..... 0 IO'S WERE USED IN SUPERGROUPING .....
..... 0 IO'S WERE USED LOADING THE DATA .....
.....

```

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

REGION            MEDIA BIAS            GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
                  NUM    ID

----- UNIT    1 -----

BWR FUEL ROD

1 CYLINDER	1	1	RADIUS = 0.62230	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2 CYLINDER	9	1	RADIUS = 0.63250	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	2	1	RADIUS = 0.72390	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

REGION            MEDIA BIAS            GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
                  NUM    ID

\*\*\*\*\* GLOBAL \*\*\*\*\*  
----- UNIT    2 -----

1 CYLINDER	3	1	RADIUS = 16.986	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	1		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	2		AT X = 0.00000	Y = 3.6905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	3		AT X = 3.1960	Y = 1.8453	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	4		AT X = 3.1960	Y = -1.8453	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	5		AT X = 0.00000	Y = -3.6905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	6		AT X = -3.1960	Y = -1.8453	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	7		AT X = -3.1960	Y = 1.8453	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	8		AT X = -3.1960	Y = 5.5358	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	9		AT X = 0.00000	Y = 7.3810	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	10		AT X = 3.1960	Y = 5.5358	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	11		AT X = 6.3920	Y = 3.6905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	12		AT X = 6.3920	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	13		AT X = 6.3920	Y = -3.6905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	14		AT X = 3.1960	Y = -5.5358	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	15		AT X = 0.00000	Y = -7.3810	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	16		AT X = -3.1960	Y = -5.5358	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	17		AT X = -6.3920	Y = -3.6905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	18		AT X = -6.3920	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	19		AT X = -6.3920	Y = 3.6905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	20		AT X = -6.3920	Y = 7.3810	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	21		AT X = 3.1960	Y = 9.2263	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	22		AT X = 9.5879	Y = 1.8453	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	23		AT X = 6.3920	Y = -7.3810	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	24		AT X = -3.1960	Y = -9.2263	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	25		AT X = -9.5879	Y = -1.8453	Z = 0.00000	IS UNIT NUMBER	1
2 CYLINDER	5	1	RADIUS = 18.891	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	6	1	RADIUS = 33.496	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4 CYLINDER	5	1	RADIUS = 36.544	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5 CYLINDER	7	1	RADIUS = 49.244	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
6 CYLINDER	5	1	RADIUS = 49.854	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
7 CUBOID	8	1	+X = 121.92	-X = -121.92	+Y = 121.92	-Y = -121.92	+Z = 10.000 -Z = -10.000

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	2.43321E+01 CM**3	2.43321E+01 CM**3
	2	2	8.04178E-01 CM**3	2.51363E+01 CM**3
	3	3	7.78958E+00 CM**3	3.29259E+01 CM**3
2	1	4	1.73060E+04 CM**3	1.81291E+04 CM**3
	2	5	4.29436E+03 CM**3	2.24235E+04 CM**3
	3	6	4.80740E+04 CM**3	7.04975E+04 CM**3
	4	7	1.34136E+04 CM**3	8.39110E+04 CM**3
	5	8	6.84563E+04 CM**3	1.52367E+05 CM**3
	6	9	3.79567E+03 CM**3	1.56163E+05 CM**3
	7	10	1.03300E+06 CM**3	1.18916E+06 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	25	1	1	6.08302E+02 CM**3
		2	9	2.01045E+01 CM**3
		3	2	1.94739E+02 CM**3
2	1	1	3	1.73060E+04 CM**3
		2	5	4.29436E+03 CM**3
		3	6	4.80740E+04 CM**3
		4	5	1.34136E+04 CM**3
		5	7	6.84563E+04 CM**3
		6	5	3.79567E+03 CM**3
		7	8	1.03300E+06 CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	6.08302E+02 CM**3	6.33363E+03
2	1.94739E+02 CM**3	1.27749E+03
3	1.73060E+04 CM**3	1.72744E+04
5	2.15036E+04 CM**3	1.70309E+05
6	4.80740E+04 CM**3	5.45351E+05
7	6.84563E+04 CM**3	6.83311E+04
8	1.03300E+06 CM**3	2.57777E+04
9	2.01045E+01 CM**3	2.00677E-19

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.....
***
***          BIASING INFORMATION          ***
***
*** A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S. ***
***
.....

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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....
..... 0.00917 MINUTES WERE USED PROCESSING DATA. ....

```

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 5.11540E-04

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED UNIFORMLY THROUGHOUT THE ENTIRE VOLUME DEFINED BY THE OUTERMOST GEOMETRY CARD.  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 15 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

385 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

0.45350 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.46933 MINUTES.

\_"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

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	1	WARNING... ONLY	361 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	2	WARNING... ONLY	361 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	3	WARNING... ONLY	290 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
	4				0.00000E+00	0.00000E+00
	5				0.00000E+00	0.00000E+00
	6				0.00000E+00	0.00000E+00
	7				0.00000E+00	0.00000E+00
	8				0.00000E+00	0.00000E+00
	9				0.00000E+00	0.00000E+00
	10				0.00000E+00	0.00000E+00
	11				0.00000E+00	0.00000E+00
	12				0.00000E+00	0.00000E+00
	13				0.00000E+00	0.00000E+00
	14				0.00000E+00	0.00000E+00
	15				0.00000E+00	0.00000E+00
	16				0.00000E+00	0.00000E+00
	17				0.00000E+00	0.00000E+00
	18				0.00000E+00	0.00000E+00
	19				0.00000E+00	0.00000E+00
	20				0.00000E+00	0.00000E+00
	21				0.00000E+00	0.00000E+00
	22				0.00000E+00	0.00000E+00
	23				0.00000E+00	0.00000E+00
	24				0.00000E+00	0.00000E+00
	25				0.00000E+00	0.00000E+00
	26				0.00000E+00	0.00000E+00
	27				0.00000E+00	0.00000E+00
	28				0.00000E+00	0.00000E+00
	29				0.00000E+00	0.00000E+00
	30				0.00000E+00	0.00000E+00
	31				0.00000E+00	0.00000E+00
	32				0.00000E+00	0.00000E+00
	33				0.00000E+00	0.00000E+00
	34				0.00000E+00	0.00000E+00
	35				0.00000E+00	0.00000E+00
	36				0.00000E+00	0.00000E+00
	37				0.00000E+00	0.00000E+00
	38				0.00000E+00	0.00000E+00
	39				0.00000E+00	0.00000E+00
	40				0.00000E+00	0.00000E+00
	41				0.00000E+00	0.00000E+00
	42				0.00000E+00	0.00000E+00
	43				0.00000E+00	0.00000E+00
	44				0.00000E+00	0.00000E+00
	45				0.00000E+00	0.00000E+00
	46				0.00000E+00	0.00000E+00
	47				0.00000E+00	0.00000E+00
	48				0.00000E+00	0.00000E+00
	49				0.00000E+00	0.00000E+00
	50				0.00000E+00	0.00000E+00
	51				0.00000E+00	0.00000E+00
	52				0.00000E+00	0.00000E+00
	53				0.00000E+00	0.00000E+00
	54				0.00000E+00	0.00000E+00
	55				0.00000E+00	0.00000E+00
	56				0.00000E+00	0.00000E+00
	57				0.00000E+00	0.00000E+00
	58				0.00000E+00	0.00000E+00
	59				0.00000E+00	0.00000E+00
	60				0.00000E+00	0.00000E+00
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	65				0.00000E+00	0.00000E+00
	66				0.00000E+00	0.00000E+00
	67				0.00000E+00	0.00000E+00
	68				0.00000E+00	0.00000E+00
	69				0.00000E+00	0.00000E+00
	70				0.00000E+00	0.00000E+00
	71				0.00000E+00	0.00000E+00
	72				0.00000E+00	0.00000E+00
	73				0.00000E+00	0.00000E+00
	74				0.00000E+00	0.00000E+00
	75				0.00000E+00	0.00000E+00
	76				0.00000E+00	0.00000E+00
	77				0.00000E+00	0.00000E+00
	78				0.00000E+00	0.00000E+00
	79				0.00000E+00	0.00000E+00
	80				0.00000E+00	0.00000E+00
	81				0.00000E+00	0.00000E+00
	82				0.00000E+00	0.00000E+00
	83				0.00000E+00	0.00000E+00
	84				0.00000E+00	0.00000E+00
	85				0.00000E+00	0.00000E+00
	86				0.00000E+00	0.00000E+00
	87				0.00000E+00	0.00000E+00
	88				0.00000E+00	0.00000E+00

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89	7.24210E-01	3.38617E+00	7.02350E-01	4.02540E-03	0.00000E+00	0.00000E+00
90	7.44614E-01	3.42000E+00	7.02830E-01	4.00827E-03	0.00000E+00	0.00000E+00
91	7.96997E-01	3.45383E+00	7.03889E-01	4.10179E-03	0.00000E+00	0.00000E+00
92	6.49206E-01	3.48767E+00	7.03281E-01	4.10121E-03	0.00000E+00	0.00000E+00
93	6.91987E-01	3.51983E+00	7.03157E-01	4.05779E-03	0.00000E+00	0.00000E+00
94	6.71316E-01	3.55267E+00	7.02811E-01	4.02834E-03	0.00000E+00	0.00000E+00
95	6.77878E-01	3.58667E+00	7.02543E-01	3.99380E-03	0.00000E+00	0.00000E+00
96	7.22040E-01	3.61867E+00	7.02750E-01	3.95652E-03	0.00000E+00	0.00000E+00
97	6.94216E-01	3.65067E+00	7.02660E-01	3.91568E-03	0.00000E+00	0.00000E+00
98	6.89477E-01	3.68450E+00	7.02523E-01	3.87711E-03	0.00000E+00	0.00000E+00
99	6.54985E-01	3.71667E+00	7.02033E-01	3.86811E-03	0.00000E+00	0.00000E+00
100	7.30407E-01	3.74683E+00	7.02322E-01	3.83936E-03	0.00000E+00	0.00000E+00
101	7.01445E-01	3.77800E+00	7.02314E-01	3.80040E-03	0.00000E+00	0.00000E+00
102	7.58112E-01	3.80900E+00	7.02872E-01	3.80335E-03	0.00000E+00	0.00000E+00
103	7.90971E-01	3.84117E+00	7.03744E-01	3.86522E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

LIFETIME = 2.30278E-04 + OR - 4.37502E-06      GENERATION TIME = 1.11547E-04 + OR - 7.28438E-07  
 NU BAR = 2.43036E+00 + OR - 2.66918E-04      AVERAGE FISSION GROUP = 2.37161E+01 + OR - 1.32587E-02  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 7.18706E-02 + OR - 8.84026E-04

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	0.70458	+ OR - 0.00381	0.70077 TO 0.70839	0.69696 TO 0.71220	0.69315 TO 0.71602	40000
4	0.70474	+ OR - 0.00385	0.70090 TO 0.70859	0.69705 TO 0.71244	0.69321 TO 0.71628	39600
5	0.70486	+ OR - 0.00388	0.70098 TO 0.70875	0.69710 TO 0.71263	0.69321 TO 0.71651	39200
6	0.70481	+ OR - 0.00392	0.70088 TO 0.70873	0.69696 TO 0.71265	0.69304 TO 0.71659	38800
7	0.70478	+ OR - 0.00396	0.70082 TO 0.70875	0.69685 TO 0.71271	0.69289 TO 0.71668	38400
8	0.70467	+ OR - 0.00401	0.70067 TO 0.70868	0.69666 TO 0.71268	0.69266 TO 0.71669	38000
9	0.70517	+ OR - 0.00402	0.70115 TO 0.70918	0.69713 TO 0.71320	0.69312 TO 0.71722	37600
10	0.70530	+ OR - 0.00406	0.70124 TO 0.70935	0.69718 TO 0.71341	0.69312 TO 0.71747	37200
11	0.70532	+ OR - 0.00410	0.70122 TO 0.70942	0.69711 TO 0.71352	0.69301 TO 0.71763	36800
12	0.70545	+ OR - 0.00415	0.70131 TO 0.70960	0.69716 TO 0.71374	0.69302 TO 0.71789	36400
17	0.70388	+ OR - 0.00423	0.69966 TO 0.70811	0.69543 TO 0.71233	0.69120 TO 0.71656	34400
22	0.70332	+ OR - 0.00429	0.69903 TO 0.70761	0.69474 TO 0.71191	0.69045 TO 0.71620	32400
27	0.70354	+ OR - 0.00441	0.69913 TO 0.70795	0.69472 TO 0.71237	0.69031 TO 0.71678	30400
32	0.70455	+ OR - 0.00454	0.70002 TO 0.70909	0.69548 TO 0.71362	0.69095 TO 0.71816	28400
37	0.70602	+ OR - 0.00481	0.70120 TO 0.71083	0.69639 TO 0.71565	0.69158 TO 0.72046	26400
42	0.70771	+ OR - 0.00497	0.70274 TO 0.71269	0.69776 TO 0.71766	0.69279 TO 0.72263	24400
47	0.71005	+ OR - 0.00520	0.70486 TO 0.71525	0.69966 TO 0.72044	0.69446 TO 0.72564	22400
52	0.71209	+ OR - 0.00555	0.70654 TO 0.71764	0.70099 TO 0.72319	0.69544 TO 0.72874	20400
57	0.71127	+ OR - 0.00595	0.70532 TO 0.71722	0.69937 TO 0.72316	0.69342 TO 0.72911	18400
62	0.71246	+ OR - 0.00654	0.70592 TO 0.71899	0.69939 TO 0.72553	0.69285 TO 0.73207	16400
67	0.71411	+ OR - 0.00720	0.70691 TO 0.72131	0.69972 TO 0.72851	0.69252 TO 0.73571	14400
72	0.71602	+ OR - 0.00783	0.70818 TO 0.72385	0.70035 TO 0.73169	0.69251 TO 0.73952	12400
77	0.71903	+ OR - 0.00894	0.71008 TO 0.72797	0.70114 TO 0.73692	0.69219 TO 0.74586	10400
82	0.70967	+ OR - 0.00941	0.70026 TO 0.71908	0.69085 TO 0.72849	0.68144 TO 0.73790	8400
87	0.71067	+ OR - 0.01120	0.69947 TO 0.72187	0.68827 TO 0.73306	0.67708 TO 0.74426	6400
92	0.70753	+ OR - 0.01206	0.69547 TO 0.71959	0.68342 TO 0.73164	0.67136 TO 0.74370	4400

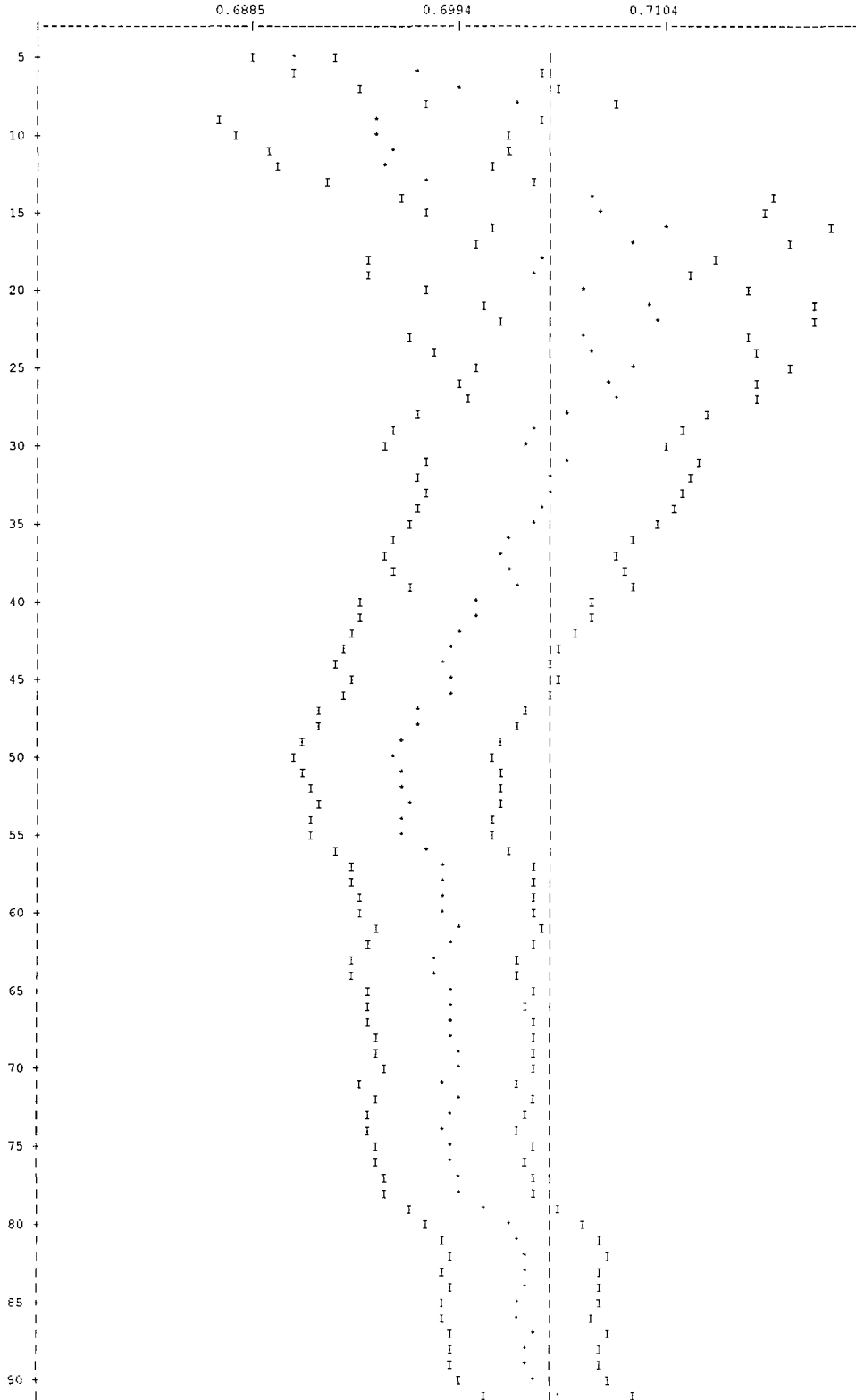
"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

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	0.72090	+ OR - 0.02008	0.70082 TO 0.74098	0.68074 TO 0.76106	0.66066 TO 0.78114	2400



"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS K-EFF = 0.7046 ± OR - 0.0038 WHICH OCCURS FOR 103 GENERATIONS RUN.





NAC-LWT Cask SAR  
Revision 43

January 2015

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"										
GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION	SKIPPING 3 GENERATIONS
1	0.0032			2.25095E-03	7.8999	1.69980E-03	4.5846	0.00000E+00	0.0000	
2	0.0117			8.26592E-03	2.6166	5.12285E-03	1.8582	0.00000E+00	0.0000	
3	0.0133			9.37768E-03	2.2716	3.87435E-03	2.1804	0.00000E+00	0.0000	
4	0.0053			3.70092E-03	2.7681	1.76169E-03	2.6427	0.00000E+00	0.0000	
5	0.0017			1.21374E-03	2.1824	1.13160E-03	1.9162	0.00000E+00	0.0000	
6	0.0014			1.01081E-03	1.6627	1.54773E-03	1.3194	0.00000E+00	0.0000	
7	0.0012			8.22068E-04	2.2097	1.39633E-03	1.8199	0.00000E+00	0.0000	
8	0.0010			6.71540E-04	2.8381	1.69331E-03	2.3480	0.00000E+00	0.0000	
9	0.0012			8.56593E-04	2.9293	2.54030E-03	2.5375	0.00000E+00	0.0000	
10	0.0024			1.66103E-03	3.2172	3.64944E-03	2.5647	0.00000E+00	0.0000	
11	0.0050			3.52613E-03	3.1318	6.32132E-03	2.5665	0.00000E+00	0.0000	
12	0.0071			5.00778E-03	3.8527	7.57670E-03	3.3871	0.00000E+00	0.0000	
13	0.0066			4.62519E-03	3.9332	7.92726E-03	3.0584	0.00000E+00	0.0000	
14	0.0050			3.54103E-03	3.7969	1.09799E-02	2.8209	0.00000E+00	0.0000	
15	0.0012			8.75754E-04	6.3603	3.16548E-03	3.1721	0.00000E+00	0.0000	
16	0.0009			5.99919E-04	7.4684	1.91457E-03	4.0471	0.00000E+00	0.0000	
17	0.0013			8.93173E-04	10.4906	1.30725E-03	5.0843	0.00000E+00	0.0000	
18	0.0019			1.32780E-03	10.3387	1.42220E-03	5.9406	0.00000E+00	0.0000	
19	0.0020			1.41318E-03	8.8499	2.19704E-03	4.2113	0.00000E+00	0.0000	
20	0.0096			6.75531E-03	4.9862	9.53559E-03	2.6179	0.00000E+00	0.0000	
21	0.0052			3.65163E-03	7.6738	4.17396E-03	3.9216	0.00000E+00	0.0000	
22	0.0131			9.23177E-03	5.0220	1.09786E-02	2.5974	0.00000E+00	0.0000	
23	0.0905			6.37689E-02	1.8699	8.17951E-02	0.8746	0.00000E+00	0.0000	
24	0.2506			1.76576E-01	1.0931	2.33370E-01	0.5061	0.00000E+00	0.0000	
25	0.2238			1.57684E-01	1.1584	2.16982E-01	0.4441	0.00000E+00	0.0000	
26	0.2640			1.86030E-01	1.1510	2.80289E-01	0.4053	0.00000E+00	0.0000	
27	0.0699			4.92422E-02	2.4599	9.82105E-02	0.7319	0.00000E+00	0.0000	
SYSTEM TOTAL =				7.04582E-01	0.5409	1.00256E+00	0.1192	0.00000E+00	0.0000	
ELAPSED TIME 3.84117 MINUTES										
RANDOM NUMBER= 12FB24B34616										

\_"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

```
FREQUENCY FOR GENERATIONS 4 TO 103
0.6045 TO 0.6245 *
0.6245 TO 0.6445 *****
0.6445 TO 0.6645 *****
0.6645 TO 0.6845 *****
0.6845 TO 0.7045 *****
0.7045 TO 0.7245 *****
0.7245 TO 0.7445 *****
0.7445 TO 0.7645 *****
0.7645 TO 0.7845 **
0.7845 TO 0.8045 *****
```

```
FREQUENCY FOR GENERATIONS 29 TO 103
0.6045 TO 0.6245 *
0.6245 TO 0.6445 **
0.6445 TO 0.6645 ****
0.6645 TO 0.6845 *****
0.6845 TO 0.7045 *****
0.7045 TO 0.7245 *****
0.7245 TO 0.7445 *****
0.7445 TO 0.7645 *****
0.7645 TO 0.7845 *
0.7845 TO 0.8045 ****
```

```
FREQUENCY FOR GENERATIONS 54 TO 103
0.6045 TO 0.6245 *
0.6245 TO 0.6445 **
0.6445 TO 0.6645 ***
0.6645 TO 0.6845 *****
0.6845 TO 0.7045 *****
0.7045 TO 0.7245 *****
0.7245 TO 0.7445 *****
0.7445 TO 0.7645 *****
0.7645 TO 0.7845 *
0.7845 TO 0.8045 ****
```

```
FREQUENCY FOR GENERATIONS 79 TO 103
0.6045 TO 0.6245 *
0.6245 TO 0.6445 **
0.6445 TO 0.6645 ***
0.6645 TO 0.6845 ****
0.6845 TO 0.7045 *****
0.7045 TO 0.7245 ***
0.7245 TO 0.7445 **
0.7445 TO 0.7645 ***
0.7645 TO 0.7845 *
0.7845 TO 0.8045 ****
```

.....

CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 3.84117 MINUTES

.....

-

Figure 6.6.4-4 CSAS Input/Output for NAC-LWT with 25 BWR Rods – Most Reactive Accident Condition Configuration

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
BWR RODS, NO BASKET, VOID EXTERIOR, GAP FULL
27GROUPNDF4 LATTICECELL
UO2 1 0.95 293.0 92235 5.0 92238 95.0 END
ZIRCALLOY 2 1.0 293.0 END
H2O 3 1.0 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1E-20 293.0 END
H2O 8 1E-20 293.0 END
H2O 9 1.0 293.0 END
END COMP
TRIANGPITCH 3.69059 1.2446 1 3 1.4478 2 1.2650 9 END
"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"
READ PARAM RUN=YES PLT=NO GEN=103 NPG=400 END PARAM
READ GEOM
UNIT 1
COM="BWR FUEL ROD"
CYLINDER 1 1 0.62230 2P10.0
CYLINDER 9 1 0.63250 2P10.0
CYLINDER 2 1 0.72390 2P10.0
GLOBAL UNIT 2
CYLINDER 3 1 16.9863 2P10.0
HOLE 1 1 .0000 .0000 .0000
HOLE 1 1 .0000 3.6905 .0000
HOLE 1 1 3.1960 1.8453 .0000
HOLE 1 1 3.1960 -1.8453 .0000
HOLE 1 1 .0000 -3.6905 .0000
HOLE 1 1 -3.1960 -1.8453 .0000
HOLE 1 1 -3.1960 1.8453 .0000
HOLE 1 1 -3.1960 5.5358 .0000
HOLE 1 1 .0000 7.3810 .0000
HOLE 1 1 3.1960 5.5358 .0000
HOLE 1 1 6.3920 3.6905 .0000
HOLE 1 1 6.3920 .0000 .0000
HOLE 1 1 6.3920 -3.6905 .0000
HOLE 1 1 3.1960 -5.5358 .0000
HOLE 1 1 .0000 -7.3810 .0000
HOLE 1 1 -3.1960 -5.5358 .0000
HOLE 1 1 -6.3920 -3.6905 .0000
HOLE 1 1 -6.3920 .0000 .0000
HOLE 1 1 -6.3920 3.6905 .0000
HOLE 1 1 -6.3920 7.3810 .0000
HOLE 1 1 3.1960 9.2263 .0000
HOLE 1 1 9.5879 1.8453 .0000
HOLE 1 1 6.3920 -7.3810 .0000
HOLE 1 1 -3.1960 -9.2263 .0000
HOLE 1 1 -9.5879 -1.8453 .0000
CYLINDER 5 1 18.8913 2P10.0
CYLINDER 6 1 33.4963 2P10.0
CYLINDER 5 1 36.5443 2P10.0
CYLINDER 7 1 49.2443 2P10.0
CYLINDER 5 1 49.6539 2P10.0
CUBOID 8 1 4P121.92 2P10.0
END GEOM
READ BOUNDS ALL=MIR END BOUNDS
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.44 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 6.37 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 238.65 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 247.05 (SECONDS).

```

```

CCCCCCCCC  SSSSSSSSS  AAAAAAAA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AAAAAAAA  SSSSSSSSS  222222222  55555555555
CC          SS        SS        AA        AA        SS        SS        22        22        55
CC          SS        SS        AA        AA        SS        SS        22        22        55
CC          SS        SS        AA        AA        SS        SS        22        22        55
CC          SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  22        55555555555
CC          SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  22        55555555555
CC          SS        SS        AA        AA        SS        SS        22        55        55
CC          CC        SS        SS        AA        AA        SS        SS        22        55        55
CCCCCCCCC  SSSSSSSSS  AA          AA        SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AA          AA        SSSSSSSSS  222222222  55555555555

```

```

SSSSSSSSS  CCCCCCCCC  AAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SS          SS        CC        CC        AA        AA        LL        LL        EE        EE        PP        PP        CC        CC
SS          SS        CC        CC        AA        AA        LL        LL        EE        EE        PP        PP        CC        CC
SS          SS        CC        CC        AA        AA        LL        LL        EE        EE        PP        PP        CC        CC
SSSSSSSSS  CC          AA        AA        LL          EEEEEEEEE  PPPPPPPPP  CC          AA        AA        AA        LL        LL        EE        EE        PP        PP        CC        CC
SSSSSSSSS  CC          AA        AA        LL          EEEEEEEEE  PPPPPPPPP  CC          AA        AA        AA        LL        LL        EE        EE        PP        PP        CC        CC
SS          SS        CC        CC        AA        AA        LL        LL        EE        EE        PP        PP        CC        CC
SSSSSSSSS  CCCCCCCCC  AA          AA        LLLLLLLLL  EEEEEEEEE  PP          CC          CC
SSSSSSSSS  CCCCCCCCC  AA          AA        LLLLLLLLL  EEEEEEEEE  PP          CC          CC

```

```

0000000  11          //          0000000  66666666666 //          0000000  0000000
00000000  111        //          00000000  66666666666 //          00000000  00000000
00          00        1111       //          00          00        66          66 //          00          00        00          00
00          00        11          //          00          00        66          66 //          00          00        00          00
00          00        11          //          00          00        66          66 //          00          00        00          00
00          00        11          //          00          00        66666666666 //          00          00        00          00
00          00        11          //          00          00        66666666666 //          00          00        00          00
00          00        11          //          00          00        66          66 //          00          00        00          00
00          00        11          //          00          00        66          66 //          00          00        00          00
00          00        11          //          00          00        66          66 //          00          00        00          00
00000000  1111111 //          00000000  66666666666 //          00000000  00000000
0000000   1111111 //          0000000   66666666666 //          0000000   0000000

```

```

0000000  88888888888  44          77777777777  11          77777777777
00000000  88888888888  444        77777777777  111        77777777777
00          00        88          88          4444       77          77          1111       77          77
00          00        88          88          44 44      77          77          11          77          77
00          00        88          88          44 44      77          77          11          77          77
00          00        88888888888  44          77          77          11          77          77
00          00        88888888888  44          77          77          11          77          77
00          00        88          88          44444444444  77          77          11          77          77
00          00        88          88          44444444444  77          77          11          77          77
00          00        88          88          44          77          77          11          77          77
00000000  88888888888  44          77          77          1111111  77          77
0000000   88888888888  44          77          77          1111111  77          77

```



BWR RODS, NO BASKET, VOID EXTERIOR, GAP FULL

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 37GROUPHDF4 LIBRARY  
MXK 9 MIXTURES  
MSC 9 COMPOSITION SPECIFICATIONS  
IZM 4 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC UO2 STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.9500 VOLUME FRACTION  
ROTH 10.9600 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 5.000 WT%  
92238 95.000 WT%  
8016 2.00 ATOMS/MOLECULE  
END

SC ZIRCALLOY STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 6.5600 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
40302 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC AL STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE  
END

SC SS304 STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%  
END

SC PB STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION



```
ME 8 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICF 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END
```

```
SC H2O STANDARD COMPOSITION  
ME 9 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICF 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```
CTP TRIANGPITCH CELL TYPE  
PITCH 3.6906 CM CENTER TO CENTER SPACING  
FUELOD 1.2446 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 3 MIXTURE NO. OF MODERATOR  
CLADOD 1.4478 CM CLAD OUTER DIAMETER  
MCLAD 2 MIXTURE NO. OF CLAD  
GAPOD 1.2650 CM GAP OUTER DIAMETER  
MGAP 9 MIXTURE NO. OF GAP
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```
ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD
```

```
.....
***
***                               BWR RODS, NO BASKET, VOID EXTERIOR, GAP FULL
***
.....
***
***                               ***** DATA LIBRARY INFORMATION *****
***
***                               UNIT          VOLUME          UNIT FUNCTION
***                               NUMBER        NAME                -----
***                               -----
***      89      G:\scale43\DATALIB\FT89F001      STANDARD COMPOSITION LIBRARY
***
***      82      G:\scale43\DATALIB\FT82F001      CROSS SECTION LIBRARY
***
***      11      D:\dch\326023-1.3_R\BROHZ2A\FT11F001  SHORT CROSS SECTION LIBRARY
***
***      90      D:\dch\326023-1.3_R\BROHZ2A\FT90F001  INPUT DATA DIRECT ACCESS
***
.....
***
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
***      UNIT NUMBER      :      89
***
***      DATASET NAME     :      G:\scale43\DATALIB\FT89F001
***
***      LIBRARY TITLE    :      SCALE-4 STANDARD COMPOSITION LIBRARY
***                               637 STANDARD COMPOSITIONS, 490 NUCLIDES
***                               90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***      CREATION DATE    :      6/30/95
***
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
***      UNIT NUMBER      :      82
***
***      DATASET NAME     :      G:\scale43\DATALIB\FT82F001
***
***      LIBRARY TITLE    :      SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***                               BASED ON ENDF-B VERSION 4 DATA
***                               COMPILED FOR NRC      1/27/89
***                               LAST UPDATED
***                               L.M.PETRIE      -      ORNL
***
***
***                               08/12/94
***
.....
```

```
..... 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.



```

.....
***
***               "LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"
***
.....
***               ***** NUMERIC PARAMETERS *****
***
***
***      TME      MAXIMUM PROBLEM TIME (MIN)                30.00
***
***      TBA      TIME PER GENERATION (MIN)                 0.50
***
***      GEN      NUMBER OF GENERATIONS                    103
***
***      NPG      NUMBER PER GENERATION                    400
***
***      NSK      NUMBER OF GENERATIONS TO BE SKIPPED      3
***
***      BEG      BEGINNING GENERATION NUMBER              1
***
***      RES      GENERATIONS BETWEEN CHECKPOINTS          0
***
***      X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS      1
***
***      NBK      NEUTRON BANK SIZE                        425
***
***      XNB      EXTRA POSITIONS IN NEUTRON BANK          0
***
***      NFB      FISSION BANK SIZE                        400
***
***      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                   BB827100001
***
***      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
***
.....

```





"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
----- UNIT 1 -----							
BWR FUEL ROD							
1	1	1	RADIUS = 0.62230	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2	1	1	RADIUS = 0.63250	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3	1	1	RADIUS = 0.72390	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
***** GLOBAL ***** ----- UNIT 2 -----							
1	3	1	RADIUS = 16.986	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
HOLE NUMBER	1		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	2		AT X = 0.00000	Y = 3.6905	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	3		AT X = 3.1960	Y = 1.8453	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	4		AT X = 3.1960	Y = -1.8453	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	5		AT X = 0.00000	Y = -3.6905	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	6		AT X = -3.1960	Y = -1.8453	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	7		AT X = -3.1960	Y = 1.8453	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	8		AT X = -3.1960	Y = 5.5358	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	9		AT X = 0.00000	Y = 7.3810	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	10		AT X = 3.1960	Y = 5.5358	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	11		AT X = 6.3920	Y = 3.6905	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	12		AT X = 6.3920	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	13		AT X = 6.3920	Y = -3.6905	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	14		AT X = 3.1960	Y = -5.5358	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	15		AT X = 0.00000	Y = -7.3810	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	16		AT X = -3.1960	Y = -5.5358	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	17		AT X = -6.3920	Y = -3.6905	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	18		AT X = -6.3920	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	19		AT X = -6.3920	Y = 3.6905	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	20		AT X = -6.3920	Y = 7.3810	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	21		AT X = 3.1960	Y = 9.2263	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	22		AT X = 9.5879	Y = 1.8453	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	23		AT X = 6.3920	Y = -7.3810	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	24		AT X = -3.1960	Y = -9.2263	Z = 0.00000	IS UNIT NUMBER 1	
HOLE NUMBER	25		AT X = -9.5879	Y = -1.8453	Z = 0.00000	IS UNIT NUMBER 1	
2	5	1	RADIUS = 18.891	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3	6	1	RADIUS = 33.496	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4	5	1	RADIUS = 36.544	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
5	7	1	RADIUS = 49.244	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
6	5	1	RADIUS = 49.854	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
7	8	1	+X = 121.92	-X = -121.92	+Y = 121.92	-Y = -121.92 +Z = 10.000 -Z = -10.000	

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	2.43321E+01 CM**3	2.43321E+01 CM**3
	2	2	8.04178E-01 CM**3	2.51363E+01 CM**3
	3	3	7.78958E+00 CM**3	3.29259E+01 CM**3
2	1	4	1.73060E+04 CM**3	1.81291E+04 CM**3
	2	5	4.29436E+03 CM**3	2.24235E+04 CM**3
	3	6	4.80740E+04 CM**3	7.04975E+04 CM**3
	4	7	1.34136E+04 CM**3	8.39110E+04 CM**3
	5	8	6.84563E+04 CM**3	1.52367E+05 CM**3
	6	9	3.79567E+03 CM**3	1.56163E+05 CM**3
	7	10	1.03300E+06 CM**3	1.18916E+06 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	25	1	1	6.08302E+02 CM**3
		2	9	2.01045E+01 CM**3
		3	2	1.94739E+02 CM**3
2	1	1	3	1.73060E+04 CM**3
		2	5	4.29436E+03 CM**3
		3	6	4.80740E+04 CM**3
		4	5	1.34136E+04 CM**3
		5	7	6.84563E+04 CM**3
		6	5	3.79567E+03 CM**3
		7	8	1.03300E+06 CM**3

MIXTURE	TOTAL VOLUME	MASS (G)
1	6.08302E+02 CM**3	6.33363E+03
2	1.94739E+02 CM**3	1.27749E+03
3	1.73060E+04 CM**3	1.72744E+04
5	2.15036E+04 CM**3	1.70309E+05
6	4.80740E+04 CM**3	5.45351E+05
7	6.84563E+04 CM**3	6.83311E-10
8	1.03300E+06 CM**3	1.03111E-14
9	2.01045E+01 CM**3	2.00677E+01

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***
***          BIASING INFORMATION          ***
***
*** A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S. ***
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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....
..... 0.00917 MINUTES WERE USED PROCESSING DATA. ....

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VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 5.11540E-04

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED UNIFORMLY THROUGHOUT THE ENTIRE VOLUME DEFINED BY THE OUTERMOST GEOMETRY CARD.  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 14 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

386 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

0.45333 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.46933 MINUTES.

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"LWT CASK, 25 BWR RODS, NO BWP BASKET, 5 W/O U235 VARIABLE PITCH"

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	355 INDEPENDENT	FISSION POINTS WERE GENERATED			
1	7.36934E-01	4.97000E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	322 INDEPENDENT	FISSION POINTS WERE GENERATED			
2	7.00540E-01	5.31833E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY	326 INDEPENDENT	FISSION POINTS WERE GENERATED			
3	6.71697E-01	5.67500E-01	6.71687E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	6.83887E-01	5.99500E-01	6.77787E-01	6.10024E-03	0.00000E+00	0.00000E+00
5	7.44438E-01	6.33500E-01	7.00004E-01	2.24944E-02	0.00000E+00	0.00000E+00
6	7.18158E-01	6.66333E-01	7.04543E-01	1.65409E-02	0.00000E+00	0.00000E+00
7	6.78785E-01	7.01167E-01	6.99391E-01	1.38093E-02	0.00000E+00	0.00000E+00
8	6.94194E-01	7.35000E-01	6.98525E-01	1.13085E-02	0.00000E+00	0.00000E+00
9	7.72562E-01	7.67167E-01	7.09102E-01	1.42552E-02	0.00000E+00	0.00000E+00
10	7.21756E-01	8.02833E-01	7.10683E-01	1.24463E-02	0.00000E+00	0.00000E+00
11	6.98534E-01	8.38500E-01	7.09333E-01	1.10593E-02	0.00000E+00	0.00000E+00
12	7.61200E-01	8.70500E-01	7.14520E-01	1.11691E-02	0.00000E+00	0.00000E+00
13	7.20594E-01	9.06167E-01	7.15072E-01	1.01179E-02	0.00000E+00	0.00000E+00
14	6.57647E-01	9.39167E-01	7.10287E-01	1.04024E-02	0.00000E+00	0.00000E+00
15	7.81967E-01	9.73000E-01	7.15801E-01	1.10437E-02	0.00000E+00	0.00000E+00
16	7.31759E-01	1.00600E+00	7.16941E-01	1.02879E-02	0.00000E+00	0.00000E+00
17	6.52070E-01	1.03983E+00	7.12616E-01	1.05086E-02	0.00000E+00	0.00000E+00
18	7.26461E-01	1.07467E+00	7.13481E-01	9.86793E-03	0.00000E+00	0.00000E+00
19	7.31605E-01	1.10767E+00	7.14547E-01	9.33041E-03	0.00000E+00	0.00000E+00
20	6.64178E-01	1.14150E+00	7.11749E-01	9.23114E-03	0.00000E+00	0.00000E+00
21	6.96333E-01	1.17633E+00	7.10927E-01	8.77038E-03	0.00000E+00	0.00000E+00
22	7.46534E-01	1.21017E+00	7.12708E-01	8.50866E-03	0.00000E+00	0.00000E+00
23	6.33256E-01	1.24500E+00	7.08924E-01	8.93400E-03	0.00000E+00	0.00000E+00
24	6.99280E-01	1.27883E+00	7.08486E-01	8.52951E-03	0.00000E+00	0.00000E+00
25	7.17385E-01	1.31183E+00	7.08873E-01	8.15941E-03	0.00000E+00	0.00000E+00
26	6.87181E-01	1.34650E+00	7.07969E-01	7.86415E-03	0.00000E+00	0.00000E+00
27	6.91288E-01	1.38233E+00	7.07302E-01	7.57248E-03	0.00000E+00	0.00000E+00
28	7.17809E-01	1.41700E+00	7.07706E-01	7.28662E-03	0.00000E+00	0.00000E+00
29	7.78800E-01	1.45000E+00	7.10339E-01	7.48967E-03	0.00000E+00	0.00000E+00
30	7.21974E-01	1.48567E+00	7.10754E-01	7.22919E-03	0.00000E+00	0.00000E+00
31	7.46391E-01	1.51867E+00	7.11983E-01	7.08286E-03	0.00000E+00	0.00000E+00
32	7.20315E-01	1.55250E+00	7.12261E-01	6.84832E-03	0.00000E+00	0.00000E+00
33	6.85997E-01	1.58633E+00	7.11414E-01	6.67769E-03	0.00000E+00	0.00000E+00
34	7.05263E-01	1.62033E+00	7.11222E-01	6.46850E-03	0.00000E+00	0.00000E+00
35	7.53469E-01	1.65600E+00	7.12502E-01	6.39880E-03	0.00000E+00	0.00000E+00
36	7.05465E-01	1.68983E+00	7.12295E-01	6.21119E-03	0.00000E+00	0.00000E+00
37	7.46440E-01	1.72367E+00	7.13270E-01	6.10951E-03	0.00000E+00	0.00000E+00
38	7.07186E-01	1.75750E+00	7.13101E-01	5.93978E-03	0.00000E+00	0.00000E+00
39	7.02359E-01	1.79050E+00	7.12811E-01	5.78431E-03	0.00000E+00	0.00000E+00
40	7.12597E-01	1.82433E+00	7.12905E-01	5.63004E-03	0.00000E+00	0.00000E+00
41	6.97974E-01	1.85917E+00	7.12425E-01	5.49695E-03	0.00000E+00	0.00000E+00
42	6.89038E-01	1.89300E+00	7.11840E-01	5.38957E-03	0.00000E+00	0.00000E+00
43	7.66648E-01	1.92700E+00	7.10982E-01	5.32610E-03	0.00000E+00	0.00000E+00
44	7.06919E-01	1.95983E+00	7.10985E-01	5.19864E-03	0.00000E+00	0.00000E+00
45	6.80629E-01	1.99467E+00	7.10182E-01	5.12483E-03	0.00000E+00	0.00000E+00
46	7.02685E-01	2.02767E+00	7.10011E-01	5.00990E-03	0.00000E+00	0.00000E+00
47	6.90168E-01	2.06233E+00	7.09570E-01	4.91712E-03	0.00000E+00	0.00000E+00
48	7.12393E-01	2.09533E+00	7.09632E-01	4.80943E-03	0.00000E+00	0.00000E+00
49	7.41267E-01	2.13017E+00	7.10305E-01	4.75388E-03	0.00000E+00	0.00000E+00
50	7.25287E-01	2.16400E+00	7.10617E-01	4.66424E-03	0.00000E+00	0.00000E+00
51	6.44596E-01	2.19783E+00	7.09270E-01	4.76262E-03	0.00000E+00	0.00000E+00
52	6.86745E-01	2.23367E+00	7.08819E-01	4.68809E-03	0.00000E+00	0.00000E+00
53	6.87129E-01	2.26750E+00	7.08394E-01	4.61489E-03	0.00000E+00	0.00000E+00
54	7.71959E-01	2.30133E+00	7.09616E-01	4.68747E-03	0.00000E+00	0.00000E+00
55	7.77561E-01	2.33433E+00	7.10898E-01	4.77354E-03	0.00000E+00	0.00000E+00
56	7.34540E-01	2.36817E+00	7.11336E-01	4.70472E-03	0.00000E+00	0.00000E+00
57	7.52295E-01	2.40200E+00	7.12081E-01	4.67805E-03	0.00000E+00	0.00000E+00
58	7.29056E-01	2.43583E+00	7.12394E-01	4.60374E-03	0.00000E+00	0.00000E+00
59	7.02691E-01	2.46993E+00	7.12214E-01	4.52545E-03	0.00000E+00	0.00000E+00
60	7.22378E-01	2.50183E+00	7.12389E-01	4.45019E-03	0.00000E+00	0.00000E+00
61	7.43714E-01	2.53567E+00	7.12920E-01	4.40622E-03	0.00000E+00	0.00000E+00
62	7.04102E-01	2.56950E+00	7.12773E-01	4.33465E-03	0.00000E+00	0.00000E+00
63	7.19153E-01	2.60433E+00	7.12878E-01	4.26428E-03	0.00000E+00	0.00000E+00
64	7.64399E-01	2.63817E+00	7.13709E-01	4.27645E-03	0.00000E+00	0.00000E+00
65	7.45281E-01	2.67217E+00	7.14210E-01	4.23776E-03	0.00000E+00	0.00000E+00
66	6.90775E-01	2.70683E+00	7.13844E-01	4.18707E-03	0.00000E+00	0.00000E+00
67	6.98713E-01	2.74067E+00	7.13611E-01	4.12871E-03	0.00000E+00	0.00000E+00
68	7.40004E-01	2.77367E+00	7.14011E-01	4.08529E-03	0.00000E+00	0.00000E+00
69	7.17451E-01	2.80850E+00	7.14062E-01	4.02419E-03	0.00000E+00	0.00000E+00
70	7.25053E-01	2.84233E+00	7.14224E-01	3.96786E-03	0.00000E+00	0.00000E+00
71	6.98406E-01	2.87533E+00	7.13994E-01	3.91665E-03	0.00000E+00	0.00000E+00
72	7.36907E-01	2.90833E+00	7.14322E-01	3.87414E-03	0.00000E+00	0.00000E+00
73	6.98716E-01	2.94217E+00	7.14102E-01	3.82550E-03	0.00000E+00	0.00000E+00
74	7.11126E-01	2.97600E+00	7.14061E-01	3.77222E-03	0.00000E+00	0.00000E+00
75	7.61261E-01	3.01167E+00	7.14707E-01	3.77596E-03	0.00000E+00	0.00000E+00
76	7.15602E-01	3.04833E+00	7.14719E-01	3.72461E-03	0.00000E+00	0.00000E+00
77	7.38835E-01	3.08133E+00	7.15041E-01	3.68865E-03	0.00000E+00	0.00000E+00
78	7.37002E-01	3.11417E+00	7.15330E-01	3.65125E-03	0.00000E+00	0.00000E+00
79	6.91165E-01	3.14900E+00	7.15016E-01	3.61715E-03	0.00000E+00	0.00000E+00
80	7.01831E-01	3.18567E+00	7.14847E-01	3.57448E-03	0.00000E+00	0.00000E+00
81	6.91587E-01	3.22050E+00	7.14552E-01	3.54120E-03	0.00000E+00	0.00000E+00
82	6.72616E-01	3.25332E+00	7.14028E-01	3.53573E-03	0.00000E+00	0.00000E+00
83	7.45505E-01	3.28917E+00	7.14466E-01	3.51917E-03	0.00000E+00	0.00000E+00
84	7.09137E-01	3.32383E+00	7.14401E-01	3.47660E-03	0.00000E+00	0.00000E+00
85	7.07948E-01	3.35767E+00	7.14324E-01	3.43533E-03	0.00000E+00	0.00000E+00
86	6.94416E-01	3.39250E+00	7.14087E-01	3.40245E-03	0.00000E+00	0.00000E+00
87	7.80753E-01	3.42817E+00	7.14871E-01	3.45246E-03	0.00000E+00	0.00000E+00
88	7.16176E-01	3.46217E+00	7.14886E-01	3.41211E-03	0.00000E+00	0.00000E+00

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89	6.91386E-01	3.49600E+00	7.14616E-01	3.38345E-03	0.00000E+00	0.00000E+00
90	7.56111E-01	3.52800E+00	7.15088E-01	3.37766E-03	0.00000E+00	0.00000E+00
91	6.92498E-01	3.56283E+00	7.14834E-01	3.34933E-03	0.00000E+00	0.00000E+00
92	6.77406E-01	3.59850E+00	7.14418E-01	3.33791E-03	0.00000E+00	0.00000E+00
93	6.75274E-01	3.63150E+00	7.13988E-01	3.32893E-03	0.00000E+00	0.00000E+00
94	7.41337E-01	3.66433E+00	7.14285E-01	3.30594E-03	0.00000E+00	0.00000E+00
95	6.86783E-01	3.69733E+00	7.13989E-01	3.28355E-03	0.00000E+00	0.00000E+00
96	7.19390E-01	3.73217E+00	7.14047E-01	3.24894E-03	0.00000E+00	0.00000E+00
97	6.80724E-01	3.76783E+00	7.13696E-01	3.23363E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-122      WARNING... ONLY 386 INDEPENDENT FISSION POINTS WERE GENERATED						
98	6.20195E-01	3.80167E+00	7.12722E-01	3.34472E-03	0.00000E+00	0.00000E+00
99	6.48745E-01	3.83833E+00	7.12062E-01	3.37513E-03	0.00000E+00	0.00000E+00
100	7.70577E-01	3.86950E+00	7.12659E-01	3.39346E-03	0.00000E+00	0.00000E+00
101	7.08621E-01	3.90417E+00	7.12619E-01	3.35925E-03	0.00000E+00	0.00000E+00
102	7.17891E-01	3.93717E+00	7.12671E-01	3.32591E-03	0.00000E+00	0.00000E+00
103	7.57292E-01	3.97200E+00	7.13113E-01	3.32232E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123      EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

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"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

LIFETIME = 2.16183E-04 + OR - 2.12662E-06      GENERATION TIME = 1.13659E-04 + OR - 8.29443E-07  
 NU BAR = 2.42979E+00 + OR - 2.35841E-04      AVERAGE FISSION GROUP = 2.37498E+01 + OR - 1.33856E-02  
 ENERGY(EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 6.89807E-02 + OR - 8.25504E-04

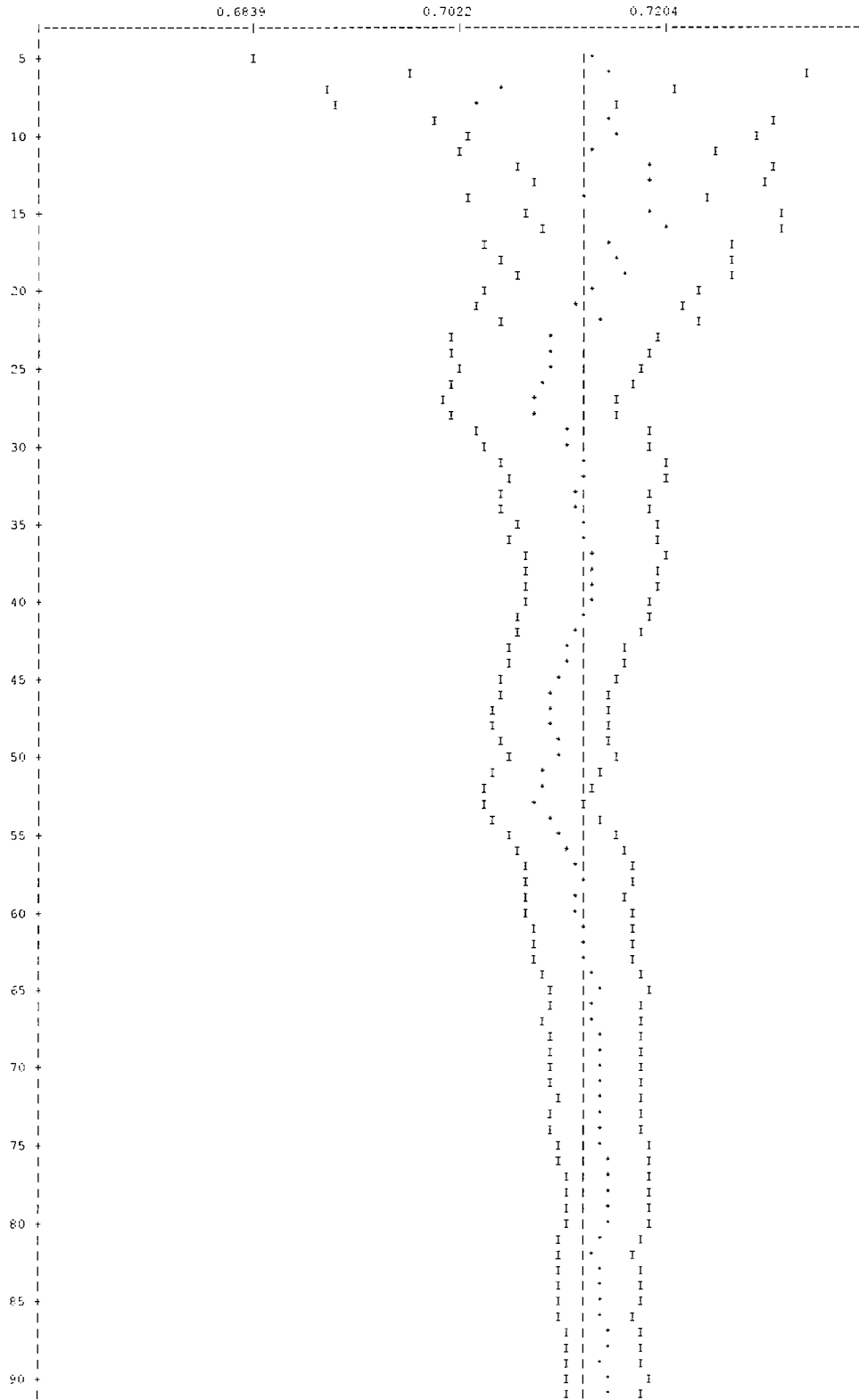
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
3	0.71353	+ OR - 0.00333	0.71020 TO 0.71686	0.70687 TO 0.72019	0.70354 TO 0.72352	40000
4	0.71383	+ OR - 0.00335	0.71048 TO 0.71718	0.70713 TO 0.72053	0.70378 TO 0.72388	39600
5	0.71351	+ OR - 0.00337	0.71015 TO 0.71688	0.70678 TO 0.72025	0.70341 TO 0.72362	39200
6	0.71347	+ OR - 0.00340	0.71006 TO 0.71687	0.70666 TO 0.72027	0.70325 TO 0.72368	38800
7	0.71383	+ OR - 0.00342	0.71041 TO 0.71725	0.70699 TO 0.72067	0.70357 TO 0.72409	38400
8	0.71403	+ OR - 0.00345	0.71058 TO 0.71748	0.70713 TO 0.72093	0.70368 TO 0.72438	38000
9	0.71341	+ OR - 0.00343	0.70998 TO 0.71684	0.70655 TO 0.72027	0.70312 TO 0.72370	37600
10	0.71332	+ OR - 0.00347	0.70986 TO 0.71679	0.70639 TO 0.72025	0.70293 TO 0.72372	37200
11	0.71348	+ OR - 0.00350	0.70998 TO 0.71698	0.70648 TO 0.72048	0.70298 TO 0.72398	36800
12	0.71296	+ OR - 0.00350	0.70946 TO 0.71646	0.70596 TO 0.71996	0.70246 TO 0.72345	36400
17	0.71320	+ OR - 0.00348	0.70972 TO 0.71668	0.70625 TO 0.72015	0.70277 TO 0.72363	34400
22	0.71321	+ OR - 0.00360	0.70961 TO 0.71661	0.70601 TO 0.72041	0.70241 TO 0.72401	32400
27	0.71502	+ OR - 0.00365	0.71137 TO 0.71868	0.70772 TO 0.72233	0.70407 TO 0.72598	30400
32	0.71347	+ OR - 0.00377	0.70970 TO 0.71724	0.70593 TO 0.72101	0.70216 TO 0.72478	28400
37	0.71303	+ OR - 0.00395	0.70908 TO 0.71698	0.70512 TO 0.72094	0.70117 TO 0.72489	26400
42	0.71395	+ OR - 0.00425	0.70970 TO 0.71820	0.70545 TO 0.72244	0.70120 TO 0.72669	24400
47	0.71596	+ OR - 0.00451	0.71145 TO 0.72047	0.70694 TO 0.72498	0.70244 TO 0.72948	22400
52	0.71732	+ OR - 0.00468	0.71264 TO 0.72200	0.70797 TO 0.72668	0.70329 TO 0.73136	20400
57	0.71435	+ OR - 0.00473	0.70962 TO 0.71908	0.70488 TO 0.72381	0.70015 TO 0.72854	18400
62	0.71361	+ OR - 0.00524	0.70838 TO 0.71885	0.70314 TO 0.72408	0.69790 TO 0.72932	16400
67	0.71221	+ OR - 0.00567	0.70654 TO 0.71789	0.70087 TO 0.72356	0.69520 TO 0.72923	14400
72	0.71038	+ OR - 0.00645	0.70394 TO 0.71683	0.69749 TO 0.72328	0.69104 TO 0.72973	12400
77	0.70755	+ OR - 0.00733	0.70023 TO 0.71488	0.69290 TO 0.72220	0.68557 TO 0.72953	10400
82	0.70963	+ OR - 0.00875	0.70088 TO 0.71838	0.69213 TO 0.72713	0.68338 TO 0.73587	8400
87	0.70378	+ OR - 0.01015	0.69363 TO 0.71392	0.68348 TO 0.72407	0.67333 TO 0.73422	6400
92	0.70244	+ OR - 0.01376	0.68868 TO 0.71620	0.67492 TO 0.72996	0.66116 TO 0.74372	4400

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

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	0.70389	+ OR - 0.02420	0.67969 TO 0.72808	0.65549 TO 0.75228	0.63130 TO 0.77647	2400

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS  $K\text{-EFF} = 0.7135 \pm 0.0033$  WHICH OCCURS FOR 103 GENERATIONS RUN.





"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0027			1.92049E-03	7.9551	1.55933E-03	4.6801	0.00000E+00	0.0000
2	0.0119			8.47839E-03	2.3095	5.24441E-03	1.6315	0.00000E+00	0.0000
3	0.0124			8.87829E-03	2.4641	3.70982E-03	2.3483	0.00000E+00	0.0000
4	0.0051			3.61159E-03	3.2896	1.73889E-03	3.1541	0.00000E+00	0.0000
5	0.0017			1.24621E-03	1.8610	1.25950E-03	1.6420	0.00000E+00	0.0000
6	0.0014			1.00221E-03	1.6885	2.17782E-03	1.6503	0.00000E+00	0.0000
7	0.0012			8.32696E-04	2.1601	2.77279E-03	1.9339	0.00000E+00	0.0000
8	0.0009			6.32962E-04	2.3808	2.54617E-03	2.1997	0.00000E+00	0.0000
9	0.0011			8.12195E-04	3.1579	3.22371E-03	2.3339	0.00000E+00	0.0000
10	0.0024			1.71284E-03	3.3921	5.74338E-03	2.3470	0.00000E+00	0.0000
11	0.0052			3.71633E-03	2.9123	8.87449E-03	2.1449	0.00000E+00	0.0000
12	0.0066			4.74161E-03	3.6874	8.82059E-03	2.7710	0.00000E+00	0.0000
13	0.0063			4.51110E-03	4.4318	9.69352E-03	2.7547	0.00000E+00	0.0000
14	0.0052			3.72684E-03	3.9334	1.36092E-02	2.5871	0.00000E+00	0.0000
15	0.0013			9.07042E-04	6.3377	4.51955E-03	3.1016	0.00000E+00	0.0000
16	0.0008			5.46759E-04	7.0791	2.57548E-03	3.9213	0.00000E+00	0.0000
17	0.0012			8.73620E-04	11.1197	1.64378E-03	5.2113	0.00000E+00	0.0000
18	0.0018			1.28315E-03	10.7961	1.66254E-03	5.4296	0.00000E+00	0.0000
19	0.0023			1.65015E-03	8.1758	2.73285E-03	3.5998	0.00000E+00	0.0000
20	0.0096			6.86870E-03	4.2910	1.04665E-02	2.3819	0.00000E+00	0.0000
21	0.0053			3.76837E-03	7.3940	4.49843E-03	3.9745	0.00000E+00	0.0000
22	0.0137			9.74644E-03	4.5119	1.12421E-02	2.5474	0.00000E+00	0.0000
23	0.0891			6.35829E-02	1.7811	8.04947E-02	0.8691	0.00000E+00	0.0000
24	0.2522			1.79948E-01	1.0626	2.28908E-01	0.5136	0.00000E+00	0.0000
25	0.2261			1.61345E-01	1.0192	2.13349E-01	0.4255	0.00000E+00	0.0000
26	0.2579			1.84035E-01	0.8679	2.71962E-01	0.4119	0.00000E+00	0.0000
27	0.0745			5.31486E-02	2.3429	9.70387E-02	0.6775	0.00000E+00	0.0000
SYSTEM TOTAL =				7.13527E-01	0.4666	1.00207E+00	0.1223	0.00000E+00	0.0000

ELAPSED TIME 3.97283 MINUTES

RANDOM NUMBER= 6ECC71283DC6

-

"LWT CASK, 25 BWR RODS, NO BWR BASKET, 5 W/O U235 VARIABLE PITCH"

```
                                FREQUENCY FOR GENERATIONS    4 TO 103
0.6076 TO 0.6276      *
0.6276 TO 0.6476      **
0.6476 TO 0.6676      ****
0.6676 TO 0.6876      *****
0.6876 TO 0.7076      *****
0.7076 TO 0.7276      *****
0.7276 TO 0.7476      *****
0.7476 TO 0.7676      *****
0.7676 TO 0.7876      *****
```

```
                                FREQUENCY FOR GENERATIONS    29 TO 103
0.6076 TO 0.6276      *
0.6276 TO 0.6476      *
0.6476 TO 0.6676      *
0.6676 TO 0.6876      *****
0.6876 TO 0.7076      *****
0.7076 TO 0.7276      *****
0.7276 TO 0.7476      *****
0.7476 TO 0.7676      *****
0.7676 TO 0.7876      *****
```

```
                                FREQUENCY FOR GENERATIONS    54 TO 103
0.6076 TO 0.6276      *
0.6276 TO 0.6476      *
0.6476 TO 0.6676      *
0.6676 TO 0.6876      *****
0.6876 TO 0.7076      *****
0.7076 TO 0.7276      *****
0.7276 TO 0.7476      *****
0.7476 TO 0.7676      *****
0.7676 TO 0.7876      *****
```

```
                                FREQUENCY FOR GENERATIONS    79 TO 103
0.6076 TO 0.6276      *
0.6276 TO 0.6476      *
0.6476 TO 0.6676      *
0.6676 TO 0.6876      *****
0.6876 TO 0.7076      *****
0.7076 TO 0.7276      *****
0.7276 TO 0.7476      *
0.7476 TO 0.7676      **
0.7676 TO 0.7876      **
```

.....  
\*  
.....  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 3.97283 MINUTES  
.....  
\*  
-  
-

**6.6.5**      **TRIGA Fuel Elements**

This section contains abbreviated output files from the most reactive non-poisoned and poisoned basket configurations for TRIGA fuel elements, and a sample benchmark case for TRIGA fuel.



**Figure 6.6.5-1 Summary of CSAS Input/Output for NAC-LWT with TRIGA Fuel Elements - Most Reactive Nonpoisoned Basket Configuration**

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE
27GROUPNDF4 INFHOMMEDIUM
'FUEL
U-235 1 0.0 2.3049E-04 END
U-238 1 0.0 9.8008E-05 END
ZR 1 0.0 8.7748E-03 END
H 1 0.0 1.4040E-02 END
H2O 1 0.7454 293.0 END
'CLAD, BASKET, AND CASK
SS304 2 1.0 293.0 END
'CANISTER INTERNAL MODERATOR
H2O 3 1.0 293.0 END
'ZIRCONIUM ROD
ZR 4 1.0 293.0 END
'GRAPHITE REFLECTOR
C 5 1.0 293.0 END
'LEAD SHIELD
PB 6 1.0 293.0 END
'NEUTRON SHIELD
H2O 7 1.0E-20 293.0 END
'CASK EXTERNAL MATERIAL
H2O 8 1.0E-20 293.0 END
'END FITTING FOR FUEL ELEMENT
SS304 9 0.337137 293.0 END
H2O 9 0.662863 293.0 END
'SECOND FUEL MATERIAL FOR UN-CANISTERED
U-235 10 0.0 9.052980E-4 END
U-238 10 0.0 3.849480E-4 END
ZR 10 0.0 3.446510E-2 END
H 10 0.0 5.514420E-2 END
'SECOND END-FITTING MATERIAL FOR UN-CANISTERED FUEL
SS304 11 0.337137 293.0 END
H2O 11 DEN=0.662863 1.0E-20 293.0 END
'CASK INTERIOR MODERATOR MATERIAL
H2O 12 1.0E-20 293.0 END
END COMP
MORE DATA
RES=10 CYLINDER 1.8224 DAN(10)=9.52196E-01
END MORE
TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE
READ PARAM TME=170.0 GEN=403 NPG=1000 RUN=YES PLT=NO
TBA=2.0 END PARAM
READ GEOM
UNIT 1
COM='TRIGA FUEL (SMEARED)'
CYLINDER 1 1 3.9877 60.959 0.001
UNIT 5
COM='3.38 in Width / 0.28 in Thickness DIVIDER CENTER STACK (SEALED)'
CUBOID 2 1 2P4.2926 0.7112 0.0 +74.29 -8.255
UNIT 6
COM='3.38 in Width / 0.24 in Thickness DIVIDER OUTSIDE STACK (SEALED)'
CUBOID 2 1 2P4.2926 0.6096 0.0 +74.29 -8.255
UNIT 7
COM='SEALED CANISTER'
CYLINDER 12 1 3.9878 +60.96 0.0
HOLE 1 0.0 0.0 0.0
CYLINDER 2 1 4.1529 +63.50 -1.27
CYLINDER 12 1 4.1529 +74.29 -8.255
UNIT 10
COM='TRIGA ELEMENTS IN Top of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2926 2P4.2926 +74.29 -8.255
HOLE 7 0.0 0.1396 0.0
UNIT 11
COM='TRIGA ELEMENTS IN Bottom of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2926 2P4.2926 +74.29 -8.255
HOLE 7 0.0 -0.1396 0.0
UNIT 12
COM='TRIGA ELEMENTS IN Bottom Right of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2926 2P4.2926 +74.29 -8.255
HOLE 7 +0.1396 -0.1396 0.0
UNIT 13
COM='TRIGA ELEMENTS IN Top Right of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2926 2P4.2926 +74.29 -8.255
HOLE 7 +0.1396 +0.1396 0.0
UNIT 14
COM='TRIGA ELEMENTS IN Bottom Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2926 2P4.2926 +74.29 -8.255
HOLE 7 -0.1396 -0.1396 0.0
UNIT 15
COM='TRIGA ELEMENTS IN Top Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2926 2P4.2926 +74.29 -8.255
HOLE 7 -0.1396 +0.1396 0.0
UNIT 16
COM='TRIGA BASKET 3.38 in x 3.38 in CENTER OPENING (SEALED)'
CUBOID 12 1 2P4.2926 2P4.2926 +74.29 -8.255
UNIT 20
```

```
COM='CENTER COLUMN OF THREE OPENINGS w/ 0.28 in plate (SEALED)'  
ARRAY 1 -4.2926 -13.589 -8.255  
REPLICATE 2 1 4R0.7112 2R0.0 1  
UNIT 21  
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'  
ARRAY 2 -4.2926 -8.89 -8.255  
REPLICATE 2 1 0.0 0.3048 2R0.3048 2R0.0 1  
UNIT 22  
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'  
ARRAY 3 -4.2926 -8.89 -8.255  
REPLICATE 2 1 0.3048 0.0 2R0.3048 2R0.0 1  
UNIT 30  
COM='NAC-LWT TRIGA BASKET (SEALED)'  
CYLINDER 12 1 17.1 +74.29 -8.255  
HOLE 20 0.0 0.0 0.0  
HOLE 21 -9.2974 0.0 0.0  
HOLE 22 +9.2974 0.0 0.0  
CYLINDER 2 1 18.9103 +74.93 -8.890  
CYLINDER 6 1 33.4645 +74.93 -8.890  
CYLINDER 2 1 36.5188 +74.93 -8.890  
CYLINDER 7 1 49.2227 +74.93 -8.890  
CYLINDER 2 1 49.8221 +74.93 -8.890  
CUBOID 8 1 4P49.8221 +74.93 -8.890  
UNIT 41  
COM='TRIGA FUEL ELEMENT'  
CYLINDER 4 1 0.2858 2P19.05  
CYLINDER 10 1 1.8224 2P19.05  
CYLINDER 5 1 1.8224 2P27.7368  
CYLINDER 2 1 1.8771 2P27.7368  
CYLINDER 11 1 1.8771 2P36.703  
UNIT 45  
COM='3.38 in Width / 0.28 in Thickness DIVIDER CENTER STACK'  
CUBOID 2 1 2P4.2926 0.7112 0.0 2P36.703  
UNIT 46  
COM='3.38 in Width / 0.24 in Thickness DIVIDER OUTSIDE STACK'  
CUBOID 2 1 2P4.2926 0.6096 0.0 2P36.703  
UNIT 50  
COM='TRIGA FUEL ELEMENTS IN Top of 3.38 in x 3.38 in OPENING'  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
HOLE 41 +1.8772 +2.4154 0.0  
HOLE 41 -1.8772 +2.4154 0.0  
HOLE 41 -1.8772 -1.3389 0.0  
HOLE 41 +1.8772 -1.3389 0.0  
UNIT 51  
COM='TRIGA FUEL ELEMENTS IN Bottom of 3.38 in x 3.38 in OPENING'  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
HOLE 41 +1.8772 -2.4154 0.0  
HOLE 41 -1.8772 -2.4154 0.0  
HOLE 41 -1.8772 +1.3389 0.0  
HOLE 41 +1.8772 +1.3389 0.0  
UNIT 52  
COM='TRIGA FUEL ELEMENTS IN Bottom Right of 3.38 in x 3.38 in OPENING'  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
HOLE 41 +2.4154 -2.4154 0.0  
HOLE 41 +2.4154 +1.3389 0.0  
HOLE 41 -1.3389 -2.4154 0.0  
HOLE 41 -1.3389 +1.3389 0.0  
UNIT 53  
COM='TRIGA FUEL ELEMENTS IN Top Right of 3.38 in x 3.38 in OPENING'  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
HOLE 41 +2.4154 +2.4154 0.0  
HOLE 41 +2.4154 -1.3389 0.0  
HOLE 41 -1.3389 +2.4154 0.0  
HOLE 41 -1.3389 -1.3389 0.0  
UNIT 54  
COM='TRIGA FUEL ELEMENTS IN Bottom Left of 3.38 in x 3.38 in OPENING'  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
HOLE 41 -2.4154 -2.4154 0.0  
HOLE 41 -2.4154 +1.3389 0.0  
HOLE 41 +1.3389 -2.4154 0.0  
HOLE 41 +1.3389 +1.3389 0.0  
UNIT 55  
COM='TRIGA FUEL ELEMENTS IN Top Left of 3.38 in x 3.38 in OPENING'  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
HOLE 41 -2.4154 +2.4154 0.0  
HOLE 41 -2.4154 -1.3389 0.0  
HOLE 41 +1.3389 +2.4154 0.0  
HOLE 41 +1.3389 -1.3389 0.0  
UNIT 56  
COM='TRIGA BASKET 3.38 in x 3.38 in CENTER OPENING'  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
UNIT 60  
COM='CENTER COLUMN OF THREE OPENINGS w/ 0.28 in plate'  
ARRAY 11 -4.2926 -13.589 -36.703  
REPLICATE 2 1 4R0.7112 2R0.0 1  
UNIT 61  
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate'  
ARRAY 12 -4.2926 -8.89 -36.703  
REPLICATE 2 1 0.0 0.3048 2R0.3048 2R0.0 1  
UNIT 62  
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate'  
ARRAY 13 -4.2926 -8.89 -36.703  
REPLICATE 2 1 0.3048 0.0 2R0.3048 2R0.0 1  
UNIT 70  
COM='NAC-LWT TRIGA BASKET'
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CYLINDER 12 1 17.1 2P36.703
HOLE 60 0.0 0.0 0.0
HOLE 61 -9.2974 0.0 0.0
HOLE 62 +9.2974 0.0 0.0
CYLINDER 2 1 18.9103 2P37.338
CYLINDER 6 1 33.4645 2P37.338
CYLINDER 2 1 36.5188 2P37.338
CYLINDER 7 1 49.8227 2P37.338
CYLINDER 2 1 49.8221 2P37.338
CUBOID 8 1 4P49.8221 2P37.338
UNIT 80
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 2 1 36.5188 2P14.1351
CYLINDER 8 1 49.8221 2P14.1351
CUBOID 8 1 4P49.8221 2P14.1351
UNIT 81
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 6 1 26.3525 2P3.81
CYLINDER 2 1 36.6188 +13.97 -12.7
CYLINDER 8 1 49.8221 +13.97 -12.7
CUBOID 8 1 4P49.8221 +13.97 -12.7
GLOBAL UNIT 82
COM='STACK OF 5 BASKETS IN CASK'
ARRAY 20 -49.8221 -49.8221 -221.3
END GEOM
READ ARRAY
ARA=1 NUX=1 NUY=5 NUZ=1 FILL 10 5 16 5 11 END FILL
ARA=2 NUX=1 NUY=3 NUZ=1 FILL 13 6 12 END FILL
ARA=3 NUX=1 NUY=3 NUZ=1 FILL 15 6 14 END FILL
ARA=11 NUX=1 NUY=5 NUZ=1 FILL 50 45 56 45 51 END FILL
ARA=12 NUX=1 NUY=3 NUZ=1 FILL 53 46 52 END FILL
ARA=13 NUX=1 NUY=3 NUZ=1 FILL 55 46 54 END FILL
ARA=20 NUX=1 NUY=1 NUZ=7 FILL 81 30 3R70 30 80 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CASK (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-50.0 YUL=50.0 ZUL=149.352
XLR=50.0 YLR=-50.0 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=149.352
XLR=17.2 YLR=-17.2 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CAVITY MID PLANE)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=0.0
XLR=17.2 YLR=-17.2 ZLR=0.0 END
TTL='X-Y PLOT OF CENTER OPENING (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=7.0 ZUL=149.352
XLR=7.0 YLR=-7.0 ZLR=149.352 END
TTL='X-Y PLOT OF PERIPHERAL OPENING (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=16.0 ZUL=149.352
XLR=7.0 YLR=4.0 ZLR=149.352 END
TTL='Y-Z PLOT OF BASKET (CENTER OF FUEL ELEMENTS,CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-14.0 ZUL=186.69
XLR=2.12 YLR=-4.5 ZLR=112.014 END
TTL='Y-Z PLOT OF BASKET (CASK)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-51 ZUL=250
XLR=2.12 YLR=+51 ZLR=-250
END PLOT
END DATA

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```

SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.88 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 9.72 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 718.10 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 729.96 (SECONDS).

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```

CCCCCCCCC      SSSSSSSSS      AAAAAAAAA      SSSSSSSSS      222222222      55555555555
CCCCCCCCCCCCC  SSSSSSSSSSS    AAAAAAAAAAA    SSSSSSSSSSS    22222222222    5555555555555
CC      CC      SS      SS      AA      AA      SS      SS      22      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SSSSSSSSSSS    AAAAAAAAAAA    SSSSSSSSSSS    22      55555555555
CC      SSSSSSSSSSS    AAAAAAAAAAA    SSSSSSSSSSS    22      5555555555555
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      CC      SS      SS      AA      AA      SS      SS      22      55      55
CCCCCCCCCCCCC  SSSSSSSSSSS    AA      AA      SSSSSSSSSSS    22222222222    5555555555555
CCCCCCCCCCCCC  SSSSSSSSSSS    AA      AA      SSSSSSSSSSS    22222222222    55555555555
    
```

```

SSSSSSSSSS    CCCCCCCCCC      AAAAAAAAA      LL      EEEEEEEEEEE      PPPPPPPPPPP      CCCCCCCCCC
SSSSSSSSSSSS  CCCCCCCCCCCCC    AAAAAAAAAAA    LL      EEEEEEEEEEE      PPPPPPPPPPPPP  CCCCCCCCCCCCC
SS      SS      CC      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SSSSSSSSSSSS  CC      AAAAAAAAAAA    LL      EEEEEEEEE     -----  PPPPPPPPPPPPP  CC
SSSSSSSSSSSS  CC      AAAAAAAAAAA    LL      EEEEEEEEE     -----  PPPPPPPPPPPPP  CC
SS      SS      CC      AA      LL      EE      PP      CC      CC
SS      SS      CC      AA      LL      EE      PP      CC      CC
SS      SS      CC      AA      LL      EE      PP      CC      CC
SSSSSSSSSSSS  CCCCCCCCCCCCC    AA      AA      LLLLLLLLLLLL  EEEEEEEEEEE     PPP      CCCCCCCCCC
SSSSSSSSSSSS  CCCCCCCCCCCCC    AA      AA      LLLLLLLLLLLL  EEEEEEEEEEE     PP      CCCCCCCCCC
    
```

```

11      222222222      //      333333333      0000000      //      999999999      888888888
111     22222222222    //      33333333333    000000000    //      99999999999    88888888888
1111    22      22      //      33      33      00      00      //      99      99      88      88
11      22      //      33      33      00      00      //      99      99      88      88
11      22      //      333      00      00      //      99999999999    88888888888
11      22      //      333      00      00      //      99999999999    88888888888
11      22      //      33      33      00      00      //      99      99      88      88
11      22      //      33      33      00      00      //      99      99      88      88
11      22      //      33      33      00      00      //      99      99      88      88
1111111  22222222222    //      33333333333    000000000    //      99999999999    88888888888
1111111  22222222222    //      33333333333    0000000      //      99999999999    88888888888
    
```

```

0000000      55555555555      333333333      333333333      55555555555      888888888
000000000    5555555555555    33333333333    33333333333    5555555555555    8888888888888
00      00      55      //      33      33      33      33      //      55      55      88      88
00      00      55      //      33      33      33      33      //      55      55      88      88
00      00      55      //      33      33      33      33      //      55      55      88      88
00      00      55555555555    333      333      55555555555    88888888888
00      00      5555555555555    333      333      5555555555555    8888888888888
00      00      55      //      33      33      33      33      //      55      55      88      88
00      00      55      //      33      33      33      33      //      55      55      88      88
00      00      55      //      33      33      33      33      //      55      55      88      88
00      00      55      //      33      33      33      33      //      55      55      88      88
000000000    5555555555555    33333333333    33333333333    5555555555555    8888888888888
0000000      55555555555      333333333      333333333      55555555555      88888888888
    
```



```

KK      KK  EEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEE  NNN     NN  0000000000000    VV      VV
KK      KK  EE           NNNN    NN  00           VV      VV
KK      KK  EE           NN NN   NN  00           VV      VV
KK      KK  EE           NN  NN  NN  00           VV      VV
KKKKKKKK EEEEEEEEE   NN  NN  NN  00           VV      VV
KKKKKKKK EEEEEEEEE   NN  NN  NN  00           VV      VV
KK      KK  EE           NN  NN  NN  00           VV      VV
KK      KK  EE           NN  NN  NN  00           VV      VV
KK      KK  EE           NN  NN  NN  00           VV      VV
KK      KK  EEEEEEEEEEE NN  NN  NN  00000000000    VV      VV
KK      KK  EEEEEEEEEEE NN  NN  NN  00000000000    VV      VV

```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE   PPPPPPPPPPP  CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE   PPPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE           PP      CC
SS      SS  CC      AA      AA  LL      EE           PP      CC
SS      SS  CC      AA      AA  LL      EE           PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC

```

```

11      2222222222  //  3333333333  0000000  //  9999999999  8888888888
111     2222222222  //  3333333333  000000000  //  9999999999  8888888888
1111    22      22  //  33      33  00      00  //  99      99  88      88
11      22      22  //  33      33  00      00  //  99      99  88      88
11      22      22  //  33      33  00      00  //  99      99  88      88
11      22      22  //  333     33  00      00  //  9999999999  8888888888
11      22      22  //  333     33  00      00  //  9999999999  8888888888
11      22      22  //  33      33  00      00  //  99      99  88      88
11      22      22  //  33      33  00      00  //  99      99  88      88
11      22      22  //  33      33  00      00  //  99      99  88      88
11111111 2222222222  //  3333333333  000000000  //  9999999999  8888888888
11111111 2222222222  //  3333333333  0000000    //  9999999999  8888888888

```

```

00000000  555555555555  3333333333  44      11      00000000
000000000  555555555555  33333333333  444     111     000000000
00      00  55      :::  33      33  4444      :::  1111    00      00
00      00  55      :::  33      33  44 44      :::  11      00      00
00      00  55      :::  33      33  44 44      :::  11      00      00
00      00  555555555555  333     44 44  444444444444  :::  11      00      00
00      00  555555555555  333     44 44  444444444444  :::  11      00      00
00      00  55      55  :::  33      33  44444444444444  :::  11      00      00
00      00  55      55  :::  33      33  44444444444444  :::  11      00      00
00      00  55      55  :::  33      33  44      44  :::  11      00      00
000000000  555555555555  33333333333  44      11111111  000000000
00000000  55555555555  33333333333  44      11111111  00000000

```



```
.....
...
... TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE ...
...
... ***** NUMERIC PARAMETERS ***** ...
...
... TME MAXIMUM PROBLEM TIME (MIN) 170.00 ...
... TBA TIME PER GENERATION (MIN) 2.00 ...
... GEN NUMBER OF GENERATIONS 403 ...
... NPG NUMBER PER GENERATION 1000 ...
... NSK NUMBER OF GENERATIONS TO BE SKIPPED 3 ...
... BEG BEGINNING GENERATION NUMBER 1 ...
... RES GENERATIONS BETWEEN CHECKPOINTS 0 ...
... X1D NUMBER OF EXTRA 1-D CROSS SECTIONS 1 ...
... NBK NEUTRON BANK SIZE 1025 ...
... XNB EXTRA POSITIONS IN NEUTRON BANK 0 ...
... NFB FISSION BANK SIZE 1000 ...
... 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 BB027100001 ...
... NBS NUMBER OF D.A. BLOCKS ON UNIT 8 200 ...
... NLS 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 ...
.....
```



```

.....
TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE
.....
***** LOGICAL PARAMETERS *****
.....
*** RUN EXECUTE PROBLEM AFTER CHECKING DATA YES PLT PLOT PICTURE MAP(S) NO ***
*** FLX COMPUTE FLUX NO FDW COMPUTE FISSION DENSITIES NO ***
*** SMU COMPUTE AVG UNIT SELF-MULTIPLICATION NO HUB COMPUTE NU-BAR & AVG FISSION GROUP YES ***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO ***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO PWT PRINT WEIGHT AVERAGE ARRAY NO ***
*** FKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO ***
*** F1D PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO ***
*** TRK PRINT TRACKING INFORMATION NO ***
.....
PARAMETER INPUT COMPLETED
.....

```

..... 0 IO'S WERE USED READING THE PARAMETER DATA .....

\*\*\*\*\* DATA READING COMPLETED \*\*\*\*\*

```

.....
TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE
.....
***** ADDITIONAL INFORMATION *****
.....
*** NUMBER OF ENERGY GROUPS 27 USE LATTICE GEOMETRY YES ***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1 GLOBAL ARRAY NUMBER 20 ***
*** NO. OF SCATTERING ANGLES IN XSECS 2 NUMBER OF UNITS IN THE GLOBAL X DIR. 1 ***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 25 NUMBER OF UNITS IN THE GLOBAL Y DIR. 1 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK 18 NUMBER OF UNITS IN THE GLOBAL Z DIR. 7 ***
*** NUMBER OF MIXTURES USED 10 USE A GLOBAL REFLECTOR YES ***
*** NUMBER OF BIAS ID'S USED 1 USE NESTED HOLES YES ***
*** NUMBER OF DIFFERENTIAL ALBEDOS USED 0 NUMBER OF HOLES 37 ***
*** TOTAL INPUT GEOMETRY REGIONS 61 MAXIMUM HOLE NESTING LEVEL 3 ***
*** NUMBER OF GEOMETRY REGIONS USED 61 USE NESTED ARRAYS YES ***
*** LARGEST GEOMETRY UNIT NUMBER 82 NUMBER OF ARRAYS USED 7 ***
*** LARGEST ARRAY NUMBER 20 MAXIMUM ARRAY NESTING LEVEL 2 ***
*** +X BOUNDARY CONDITION MIR -X BOUNDARY CONDITION MIR ***
*** +Y BOUNDARY CONDITION MIR -Y BOUNDARY CONDITION MIR ***
*** +Z BOUNDARY CONDITION MIR -Z BOUNDARY CONDITION MIR ***
.....

```

```

.....
***
*** TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE ***
***
.....
***
***          ***** SPACE AND SUPERGROUP INFORMATION *****          ***
***
*** 100000 WORDS IS THE TOTAL SPACE AVAILABLE. ***
***
*** 48807 WORDS WERE USED FOR NON-SUPERGROUP STORAGE. ***
***
*** 51193 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA. ***
***
*** 99679 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS. ***
***
*** 51133 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP. ***
***
*** 1315 WORDS ARE NEEDED FOR THE LARGEST GROUP. ***
***
*** 50338 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM. ***
***
*** 65200 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP. ***
***
*** 65696 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM. ***
***
.....
***
*** SUPERGROUP      STARTING      ENDING      KSEC      ALBEDO      TOTAL ***
***   GROUP          GROUP        GROUP      LENGTH     LENGTH     LENGTH ***
***
***      1             1           27         3334        0         16333 ***
***
.....

```

..... 0 IO'S WERE USED IN SUPERGROUPING .....

```

.....
**
** ARRAY      UNITS IN   UNITS IN   UNITS IN   NESTING **
** NUMBER     X DIR.     Y DIR.     Z DIR.     LEVEL   **
**
**      1         1         5         1         2 **
**
**      2         1         3         1         2 **
**
**      3         1         3         1         2 **
**
**     11         1         5         1         2 **
**
**     12         1         3         1         2 **
**
**     13         1         3         1         2 **
**
**    20 GLOBAL   1         1         7         1 **
**
.....

```

..... 0 IO'S WERE USED LOADING THE DATA .....

TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

```

          MEDIA BIAS      GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM
REGION   NUM   ID
-----
          ----- UNIT 1 -----
TRIGA FUEL (SMEARED)
  1 CYLINDER      1 1 RADIUS = 3.9877 +Z = 60.959 -Z = 1.00000E-03 CENTERLINE IS AT X = 0.00000 Y = 0.00000
          ----- UNIT 5 -----
3.38 IN WIDTH / 0.28 IN THICKNESS DIVIDER CENTER STACK (SEALED)
  1 CUBOID        2 1 +X = 4.2926 -X = -4.2926 +Y = 0.71120 -Y = 0.00000 +Z = 74.290 -Z = -8.2550
          ----- UNIT 6 -----
3.38 IN WIDTH / 0.24 IN THICKNESS DIVIDER OUTSIDE STACK (SEALED)
  1 CUBOID        2 1 +X = 4.2926 -X = -4.2926 +Y = 0.60960 -Y = 0.00000 +Z = 74.290 -Z = -8.2550
          ----- UNIT 7 -----
SEALED CANISTER
  1 CYLINDER      12 1 RADIUS = 3.9878 +Z = 60.960 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

```

HOLE NUMBER	1	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1	
2 CYLINDER	2 1	RADIUS = 4.1529	+Z = 63.500	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CYLINDER	12 1	RADIUS = 4.1529	+Z = 74.290	-Z = -8.2550	CENTERLINE IS AT X = 0.00000	Y = 0.00000	

----- UNIT 10 -----

TRIGA ELEMENTS IN TOP OF 3.38 IN X 3.38 IN OPENING (SEALED)

1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 74.290	-Z = -8.2550
----------	------	-------------	--------------	-------------	--------------	-------------	--------------

HOLE NUMBER	2	AT X = 0.00000	Y = 0.13960	Z = 0.00000	IS UNIT NUMBER	7	
-------------	---	----------------	-------------	-------------	----------------	---	--

----- UNIT 11 -----

TRIGA ELEMENTS IN BOTTOM OF 3.38 IN X 3.38 IN OPENING (SEALED)

1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 74.290	-Z = -8.2550
----------	------	-------------	--------------	-------------	--------------	-------------	--------------

HOLE NUMBER	3	AT X = 0.00000	Y = -0.13960	Z = 0.00000	IS UNIT NUMBER	7	
TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE							

-----

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
--------	----------------------	---	--	--	--	--	--

----- UNIT 12 -----

TRIGA ELEMENTS IN BOTTOM RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)

1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 74.290	-Z = -8.2550
----------	------	-------------	--------------	-------------	--------------	-------------	--------------

HOLE NUMBER	4	AT X = 0.13960	Y = -0.13960	Z = 0.00000	IS UNIT NUMBER	7	
-------------	---	----------------	--------------	-------------	----------------	---	--

----- UNIT 13 -----

TRIGA ELEMENTS IN TOP RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)

1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 74.290	-Z = -8.2550
----------	------	-------------	--------------	-------------	--------------	-------------	--------------

HOLE NUMBER	5	AT X = 0.13960	Y = 0.13960	Z = 0.00000	IS UNIT NUMBER	7	
-------------	---	----------------	-------------	-------------	----------------	---	--

----- UNIT 14 -----

TRIGA ELEMENTS IN BOTTOM LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)

1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 74.290	-Z = -8.2550
----------	------	-------------	--------------	-------------	--------------	-------------	--------------

HOLE NUMBER	6	AT X = -0.13960	Y = -0.13960	Z = 0.00000	IS UNIT NUMBER	7	
-------------	---	-----------------	--------------	-------------	----------------	---	--

----- UNIT 15 -----

TRIGA ELEMENTS IN TOP LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)

1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 74.290	-Z = -8.2550
----------	------	-------------	--------------	-------------	--------------	-------------	--------------

HOLE NUMBER	7	AT X = -0.13960	Y = 0.13960	Z = 0.00000	IS UNIT NUMBER	7	
-------------	---	-----------------	-------------	-------------	----------------	---	--

----- UNIT 16 -----

TRIGA BASKET 3.38 IN X 3.38 IN CENTER OPENING (SEALED)

1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 74.290	-Z = -8.2550
----------	------	-------------	--------------	-------------	--------------	-------------	--------------

----- UNIT 20 EXTERNAL TO LATTICE 1 -----

CENTER COLUMN OF THREE OPENINGS W/ 0.28 IN PLATE (SEALED)

1 ARRAY NUMBER	1	+X = 4.2926	-X = -4.2926	+Y = 13.589	-Y = -13.589	+Z = 74.290	-Z = -8.2550
2 CUBOID	2 1	+X = 5.0038	-X = -5.0038	+Y = 14.300	-Y = -14.300	+Z = 74.290	-Z = -8.2550

TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE							
---	--	--	--	--	--	--	--

-----

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
--------	----------------------	---	--	--	--	--	--

----- UNIT 21 EXTERNAL TO LATTICE 2 -----

LEFT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)

1 ARRAY NUMBER	2	+X = 4.2926	-X = -4.2926	+Y = 8.8900	-Y = -8.8900	+Z = 74.290	-Z = -8.2550
2 CUBOID	2 1	+X = 4.2926	-X = -4.5974	+Y = 9.1948	-Y = -9.1948	+Z = 74.290	-Z = -8.2550

----- UNIT 22 EXTERNAL TO LATTICE 3 -----  
RIGHT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)  
1 ARRAY NUMBER 3 +X = 4.2926 -X = -4.2926 +Y = 8.8900 -Y = -8.8900 +Z = 74.290 -Z = -8.2550  
2 CUBOID 2 1 +X = 4.5974 -X = -4.2926 +Y = 9.1948 -Y = -9.1948 +Z = 74.290 -Z = -8.2550

----- UNIT 30 -----  
NAC-LWT TRIGA BASKET (SEALED)  
1 CYLINDER 12 1 RADIUS = 17.100 +Z = 74.290 -Z = -8.2550 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
HOLE NUMBER 8 AT X = 0.00000 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 20  
HOLE NUMBER 9 AT X = -9.2974 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 21  
HOLE NUMBER 10 AT X = 9.2974 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 22  
2 CYLINDER 2 1 RADIUS = 18.910 +Z = 74.930 -Z = -8.8900 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
3 CYLINDER 6 1 RADIUS = 33.465 +Z = 74.930 -Z = -8.8900 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
4 CYLINDER 2 1 RADIUS = 36.519 +Z = 74.930 -Z = -8.8900 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
5 CYLINDER 7 1 RADIUS = 49.223 +Z = 74.930 -Z = -8.8900 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
6 CYLINDER 2 1 RADIUS = 49.822 +Z = 74.930 -Z = -8.8900 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
7 CUBOID 8 1 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 74.930 -Z = -8.8900  
TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 41 -----  
TRIGA FUEL ELEMENT  
1 CYLINDER 4 1 RADIUS = 0.28580 +Z = 19.050 -Z = -19.050 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
2 CYLINDER 10 1 RADIUS = 1.8224 +Z = 19.050 -Z = -19.050 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
3 CYLINDER 5 1 RADIUS = 1.8224 +Z = 27.737 -Z = -27.737 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
4 CYLINDER 2 1 RADIUS = 1.8771 +Z = 27.737 -Z = -27.737 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
5 CYLINDER 11 1 RADIUS = 1.8771 +Z = 36.703 -Z = -36.703 CENTERLINE IS AT X = 0.00000 Y = 0.00000

----- UNIT 45 -----  
3.38 IN WIDTH / 0.28 IN THICKNESS DIVIDER CENTER STACK  
1 CUBOID 2 1 +X = 4.2926 -X = -4.2926 +Y = 0.71120 -Y = 0.00000 +Z = 36.703 -Z = -36.703

----- UNIT 46 -----  
3.38 IN WIDTH / 0.24 IN THICKNESS DIVIDER OUTSIDE STACK  
1 CUBOID 2 1 +X = 4.2926 -X = -4.2926 +Y = 0.60960 -Y = 0.00000 +Z = 36.703 -Z = -36.703

----- UNIT 50 -----  
TRIGA FUEL ELEMENTS IN TOP OF 3.38 IN X 3.38 IN OPENING  
1 CUBOID 12 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 36.703 -Z = -36.703  
HOLE NUMBER 11 AT X = 1.8772 Y = 2.4154 Z = 0.00000 IS UNIT NUMBER 41  
HOLE NUMBER 12 AT X = -1.8772 Y = 2.4154 Z = 0.00000 IS UNIT NUMBER 41  
HOLE NUMBER 13 AT X = -1.8772 Y = -1.3389 Z = 0.00000 IS UNIT NUMBER 41  
HOLE NUMBER 14 AT X = 1.8772 Y = -1.3389 Z = 0.00000 IS UNIT NUMBER 41  
TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 51 -----  
TRIGA FUEL ELEMENTS IN BOTTOM OF 3.38 IN X 3.38 IN OPENING  
1 CUBOID 12 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 36.703 -Z = -36.703  
HOLE NUMBER 15 AT X = 1.8772 Y = -2.4154 Z = 0.00000 IS UNIT NUMBER 41  
HOLE NUMBER 16 AT X = -1.8772 Y = -2.4154 Z = 0.00000 IS UNIT NUMBER 41

HOLE NUMBER	17	AT X = -1.8772	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	18	AT X = 1.8772	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
----- UNIT 52 -----							
TRIGA FUEL ELEMENTS IN BOTTOM RIGHT OF 3.38 IN X 3.38 IN OPENING							
1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	19	AT X = 2.4154	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	20	AT X = 2.4154	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	21	AT X = -1.3389	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	22	AT X = -1.3389	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
----- UNIT 53 -----							
TRIGA FUEL ELEMENTS IN TOP RIGHT OF 3.38 IN X 3.38 IN OPENING							
1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	23	AT X = 2.4154	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	24	AT X = 2.4154	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	25	AT X = -1.3389	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	26	AT X = -1.3389	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	
----- UNIT 54 -----							
TRIGA FUEL ELEMENTS IN BOTTOM LEFT OF 3.38 IN X 3.38 IN OPENING							
1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	27	AT X = -2.4154	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	28	AT X = -2.4154	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	29	AT X = 1.3389	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	30	AT X = 1.3389	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
----- UNIT 55 -----							
TRIGA FUEL ELEMENTS IN TOP LEFT OF 3.38 IN X 3.38 IN OPENING							
1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	31	AT X = -2.4154	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	32	AT X = -2.4154	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	33	AT X = 1.3389	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	34	AT X = 1.3389	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	
----- UNIT 56 -----							
TRIGA BASKET 3.38 IN X 3.38 IN CENTER OPENING							
1 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
----- UNIT 60 EXTERNAL TO LATTICE 11 -----							
CENTER COLUMN OF THREE OPENINGS W/ 0.28 IN PLATE							
1 ARRAY NUMBER	11	+X = 4.2926	-X = -4.2926	+Y = 13.589	-Y = -13.589	+Z = 36.703	-Z = -36.703
2 CUBOID	2 1	+X = 5.0038	-X = -5.0038	+Y = 14.300	-Y = -14.300	+Z = 36.703	-Z = -36.703
----- UNIT 61 EXTERNAL TO LATTICE 12 -----							
LEFT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE							
1 ARRAY NUMBER	12	+X = 4.2926	-X = -4.2926	+Y = 8.8900	-Y = -8.8900	+Z = 36.703	-Z = -36.703
2 CUBOID	2 1	+X = 4.2926	-X = -4.5974	+Y = 9.1948	-Y = -9.1948	+Z = 36.703	-Z = -36.703
----- UNIT 62 EXTERNAL TO LATTICE 13 -----							
RIGHT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE							

1 ARRAY NUMBER 13 +X = 4.2926 -X = -4.2926 +Y = 8.8900 -Y = -8.8900 +Z = 36.703 -Z = -36.703  
 2 CUBOID 2 1 +X = 4.5974 -X = -4.2926 +Y = 9.1948 -Y = -9.1948 +Z = 36.703 -Z = -36.703

----- UNIT 70 -----

NAC-LWT TRIGA BASKET

1 CYLINDER 12 1 RADIUS = 17.100 +Z = 36.703 -Z = -36.703 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 HOLE NUMBER 35 AT X = 0.00000 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 60  
 HOLE NUMBER 36 AT X = -9.2974 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 61  
 HOLE NUMBER 37 AT X = 9.2974 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 62  
 2 CYLINDER 2 1 RADIUS = 18.910 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 3 CYLINDER 6 1 RADIUS = 33.465 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 4 CYLINDER 2 1 RADIUS = 36.519 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 5 CYLINDER 7 1 RADIUS = 49.223 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 6 CYLINDER 2 1 RADIUS = 49.822 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 7 CUBOID 8 1 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 37.338 -Z = -37.338

----- UNIT 80 -----

SIMPLIFIED LID STRUCTURE NAC-LWT

1 CYLINDER 2 1 RADIUS = 36.519 +Z = 14.135 -Z = -14.135 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 2 CYLINDER 8 1 RADIUS = 49.822 +Z = 14.135 -Z = -14.135 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 3 CUBOID 8 1 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 14.135 -Z = -14.135  
 TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
 NUM ID

----- UNIT 81 -----

SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT

1 CYLINDER 6 1 RADIUS = 26.353 +Z = 3.8100 -Z = -3.8100 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 2 CYLINDER 2 1 RADIUS = 36.619 +Z = 13.970 -Z = -12.700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 3 CYLINDER 8 1 RADIUS = 49.822 +Z = 13.970 -Z = -12.700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
 4 CUBOID 8 1 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 13.970 -Z = -12.700

\*\*\*\*\* GLOBAL \*\*\*\*\*  
 ----- UNIT 82 EXTERNAL TO LATTICE 20 -----

STACK OF 5 BASKETS IN CASK

1 ARRAY NUMBER 20 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 225.31 -Z = -221.30  
 TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

11  
5  
16  
5  
10

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 2 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

12  
6  
13

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 3 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

14  
6  
15

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 11 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP  
51  
45  
56  
45  
50

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 12 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP  
52  
46  
53

TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 13 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP  
54  
46  
55

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 20 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
81  
Z LAYER 2, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
30  
Z LAYER 3, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
70  
Z LAYER 4, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
70  
Z LAYER 5, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
70  
Z LAYER 6, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
30  
Z LAYER 7, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
80

TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	3.04527E+03 CM**3	3.04527E+03 CM**3
5	1	2	5.04003E+02 CM**3	5.04003E+02 CM**3
6	1	3	4.32002E+02 CM**3	4.32002E+02 CM**3
7	1	4	2.52441E-01 CM**3	3.04552E+03 CM**3
		5	4.63830E+02 CM**3	3.50935E+03 CM**3
		6	9.63081E+02 CM**3	4.47243E+03 CM**3
10	1	7	1.61160E+03 CM**3	6.08403E+03 CM**3
11	1	8	1.61160E+03 CM**3	6.08403E+03 CM**3
12	1	9	1.61160E+03 CM**3	6.08403E+03 CM**3
13	1	10	1.61160E+03 CM**3	6.08403E+03 CM**3
14	1	11	1.61160E+03 CM**3	6.08403E+03 CM**3
15	1	12	1.61160E+03 CM**3	6.08403E+03 CM**3
16	1	13	6.08403E+03 CM**3	6.08403E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 14 IS AN ARRAY PLACEMENT BOUNDARY REGION				
20	1	14	1.92601E+04 CM**3	1.92601E+04 CM**3
	2	15	4.36604E+03 CM**3	2.36261E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 16 IS AN ARRAY PLACEMENT BOUNDARY REGION				
21	1	16	1.26001E+04 CM**3	1.26001E+04 CM**3
	2	17	8.94680E+02 CM**3	1.34948E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 18 IS AN ARRAY PLACEMENT BOUNDARY REGION				
22	1	18	1.26001E+04 CM**3	1.26001E+04 CM**3
	2	19	8.94680E+02 CM**3	1.34948E+04 CM**3

30	1	20	2.52129E+04 CM**3	7.58286E+04 CM**3
	2	21	1.83375E+04 CM**3	9.41660E+04 CM**3
	3	22	2.00728E+05 CM**3	2.94894E+05 CM**3
	4	23	5.62864E+04 CM**3	3.51181E+05 CM**3
	5	24	2.86831E+05 CM**3	6.38011E+05 CM**3
	6	25	1.56332E+04 CM**3	6.53645E+05 CM**3
	7	26	1.78602E+05 CM**3	8.32246E+05 CM**3
41	1	27	9.77686E+00 CM**3	9.77686E+00 CM**3
	2	28	3.87746E+02 CM**3	3.97523E+02 CM**3
	3	29	1.81270E+02 CM**3	5.78793E+02 CM**3
	4	30	3.52668E+01 CM**3	6.14060E+02 CM**3
	5	31	1.98501E+02 CM**3	8.12561E+02 CM**3
45	1	32	4.48202E+02 CM**3	4.48202E+02 CM**3
46	1	33	3.84173E+02 CM**3	3.84173E+02 CM**3
50	1	34	2.16019E+03 CM**3	5.41044E+03 CM**3
51	1	35	2.16019E+03 CM**3	5.41044E+03 CM**3
52	1	36	2.16019E+03 CM**3	5.41044E+03 CM**3
53	1	37	2.16019E+03 CM**3	5.41044E+03 CM**3
54	1	38	2.16019E+03 CM**3	5.41044E+03 CM**3
55	1	39	2.16019E+03 CM**3	5.41044E+03 CM**3
56	1	40	5.41044E+03 CM**3	5.41044E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 41 IS AN ARRAY PLACEMENT BOUNDARY REGION				
60	1	41	1.71277E+04 CM**3	1.71277E+04 CM**3
	2	42	3.88265E+03 CM**3	2.10104E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 43 IS AN ARRAY PLACEMENT BOUNDARY REGION				
61	1	43	1.12050E+04 CM**3	1.12050E+04 CM**3
	2	44	7.95625E+02 CM**3	1.20007E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 45 IS AN ARRAY PLACEMENT BOUNDARY REGION				
62	1	45	1.12050E+04 CM**3	1.12050E+04 CM**3
	2	46	7.95625E+02 CM**3	1.20007E+04 CM**3
70	1	47	2.24215E+04 CM**3	6.74332E+04 CM**3
	2	48	1.64602E+04 CM**3	8.38934E+04 CM**3
	3	49	1.78831E+05 CM**3	2.62724E+05 CM**3
	4	50	5.01461E+04 CM**3	3.12870E+05 CM**3
	5	51	2.55540E+05 CM**3	5.68410E+05 CM**3
	6	52	1.39278E+04 CM**3	5.82338E+05 CM**3
	7	53	1.59118E+05 CM**3	7.41456E+05 CM**3
80	1	54	1.18444E+05 CM**3	1.18444E+05 CM**3
	2	55	1.02013E+05 CM**3	2.20456E+05 CM**3
	3	56	6.02374E+04 CM**3	2.80694E+05 CM**3
81	1	57	1.66245E+04 CM**3	1.66245E+04 CM**3
	2	58	9.57276E+04 CM**3	1.12352E+05 CM**3
	3	59	9.56257E+04 CM**3	2.07978E+05 CM**3
	4	60	5.68278E+04 CM**3	2.64806E+05 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 61 IS AN ARRAY PLACEMENT BOUNDARY REGION				
82	1	61	4.43436E+06 CM**3	4.43436E+06 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	12	1	1	3.65432E+04 CM**3
5	4	1	2	2.01601E+03 CM**3
6	4	1	2	1.72801E+03 CM**3
7	12	1	12	3.02930E+00 CM**3
		2	2	5.56596E+03 CM**3
		3	12	1.15570E+04 CM**3
10	2	1	12	3.22321E+03 CM**3
11	2	1	12	3.22321E+03 CM**3
12	2	1	12	3.22321E+03 CM**3
13	2	1	12	3.22321E+03 CM**3
14	2	1	12	3.22321E+03 CM**3
15	2	1	12	3.22321E+03 CM**3
16	2	1	12	1.21681E+04 CM**3
20	2	1	2	3.85202E+04 CM**3
		2	2	8.73207E+03 CM**3
21	2	1	2	2.52001E+04 CM**3
		2	2	1.78936E+03 CM**3
22	2	1		2.52001E+04 CM**3





TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

GENERATION KENO MESSAGE NUMBER K5-132	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES WARNING... ONLY	AVERAGE K-EFFECTIVE 972 INDEPENDENT	AVG K-EFF DEVIATION FISSION POINTS WERE	MATRIX K-EFFECTIVE GENERATED	MATRIX K-EFF DEVIATION
1	8.86573E-01	1.34833E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	8.96575E-01	1.37500E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.46605E-01	1.39967E+00	9.46605E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.05069E-01	1.42717E+00	9.25837E-01	2.07660E-02	0.00000E+00	0.00000E+00
5	8.93514E-01	1.45367E+00	9.15062E-01	1.61200E-02	0.00000E+00	0.00000E+00
6	8.87426E-01	1.48017E+00	9.08153E-01	1.33291E-02	0.00000E+00	0.00000E+00
7	9.05121E-01	1.50583E+00	9.07547E-01	1.03424E-02	0.00000E+00	0.00000E+00
8	9.14380E-01	1.53333E+00	9.08686E-01	8.52102E-03	0.00000E+00	0.00000E+00
9	9.27548E-01	1.55900E+00	9.11380E-01	7.68918E-03	0.00000E+00	0.00000E+00
10	9.33538E-01	1.58633E+00	9.14150E-01	7.21207E-03	0.00000E+00	0.00000E+00
11	8.75479E-01	1.61300E+00	9.09853E-01	7.67580E-03	0.00000E+00	0.00000E+00
12	8.89903E-01	1.63950E+00	9.07858E-01	7.14943E-03	0.00000E+00	0.00000E+00
13	9.05310E-01	1.66417E+00	9.07626E-01	6.47105E-03	0.00000E+00	0.00000E+00
14	8.99313E-01	1.69067E+00	9.06934E-01	5.94772E-03	0.00000E+00	0.00000E+00
15	8.67635E-01	1.71817E+00	9.03911E-01	6.25069E-03	0.00000E+00	0.00000E+00
16	9.18474E-01	1.74383E+00	9.04951E-01	5.87577E-03	0.00000E+00	0.00000E+00
17	9.18015E-01	1.76950E+00	9.05822E-01	5.54263E-03	0.00000E+00	0.00000E+00
18	9.55121E-01	1.79600E+00	9.06903E-01	6.03113E-03	0.00000E+00	0.00000E+00
19	9.27495E-01	1.82167E+00	9.09997E-01	5.76985E-03	0.00000E+00	0.00000E+00
20	9.13119E-01	1.84733E+00	9.10170E-01	5.44263E-03	0.00000E+00	0.00000E+00
21	8.83728E-01	1.87383E+00	9.06779E-01	5.33300E-03	0.00000E+00	0.00000E+00
22	9.23659E-01	1.90133E+00	9.09522E-01	5.11268E-03	0.00000E+00	0.00000E+00
23	8.81713E-01	1.92883E+00	9.08196E-01	5.04112E-03	0.00000E+00	0.00000E+00
24	9.26039E-01	1.95533E+00	9.09009E-01	4.87445E-03	0.00000E+00	0.00000E+00
25	9.26088E-01	1.98367E+00	9.09751E-01	4.71653E-03	0.00000E+00	0.00000E+00
26	9.40076E-01	2.01017E+00	9.11015E-01	4.68917E-03	0.00000E+00	0.00000E+00
27	9.06228E-01	2.03767E+00	9.10823E-01	4.50177E-03	0.00000E+00	0.00000E+00
28	9.22137E-01	2.06417E+00	9.11259E-01	4.34699E-03	0.00000E+00	0.00000E+00
29	9.33598E-01	2.08983E+00	9.12086E-01	4.26394E-03	0.00000E+00	0.00000E+00
30	9.09525E-01	2.11550E+00	9.11994E-01	4.10985E-03	0.00000E+00	0.00000E+00
31	9.31245E-01	2.14200E+00	9.12658E-01	4.02077E-03	0.00000E+00	0.00000E+00
32	8.68747E-01	2.17050E+00	9.11195E-01	4.15106E-03	0.00000E+00	0.00000E+00
33	8.96693E-01	2.19700E+00	9.10727E-01	4.04209E-03	0.00000E+00	0.00000E+00
34	8.63080E-01	2.22450E+00	9.09238E-01	4.18740E-03	0.00000E+00	0.00000E+00
35	9.20550E-01	2.25100E+00	9.09581E-01	4.07298E-03	0.00000E+00	0.00000E+00
36	8.80113E-01	2.27750E+00	9.08714E-01	4.04530E-03	0.00000E+00	0.00000E+00
37	8.68839E-01	2.30500E+00	9.07575E-01	4.08990E-03	0.00000E+00	0.00000E+00
38	9.81777E-01	2.32967E+00	9.09636E-01	4.47733E-03	0.00000E+00	0.00000E+00
39	9.02998E-01	2.35633E+00	9.09456E-01	4.35833E-03	0.00000E+00	0.00000E+00
40	9.21249E-01	2.38367E+00	9.09767E-01	4.25343E-03	0.00000E+00	0.00000E+00
41	8.98955E-01	2.40933E+00	9.09490E-01	4.15219E-03	0.00000E+00	0.00000E+00
42	9.16342E-01	2.43583E+00	9.09661E-01	4.05068E-03	0.00000E+00	0.00000E+00
43	8.94618E-01	2.46250E+00	9.09294E-01	3.96765E-03	0.00000E+00	0.00000E+00
44	9.19541E-01	2.48983E+00	9.09538E-01	3.87971E-03	0.00000E+00	0.00000E+00
45	9.10338E-01	2.51650E+00	9.09557E-01	3.78845E-03	0.00000E+00	0.00000E+00
46	9.27432E-01	2.54383E+00	9.09963E-01	3.72358E-03	0.00000E+00	0.00000E+00
47	9.54838E-01	2.56950E+00	9.10962E-01	3.77462E-03	0.00000E+00	0.00000E+00
48	9.21564E-01	2.59617E+00	9.11193E-01	3.69884E-03	0.00000E+00	0.00000E+00
49	9.21195E-01	2.62267E+00	9.11406E-01	3.62554E-03	0.00000E+00	0.00000E+00
50	9.37939E-01	2.64833E+00	9.11958E-01	3.59199E-03	0.00000E+00	0.00000E+00
51	9.44721E-01	2.67483E+00	9.12627E-01	3.58090E-03	0.00000E+00	0.00000E+00
52	9.43395E-01	2.70050E+00	9.13242E-01	3.56210E-03	0.00000E+00	0.00000E+00
53	9.03409E-01	2.72617E+00	9.13049E-01	3.49688E-03	0.00000E+00	0.00000E+00
54	9.79075E-01	2.75167E+00	9.14319E-01	3.65651E-03	0.00000E+00	0.00000E+00
55	8.65570E-01	2.77817E+00	9.13475E-01	3.68489E-03	0.00000E+00	0.00000E+00
56	8.82250E-01	2.80567E+00	9.12897E-01	3.66195E-03	0.00000E+00	0.00000E+00
57	9.28974E-01	2.83133E+00	9.13189E-01	3.60662E-03	0.00000E+00	0.00000E+00
58	9.19140E-01	2.85783E+00	9.13295E-01	3.54322E-03	0.00000E+00	0.00000E+00
59	8.95242E-01	2.88450E+00	9.12978E-01	3.48499E-03	0.00000E+00	0.00000E+00
60	8.93794E-01	2.91100E+00	9.12648E-01	3.45000E-03	0.00000E+00	0.00000E+00
61	9.13418E-01	2.93750E+00	9.12661E-01	3.39104E-03	0.00000E+00	0.00000E+00
62	9.32754E-01	2.96417E+00	9.12996E-01	3.35082E-03	0.00000E+00	0.00000E+00
63	9.23592E-01	2.98967E+00	9.13169E-01	3.30001E-03	0.00000E+00	0.00000E+00
64	9.12051E-01	3.01717E+00	9.13151E-01	3.24640E-03	0.00000E+00	0.00000E+00
65	8.73464E-01	3.04367E+00	9.12521E-01	3.25597E-03	0.00000E+00	0.00000E+00
66	9.17888E-01	3.07033E+00	9.12605E-01	3.20579E-03	0.00000E+00	0.00000E+00
67	9.13136E-01	3.09683E+00	9.12613E-01	3.15610E-03	0.00000E+00	0.00000E+00
68	9.40430E-01	3.12350E+00	9.13035E-01	3.13636E-03	0.00000E+00	0.00000E+00
69	9.45408E-01	3.14617E+00	9.13516E-01	3.12675E-03	0.00000E+00	0.00000E+00
70	9.46323E-01	3.17367E+00	9.14000E-01	3.11797E-03	0.00000E+00	0.00000E+00
71	8.77874E-01	3.20033E+00	9.13477E-01	3.11674E-03	0.00000E+00	0.00000E+00
72	8.92626E-01	3.22767E+00	9.13179E-01	3.08630E-03	0.00000E+00	0.00000E+00
73	9.20170E-01	3.25333E+00	9.13277E-01	3.04412E-03	0.00000E+00	0.00000E+00
74	9.25709E-01	3.28000E+00	9.13450E-01	3.00650E-03	0.00000E+00	0.00000E+00
75	8.96801E-01	3.30550E+00	9.13222E-01	2.97379E-03	0.00000E+00	0.00000E+00
76	9.03788E-01	3.33217E+00	9.13095E-01	2.93610E-03	0.00000E+00	0.00000E+00
77	8.98111E-01	3.35867E+00	9.12895E-01	2.90357E-03	0.00000E+00	0.00000E+00
78	9.10537E-01	3.38517E+00	9.12864E-01	2.86527E-03	0.00000E+00	0.00000E+00
79	9.14309E-01	3.41083E+00	9.12883E-01	2.82788E-03	0.00000E+00	0.00000E+00
80	9.21505E-01	3.43733E+00	9.12993E-01	2.79358E-03	0.00000E+00	0.00000E+00
81	8.66482E-01	3.46400E+00	9.12404E-01	2.82013E-03	0.00000E+00	0.00000E+00
82	9.07877E-01	3.48950E+00	9.12348E-01	2.78523E-03	0.00000E+00	0.00000E+00
83	9.29570E-01	3.51517E+00	9.12560E-01	2.75883E-03	0.00000E+00	0.00000E+00
84	8.91949E-01	3.54167E+00	9.12309E-01	2.73655E-03	0.00000E+00	0.00000E+00
85	9.08112E-01	3.56732E+00	9.12258E-01	2.70385E-03	0.00000E+00	0.00000E+00
86	9.32694E-01	3.59300E+00	9.12502E-01	2.68252E-03	0.00000E+00	0.00000E+00
87	8.81980E-01	3.62050E+00	9.12143E-01	2.67499E-03	0.00000E+00	0.00000E+00
88	9.89171E-01	3.64700E+00	9.11876E-01	2.65716E-03	0.00000E+00	0.00000E+00
89	9.37304E-01	3.67267E+00	9.12168E-01	2.64265E-03	0.00000E+00	0.00000E+00

90	8.86036E-01	3.70017E+00	9.11980E-01	2.62826E-03	0.00000E+00	0.00000E+00
91	8.99199E-01	3.72567E+00	9.11737E-01	2.60247E-03	0.00000E+00	0.00000E+00
92	9.18743E-01	3.75233E+00	9.11815E-01	2.57456E-03	0.00000E+00	0.00000E+00
93	9.79235E-01	3.77967E+00	9.12556E-01	2.65172E-03	0.00000E+00	0.00000E+00
94	9.00994E-01	3.80633E+00	9.12431E-01	2.62574E-03	0.00000E+00	0.00000E+00
95	9.02452E-01	3.83200E+00	9.12323E-01	2.59957E-03	0.00000E+00	0.00000E+00
96	9.38238E-01	3.85933E+00	9.12599E-01	2.58650E-03	0.00000E+00	0.00000E+00
97	8.91607E-01	3.88600E+00	9.12378E-01	2.56865E-03	0.00000E+00	0.00000E+00
98	9.14741E-01	3.91250E+00	9.12403E-01	2.54188E-03	0.00000E+00	0.00000E+00
99	8.69482E-01	3.94000E+00	9.11960E-01	2.55415E-03	0.00000E+00	0.00000E+00
100	9.42607E-01	3.96650E+00	9.12273E-01	2.54723E-03	0.00000E+00	0.00000E+00
101	9.18963E-01	3.99217E+00	9.12340E-01	2.52227E-03	0.00000E+00	0.00000E+00
102	9.11021E-01	4.01950E+00	9.12327E-01	2.49696E-03	0.00000E+00	0.00000E+00
103	9.31676E-01	4.04617E+00	9.12519E-01	2.47952E-03	0.00000E+00	0.00000E+00
104	9.31187E-01	4.07183E+00	9.12702E-01	2.46190E-03	0.00000E+00	0.00000E+00
105	9.12106E-01	4.09833E+00	9.12696E-01	2.43789E-03	0.00000E+00	0.00000E+00
106	9.14433E-01	4.12583E+00	9.12713E-01	2.41439E-03	0.00000E+00	0.00000E+00
107	8.97115E-01	4.15233E+00	9.12564E-01	2.39590E-03	0.00000E+00	0.00000E+00
108	9.29588E-01	4.17800E+00	9.12725E-01	2.37862E-03	0.00000E+00	0.00000E+00
109	8.96594E-01	4.20533E+00	9.12574E-01	2.36110E-03	0.00000E+00	0.00000E+00
110	9.43979E-01	4.23200E+00	9.12865E-01	2.35714E-03	0.00000E+00	0.00000E+00
111	8.75353E-01	4.26033E+00	9.12521E-01	2.36064E-03	0.00000E+00	0.00000E+00
112	8.94002E-01	4.28783E+00	9.12352E-01	2.34513E-03	0.00000E+00	0.00000E+00
113	9.47321E-01	4.31350E+00	9.12667E-01	2.34516E-03	0.00000E+00	0.00000E+00
114	9.31552E-01	4.33900E+00	9.12838E-01	2.33024E-03	0.00000E+00	0.00000E+00
115	8.95026E-01	4.36500E+00	9.12590E-01	2.32259E-03	0.00000E+00	0.00000E+00
116	9.39129E-01	4.39217E+00	9.12823E-01	2.31387E-03	0.00000E+00	0.00000E+00
117	9.07775E-01	4.41867E+00	9.12779E-01	2.29408E-03	0.00000E+00	0.00000E+00
118	9.20362E-01	4.44433E+00	9.12844E-01	2.27515E-03	0.00000E+00	0.00000E+00
119	8.87089E-01	4.47083E+00	9.12624E-01	2.26634E-03	0.00000E+00	0.00000E+00
120	9.39109E-01	4.49650E+00	9.12849E-01	2.25823E-03	0.00000E+00	0.00000E+00
121	9.33180E-01	4.52300E+00	9.13019E-01	2.24568E-03	0.00000E+00	0.00000E+00
122	8.98252E-01	4.54967E+00	9.12896E-01	2.23029E-03	0.00000E+00	0.00000E+00
123	9.04215E-01	4.57617E+00	9.12825E-01	2.21294E-03	0.00000E+00	0.00000E+00
124	9.11441E-01	4.60183E+00	9.12813E-01	2.19476E-03	0.00000E+00	0.00000E+00
125	9.37687E-01	4.62750E+00	9.13015E-01	2.18622E-03	0.00000E+00	0.00000E+00
126	9.12857E-01	4.65400E+00	9.13014E-01	2.16851E-03	0.00000E+00	0.00000E+00
127	9.26716E-01	4.67967E+00	9.13124E-01	2.15389E-03	0.00000E+00	0.00000E+00
128	9.14491E-01	4.70617E+00	9.13135E-01	2.13675E-03	0.00000E+00	0.00000E+00
129	9.17151E-01	4.73183E+00	9.13166E-01	2.12010E-03	0.00000E+00	0.00000E+00
130	9.20122E-01	4.75733E+00	9.13221E-01	2.10417E-03	0.00000E+00	0.00000E+00
131	9.54932E-01	4.78400E+00	9.13544E-01	2.11269E-03	0.00000E+00	0.00000E+00
132	9.15704E-01	4.81050E+00	9.13561E-01	2.09644E-03	0.00000E+00	0.00000E+00
133	8.87318E-01	4.83883E+00	9.13360E-01	2.08999E-03	0.00000E+00	0.00000E+00
134	9.15454E-01	4.86550E+00	9.13376E-01	2.07416E-03	0.00000E+00	0.00000E+00
135	8.66688E-01	4.89200E+00	9.13025E-01	2.08825E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 WARNING... ONLY 992 INDEPENDENT FISSION POINTS WERE GENERATED						
136	8.88865E-01	4.91850E+00	9.12845E-01	2.08043E-03	0.00000E+00	0.00000E+00
137	8.96141E-01	4.94500E+00	9.12721E-01	2.06867E-03	0.00000E+00	0.00000E+00
138	9.07659E-01	4.97167E+00	9.12684E-01	2.05374E-03	0.00000E+00	0.00000E+00
139	9.31430E-01	4.99633E+00	9.12821E-01	2.04328E-03	0.00000E+00	0.00000E+00
140	9.09886E-01	5.02283E+00	9.12799E-01	2.02853E-03	0.00000E+00	0.00000E+00
141	8.91672E-01	5.04950E+00	9.12647E-01	2.01961E-03	0.00000E+00	0.00000E+00
142	9.51248E-01	5.07500E+00	9.12923E-01	2.02400E-03	0.00000E+00	0.00000E+00
143	9.01526E-01	5.10350E+00	9.12842E-01	2.01122E-03	0.00000E+00	0.00000E+00
144	9.32889E-01	5.12900E+00	9.12983E-01	2.00199E-03	0.00000E+00	0.00000E+00
145	8.96369E-01	5.15567E+00	9.12867E-01	1.99133E-03	0.00000E+00	0.00000E+00
146	8.94883E-01	5.18217E+00	9.12742E-01	1.98140E-03	0.00000E+00	0.00000E+00
147	9.34025E-01	5.20867E+00	9.12889E-01	1.97315E-03	0.00000E+00	0.00000E+00
148	9.40930E-01	5.23433E+00	9.13081E-01	1.96902E-03	0.00000E+00	0.00000E+00
149	9.23585E-01	5.26083E+00	9.13153E-01	1.95688E-03	0.00000E+00	0.00000E+00
150	9.19423E-01	5.28650E+00	9.13195E-01	1.94408E-03	0.00000E+00	0.00000E+00
151	9.47482E-01	5.31217E+00	9.13425E-01	1.94465E-03	0.00000E+00	0.00000E+00
152	9.08613E-01	5.33783E+00	9.13393E-01	1.93191E-03	0.00000E+00	0.00000E+00
153	8.95331E-01	5.36533E+00	9.13274E-01	1.92280E-03	0.00000E+00	0.00000E+00
154	9.44444E-01	5.39183E+00	9.13479E-01	1.92108E-03	0.00000E+00	0.00000E+00
155	8.93390E-01	5.41933E+00	9.13347E-01	1.91299E-03	0.00000E+00	0.00000E+00
156	8.92057E-01	5.44483E+00	9.13209E-01	1.90555E-03	0.00000E+00	0.00000E+00
157	9.03251E-01	5.47233E+00	9.13145E-01	1.89431E-03	0.00000E+00	0.00000E+00
158	8.97894E-01	5.49883E+00	9.13047E-01	1.88467E-03	0.00000E+00	0.00000E+00
159	8.64900E-01	5.52633E+00	9.12740E-01	1.89757E-03	0.00000E+00	0.00000E+00
160	8.97223E-01	5.55383E+00	9.12642E-01	1.88808E-03	0.00000E+00	0.00000E+00
161	9.18827E-01	5.57950E+00	9.12681E-01	1.87657E-03	0.00000E+00	0.00000E+00
162	9.24453E-01	5.60600E+00	9.12755E-01	1.86625E-03	0.00000E+00	0.00000E+00
163	8.87075E-01	5.63350E+00	9.12595E-01	1.86147E-03	0.00000E+00	0.00000E+00
164	9.46600E-01	5.65817E+00	9.12805E-01	1.86182E-03	0.00000E+00	0.00000E+00
165	9.22187E-01	5.68383E+00	9.12863E-01	1.85125E-03	0.00000E+00	0.00000E+00
166	9.36622E-01	5.70850E+00	9.13008E-01	1.84562E-03	0.00000E+00	0.00000E+00
167	9.53502E-01	5.73417E+00	9.13253E-01	1.85075E-03	0.00000E+00	0.00000E+00
168	9.17649E-01	5.75983E+00	9.13279E-01	1.83976E-03	0.00000E+00	0.00000E+00
169	9.23258E-01	5.78550E+00	9.13339E-01	1.82968E-03	0.00000E+00	0.00000E+00
170	9.26120E-01	5.81100E+00	9.13415E-01	1.82035E-03	0.00000E+00	0.00000E+00
171	9.26614E-01	5.83583E+00	9.13493E-01	1.81123E-03	0.00000E+00	0.00000E+00
172	9.08422E-01	5.86317E+00	9.13464E-01	1.80079E-03	0.00000E+00	0.00000E+00
173	9.02981E-01	5.88983E+00	9.13402E-01	1.79128E-03	0.00000E+00	0.00000E+00
174	9.18104E-01	5.91550E+00	9.13430E-01	1.78105E-03	0.00000E+00	0.00000E+00
175	8.91059E-01	5.94100E+00	9.13300E-01	1.77544E-03	0.00000E+00	0.00000E+00
176	8.95988E-01	5.96850E+00	9.13201E-01	1.76800E-03	0.00000E+00	0.00000E+00
177	9.03157E-01	5.99500E+00	9.13143E-01	1.75881E-03	0.00000E+00	0.00000E+00
178	9.30350E-01	6.02087E+00	9.13241E-01	1.75152E-03	0.00000E+00	0.00000E+00
179	9.01541E-01	6.04633E+00	9.13175E-01	1.74285E-03	0.00000E+00	0.00000E+00
180	9.35730E-01	6.07200E+00	9.13302E-01	1.73766E-03	0.00000E+00	0.00000E+00
181	9.59340E-01	6.09767E+00	9.13559E-01	1.74696E-03	0.00000E+00	0.00000E+00
182	9.24043E-01	6.12417E+00	9.13617E-01	1.73820E-03	0.00000E+00	0.00000E+00
183	9.16527E-01	6.15067E+00	9.13623E-01	1.72865E-03	0.00000E+00	0.00000E+00

184	8.97510E-01	6.17717E+00	9.13545E-01	1.72140E-03	0.00000E+00	0.00000E+00
185	9.20277E-01	6.20283E+00	9.13614E-01	1.71338E-03	0.00000E+00	0.00000E+00
186	9.05086E-01	6.12285E+00	9.13566E-01	1.70468E-03	0.00000E+00	0.00000E+00
187	8.84514E-01	6.25600E+00	9.13411E-01	1.70269E-03	0.00000E+00	0.00000E+00
188	9.23112E-01	6.28167E+00	9.13463E-01	1.69432E-03	0.00000E+00	0.00000E+00
189	9.13747E-01	6.30817E+00	9.13465E-01	1.68523E-03	0.00000E+00	0.00000E+00
190	9.20376E-01	6.33382E+00	9.13501E-01	1.67665E-03	0.00000E+00	0.00000E+00
191	8.83891E-01	6.36117E+00	9.13345E-01	1.67510E-03	0.00000E+00	0.00000E+00
192	9.27817E-01	6.38683E+00	9.13421E-01	1.66800E-03	0.00000E+00	0.00000E+00
193	9.44874E-01	6.41350E+00	9.13586E-01	1.66739E-03	0.00000E+00	0.00000E+00
194	9.09017E-01	6.43900E+00	9.13562E-01	1.65886E-03	0.00000E+00	0.00000E+00
195	8.94144E-01	6.46650E+00	9.13461E-01	1.65330E-03	0.00000E+00	0.00000E+00
196	8.72850E-01	6.49300E+00	9.13252E-01	1.65803E-03	0.00000E+00	0.00000E+00
197	8.64799E-01	6.52150E+00	9.13003E-01	1.66811E-03	0.00000E+00	0.00000E+00
198	9.19588E-01	6.54433E+00	9.13037E-01	1.65992E-03	0.00000E+00	0.00000E+00
199	8.81152E-01	6.57183E+00	9.12875E-01	1.65939E-03	0.00000E+00	0.00000E+00
200	9.45768E-01	6.59650E+00	9.13041E-01	1.65932E-03	0.00000E+00	0.00000E+00
201	9.35985E-01	6.62217E+00	9.13156E-01	1.65498E-03	0.00000E+00	0.00000E+00
202	9.29791E-01	6.64783E+00	9.13240E-01	1.64878E-03	0.00000E+00	0.00000E+00
203	8.99879E-01	6.67433E+00	9.13173E-01	1.64191E-03	0.00000E+00	0.00000E+00
204	8.93893E-01	6.70083E+00	9.13078E-01	1.63654E-03	0.00000E+00	0.00000E+00
205	9.12423E-01	6.72733E+00	9.13074E-01	1.62847E-03	0.00000E+00	0.00000E+00
206	8.95375E-01	6.75400E+00	9.12988E-01	1.62278E-03	0.00000E+00	0.00000E+00
207	9.06899E-01	6.78050E+00	9.12958E-01	1.61512E-03	0.00000E+00	0.00000E+00
208	9.11243E-01	6.80700E+00	9.12950E-01	1.60728E-03	0.00000E+00	0.00000E+00
209	9.54339E-01	6.83183E+00	9.13150E-01	1.61195E-03	0.00000E+00	0.00000E+00
210	9.39932E-01	6.85733E+00	9.13278E-01	1.60930E-03	0.00000E+00	0.00000E+00
211	9.24160E-01	6.88400E+00	9.13330E-01	1.60243E-03	0.00000E+00	0.00000E+00
212	9.33426E-01	6.91050E+00	9.13426E-01	1.59765E-03	0.00000E+00	0.00000E+00
213	9.55546E-01	6.93517E+00	9.13625E-01	1.60254E-03	0.00000E+00	0.00000E+00
214	9.40680E-01	6.96183E+00	9.13753E-01	1.60006E-03	0.00000E+00	0.00000E+00
215	8.73992E-01	6.98833E+00	9.13566E-01	1.60344E-03	0.00000E+00	0.00000E+00
216	8.77587E-01	7.01583E+00	9.13398E-01	1.60476E-03	0.00000E+00	0.00000E+00
217	9.07999E-01	7.04133E+00	9.13373E-01	1.59748E-03	0.00000E+00	0.00000E+00
218	8.72392E-01	7.06800E+00	9.13182E-01	1.60134E-03	0.00000E+00	0.00000E+00
219	9.17626E-01	7.09450E+00	9.13204E-01	1.59408E-03	0.00000E+00	0.00000E+00
220	8.90346E-01	7.12100E+00	9.13099E-01	1.59021E-03	0.00000E+00	0.00000E+00
221	9.30152E-01	7.14850E+00	9.13177E-01	1.58485E-03	0.00000E+00	0.00000E+00
222	9.30915E-01	7.17600E+00	9.13257E-01	1.57968E-03	0.00000E+00	0.00000E+00
223	8.98220E-01	7.20350E+00	9.13189E-01	1.57399E-03	0.00000E+00	0.00000E+00
224	9.16913E-01	7.23083E+00	9.13206E-01	1.56698E-03	0.00000E+00	0.00000E+00
225	9.36257E-01	7.25833E+00	9.13309E-01	1.56335E-03	0.00000E+00	0.00000E+00
226	8.86142E-01	7.28400E+00	9.13188E-01	1.56108E-03	0.00000E+00	0.00000E+00
227	9.18733E-01	7.31150E+00	9.13213E-01	1.55432E-03	0.00000E+00	0.00000E+00
228	9.04503E-01	7.33893E+00	9.13174E-01	1.54791E-03	0.00000E+00	0.00000E+00
229	9.11392E-01	7.36550E+00	9.13166E-01	1.54109E-03	0.00000E+00	0.00000E+00
230	8.62658E-01	7.39300E+00	9.12945E-01	1.55023E-03	0.00000E+00	0.00000E+00
231	9.13911E-01	7.41950E+00	9.12949E-01	1.54345E-03	0.00000E+00	0.00000E+00
232	9.02364E-01	7.44700E+00	9.12903E-01	1.53741E-03	0.00000E+00	0.00000E+00
233	9.47530E-01	7.47250E+00	9.13053E-01	1.53807E-03	0.00000E+00	0.00000E+00
234	9.44243E-01	7.49817E+00	9.13187E-01	1.53731E-03	0.00000E+00	0.00000E+00
235	8.88140E-01	7.52650E+00	9.13080E-01	1.53447E-03	0.00000E+00	0.00000E+00
236	9.19263E-01	7.55217E+00	9.13106E-01	1.52913E-03	0.00000E+00	0.00000E+00
237	9.23997E-01	7.57883E+00	9.13153E-01	1.52231E-03	0.00000E+00	0.00000E+00
238	9.23856E-01	7.60433E+00	9.13198E-01	1.51653E-03	0.00000E+00	0.00000E+00
239	9.03672E-01	7.63000E+00	9.13158E-01	1.51065E-03	0.00000E+00	0.00000E+00
240	9.25109E-01	7.65467E+00	9.13208E-01	1.50513E-03	0.00000E+00	0.00000E+00
241	8.93009E-01	7.68133E+00	9.13124E-01	1.50120E-03	0.00000E+00	0.00000E+00
242	9.33327E-01	7.70783E+00	9.13208E-01	1.49730E-03	0.00000E+00	0.00000E+00
243	9.48267E-01	7.73350E+00	9.13353E-01	1.49815E-03	0.00000E+00	0.00000E+00
244	9.19141E-01	7.76000E+00	9.13377E-01	1.49214E-03	0.00000E+00	0.00000E+00
245	9.44672E-01	7.78467E+00	9.13506E-01	1.49156E-03	0.00000E+00	0.00000E+00
246	9.15887E-01	7.81033E+00	9.13516E-01	1.48546E-03	0.00000E+00	0.00000E+00
247	9.30912E-01	7.83600E+00	9.13587E-01	1.48109E-03	0.00000E+00	0.00000E+00
248	9.59002E-01	7.86067E+00	9.13771E-01	1.48657E-03	0.00000E+00	0.00000E+00
249	9.00273E-01	7.88633E+00	9.13717E-01	1.48154E-03	0.00000E+00	0.00000E+00
250	9.28078E-01	7.91383E+00	9.13775E-01	1.47669E-03	0.00000E+00	0.00000E+00
251	9.42718E-01	7.94033E+00	9.13891E-01	1.47534E-03	0.00000E+00	0.00000E+00
252	9.55589E-01	7.96600E+00	9.14058E-01	1.47886E-03	0.00000E+00	0.00000E+00
253	9.23685E-01	7.99167E+00	9.14096E-01	1.47346E-03	0.00000E+00	0.00000E+00
254	8.78260E-01	8.01817E+00	9.13954E-01	1.47447E-03	0.00000E+00	0.00000E+00
255	9.35734E-01	8.04567E+00	9.14040E-01	1.47115E-03	0.00000E+00	0.00000E+00
256	9.04964E-01	8.07217E+00	9.14004E-01	1.46579E-03	0.00000E+00	0.00000E+00
257	9.42663E-01	8.09783E+00	9.14116E-01	1.46435E-03	0.00000E+00	0.00000E+00
258	9.44797E-01	8.12350E+00	9.14236E-01	1.46353E-03	0.00000E+00	0.00000E+00
259	8.97386E-01	8.15000E+00	9.14171E-01	1.45930E-03	0.00000E+00	0.00000E+00
260	8.94212E-01	8.17750E+00	9.14093E-01	1.45569E-03	0.00000E+00	0.00000E+00
261	8.93854E-01	8.20483E+00	9.14015E-01	1.45216E-03	0.00000E+00	0.00000E+00
262	8.80088E-01	8.23233E+00	9.13885E-01	1.45244E-03	0.00000E+00	0.00000E+00
263	8.94366E-01	8.25883E+00	9.13810E-01	1.44879E-03	0.00000E+00	0.00000E+00
264	9.26458E-01	8.28550E+00	9.13958E-01	1.44406E-03	0.00000E+00	0.00000E+00
265	9.03500E-01	8.31300E+00	9.13819E-01	1.43910E-03	0.00000E+00	0.00000E+00
266	9.05842E-01	8.33950E+00	9.13789E-01	1.43395E-03	0.00000E+00	0.00000E+00
267	9.05741E-01	8.36600E+00	9.13758E-01	1.42888E-03	0.00000E+00	0.00000E+00
268	9.14516E-01	8.39250E+00	9.13761E-01	1.42348E-03	0.00000E+00	0.00000E+00
269	8.92759E-01	8.41917E+00	9.13692E-01	1.42022E-03	0.00000E+00	0.00000E+00
270	8.90366E-01	8.44650E+00	9.13595E-01	1.41768E-03	0.00000E+00	0.00000E+00
271	9.10508E-01	8.47317E+00	9.13584E-01	1.41244E-03	0.00000E+00	0.00000E+00
272	9.19793E-01	8.49867E+00	9.13607E-01	1.40739E-03	0.00000E+00	0.00000E+00
273	9.00867E-01	8.52533E+00	9.13560E-01	1.40298E-03	0.00000E+00	0.00000E+00
274	9.13967E-01	8.55367E+00	9.13561E-01	1.39781E-03	0.00000E+00	0.00000E+00
275	8.84982E-01	8.57933E+00	9.13457E-01	1.39661E-03	0.00000E+00	0.00000E+00
276	9.45233E-01	8.60583E+00	9.13573E-01	1.39633E-03	0.00000E+00	0.00000E+00
277	9.36732E-01	8.63233E+00	9.13657E-01	1.39379E-03	0.00000E+00	0.00000E+00
278	9.33689E-01	8.65800E+00	9.13730E-01	1.39062E-03	0.00000E+00	0.00000E+00

279	9.06970E-01	8.69550E+00	9.13712E-01	1.38570E-03	0.00000E+00	0.00000E+00
280	8.76328E-01	8.71300E+00	9.13578E-01	1.38724E-03	0.00000E+00	0.00000E+00
281	9.64515E-01	8.73867E+00	9.13760E-01	1.39426E-03	0.00000E+00	0.00000E+00
282	8.95538E-01	8.76417E+00	9.13695E-01	1.39080E-03	0.00000E+00	0.00000E+00
283	9.38120E-01	8.78983E+00	9.13782E-01	1.38856E-03	0.00000E+00	0.00000E+00
284	8.98166E-01	8.81917E+00	9.13727E-01	1.38474E-03	0.00000E+00	0.00000E+00
285	9.30993E-01	8.84567E+00	9.13788E-01	1.38118E-03	0.00000E+00	0.00000E+00
286	9.28540E-01	8.87217E+00	9.13840E-01	1.37729E-03	0.00000E+00	0.00000E+00
287	8.83832E-01	8.89967E+00	9.13735E-01	1.37648E-03	0.00000E+00	0.00000E+00
288	9.06707E-01	8.92633E+00	9.13710E-01	1.37188E-03	0.00000E+00	0.00000E+00
289	8.98009E-01	8.95367E+00	9.13655E-01	1.36819E-03	0.00000E+00	0.00000E+00
290	9.10563E-01	8.97933E+00	9.13645E-01	1.36347E-03	0.00000E+00	0.00000E+00
291	9.35439E-01	9.00583E+00	9.13720E-01	1.36084E-03	0.00000E+00	0.00000E+00
292	9.24570E-01	9.03250E+00	9.13757E-01	1.35665E-03	0.00000E+00	0.00000E+00
293	9.02256E-01	9.05983E+00	9.13718E-01	1.35256E-03	0.00000E+00	0.00000E+00
294	9.50070E-01	9.08550E+00	9.13842E-01	1.35366E-03	0.00000E+00	0.00000E+00
295	9.16326E-01	9.11033E+00	9.13851E-01	1.34905E-03	0.00000E+00	0.00000E+00
296	9.43632E-01	9.13583E+00	9.13952E-01	1.34827E-03	0.00000E+00	0.00000E+00
297	8.79052E-01	9.16250E+00	9.13834E-01	1.34889E-03	0.00000E+00	0.00000E+00
298	9.54132E-01	9.18800E+00	9.13970E-01	1.35120E-03	0.00000E+00	0.00000E+00
299	9.25572E-01	9.21283E+00	9.14009E-01	1.34721E-03	0.00000E+00	0.00000E+00
300	9.56927E-01	9.23933E+00	9.14153E-01	1.35038E-03	0.00000E+00	0.00000E+00
301	9.02724E-01	9.26500E+00	9.14115E-01	1.34640E-03	0.00000E+00	0.00000E+00
302	9.44560E-01	9.29067E+00	9.14216E-01	1.34574E-03	0.00000E+00	0.00000E+00
303	8.79787E-01	9.31800E+00	9.14102E-01	1.34613E-03	0.00000E+00	0.00000E+00
304	8.69867E-01	9.34550E+00	9.13855E-01	1.34964E-03	0.00000E+00	0.00000E+00
305	9.33420E-01	9.37117E+00	9.14020E-01	1.34671E-03	0.00000E+00	0.00000E+00
306	9.01636E-01	9.39767E+00	9.13979E-01	1.34289E-03	0.00000E+00	0.00000E+00
307	8.83105E-01	9.42417E+00	9.13878E-01	1.34230E-03	0.00000E+00	0.00000E+00
308	9.42584E-01	9.44983E+00	9.13972E-01	1.34119E-03	0.00000E+00	0.00000E+00
309	9.69021E-01	9.47650E+00	9.14151E-01	1.34879E-03	0.00000E+00	0.00000E+00
310	8.88058E-01	9.50300E+00	9.14066E-01	1.34707E-03	0.00000E+00	0.00000E+00
311	8.87527E-01	9.53050E+00	9.13980E-01	1.34545E-03	0.00000E+00	0.00000E+00
312	8.72847E-01	9.55883E+00	9.13848E-01	1.34765E-03	0.00000E+00	0.00000E+00
313	9.14955E-01	9.58633E+00	9.13851E-01	1.34331E-03	0.00000E+00	0.00000E+00
314	9.26581E-01	9.61283E+00	9.13892E-01	1.33962E-03	0.00000E+00	0.00000E+00
315	8.93774E-01	9.63933E+00	9.13828E-01	1.33688E-03	0.00000E+00	0.00000E+00
316	9.04703E-01	9.66683E+00	9.13799E-01	1.33293E-03	0.00000E+00	0.00000E+00
317	8.73971E-01	9.69517E+00	9.13672E-01	1.33470E-03	0.00000E+00	0.00000E+00
318	9.87092E-01	9.72000E+00	9.13905E-01	1.35060E-03	0.00000E+00	0.00000E+00
319	9.36953E-01	9.74650E+00	9.13977E-01	1.34829E-03	0.00000E+00	0.00000E+00
320	9.02684E-01	9.77400E+00	9.13942E-01	1.34452E-03	0.00000E+00	0.00000E+00
321	8.99100E-01	9.80050E+00	9.13895E-01	1.34110E-03	0.00000E+00	0.00000E+00
322	9.17986E-01	9.82617E+00	9.13908E-01	1.33697E-03	0.00000E+00	0.00000E+00
323	8.83328E-01	9.85333E+00	9.13813E-01	1.33620E-03	0.00000E+00	0.00000E+00
324	9.00061E-01	9.88200E+00	9.13770E-01	1.33272E-03	0.00000E+00	0.00000E+00
325	9.01044E-01	9.90767E+00	9.13731E-01	1.32918E-03	0.00000E+00	0.00000E+00
326	9.46564E-01	9.93317E+00	9.13832E-01	1.32894E-03	0.00000E+00	0.00000E+00
327	9.22457E-01	9.95983E+00	9.13858E-01	1.32511E-03	0.00000E+00	0.00000E+00
328	9.33945E-01	9.98633E+00	9.13920E-01	1.32247E-03	0.00000E+00	0.00000E+00
329	9.20471E-01	1.00128E+01	9.13940E-01	1.31857E-03	0.00000E+00	0.00000E+00
330	9.06509E-01	1.00403E+01	9.13917E-01	1.31474E-03	0.00000E+00	0.00000E+00
331	8.96690E-01	1.00668E+01	9.13865E-01	1.31179E-03	0.00000E+00	0.00000E+00
332	9.09415E-01	1.00935E+01	9.13852E-01	1.30787E-03	0.00000E+00	0.00000E+00
333	8.96729E-01	1.01218E+01	9.13800E-01	1.30494E-03	0.00000E+00	0.00000E+00
334	9.65757E-01	1.01475E+01	9.13565E-01	1.31038E-03	0.00000E+00	0.00000E+00
335	9.35715E-01	1.01740E+01	9.14022E-01	1.30808E-03	0.00000E+00	0.00000E+00
336	9.30031E-01	1.01997E+01	9.14070E-01	1.30503E-03	0.00000E+00	0.00000E+00
337	9.10459E-01	1.02252E+01	9.14059E-01	1.30118E-03	0.00000E+00	0.00000E+00
338	8.99454E-01	1.02518E+01	9.14015E-01	1.29803E-03	0.00000E+00	0.00000E+00
339	9.40123E-01	1.02765E+01	9.14093E-01	1.29649E-03	0.00000E+00	0.00000E+00
340	9.48688E-01	1.03030E+01	9.14195E-01	1.29669E-03	0.00000E+00	0.00000E+00
341	8.91158E-01	1.03315E+01	9.14127E-01	1.29465E-03	0.00000E+00	0.00000E+00
342	9.27387E-01	1.03570E+01	9.14166E-01	1.29142E-03	0.00000E+00	0.00000E+00
343	9.12735E-01	1.03837E+01	9.14162E-01	1.28763E-03	0.00000E+00	0.00000E+00
344	8.78610E-01	1.04110E+01	9.14058E-01	1.28807E-03	0.00000E+00	0.00000E+00
345	8.89034E-01	1.04377E+01	9.13985E-01	1.28638E-03	0.00000E+00	0.00000E+00
346	9.47418E-01	1.04652E+01	9.14082E-01	1.28631E-03	0.00000E+00	0.00000E+00
347	9.94473E-01	1.04907E+01	9.14026E-01	1.28383E-03	0.00000E+00	0.00000E+00
348	9.11660E-01	1.05182E+01	9.14019E-01	1.28014E-03	0.00000E+00	0.00000E+00
349	9.23040E-01	1.05438E+01	9.14045E-01	1.27671E-03	0.00000E+00	0.00000E+00
350	9.02013E-01	1.05703E+01	9.14101E-01	1.27350E-03	0.00000E+00	0.00000E+00
351	9.06768E-01	1.05978E+01	9.13989E-01	1.27002E-03	0.00000E+00	0.00000E+00
352	9.40376E-01	1.06225E+01	9.14065E-01	1.26862E-03	0.00000E+00	0.00000E+00
353	9.00742E-01	1.06492E+01	9.14027E-01	1.26557E-03	0.00000E+00	0.00000E+00
354	9.36849E-01	1.06765E+01	9.14092E-01	1.26364E-03	0.00000E+00	0.00000E+00
355	9.24388E-01	1.07032E+01	9.14121E-01	1.26039E-03	0.00000E+00	0.00000E+00
356	9.14130E-01	1.07278E+01	9.14121E-01	1.25683E-03	0.00000E+00	0.00000E+00
357	8.95041E-01	1.07535E+01	9.14067E-01	1.25443E-03	0.00000E+00	0.00000E+00
358	9.66788E-01	1.07782E+01	9.14215E-01	1.25964E-03	0.00000E+00	0.00000E+00
359	9.09260E-01	1.08038E+01	9.14201E-01	1.25619E-03	0.00000E+00	0.00000E+00
360	9.30507E-01	1.08303E+01	9.14247E-01	1.25350E-03	0.00000E+00	0.00000E+00
361	9.16966E-01	1.08560E+01	9.14254E-01	1.25002E-03	0.00000E+00	0.00000E+00
362	8.91497E-01	1.08817E+01	9.14191E-01	1.24815E-03	0.00000E+00	0.00000E+00
363	8.78586E-01	1.09090E+01	9.14093E-01	1.24859E-03	0.00000E+00	0.00000E+00
364	9.01561E-01	1.09347E+01	9.14058E-01	1.24561E-03	0.00000E+00	0.00000E+00
365	8.76975E-01	1.09612E+01	9.13956E-01	1.24637E-03	0.00000E+00	0.00000E+00
366	8.76950E-01	1.09868E+01	9.13854E-01	1.24709E-03	0.00000E+00	0.00000E+00
367	9.13162E-01	1.10125E+01	9.13852E-01	1.24367E-03	0.00000E+00	0.00000E+00
368	9.09250E-01	1.10382E+01	9.13840E-01	1.24033E-03	0.00000E+00	0.00000E+00
369	9.06512E-01	1.10647E+01	9.13820E-01	1.23711E-03	0.00000E+00	0.00000E+00
370	8.96960E-01	1.10922E+01	9.13774E-01	1.23460E-03	0.00000E+00	0.00000E+00
371	9.11398E-01	1.11178E+01	9.13767E-01	1.23126E-03	0.00000E+00	0.00000E+00
372	9.56847E-01	1.11435E+01	9.13884E-01	1.23344E-03	0.00000E+00	0.00000E+00
373	8.99059E-01	1.11700E+01	9.13844E-01	1.23076E-03	0.00000E+00	0.00000E+00

374	8.99473E-01	1.11975E+01	9.13805E-01	1.22805E-03	0.00000E+00	0.00000E+00
375	9.23804E-01	1.12222E+01	9.13832E-01	1.22505E-03	0.00000E+00	0.00000E+00
376	9.49284E-01	1.12468E+01	9.13927E-01	1.22544E-03	0.00000E+00	0.00000E+00
377	9.07115E-01	1.12733E+01	9.13909E-01	1.22230E-03	0.00000E+00	0.00000E+00
378	8.89644E-01	1.13000E+01	9.13844E-01	1.22076E-03	0.00000E+00	0.00000E+00
379	8.62222E-01	1.13265E+01	9.13707E-01	1.22519E-03	0.00000E+00	0.00000E+00
380	9.08018E-01	1.13530E+01	9.13692E-01	1.22204E-03	0.00000E+00	0.00000E+00
381	9.29187E-01	1.13787E+01	9.13733E-01	1.21949E-03	0.00000E+00	0.00000E+00
382	8.74807E-01	1.14043E+01	9.13631E-01	1.22059E-03	0.00000E+00	0.00000E+00
383	9.10426E-01	1.14308E+01	9.13622E-01	1.21741E-03	0.00000E+00	0.00000E+00
384	9.22945E-01	1.14583E+01	9.13647E-01	1.21446E-03	0.00000E+00	0.00000E+00
385	8.96198E-01	1.14840E+01	9.13601E-01	1.21214E-03	0.00000E+00	0.00000E+00
386	8.96304E-01	1.15105E+01	9.13556E-01	1.20982E-03	0.00000E+00	0.00000E+00
387	9.07288E-01	1.15370E+01	9.13540E-01	1.20678E-03	0.00000E+00	0.00000E+00
388	8.81735E-01	1.15645E+01	9.13457E-01	1.20647E-03	0.00000E+00	0.00000E+00
389	8.87890E-01	1.15902E+01	9.13391E-01	1.20516E-03	0.00000E+00	0.00000E+00
390	9.27316E-01	1.16177E+01	9.13427E-01	1.20259E-03	0.00000E+00	0.00000E+00
391	9.83680E-01	1.16423E+01	9.13608E-01	1.21301E-03	0.00000E+00	0.00000E+00
392	9.33104E-01	1.16680E+01	9.13658E-01	1.21093E-03	0.00000E+00	0.00000E+00
393	9.12553E-01	1.16945E+01	9.13655E-01	1.20783E-03	0.00000E+00	0.00000E+00
394	8.88733E-01	1.17220E+01	9.13591E-01	1.20642E-03	0.00000E+00	0.00000E+00
395	9.20633E-01	1.17485E+01	9.13609E-01	1.20348E-03	0.00000E+00	0.00000E+00
396	9.19766E-01	1.17760E+01	9.13625E-01	1.20053E-03	0.00000E+00	0.00000E+00
397	9.32565E-01	1.18025E+01	9.13673E-01	1.19844E-03	0.00000E+00	0.00000E+00
398	8.96231E-01	1.18290E+01	9.13629E-01	1.19622E-03	0.00000E+00	0.00000E+00
399	9.16973E-01	1.18557E+01	9.13637E-01	1.19324E-03	0.00000E+00	0.00000E+00
400	9.28953E-01	1.18822E+01	9.13678E-01	1.19094E-03	0.00000E+00	0.00000E+00
401	9.16362E-01	1.19068E+01	9.13685E-01	1.18797E-03	0.00000E+00	0.00000E+00
402	9.38027E-01	1.19335E+01	9.13746E-01	1.18656E-03	0.00000E+00	0.00000E+00
403	8.68354E-01	1.19600E+01	9.13633E-01	1.18900E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

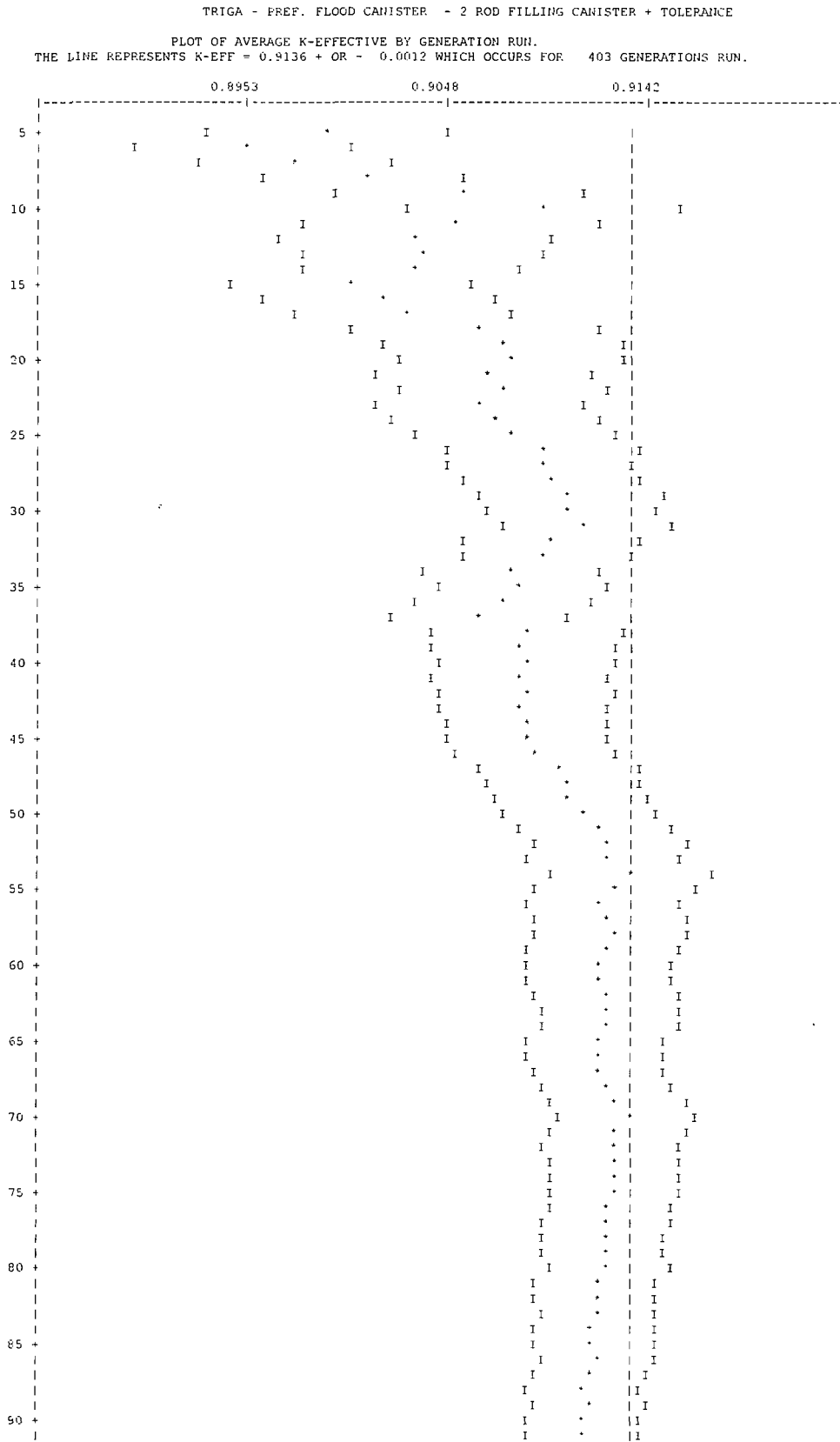
**NAC-LWT Cask SAR  
Revision 43**

**January 2015**

TRIGA - PREF. FLOOD CAHISTER - 2 POD FILLING CAHISTER + TOLERANCE

LIFETIME = 6.65193E-05 + OR - 1.55342E-07      GENERATION TIME = 2.66454E-05 + OR - 6.91541E-08  
 NU BAR = 2.42127E+00 + OR - 9.95371E-06      AVERAGE FISSION GROUP = 3.22457E+01 + OR - 5.44642E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.48733E-01 + OR - 5.78070E-04

NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE		67 PER CENT		95 PER CENT		99 PER CENT		NUMBER OF HISTORIES
	K-EFFECTIVE	DEVIATION	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	
3	0.91355	+ OR - 0.00119	0.91236	TO 0.91474	0.91117	TO 0.91593	0.90998	TO 0.91712	400000
4	0.91357	+ OR - 0.00119	0.91238	TO 0.91476	0.91119	TO 0.91596	0.91000	TO 0.91715	399000
5	0.91362	+ OR - 0.00119	0.91243	TO 0.91482	0.91123	TO 0.91601	0.91004	TO 0.91720	398000
6	0.91369	+ OR - 0.00120	0.91249	TO 0.91488	0.91130	TO 0.91608	0.91010	TO 0.91727	397000
7	0.91371	+ OR - 0.00120	0.91251	TO 0.91491	0.91131	TO 0.91611	0.91012	TO 0.91730	396000
8	0.91371	+ OR - 0.00120	0.91251	TO 0.91491	0.91131	TO 0.91611	0.91011	TO 0.91731	395000
9	0.91367	+ OR - 0.00120	0.91247	TO 0.91488	0.91127	TO 0.91608	0.91006	TO 0.91728	394000
10	0.91362	+ OR - 0.00121	0.91242	TO 0.91483	0.91121	TO 0.91603	0.91001	TO 0.91724	393000
11	0.91372	+ OR - 0.00120	0.91251	TO 0.91492	0.91131	TO 0.91613	0.91011	TO 0.91733	392000
12	0.91378	+ OR - 0.00121	0.91257	TO 0.91499	0.91137	TO 0.91619	0.91016	TO 0.91740	391000
17	0.91394	+ OR - 0.00121	0.91272	TO 0.91515	0.91151	TO 0.91637	0.91029	TO 0.91758	386000
22	0.91385	+ OR - 0.00122	0.91263	TO 0.91507	0.91140	TO 0.91629	0.91018	TO 0.91752	381000
27	0.91382	+ OR - 0.00123	0.91259	TO 0.91505	0.91135	TO 0.91629	0.91012	TO 0.91752	376000
32	0.91383	+ OR - 0.00124	0.91259	TO 0.91507	0.91135	TO 0.91631	0.91011	TO 0.91755	371000
37	0.91421	+ OR - 0.00124	0.91297	TO 0.91545	0.91173	TO 0.91669	0.91049	TO 0.91793	366000
42	0.91407	+ OR - 0.00124	0.91283	TO 0.91531	0.91159	TO 0.91656	0.91035	TO 0.91780	361000
47	0.91397	+ OR - 0.00125	0.91272	TO 0.91522	0.91147	TO 0.91647	0.91021	TO 0.91773	356000
52	0.91369	+ OR - 0.00126	0.91243	TO 0.91495	0.91116	TO 0.91621	0.90990	TO 0.91747	351000
57	0.91370	+ OR - 0.00126	0.91245	TO 0.91496	0.91119	TO 0.91621	0.90994	TO 0.91747	346000
62	0.91374	+ OR - 0.00127	0.91247	TO 0.91501	0.91120	TO 0.91628	0.90993	TO 0.91755	341000
67	0.91383	+ OR - 0.00128	0.91255	TO 0.91511	0.91126	TO 0.91640	0.90998	TO 0.91768	336000
72	0.91373	+ OR - 0.00129	0.91244	TO 0.91501	0.91116	TO 0.91630	0.90987	TO 0.91759	331000
77	0.91380	+ OR - 0.00130	0.91250	TO 0.91511	0.91120	TO 0.91641	0.90989	TO 0.91771	326000
82	0.91395	+ OR - 0.00131	0.91264	TO 0.91527	0.91132	TO 0.91658	0.91001	TO 0.91790	321000
87	0.91403	+ OR - 0.00133	0.91271	TO 0.91536	0.91138	TO 0.91669	0.91005	TO 0.91802	316000
92	0.91416	+ OR - 0.00134	0.91282	TO 0.91550	0.91148	TO 0.91684	0.91014	TO 0.91818	311000
97	0.91402	+ OR - 0.00134	0.91268	TO 0.91536	0.91134	TO 0.91670	0.91000	TO 0.91804	306000
102	0.91407	+ OR - 0.00135	0.91272	TO 0.91542	0.91136	TO 0.91677	0.91001	TO 0.91812	301000
107	0.91401	+ OR - 0.00137	0.91264	TO 0.91538	0.91127	TO 0.91675	0.90990	TO 0.91812	296000
112	0.91412	+ OR - 0.00138	0.91274	TO 0.91550	0.91136	TO 0.91688	0.90998	TO 0.91825	291000
117	0.91398	+ OR - 0.00139	0.91259	TO 0.91537	0.91119	TO 0.91676	0.90980	TO 0.91815	286000
122	0.91395	+ OR - 0.00141	0.91254	TO 0.91535	0.91113	TO 0.91676	0.90973	TO 0.91817	281000
127	0.91386	+ OR - 0.00143	0.91243	TO 0.91529	0.91101	TO 0.91672	0.90958	TO 0.91815	276000
132	0.91367	+ OR - 0.00145	0.91222	TO 0.91511	0.91077	TO 0.91656	0.90933	TO 0.91801	271000
137	0.91410	+ OR - 0.00145	0.91264	TO 0.91555	0.91119	TO 0.91700	0.90973	TO 0.91846	266000
142	0.91401	+ OR - 0.00147	0.91254	TO 0.91548	0.91107	TO 0.91696	0.90960	TO 0.91843	261000
147	0.91405	+ OR - 0.00149	0.91256	TO 0.91555	0.91107	TO 0.91704	0.90958	TO 0.91853	256000
152	0.91378	+ OR - 0.00151	0.91226	TO 0.91529	0.91075	TO 0.91680	0.90924	TO 0.91831	251000
157	0.91394	+ OR - 0.00153	0.91241	TO 0.91547	0.91088	TO 0.91700	0.90935	TO 0.91853	246000
162	0.91422	+ OR - 0.00154	0.91267	TO 0.91576	0.91113	TO 0.91730	0.90958	TO 0.91885	241000
167	0.91390	+ OR - 0.00155	0.91234	TO 0.91545	0.91079	TO 0.91701	0.90923	TO 0.91856	236000
172	0.91376	+ OR - 0.00159	0.91217	TO 0.91534	0.91059	TO 0.91693	0.90900	TO 0.91851	231000
177	0.91401	+ OR - 0.00161	0.91240	TO 0.91563	0.91078	TO 0.91724	0.90917	TO 0.91895	226000
182	0.91365	+ OR - 0.00163	0.91201	TO 0.91528	0.91038	TO 0.91691	0.90875	TO 0.91854	221000
187	0.91382	+ OR - 0.00166	0.91216	TO 0.91548	0.91050	TO 0.91714	0.90884	TO 0.91880	216000
192	0.91362	+ OR - 0.00169	0.91213	TO 0.91552	0.91044	TO 0.91721	0.90875	TO 0.91890	211000
197	0.91423	+ OR - 0.00170	0.91253	TO 0.91592	0.91084	TO 0.91762	0.90914	TO 0.91931	206000
202	0.91402	+ OR - 0.00172	0.91231	TO 0.91574	0.91059	TO 0.91746	0.90887	TO 0.91917	201000
207	0.91434	+ OR - 0.00175	0.91259	TO 0.91609	0.91083	TO 0.91784	0.90908	TO 0.91960	196000
212	0.91386	+ OR - 0.00178	0.91208	TO 0.91564	0.91030	TO 0.91742	0.90853	TO 0.91919	191000
217	0.91393	+ OR - 0.00178	0.91215	TO 0.91572	0.91037	TO 0.91750	0.90859	TO 0.91928	186000
222	0.91409	+ OR - 0.00181	0.91228	TO 0.91590	0.91047	TO 0.91770	0.90867	TO 0.91951	181000
227	0.91417	+ OR - 0.00185	0.91232	TO 0.91601	0.91048	TO 0.91786	0.90863	TO 0.91971	176000
232	0.91461	+ OR - 0.00187	0.91274	TO 0.91649	0.91087	TO 0.91836	0.90899	TO 0.92023	171000
237	0.91431	+ OR - 0.00190	0.91241	TO 0.91622	0.91051	TO 0.91812	0.90960	TO 0.92002	166000
242	0.91427	+ OR - 0.00195	0.91232	TO 0.91622	0.91036	TO 0.91817	0.90841	TO 0.92012	161000
247	0.91370	+ OR - 0.00199	0.91172	TO 0.91569	0.90973	TO 0.91768	0.90774	TO 0.91967	156000
252	0.91293	+ OR - 0.00200	0.91093	TO 0.91493	0.90993	TO 0.91693	0.90693	TO 0.91893	151000
257	0.91279	+ OR - 0.00204	0.91075	TO 0.91482	0.90872	TO 0.91686	0.90668	TO 0.91889	146000
262	0.91317	+ OR - 0.00207	0.91110	TO 0.91524	0.90903	TO 0.91731	0.90696	TO 0.91938	141000
267	0.91339	+ OR - 0.00214	0.91125	TO 0.91553	0.90911	TO 0.91766	0.90697	TO 0.91980	136000
272	0.91369	+ OR - 0.00221	0.91148	TO 0.91589	0.90927	TO 0.91810	0.90707	TO 0.92030	131000
277	0.91358	+ OR - 0.00226	0.91132	TO 0.91584	0.90906	TO 0.91810	0.90680	TO 0.92036	126000
282	0.91349	+ OR - 0.00228	0.91121	TO 0.91577	0.90892	TO 0.91805	0.90664	TO 0.92034	121000
287	0.91338	+ OR - 0.00235	0.91104	TO 0.91573	0.90869	TO 0.91807	0.90635	TO 0.92042	116000
292	0.91331	+ OR - 0.00244	0.91097	TO 0.91574	0.90843	TO 0.91818	0.90600	TO 0.92062	111000
297	0.91307	+ OR - 0.00249	0.91058	TO 0.91556	0.90810	TO 0.91805	0.90561	TO 0.92054	106000
302	0.91190	+ OR - 0.00252	0.90938	TO 0.91441	0.90687	TO 0.91693	0.90435	TO 0.91945	101000
307	0.91285	+ OR - 0.00256	0.91030	TO 0.91541	0.90774	TO 0.91797	0.90518	TO 0.92052	96000
312	0.91290	+ OR - 0.00254	0.91036	TO 0.91544	0.90783	TO 0.91798	0.90529	TO 0.92051	91000
317	0.91349	+ OR - 0.00263	0.91086	TO 0.91612	0.90823	TO 0.91875	0.90560	TO 0.92138	86000
322	0.91255	+ OR - 0.00261	0.90993	TO 0.91516	0.90732	TO 0.91777	0.90471	TO 0.92038	81000
327	0.91267	+ OR - 0.00271	0.90996	TO 0.91537	0.90725	TO 0.91808	0.90455	TO 0.92079	76000
332	0.91261	+ OR - 0.00287	0.90974	TO 0.91549	0.90687	TO 0.91826	0.90400	TO 0.92123	71000
337	0.91147	+ OR - 0.00293	0.90853	TO 0.91440	0.90560	TO 0.91734	0.90266	TO 0.92027	66000
342	0.91066	+ OR - 0.00304	0.90762	TO 0.91370	0.90457	TO 0.91674	0.90153	TO 0.91979	61000
347	0.91121	+ OR - 0.00316	0.90805	TO 0.91437	0.90489	TO 0.91753	0.90173	TO 0.92069	56000
352	0.91067	+ OR - 0.00341	0.90726	TO 0.91408	0.90365	TO 0.91745	0.90044	TO 0.92090	51000
357	0.91028	+ OR - 0.00371	0.90657	TO 0.91399	0.90287	TO 0.91765	0.89916	TO 0.92140	46000
362	0.90873	+ OR - 0.00385	0.90488	TO 0.91258	0.90103	TO 0.91643	0.89718	TO 0.92028	41000
367	0.91141	+ OR - 0.00409	0.90732	TO 0.91549	0.90323	TO 0.91959	0.89914	TO 0.92367	36000
372	0.91063	+ OR - 0.00449	0.90614	TO 0.91512	0.90165	TO 0.91961	0.89717	TO 0.92410	31000
377	0.90965	+ OR - 0.00508	0.90457	TO 0.91473	0.89949	TO 0.91961	0.89441	TO 0.92489	26000
382	0.91367	+ OR - 0.00539	0.90828	TO 0.91906	0.90289	TO 0.92444	0.89750	TO 0.92983	21000
387	0.91587	+ OR - 0.00688	0.90898	TO 0.92275	0.90210	TO 0.92963	0.89522	TO 0.93652	16000
392	0.91274	+ OR - 0.00625	0.90650	TO 0.91899	0.90025	TO 0.92523	0.89401	TO 0.93148	11000
397	0.91098	+ OR - 0.01031	0.90067	TO 0.92130	0.89036	TO 0.92161	0.88004	TO 0.94192	6000







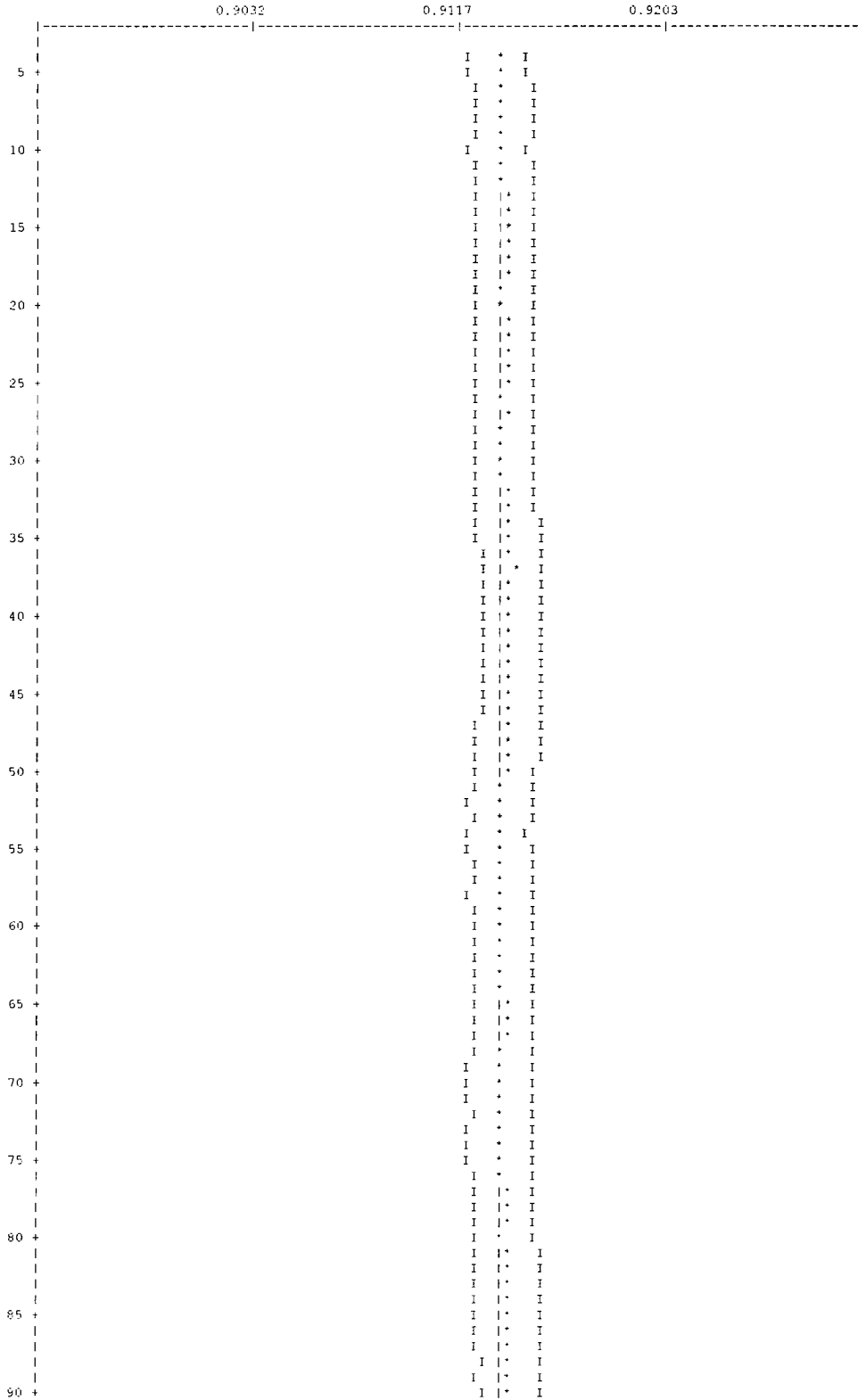




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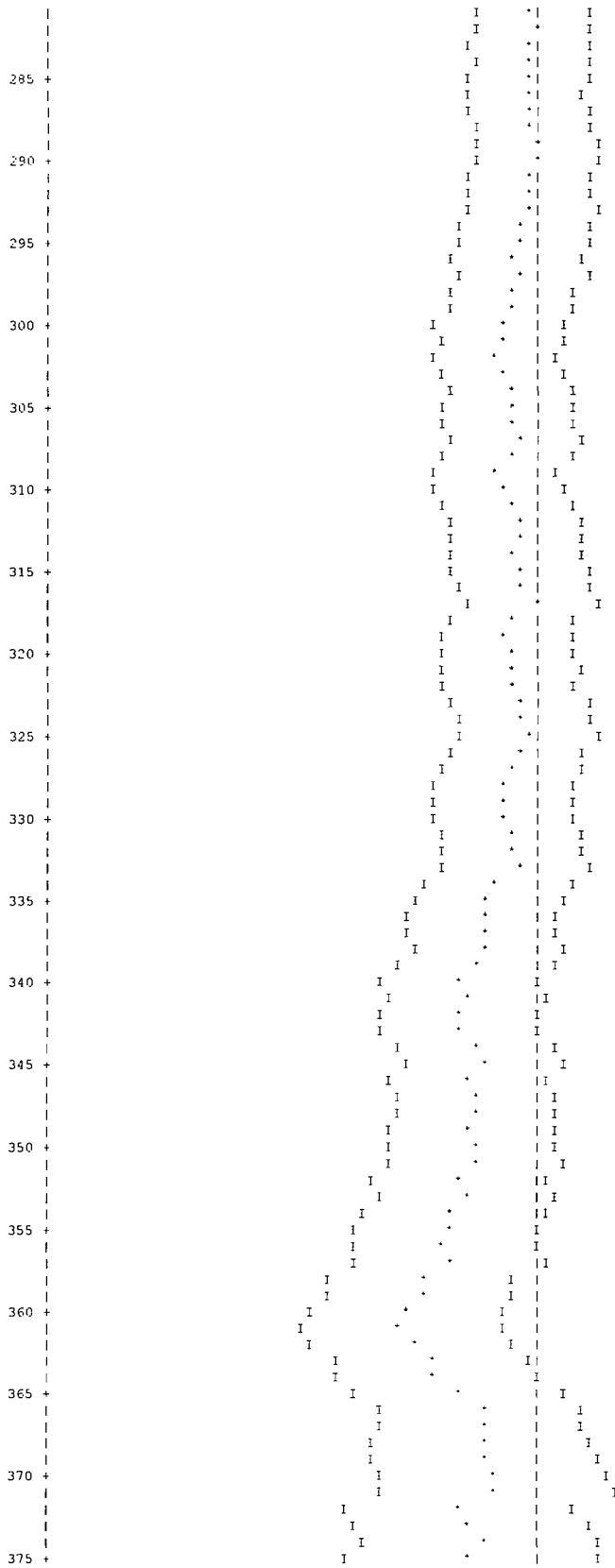
TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS K-EFF = 0.9136 + GR - 0.0012 WHICH OCCURS FOR 3 GENERATIONS SKIPPED.

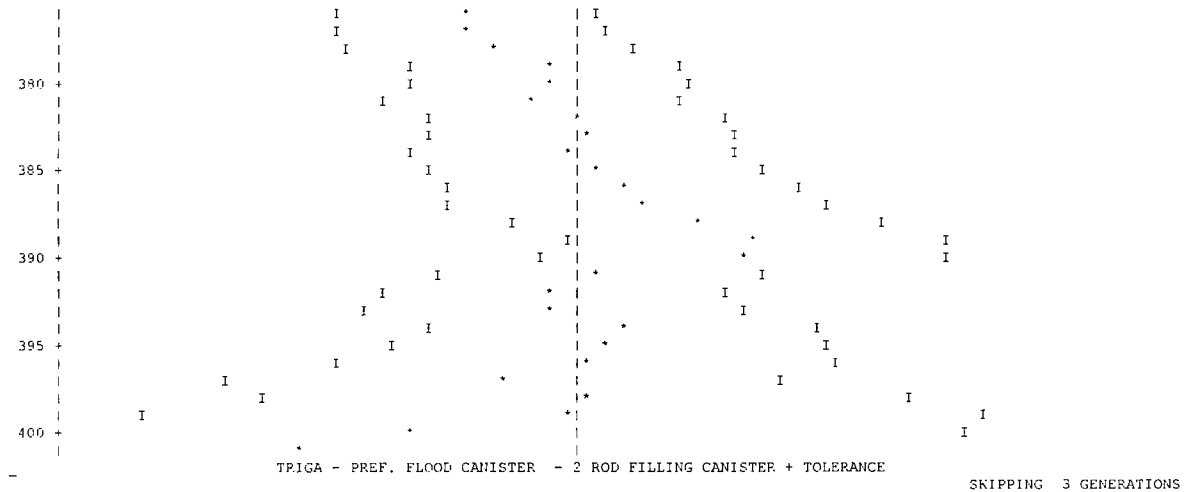












GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0004			3.78261E-04	1.7107	1.15095E-03	1.5661	0.00000E+00	0.0000
2	0.0019			1.75837E-03	0.5591	3.10796E-03	0.4703	0.00000E+00	0.0000
3	0.0025			2.28749E-03	0.5099	1.94752E-03	0.3999	0.00000E+00	0.0000
4	0.0015			1.37908E-03	0.5231	1.10253E-03	0.4127	0.00000E+00	0.0000
5	0.0021			1.94967E-03	0.4578	2.41958E-03	0.3640	0.00000E+00	0.0000
6	0.0032			2.93131E-03	0.3491	8.91355E-03	0.3460	0.00000E+00	0.0000
7	0.0039			3.60175E-03	0.2838	1.93545E-02	0.3332	0.00000E+00	0.0000
8	0.0041			3.76576E-03	0.2765	1.66521E-02	0.3506	0.00000E+00	0.0000
9	0.0057			5.16621E-03	0.2941	1.80498E-02	0.2826	0.00000E+00	0.0000
10	0.0121			1.10499E-02	0.2832	4.36278E-02	0.2806	0.00000E+00	0.0000
11	0.0257			2.35064E-02	0.2820	6.14684E-02	0.2361	0.00000E+00	0.0000
12	0.0344			3.14157E-02	0.2790	4.92024E-02	0.2293	0.00000E+00	0.0000
13	0.0313			2.85808E-02	0.2936	5.76898E-02	0.2103	0.00000E+00	0.0000
14	0.0255			2.32593E-02	0.2715	6.87534E-02	0.2560	0.00000E+00	0.0000
15	0.0050			4.54822E-03	0.3571	3.02211E-02	0.3717	0.00000E+00	0.0000
16	0.0034			3.09197E-03	0.4445	1.65618E-02	0.4372	0.00000E+00	0.0000
17	0.0052			4.73396E-03	0.6335	9.52084E-03	0.4348	0.00000E+00	0.0000
18	0.0068			6.25696E-03	0.6007	8.97307E-03	0.4118	0.00000E+00	0.0000
19	0.0084			7.65993E-03	0.5298	1.40545E-02	0.4171	0.00000E+00	0.0000
20	0.0338			3.08651E-02	0.3441	4.44361E-02	0.3445	0.00000E+00	0.0000
21	0.0177			1.61492E-02	0.4988	1.70573E-02	0.4152	0.00000E+00	0.0000
22	0.0403			3.67780E-02	0.3622	3.38568E-02	0.3256	0.00000E+00	0.0000
23	0.1157			1.05719E-01	0.2352	8.93478E-02	0.2345	0.00000E+00	0.0000
24	0.1882			1.71967E-01	0.2075	1.29114E-01	0.1984	0.00000E+00	0.0000
25	0.1537			1.40418E-01	0.2359	9.90052E-02	0.2247	0.00000E+00	0.0000
26	0.1909			1.74441E-01	0.2514	1.15238E-01	0.2552	0.00000E+00	0.0000
27	0.0765			6.96923E-02	0.3710	4.14854E-02	0.3860	0.00000E+00	0.0000
SYSTEM TOTAL =				9.13550E-01	0.1302	1.00231E+00	0.0445	0.00000E+00	0.0000

ELAPSED TIME 11.96183 MINUTES

RANDOM NUMBER= 1B2D06BC15BF

TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

FREQUENCY FOR GENERATIONS 4 TO 403  
0.8577 TO 0.8660 \*\*\*\*\*  
0.8660 TO 0.8743 \*\*\*\*\*  
0.8743 TO 0.8825 \*\*\*\*\*  
0.8825 TO 0.8908 \*\*\*\*\*  
0.8908 TO 0.8991 \*\*\*\*\*  
0.8991 TO 0.9073 \*\*\*\*\*  
0.9073 TO 0.9156 \*\*\*\*\*  
0.9156 TO 0.9239 \*\*\*\*\*  
0.9239 TO 0.9321 \*\*\*\*\*  
0.9321 TO 0.9404 \*\*\*\*\*  
0.9404 TO 0.9487 \*\*\*\*\*  
0.9487 TO 0.9569 \*\*\*\*\*  
0.9569 TO 0.9652 \*\*\*  
0.9652 TO 0.9735 \*\*\*  
0.9735 TO 0.9817 \*\*  
0.9817 TO 0.9900 \*\*\*

FREQUENCY FOR GENERATIONS 104 TO 403  
0.8577 TO 0.8660 \*\*\*\*  
0.8660 TO 0.8743 \*\*\*\*\*  
0.8743 TO 0.8825 \*\*\*\*\*  
0.8825 TO 0.8908 \*\*\*\*\*  
0.8908 TO 0.8991 \*\*\*\*\*  
0.8991 TO 0.9073 \*\*\*\*\*  
0.9073 TO 0.9156 \*\*\*\*\*  
0.9156 TO 0.9239 \*\*\*\*\*  
0.9239 TO 0.9321 \*\*\*\*\*  
0.9321 TO 0.9404 \*\*\*\*\*  
0.9404 TO 0.9487 \*\*\*\*\*  
0.9487 TO 0.9569 \*\*\*\*\*  
0.9569 TO 0.9652 \*\*\*  
0.9652 TO 0.9735 \*\*\*  
0.9735 TO 0.9817 \*\*  
0.9817 TO 0.9900 \*\*

FREQUENCY FOR GENERATIONS 204 TO 403  
0.8577 TO 0.8660 \*\*  
0.8660 TO 0.8743 \*\*\*\*\*  
0.8743 TO 0.8825 \*\*\*\*\*  
0.8825 TO 0.8908 \*\*\*\*\*  
0.8908 TO 0.8991 \*\*\*\*\*  
0.8991 TO 0.9073 \*\*\*\*\*  
0.9073 TO 0.9156 \*\*\*\*\*  
0.9156 TO 0.9239 \*\*\*\*\*  
0.9239 TO 0.9321 \*\*\*\*\*  
0.9321 TO 0.9404 \*\*\*\*\*  
0.9404 TO 0.9487 \*\*\*\*\*  
0.9487 TO 0.9569 \*\*\*\*\*  
0.9569 TO 0.9652 \*\*  
0.9652 TO 0.9735 \*\*\*  
0.9735 TO 0.9817 \*\*  
0.9817 TO 0.9900 \*\*

TRIGA - PREF. FLOOD CANISTER - 2 ROD FILLING CANISTER + TOLERANCE

FREQUENCY FOR GENERATIONS 304 TO 403  
0.8577 TO 0.8660 \*  
0.8660 TO 0.8743 \*\*\*\*\*  
0.8743 TO 0.8825 \*\*\*\*\*  
0.8825 TO 0.8908 \*\*\*\*\*  
0.8908 TO 0.8991 \*\*\*\*\*  
0.8991 TO 0.9073 \*\*\*\*\*  
0.9073 TO 0.9156 \*\*\*\*\*  
0.9156 TO 0.9239 \*\*\*\*\*  
0.9239 TO 0.9321 \*\*\*\*\*  
0.9321 TO 0.9404 \*\*\*\*\*  
0.9404 TO 0.9487 \*\*\*  
0.9487 TO 0.9569 \*\*\*  
0.9569 TO 0.9652 \*\*\*  
0.9652 TO 0.9735 \*\*\*  
0.9735 TO 0.9817 \*\*  
0.9817 TO 0.9900 \*\*

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 11.96183 MINUTES  
.....  
\*  
-

**Figure 6.6.5-2 Summary of CSAS25 Input/Output for NAC-LWT with TRIGA Fuel Elements – Most Reactive Poisoned Basket Configuration**

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
TRIGA - PREF. FLOOD CANISTER
27GROUPNDF4 LATTICECELL
'FUEL
U-235 1 0.0 9.052980E-4 END
U-238 1 0.0 3.849480E-4 END
ZR 1 0.0 3.446510E-2 END
H 1 0.0 5.514420E-2 END
'CLAD, BASKET, AND CASK
SS304 2 1.0 293.0 END
'CANISTER INTERNAL MODERATOR
H2O 3 1.0 293.0 END
'ZIRCONIUM ROD
ZR 4 1.0 293.0 END
'GRAPHITE REFLECTOR
C 5 1.0 293.0 END
'LEAD SHIELD
PB 6 1.0 293.0 END
'NEUTRON SHIELD
H2O 7 1.0 293.0 END
'CASK EXTERNAL MATERIAL
H2O 8 1E-20 293.0 END
'END FITTING FOR FUEL ELEMENT
SS304 9 0.337137 293.0 END
H2O 9 0.662863 293.0 END
'SECOND FUEL MATERIAL FOR UN-CANISTERED
U-235 10 0.0 9.052980E-4 END
U-238 10 0.0 3.849480E-4 END
ZR 10 0.0 3.446510E-2 END
H 10 0.0 5.514420E-2 END
'SECOND END-FITTING MATERIAL FOR UN-CANISTERED FUEL
SS304 11 0.337137 293.0 END
H2O 11 1.0E-20 293.0 END
'CASK INTERIOR MODERATOR MATERIAL
H2O 12 1.0E-20 293.0 END
'NEUTRON ABSORBER PLATE WITH BORON
FE 13 DEN=7.76 0.6717 293.0 END
C 13 DEN=7.76 0.0001 293.0 END
SI 13 DEN=7.76 0.0033 293.0 END
MN 13 DEN=7.76 0.0060 293.0 END
P 13 DEN=7.75 0.0001 293.0 END
CR 13 DEN=7.76 0.1849 293.0 END
NI 13 DEN=7.76 0.1233 293.0 END
B-10 13 DEN=7.76 0.0073 293.0 END
B-11 13 DEN=7.76 0.0007 293.0 END
N 13 DEN=7.76 0.0017 293.0 END
'NEUTRON ABSORBER PLATE WITHOUT BORON
FE 14 DEN=7.76 0.6717 293.0 END
C 14 DEN=7.76 0.0001 293.0 END
SI 14 DEN=7.76 0.0033 293.0 END
MN 14 DEN=7.76 0.0060 293.0 END
P 14 DEN=7.75 0.0001 293.0 END
CR 14 DEN=7.76 0.1849 293.0 END
NI 14 DEN=7.76 0.1233 293.0 END
N 14 DEN=7.76 0.0017 293.0 END
END COMP
SQUAREPITCH 4.2992 3.6449 1 3 3.7541 2 END
MORE DATA
RES=10 CYLINDER 1.8224 DAN(10)=8.52196E-01
END MORE
TRIGA - PREF. FLOOD CANISTER
READ PARAM TME=170.0 GEN=403 NPG=1000 RUN=YES PLT=HO
TBA=2.0 END PARAM
READ GEOM
UNIT 1
COM='TRIGA FUEL ELEMENT (SCREENED) '
CYLINDER 4 1 0.2858 2P19.05
CYLINDER 1 1 1.8224 2P18.05
CYLINDER 5 1 1.8224 2E27.7368
CYLINDER 2 1 1.8771 2P27.7368
CYLINDER 9 1 1.8771 2P36.703
UNIT 5
COM='3.38 in Width / 0.28 in Thickness DIVIDER CENTER STACK (SCREENED) '
CUBOID 2 1 2P4.2926 0.7112 0.0 2P36.703
UNIT 6
COM='3.38 in Width / 0.24 in Thickness DIVIDER OUTSIDE STACK (SCREENED) '
CUBOID 2 1 2P4.2926 0.6096 0.0 2P36.703
UNIT 10
COM='TRIGA ELEMENTS IN Top of 3.38 in x 3.38 in OPENING (SCREENED) '
CUBOID 3 1 2P4.0267 +4.1029 -3.9505 2P36.703
HOLE 1 +2.1495 +2.2257 0.0
HOLE 1 -2.1495 +2.2257 0.0
HOLE 1 -2.1495 -2.0733 0.0
HOLE 1 +2.1495 -2.0733 0.0
CUBOID 2 1 2P4.2164 +4.2926 -4.1402 2P36.703
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
UNIT 11

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COM='TRIGA ELEMENTS IN Bottom of 3.38 in x 3.38 in OPENING (SCREENED)'  
CUBOID 3 1 2P4.0267 +3.9505 -4.1029 2P36.703  
HOLE 1 +2.1495 -2.2257 0.0  
HOLE 1 -2.1495 -2.2257 0.0  
HOLE 1 -2.1495 +2.0733 0.0  
HOLE 1 +2.1495 +2.0733 0.0  
CUBOID 2 1 2P4.2164 +4.1402 -4.2926 2P36.703  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
UNIT 12  
COM='TRIGA ELEMENTS III Bottom Right of 3.38 in x 3.38 in OPENING (SCREENED)'  
CUBOID 3 1 +4.1029 -3.9505 +3.9505 -4.1029 2P36.703  
HOLE 1 +2.2257 -2.2257 0.0  
HOLE 1 +2.2257 +2.0733 0.0  
HOLE 1 -2.0733 -2.2257 0.0  
HOLE 1 -2.0733 +2.0733 0.0  
CUBOID 2 1 +4.2926 -4.1402 +4.1402 -4.2926 2P36.703  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
UNIT 13  
COM='TRIGA ELEMENTS IN Top Right of 3.38 in x 3.38 in OPENING (SCREENED)'  
CUBOID 3 1 +4.1029 -3.9505 +4.1029 -3.9505 2P36.703  
HOLE 1 +2.2257 +2.2257 0.0  
HOLE 1 +2.2257 -2.0733 0.0  
HOLE 1 -2.0733 +2.2257 0.0  
HOLE 1 -2.0733 -2.0733 0.0  
CUBOID 2 1 +4.2926 -4.1402 +4.2926 -4.1402 2P36.703  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
UNIT 14  
COM='TRIGA ELEMENTS IN Bottom Left of 3.38 in x 3.38 in OPENING (SCREENED)'  
CUBOID 3 1 +3.9505 -4.1029 +3.9505 -4.1029 2P36.703  
HOLE 1 -2.2257 -2.2257 0.0  
HOLE 1 -2.2257 +2.0733 0.0  
HOLE 1 +2.0733 -2.2257 0.0  
HOLE 1 +2.0733 +2.0733 0.0  
CUBOID 2 1 +4.1402 -4.2926 +4.1402 -4.2926 2P36.703  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
UNIT 15  
COM='TRIGA ELEMENTS IN Top Left of 3.38 in x 3.38 in OPENING (SCREENED)'  
CUBOID 3 1 +3.9505 -4.1029 +4.1029 -3.9505 2P36.703  
HOLE 1 -2.2257 +2.2257 0.0  
HOLE 1 -2.2257 -2.0733 0.0  
HOLE 1 +2.0733 +2.2257 0.0  
HOLE 1 +2.0733 -2.0733 0.0  
CUBOID 2 1 +4.1402 -4.2926 +4.2926 -4.1402 2P36.703  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
UNIT 16  
COM='TRIGA BASKET 3.38 in x 3.38 in CENTER OPENING (SCREENED)'  
CUBOID 3 1 2P4.0267 2P4.0267 2P36.703  
HOLE 1 -2.1495 +2.1495 0.0  
HOLE 1 -2.1495 -2.1495 0.0  
HOLE 1 +2.1495 +2.1495 0.0  
HOLE 1 +2.1495 -2.1495 0.0  
CUBOID 2 1 2P4.2164 2P4.2164 2P36.703  
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703  
UNIT 17  
COM='HORIZONTAL X-Y POISON SHEET + WATER'  
CUBOID 13 1 2P3.8227 0.3175 0.0 2P34.163  
CUBOID 14 1 2P4.1402 0.3175 0.0 2P34.163  
CUBOID 12 1 2P4.2926 0.3175 0.0 2P36.703  
UNIT 20  
COM='CENTER COLUMN OF THREE OPENINGS w/ 0.28 in plate (SCREENED)'  
ARRAY 1 -4.2926 -13.9065 -36.703  
REPLICATE 2 1 4R0.7112 2R0.0 1  
UNIT 21  
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SCREENED)'  
ARRAY 2 -4.2926 -9.0488 -36.703  
REPLICATE 2 1 0.0 0.3048 2R0.3048 2R0.0 1  
UNIT 22  
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SCREENED)'  
ARRAY 3 -4.2926 -9.0488 -36.703  
REPLICATE 2 1 0.3048 0.0 2R0.3048 2R0.0 1  
UNIT 30  
COM='NAC-LWT TRIGA BASKET (SCREENED)'  
CYLINDER 12 1 17.1500 2P36.703  
HOLE 20 0.0 0.0 0.0  
HOLE 21 -9.2974 0.0 0.0  
HOLE 22 +9.2974 0.0 0.0  
CYLINDER 2 1 18.9103 2P37.338  
CYLINDER 6 1 33.4645 2P37.338  
CYLINDER 2 1 36.5189 2P37.338  
CYLINDER 8 1 49.2227 2P37.338  
CYLINDER 2 1 49.8221 2P37.338  
CUBOID 8 1 4P49.8221 2P37.338  
UNIT 41  
COM='TRIGA FUEL ELEMENT'  
CYLINDER 4 1 0.2858 2P19.05  
CYLINDER 10 1 1.8224 2P19.05  
CYLINDER 5 1 1.8224 2P27.7368  
CYLINDER 2 1 1.8771 2P27.7368  
CYLINDER 11 1 1.8771 2P36.703  
UNIT 45  
COM='3.38 in Width / 0.28 in Thickness DIVIDER CENTER STACK'  
CUBOID 2 1 2P4.2926 0.7112 0.0 2P36.703  
UNIT 46  
COM='3.38 in Width / 0.24 in Thickness DIVIDER OUTSIDE STACK'  
CUBOID 2 1 2P4.2926 0.6086 0.0 2P36.703
```

```
UNIT 50
COM='TRIGA FUEL ELEMENTS IN Top of 3.38 in x 3.38 in OPENING'
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
HOLE 41 +2.1495 +2.4154 0.0
HOLE 41 -2.1495 +2.4154 0.0
HOLE 41 -2.1495 -1.3389 0.0
HOLE 41 +2.1495 -1.3389 0.0
UNIT 51
COM='TRIGA FUEL ELEMENTS IN Bottom of 3.38 in x 3.38 in OPENING'
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
HOLE 41 +2.1495 -2.4154 0.0
HOLE 41 -2.1495 -2.4154 0.0
HOLE 41 -2.1495 +1.3389 0.0
HOLE 41 +2.1495 +1.3389 0.0
UNIT 52
COM='TRIGA FUEL ELEMENTS IN Bottom Right of 3.38 in x 3.38 in OPENING'
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
HOLE 41 +2.4154 -2.4154 0.0
HOLE 41 +2.4154 +1.3389 0.0
HOLE 41 -1.3389 -2.4154 0.0
HOLE 41 -1.3389 +1.3389 0.0
UNIT 53
COM='TRIGA FUEL ELEMENTS IN Top Right of 3.38 in x 3.38 in OPENING'
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
HOLE 41 +2.4154 +2.4154 0.0
HOLE 41 +2.4154 -1.3389 0.0
HOLE 41 -1.3389 +2.4154 0.0
HOLE 41 -1.3389 -1.3389 0.0
UNIT 54
COM='TRIGA FUEL ELEMENTS IN Bottom Left of 3.38 in x 3.38 in OPENING'
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
HOLE 41 -2.4154 -2.4154 0.0
HOLE 41 -2.4154 +1.3389 0.0
HOLE 41 +1.3389 -2.4154 0.0
HOLE 41 +1.3389 +1.3389 0.0
UNIT 55
COM='TRIGA FUEL ELEMENTS IN Top Left of 3.38 in x 3.38 in OPENING'
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
HOLE 41 -2.4154 +2.4154 0.0
HOLE 41 -2.4154 -1.3389 0.0
HOLE 41 +1.3389 +2.4154 0.0
HOLE 41 +1.3389 -1.3389 0.0
UNIT 56
COM='TRIGA BASKET 3.38 in x 3.38 in CENTER OPENING'
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
HOLE 41 +2.1495 -2.1495 0.0
HOLE 41 -2.1495 +2.1495 0.0
HOLE 41 -2.1495 -2.1495 0.0
HOLE 41 +2.1495 +2.1495 0.0
CUBOID 12 1 2P4.2926 2P4.2926 2P36.703
UNIT 60
COM='CENTER COLUMN OF THREE OPENINGS w/ 0.28 in plate'
ARRAY 11 -4.2926 -13.9065 -36.703
REPLICATE 2 1 4R0.7112 2R0.0 1
UNIT 61
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate'
ARRAY 12 -4.2926 -9.0488 -36.703
REPLICATE 2 1 0.0 0.3048 2R0.3048 2R0.0 1
UNIT 62
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate'
ARRAY 13 -4.2926 -9.0488 -36.703
REPLICATE 2 1 0.3048 0.0 2R0.3048 2R0.0 1
UNIT 70
COM='NAC-LWT TRIGA BASKET'
CYLINDER 12 1 17.1500 2P36.703
HOLE 60 0.0 0.0 0.0
HOLE 61 -9.2974 0.0 0.0
HOLE 62 +9.2974 0.0 0.0
CYLINDER 2 1 18.9103 2P37.338
CYLINDER 6 1 33.4645 2P37.338
CYLINDER 2 1 36.5188 2P37.338
CYLINDER 8 1 49.2227 2P37.338
CYLINDER 2 1 49.8221 2P37.338
CUBOID 8 1 4P49.8221 2P37.338
UNIT 80
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 2 1 36.5188 2P14.1351
CYLINDER 8 1 49.8221 2P14.1351
CUBOID 8 1 4P49.8221 2P14.1351
UNIT 81
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 6 1 26.3525 2P3.81
CYLINDER 2 1 36.6189 +13.97 -12.7
CYLINDER 8 1 49.8221 +13.97 -12.7
CUBOID 8 1 4P49.8221 +13.97 -12.7
GLOBAL UNIT 82
COM='STACK OF 5 BASKETS IN CASK'
ARRAY 20 -49.8221 -49.8221 -213.36
END GEOM
READ ARRAY
ARA=1 NUX=1 NUY=7 NUZ=1 FILL 10 5 17 16 17 5 11 END FILL
ARA=2 NUX=1 NUY=4 NUZ=1 FILL 13 17 6 12 END FILL
ARA=3 NUX=1 NUY=4 NUZ=1 FILL 15 17 6 14 END FILL
ARA=11 NUX=1 NUY=7 NUZ=1 FILL 50 45 17 56 17 45 51 END FILL
ARA=12 NUX=1 NUY=4 NUZ=1 FILL 53 17 46 52 END FILL
ARA=13 NUX=1 NUY=4 NUZ=1 FILL 55 17 46 54 END FILL
ARA=20 NUX=1 NUY=1 NUZ=7 FILL 81 30 3P70 39 89 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
END DATA
```

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SECONDARY MODULE 000008 HAS BEEN CALLED.  
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.87 (SECONDS).  
SECONDARY MODULE 000002 HAS BEEN CALLED.  
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 20.60 (SECONDS).  
SECONDARY MODULE 000009 HAS BEEN CALLED.  
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1087.30 (SECONDS).  
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1112.90 (SECONDS).

```

CCCCCCCCC  SSSSSSSSS  AAAAAAA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  22222222222  55555555555
CC          SS        SS    AA    AA    SS    SS    22    22    55
CC          SS        SS    AA    AA    SS    SS    22    22    55
CC          SS        SS    AA    AA    SS    SS    22    22    55
CC          SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  22    22    55555555555
CC          SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  22    22    55555555555
CC          SS        SS    AA    AA    SS    SS    22    22    55
CC          SS        SS    AA    AA    SS    SS    22    22    55
CC          CC        SS        SS    AA    AA    SS    SS    22    55    55
CCCCCCCCC  SSSSSSSSS  AA        AA    SSSSSSSSS  22222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AA        AA    SSSSSSSSS  22222222222  55555555555
    
```

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SSSSSSSSS  CCCCCCCCC  AAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SS          SS        CC        CC    AA    AA    LL          EE          PP          PP        CC        CC
SS          SS        CC        CC    AA    AA    LL          EE          PP          PP        CC        CC
SS          SS        CC        CC    AA    AA    LL          EE          PP          PP        CC        CC
SSSSSSSSS  CC          AAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CC
SSSSSSSSS  CC          AAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CC
SS          SS        CC        AA    AA    LL          EE          PP          CC        CC
SS          SS        CC        AA    AA    LL          EE          PP          CC        CC
SS          SS        CC        CC    AA    AA    LL          EE          PP          CC        CC
SSSSSSSSS  CCCCCCCCC  AA        AA    LLLLLLLLL  EEEEEEEEE  PP          CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AA        AA    LLLLLLLLL  EEEEEEEEE  PP          CCCCCCCCC
    
```

```

11          222222222  //          11          55555555555  //          999999999  888888888
111         222222222  //          111         55555555555  //          999999999  88888888888
1111        22        22          1111        55          99          99          88          88
11          22        22          11          55          99          99          88          88
11          22        22          11          55          99          99          88          88
11          22        22          11          55          99          99          88          88
11          22        22          11          55          99          99          88          88
11          22        22          11          55          99          99          88          88
11111111   2222222222222  //          11111111  5555555555555  //          99999999999  8888888888888
11111111   2222222222222  //          11111111  5555555555555  //          99999999999  8888888888888
    
```

```

0000000    66666666666  222222222  66666666666  0000000    77777777777
000000000  6666666666666  22222222222  6666666666666  000000000  77777777777
00          00        66          :::        22        22        66          :::        00          00        77
00          00        66          :::        22        22        66          :::        00          00        77
00          00        66          :::        22        22        66          :::        00          00        77
00          00        66666666666  :::        22        66666666666  :::        00          00        77
00          00        6666666666666  :::        22        6666666666666  :::        00          00        77
00          00        66          66          :::        22        66          66          :::        00          00        77
00          00        66          66          :::        22        66          66          :::        00          00        77
00          00        66          66          :::        22        66          66          :::        00          00        77
000000000  6666666666666  22222222222  6666666666666  000000000  77
0000000    66666666666  22222222222  66666666666  0000000    77
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS  SS  CC  CC  AA  AA  LL  EE  PP  PP  CC  CC
SS  SS  CC  CC  AA  AA  LL  EE  PP  PP  CC  CC
SS  SS  CC  CC  AA  AA  LL  EE  PP  PP  CC  CC
SSSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEEE  PPPPPPPPPPP  CC
SSSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEEE  PPPPPPPPPPP  CC
SS  SS  CC  AA  AA  LL  EE  PP  CC  CC
SS  SS  CC  CC  AA  AA  LL  EE  PP  CC  CC
SS  SS  CC  CC  AA  AA  LL  EE  PP  CC  CC
SSSSSSSSSS  CCCCCCCCCC  AA  AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA  AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP  CCCCCCCCCC
    
```

```

*****
*****
*****          PROGRAM VERIFICATION INFORMATION          *****
*****
*****          CODE SYSTEM:  SCALE-PC VERSION:  4.3          *****
*****
*****
*****          PROGRAM:  CSAS          *****
*****
*****          CREATION DATE:  03/08/96          *****
*****
*****          VOLUME:  ENG          *****
*****
*****          LIBRARY:  G:\SCALE43\WIN_NT\EXE          *****
*****
*****          PRODUCTION CODE:  CSAS          *****
*****
*****          VERSION:  3.1          *****
*****
*****          JOBNAME:  SCALE-PC          *****
*****
*****          DATE OF EXECUTION:  12/15/98          *****
*****
*****          TIME OF EXECUTION:  06:26:07          *****
*****
*****
    
```

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

```

LIB  C7GROUPNDF4  LIBRARY
MX  14  MIXTURES
MSC  38  COMPOSITION SPECIFICATIONS
IZM  3  MATERIAL ZONES
GE  LATTICECELL  GEOMETRY
MORE  1  0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLN  0  FUEL SOLUTIONS
    
```

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

```

CTP  SQUAREPITCH  CELL TYPE
PITCH  4.2992  CM CENTER TO CENTER SPACING
FUELOD  3.6449  CM FUEL DIAMETER OR SLAB THICKNESS
MFUEL  1  MIXTURE NO. OF FUEL
MMOD  3  MIXTURE NO. OF MODERATOR
CLADOD  3.7541  CM CLAD OUTER DIAMETER
MCLAD  2  MIXTURE NO. OF CLAD
    
```

\*\*\*\* SPECIAL PARAMETERS \*\*\*\*

```

ISN  8  ORDER OF ANGULAR QUADRATURE
IIM  20  INNER ITERATION MAXIMUM
ICM  25  OUTER ITERATION MAXIMUM
SZF  1.00000E+00  SIZE FACTOR FOR SPATIAL MESH
EPS  1.00000E-04  OVERALL PROBLEM CONVERGENCE
PTC  1.00000E-04  SCALAR FLUX CONVERGENCE
BKL  1.42089E+00  BUCKLING FACTOR
IUS  0  THERMAL UPSCATTER SCALING
BAL  FINE  FINE BALANCE TABLE PRINT FLAG
DY  0.00000E+00  BUCKLING HEIGHT
DZ  0.00000E+00  BUCKLING DEPTH
IPH  0  DIFFUSION COEFFICIENT OPTION
FRD  0  LOGICAL UNIT NUMBER TO READ FLUX GUESS
FWR  -1  LOGICAL UNIT NUMBER TO WRITE FLUX GUESS
MSH  2001  NUMBER OF INTERVALS FOR RES. INTGRTHS
MLV  2  MAX LVALUE FOR RES. INTGRTHS
A:S  0  LOGICAL UNIT NUMBER TO WRITE ANISH LIB
RES  10  MIXTURE WITH SPECIAL RESONANCE CORRECTION
*  CYLINDER GEOMETRY FOR SPECIAL RESONANCE CORRECTION
*  1.82240E+00  DIMENSION (LBAR) FOR SPECIAL RESONANCE CORRECTION
    
```

```

DANCOFF FACTOR SPECIFICATION
MIXTURE  FACTOR
10  0.95220
    
```

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

```

ZONE  1  IS FUEL
ZONE  2  IS CLAD
ZONE  3  IS MOD
    
```



```

KK      KK      EEEEEEEEEEE  NN      NN      0000000000      VV      VV
KK      KK      EEEEEEEEEEE  NNN     NN      000000000000     VV      VV
KK      KK      EE           NNNN    NN      00           00      VV      VV
KK      KK      EE           NN NN   NN      00           00      VV      VV
KK      KK      EE           NN  NN  NN      00           00      VV      VV
KKKKKKK  EEEEEEEEE  NN  NN  NN      00           00      -----  VV      VV
KKKKKKK  EEEEEEEEE  NN  NN  NN      00           00      -----  VV      VV
KK      KK      EE           NN  NN  NN      00           00      VV      VV
KK      KK      EE           NN  NN  NN      00           00      VV      VV
KK      KK      EE           NN  NN  NN      00           00      VV      VV
KK      KK      EE           NN  NN  NN      00           00      VV      VV
KK      KK      EEEEEEEEEEE  NN      NNN     000000000000     VVV
KK      KK      EEEEEEEEEEE  NN      NN      0000000000      V
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE  -----  PPPPPPPPPP  CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE  -----  PPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE           PP      CC
SS      SS  CC      AA      AA  LL      EE           PP      CC
SS      SS  CC      AA      AA  LL      EE           PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CC      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

11      2222222222  //      11      555555555555  //      9999999999  8888888888
111     2222222222  //      111     555555555555  //      9999999999  8888888888
1111    22          //      1111   55          //      99      99  88      88
11      22          //      11      55          //      99      99  88      88
11      22          //      11      55          //      99      99  88      88
11      22          //      11      555555555555  //      9999999999  8888888888
11      22          //      11      555555555555  //      9999999999  8888888888
11      22          //      11      55          //      99      88      88
11      22          //      11      55          //      99      88      88
11      22          //      11      55          //      99      88      88
11111111  222222222222  //      11111111  555555555555  //      9999999999  888888888888
11111111  222222222222  //      11111111  555555555555  //      9999999999  8888888888
    
```

```

00000000  666666666666  2222222222  666666666666  3333333333  2222222222
000000000  66666666666666  222222222222  66666666666666  333333333333  222222222222
00      00  66          :::  22      22  66          :::  33      33  22      22
00      00  66          :::  22      22  66          :::  33      33  22      22
00      00  66          :::  22      22  66          :::  33      33  22      22
00      00  666666666666  22          666666666666  333          22
00      00  66666666666666  22          66666666666666  333          22
00      00  66          66          :::  22          66          66          :::  33          33  22
00      00  66          66          :::  22          66          66          :::  33          33  22
00      00  66          66          :::  22          66          66          :::  33          33  22
000000000  66666666666666  222222222222  66666666666666  333333333333  222222222222
00000000  666666666666  222222222222  666666666666  333333333333  222222222222
    
```





```
.....  
***  
*** TRIGA - PREF. FLOOD CANISTER ***  
.....  
*** LOGICAL PARAMETERS ***  
.....  
*** RUN EXECUTE PROBLEM AFTER CHECKING DATA YES PLT PLOT PICTURE MAP(S) NO ***  
*** FLX COMPUTE FLUX NO PDN COMPUTE FISSION DENSITIES NO ***  
*** SMU COMPUTE AVG UNIT SELF-MULTIPLICATION NO NUB COMPUTE NU-BAR & AVG FISSION GROUP YES ***  
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO ***  
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO FAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***  
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO FWT PRINT WEIGHT AVERAGE APPRAY NO ***  
*** PKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO ***  
*** P1D PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO ***  
*** TRK PRINT TRACKING INFORMATION NO ***  
.....  
.....  
PARAMETER INPUT COMPLETED  
.....
```

```
..... 0 IO'S WERE USED READING THE PARAMETER DATA .....  
***** DATA READING COMPLETED *****
```

```

*****
***** TRIGA - PREF. FLOOD CANISTER *****
*****
***** ADDITIONAL INFORMATION *****
*****
NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          YES
NO. OF FISSION SPECTRUM SOURCE GROUP 1      GLOBAL ARRAY NUMBER          20
NO. OF SCATTERING ANGLES IN XSECS  2      NUMBER OF UNITS IN THE GLOBAL X DIR.  1
ENTRIES/NEUTRON IN THE NEUTRON BANK 24     NUMBER OF UNITS IN THE GLOBAL Y DIR.  1
ENTRIES/NEUTRON IN THE FISSION BANK 17     NUMBER OF UNITS IN THE GLOBAL Z DIR.  7
NUMBER OF MIXTURES USED            13     USE A GLOBAL REFLECTOR        YES
NUMBER OF BIAS ID'S USED           1      USE NESTED HOLES              YES
NUMBER OF DIFFERENTIAL ALBEDOS USED 0      NUMBER OF HOLES                62
TOTAL INPUT GEOMETRY REGIONS       80     MAXIMUM HOLE NESTING LEVEL     2
NUMBER OF GEOMETRY REGIONS USED     80     USE NESTED ARRAYS              YES
LARGEST GEOMETRY UNIT NUMBER        82     NUMBER OF ARRAYS USED          7
LARGEST ARRAY NUMBER                20     MAXIMUM ARRAY NESTING LEVEL    2
*****
+X BOUNDARY CONDITION              MIR    -X BOUNDARY CONDITION          MIR
+Y BOUNDARY CONDITION              MIR    -Y BOUNDARY CONDITION          MIR
+Z BOUNDARY CONDITION              MIR    -Z BOUNDARY CONDITION          MIR
*****

```

```

*****
** ARRAY   UNITS IN   UNITS IN   UNITS IN   NESTING **
** NUMBER   X DIR.    Y DIR.    Z DIR.    LEVEL  **
** 1         1         7         1         2      **
** 2         1         4         1         2      **
** 3         1         4         1         2      **
** 11        1         7         1         2      **
** 12        1         4         1         2      **
** 13        1         4         1         2      **
** 20 GLOBAL 1         1         7         1      **
*****

```

..... 0 IO'S WERE USED LOADING THE DATA .....  
TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 1 -----

TRIGA FUEL ELEMENT (SCREENED)

1	CYLINDER	4	1	RADIUS = 0.28530	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2	CYLINDER	1	1	RADIUS = 1.8224	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CYLINDER	5	1	RADIUS = 1.8224	+Z = 27.737	-Z = -27.737	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4	CYLINDER	2	1	RADIUS = 1.8771	+Z = 27.737	-Z = -27.737	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5	CYLINDER	9	1	RADIUS = 1.8771	+Z = 36.703	-Z = -36.703	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 5 -----

3.38 IN WIDTH / 0.28 IN THICKNESS DIVIDER CENTER STACK (SCREENED)

1	CUBOID	2	1	+X = 4.2926	-X = -4.2926	+Y = 0.71120	-Y = 0.00000	+Z = 36.703	-Z = -36.703
---	--------	---	---	-------------	--------------	--------------	--------------	-------------	--------------

----- UNIT 6 -----

3.38 IN WIDTH / 0.24 IN THICKNESS DIVIDER OUTSIDE STACK (SCREENED)

1 CUBOID 2 1 +X = 4.2926 -X = -4.2926 +Y = 0.60960 -Y = 0.00000 +Z = 36.703 -Z = -36.703

----- UNIT 10 -----

TRIGA ELEMENTS IN TOP OF 3.38 IN X 3.38 IN OPENING (SCREENED)

1 CUBOID 3 1 +X = 4.0267 -X = -4.0267 +Y = 4.1029 -Y = -3.9505 +Z = 36.703 -Z = -36.703

HOLE NUMBER 1 AT X = 2.1495 Y = 2.2257 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 2 AT X = -2.1495 Y = 2.2257 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 3 AT X = -2.1495 Y = -2.0733 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 4 AT X = 2.1495 Y = -2.0733 Z = 0.00000 IS UNIT NUMBER 1

2 CUBOID 2 1 +X = 4.2164 -X = -4.2164 +Y = 4.2926 -Y = -4.1402 +Z = 36.703 -Z = -36.703

3 CUBOID 12 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 36.703 -Z = -36.703

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 11 -----

TRIGA ELEMENTS IN BOTTOM OF 3.38 IN X 3.38 IN OPENING (SCREENED)

1 CUBOID 3 1 +X = 4.0267 -X = -4.0267 +Y = 3.9505 -Y = -4.1029 +Z = 36.703 -Z = -36.703

HOLE NUMBER 5 AT X = 2.1495 Y = -2.2257 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 6 AT X = -2.1495 Y = -2.2257 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 7 AT X = -2.1495 Y = 2.0733 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 8 AT X = 2.1495 Y = 2.0733 Z = 0.00000 IS UNIT NUMBER 1

2 CUBOID 2 1 +X = 4.2164 -X = -4.2164 +Y = 4.1402 -Y = -4.2926 +Z = 36.703 -Z = -36.703

3 CUBOID 12 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 36.703 -Z = -36.703

----- UNIT 12 -----

TRIGA ELEMENTS IN BOTTOM RIGHT OF 3.38 IN X 3.38 IN OPENING (SCREENED)

1 CUBOID 3 1 +X = 4.1029 -X = -3.9505 +Y = 3.9505 -Y = -4.1029 +Z = 36.703 -Z = -36.703

HOLE NUMBER 9 AT X = 2.2257 Y = -2.2257 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 10 AT X = 2.2257 Y = 2.0733 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 11 AT X = -2.0733 Y = -2.2257 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 12 AT X = -2.0733 Y = 2.0733 Z = 0.00000 IS UNIT NUMBER 1

2 CUBOID 2 1 +X = 4.2926 -X = -4.1402 +Y = 4.1402 -Y = -4.2926 +Z = 36.703 -Z = -36.703

3 CUBOID 12 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 36.703 -Z = -36.703

----- UNIT 13 -----

TRIGA ELEMENTS IN TOP RIGHT OF 3.38 IN X 3.38 IN OPENING (SCREENED)

1 CUBOID 3 1 +X = 4.1029 -X = -3.9505 +Y = 4.1029 -Y = -3.9505 +Z = 36.703 -Z = -36.703

HOLE NUMBER 13 AT X = 2.2257 Y = 2.2257 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 14 AT X = 2.2257 Y = -2.0733 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 15 AT X = -2.0733 Y = 2.2257 Z = 0.00000 IS UNIT NUMBER 1

HOLE NUMBER 16 AT X = -2.0733 Y = -2.0733 Z = 0.00000 IS UNIT NUMBER 1

2 CUBOID 2 1 +X = 4.2926 -X = -4.1402 +Y = 4.2926 -Y = -4.1402 +Z = 36.703 -Z = -36.703

3 CUBOID 12 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 36.703 -Z = -36.703

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 14 -----

TRIGA ELEMENTS IN BOTTOM LEFT OF 3.38 IN X 3.38 IN OPENING (SCREENED)

1 CUBOID 3 1 +X = 3.9505 -X = -4.1029 +Y = 3.9505 -Y = -4.1029 +Z = 36.703 -Z = -36.703

HOLE NUMBER	17	AT X = -2.2257	Y = -2.2257	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	18	AT X = -2.2257	Y = 2.0733	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	19	AT X = 2.0733	Y = -2.2257	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	20	AT X = 2.0733	Y = 2.0733	Z = 0.00000	IS UNIT NUMBER	1		
2 CUBOID	2 1	+X = 4.1402	-X = -4.2926	+Y = 4.1402	-Y = -4.2926	+Z = 36.703	-Z = -36.703	
3 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703	

----- UNIT 15 -----

TRIGA ELEMENTS IN TOP LEFT OF 3.38 IN X 3.38 IN OPENING (SCREENED)

1 CUBOID	3 1	+X = 3.9505	-X = -4.1029	+Y = 4.1029	-Y = -3.9505	+Z = 36.703	-Z = -36.703	
HOLE NUMBER	21	AT X = -2.2257	Y = 2.2257	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	22	AT X = -2.2257	Y = -2.0733	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	23	AT X = 2.0733	Y = 2.2257	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	24	AT X = 2.0733	Y = -2.0733	Z = 0.00000	IS UNIT NUMBER	1		
2 CUBOID	2 1	+X = 4.1402	-X = -4.2926	+Y = 4.2926	-Y = -4.1402	+Z = 36.703	-Z = -36.703	
3 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703	

----- UNIT 16 -----

TRIGA BASKET 3.38 IN X 3.38 IN CENTER OPENING (SCREENED)

1 CUBOID	3 1	+X = 4.0267	-X = -4.0267	+Y = 4.0267	-Y = -4.0267	+Z = 36.703	-Z = -36.703	
HOLE NUMBER	25	AT X = -2.1495	Y = 2.1495	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	26	AT X = -2.1495	Y = -2.1495	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	27	AT X = 2.1495	Y = 2.1495	Z = 0.00000	IS UNIT NUMBER	1		
HOLE NUMBER	28	AT X = 2.1495	Y = -2.1495	Z = 0.00000	IS UNIT NUMBER	1		
2 CUBOID	2 1	+X = 4.2164	-X = -4.2164	+Y = 4.2164	-Y = -4.2164	+Z = 36.703	-Z = -36.703	
3 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703	

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS NUM ID GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 17 -----

HORIZONTAL X-X POISON SHEET + WATER

1 CUBOID	13 1	+X = 3.8227	-X = -3.8227	+Y = 0.31750	-Y = 0.00000	+Z = 34.163	-Z = -34.163	
2 CUBOID	14 1	+X = 4.1402	-X = -4.1402	+Y = 0.31750	-Y = 0.00000	+Z = 34.163	-Z = -34.163	
3 CUBOID	12 1	+X = 4.2926	-X = -4.2926	+Y = 0.31750	-Y = 0.00000	+Z = 36.703	-Z = -36.703	

----- UNIT 20 EXTERNAL TO LATTICE 1 -----

CENTER COLUMN OF THREE OPENINGS W/ 0.28 IN PLATE (SCREENED)

1 ARRAY NUMBER	1	+X = 4.2926	-X = -4.2926	+Y = 13.907	-Y = -13.906	+Z = 36.703	-Z = -36.703	
2 CUBOID	2 1	+X = 5.0036	-X = -5.0036	+Y = 14.618	-Y = -14.618	+Z = 36.703	-Z = -36.703	

----- UNIT 21 EXTERNAL TO LATTICE 2 -----

LEFT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SCREENED)

1 ARRAY NUMBER	2	+X = 4.2926	-X = -4.2926	+Y = 9.0487	-Y = -9.0488	+Z = 36.703	-Z = -36.703	
2 CUBOID	2 1	+X = 4.2926	-X = -4.5974	+Y = 9.3535	-Y = -9.3536	+Z = 36.703	-Z = -36.703	

----- UNIT 22 EXTERNAL TO LATTICE 3 -----

RIGHT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SCREENED)

1 ARRAY NUMBER	3	+X = 4.2926	-X = -4.2926	+Y = 9.0487	-Y = -9.0488	+Z = 36.703	-Z = -36.703	
2 CUBOID	2 1	+X = 4.5974	-X = -4.2926	+Y = 9.3535	-Y = -9.3536	+Z = 36.703	-Z = -36.703	

TRIGA - PREF. FLOOD CANISTER

MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

REGION NUM ID

----- UNIT 30 -----

NAC-LWT TRIGA BASKET (SCREENED)

1	CYLINDER	12	1	RADIUS = 17.150	+Z = 36.703	-Z = -36.703	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
	HOLE NUMBER	29		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	20	
	HOLE NUMBER	30		AT X = -9.2974	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	21	
	HOLE NUMBER	31		AT X = 9.2974	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	22	
2	CYLINDER	2	1	RADIUS = 18.910	+Z = 37.338	-Z = -37.338	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3	CYLINDER	6	1	RADIUS = 33.465	+Z = 37.338	-Z = -37.338	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
4	CYLINDER	2	1	RADIUS = 36.519	+Z = 37.338	-Z = -37.338	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
5	CYLINDER	8	1	RADIUS = 49.823	+Z = 37.338	-Z = -37.338	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
6	CYLINDER	2	1	RADIUS = 49.822	+Z = 37.338	-Z = -37.338	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
7	CUBOID	8	1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 37.338	-Z = -37.338

----- UNIT 41 -----

TRIGA FUEL ELEMENT

1	CYLINDER	4	1	RADIUS = 0.28580	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
2	CYLINDER	10	1	RADIUS = 1.8224	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3	CYLINDER	5	1	RADIUS = 1.8224	+Z = 27.737	-Z = -27.737	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
4	CYLINDER	2	1	RADIUS = 1.8771	+Z = 27.737	-Z = -27.737	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
5	CYLINDER	11	1	RADIUS = 1.8771	+Z = 36.703	-Z = -36.703	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

----- UNIT 45 -----

3.38 IN WIDTH / 0.28 IN THICKNESS DIVIDER CENTER STACK

1	CUBOID	2	1	+X = 4.2926	-X = -4.2926	+Y = 0.71120	-Y = 0.00000	+Z = 36.703	-Z = -36.703
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----- UNIT 46 -----

3.38 IN WIDTH / 0.24 IN THICKNESS DIVIDER OUTSIDE STACK

1	CUBOID	2	1	+X = 4.2926	-X = -4.2926	+Y = 0.60960	-Y = 0.00000	+Z = 36.703	-Z = -36.703
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TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 50 -----

TRIGA FUEL ELEMENTS IN TOP OF 3.38 IN X 3.38 IN OPENING

1	CUBOID	12	1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
	HOLE NUMBER	32		AT X = 2.1495	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
	HOLE NUMBER	33		AT X = -2.1495	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
	HOLE NUMBER	34		AT X = -2.1495	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	
	HOLE NUMBER	35		AT X = 2.1495	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	

----- UNIT 51 -----

TRIGA FUEL ELEMENTS IN BOTTOM OF 3.38 IN X 3.38 IN OPENING

1	CUBOID	12	1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
	HOLE NUMBER	36		AT X = 2.1495	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
	HOLE NUMBER	37		AT X = -2.1495	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
	HOLE NUMBER	38		AT X = -2.1495	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
	HOLE NUMBER	39		AT X = 2.1495	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	

----- UNIT 52 -----

TRIGA FUEL ELEMENTS IN BOTTOM RIGHT OF 3.38 IN X 3.38 IN OPENING



1 CUBOID	12	1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	40		AT X = 2.4154	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	41		AT X = 2.4154	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	42		AT X = -1.3389	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	43		AT X = -1.3389	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	

TRIGA - PREF. FLOOD CANISTER  
GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 53 -----

TRIGA FUEL ELEMENTS IN TOP RIGHT OF 3.38 IN X 3.38 IN OPENING

1 CUBOID	12	1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	44		AT X = 2.4154	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	45		AT X = 2.4154	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	46		AT X = -1.3389	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	47		AT X = -1.3389	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	

----- UNIT 54 -----

TRIGA FUEL ELEMENTS IN BOTTOM LEFT OF 3.38 IN X 3.38 IN OPENING

1 CUBOID	12	1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	48		AT X = -2.4154	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	49		AT X = -2.4154	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	50		AT X = 1.3389	Y = -2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	51		AT X = 1.3389	Y = 1.3389	Z = 0.00000	IS UNIT NUMBER	41	

----- UNIT 55 -----

TRIGA FUEL ELEMENTS IN TOP LEFT OF 3.38 IN X 3.38 IN OPENING

1 CUBOID	12	1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	52		AT X = -2.4154	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	53		AT X = -2.4154	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	54		AT X = 1.3389	Y = 2.4154	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	55		AT X = 1.3389	Y = -1.3389	Z = 0.00000	IS UNIT NUMBER	41	

TRIGA - PREF. FLOOD CANISTER  
GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 56 -----

TRIGA BASKET 3.38 IN X 3.38 IN CENTER OPENING

1 CUBOID	12	1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
HOLE NUMBER	56		AT X = 2.1495	Y = -2.1495	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	57		AT X = -2.1495	Y = 2.1495	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	58		AT X = -2.1495	Y = -2.1495	Z = 0.00000	IS UNIT NUMBER	41	
HOLE NUMBER	59		AT X = 2.1495	Y = 2.1495	Z = 0.00000	IS UNIT NUMBER	41	

2 CUBOID	12	1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 36.703	-Z = -36.703
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----- UNIT 60 EXTERNAL TO LATTICE 11 -----

CENTER COLUMN OF THREE OPENINGS W/ 0.28 IN PLATE

1 ARRAY NUMBER	11		+X = 4.2926	-X = -4.2926	+Y = 13.907	-Y = -13.906	+Z = 36.703	-Z = -36.703
2 CUBOID	2	1	+X = 5.0038	-X = -5.0038	+Y = 14.618	-Y = -14.618	+Z = 36.703	-Z = -36.703

----- UNIT 61 EXTERNAL TO LATTICE 12 -----

LEFT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE

1 ARRAY NUMBER	12		+X = 4.2926	-X = -4.2926	+Y = 9.0487	-Y = -9.0488	+Z = 36.703	-Z = -36.703
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2 CUBOID 2 1 +X = 4.2926 -X = -4.5974 +Y = 9.3535 -Y = -9.3536 +Z = 36.703 -Z = -36.703

----- UNIT 62 EXTERNAL TO LATTICE 13 -----

RIGHT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE

1 ARRAY NUMBER 13 +X = 4.2926 -X = -4.2926 +Y = 9.0487 -Y = -9.0488 +Z = 36.703 -Z = -36.703

2 CUBOID 2 1 +X = 4.5974 -X = -4.2926 +Y = 9.3535 -Y = -9.3536 +Z = 36.703 -Z = -36.703  
TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 70 -----

NAC-LWT TRIGA BASKET

1 CYLINDER 12 1 RADIUS = 17.150 +Z = 36.703 -Z = -36.703 CENTERLINE IS AT X = 0.00000 Y = 0.00000

HOLE NUMBER 60 AT X = 0.00000 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 60

HOLE NUMBER 61 AT X = -9.2974 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 61

HOLE NUMBER 62 AT X = 9.2974 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 62

2 CYLINDER 2 1 RADIUS = 18.910 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000

3 CYLINDER 6 1 RADIUS = 33.465 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000

4 CYLINDER 2 1 RADIUS = 36.519 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000

5 CYLINDER 8 1 RADIUS = 49.822 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000

6 CYLINDER 2 1 RADIUS = 49.822 +Z = 37.338 -Z = -37.338 CENTERLINE IS AT X = 0.00000 Y = 0.00000

7 CUBOID 8 1 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 37.338 -Z = -37.338

----- UNIT 80 -----

SIMPLIFIED LID STRUCTURE NAC-LWT

1 CYLINDER 2 1 RADIUS = 36.519 +Z = 14.135 -Z = -14.135 CENTERLINE IS AT X = 0.00000 Y = 0.00000

2 CYLINDER 8 1 RADIUS = 49.822 +Z = 14.135 -Z = -14.135 CENTERLINE IS AT X = 0.00000 Y = 0.00000

3 CUBOID 8 1 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 14.135 -Z = -14.135

----- UNIT 81 -----

SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT

1 CYLINDER 6 1 RADIUS = 26.353 +Z = 3.8100 -Z = -3.8100 CENTERLINE IS AT X = 0.00000 Y = 0.00000

2 CYLINDER 2 1 RADIUS = 36.619 +Z = 13.970 -Z = -12.700 CENTERLINE IS AT X = 0.00000 Y = 0.00000

3 CYLINDER 8 1 RADIUS = 49.822 +Z = 13.970 -Z = -12.700 CENTERLINE IS AT X = 0.00000 Y = 0.00000

4 CUBOID 8 1 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 13.970 -Z = -12.700  
TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

\*\*\*\*\* GLOBAL \*\*\*\*\*  
----- UNIT 82 EXTERNAL TO LATTICE 20 -----

STACK OF 5 BASKETS IN CASK

1 ARRAY NUMBER 20 +X = 49.822 -X = -49.822 +Y = 49.822 -Y = -49.822 +Z = 214.96 -Z = -213.36  
TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 7 BOTTOM TO TOP

11

5

17

16

17

5

10

```

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 2 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 4 BOTTOM TO TOP
12
6
17
13

```

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----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 3 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 4 BOTTOM TO TOP
14
6
17
15

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----- TRIGA - PREF. FLOOD CANISTER -----
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 11 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 7 BOTTOM TO TOP
51
45
17
56
17
45
50

```

```

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 12 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 4 BOTTOM TO TOP
52
46
17
53

```

```

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 13 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 4 BOTTOM TO TOP
54
46
17
55

```

```

----- TRIGA - PREF. FLOOD CANISTER -----
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 20 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
81
Z LAYER 2, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
30
Z LAYER 3, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
70
Z LAYER 4, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
70
Z LAYER 5, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
70
Z LAYER 6, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
30
Z LAYER 7, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
80

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----- TRIGA - PREF. FLOOD CANISTER -----
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

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UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	9.77686E+00 CM**3	9.77686E+00 CM**3
	2	2	3.87746E+02 CM**3	3.97523E+02 CM**3

	3	3	1.81270E+02 CM**3	5.78793E+02 CM**3
	4	4	3.52668E+01 CM**3	6.14060E+02 CM**3
	5	5	1.98501E+02 CM**3	8.12561E+02 CM**3
5	1	6	4.48202E+02 CM**3	4.48202E+02 CM**3
6	1	7	3.84173E+02 CM**3	3.84173E+02 CM**3
10	1	8	1.51067E+03 CM**3	4.76091E+03 CM**3
	2	9	4.59145E+02 CM**3	5.22006E+03 CM**3
	3	10	1.90382E+02 CM**3	5.41044E+03 CM**3
11	1	11	1.51067E+03 CM**3	4.76091E+03 CM**3
	2	12	4.59145E+02 CM**3	5.22006E+03 CM**3
	3	13	1.90382E+02 CM**3	5.41044E+03 CM**3
12	1	14	1.51067E+03 CM**3	4.76091E+03 CM**3
	2	15	4.59145E+02 CM**3	5.22006E+03 CM**3
	3	16	1.90382E+02 CM**3	5.41044E+03 CM**3
13	1	17	1.51067E+03 CM**3	4.76091E+03 CM**3
	2	18	4.59145E+02 CM**3	5.22006E+03 CM**3
	3	19	1.90382E+02 CM**3	5.41044E+03 CM**3
14	1	20	1.51067E+03 CM**3	4.76091E+03 CM**3
	2	21	4.59145E+02 CM**3	5.22006E+03 CM**3
	3	22	1.90382E+02 CM**3	5.41044E+03 CM**3
15	1	23	1.51067E+03 CM**3	4.76091E+03 CM**3
	2	24	4.59145E+02 CM**3	5.22006E+03 CM**3
	3	25	1.90382E+02 CM**3	5.41044E+03 CM**3
16	1	26	1.51067E+03 CM**3	4.76091E+03 CM**3
	2	27	4.59145E+02 CM**3	5.22006E+03 CM**3
	3	28	1.90382E+02 CM**3	5.41044E+03 CM**3
17	1	29	1.65856E+02 CM**3	1.65856E+02 CM**3
	2	30	1.37754E+01 CM**3	1.79631E+02 CM**3
	3	31	2.04593E+01 CM**3	2.00090E+02 CM**3
SURROUNDING GEOMETRY VOLUMES -			GEOMETRY REGION	32 IS AN ARRAY PLACEMENT BOUNDARY REGION
20	1	32	1.75279E+04 CM**3	1.75279E+04 CM**3
	2	33	3.94895E+03 CM**3	2.14768E+04 CM**3
SURROUNDING GEOMETRY VOLUMES -			GEOMETRY REGION	34 IS AN ARRAY PLACEMENT BOUNDARY REGION
21	1	34	1.14051E+04 CM**3	1.14051E+04 CM**3
	2	35	8.02729E+02 CM**3	1.22079E+04 CM**3
SURROUNDING GEOMETRY VOLUMES -			GEOMETRY REGION	36 IS AN ARRAY PLACEMENT BOUNDARY REGION
22	1	36	1.14051E+04 CM**3	1.14051E+04 CM**3
	2	37	8.02729E+02 CM**3	1.22079E+04 CM**3
30	1	38	2.19355E+04 CM**3	6.78281E+04 CM**3
	2	39	1.60653E+04 CM**3	8.38934E+04 CM**3
	3	40	1.78831E+05 CM**3	2.62724E+05 CM**3
	4	41	5.01461E+04 CM**3	3.12870E+05 CM**3
	5	42	2.55540E+05 CM**3	5.68410E+05 CM**3
	6	43	1.39278E+04 CM**3	5.82338E+05 CM**3
	7	44	1.59118E+05 CM**3	7.41456E+05 CM**3
41	1	45	9.77686E+00 CM**3	9.77686E+00 CM**3
	2	46	3.87746E+02 CM**3	3.97523E+02 CM**3
	3	47	1.81270E+02 CM**3	5.78793E+02 CM**3
	4	48	3.52668E+01 CM**3	6.14060E+02 CM**3
	5	49	1.98501E+02 CM**3	8.12561E+02 CM**3
45	1	50	4.48202E+02 CM**3	4.48202E+02 CM**3
46	1	51	3.84173E+02 CM**3	3.84173E+02 CM**3
50	1	52	2.16019E+03 CM**3	5.41044E+03 CM**3
51	1	53	2.16019E+03 CM**3	5.41044E+03 CM**3
52	1	54	2.16019E+03 CM**3	5.41044E+03 CM**3
53	1	55	2.16019E+03 CM**3	5.41044E+03 CM**3
54	1	56	2.16019E+03 CM**3	5.41044E+03 CM**3
55	1	57	2.16019E+03 CM**3	5.41044E+03 CM**3
56	1	58	2.16019E+03 CM**3	5.41044E+03 CM**3
	2	59	0.00000E+00 CM**3	5.41044E+03 CM**3
SURROUNDING GEOMETRY VOLUMES -			GEOMETRY REGION	60 IS AN ARRAY PLACEMENT BOUNDARY REGION
60	1	60	1.75279E+04 CM**3	1.75279E+04 CM**3
	2	61	3.94895E+03 CM**3	2.14768E+04 CM**3
SURROUNDING GEOMETRY VOLUMES -			GEOMETRY REGION	62 IS AN ARRAY PLACEMENT BOUNDARY REGION
61	1	62	1.14051E+04 CM**3	1.14051E+04 CM**3
	2	63	8.02729E+02 CM**3	1.22079E+04 CM**3
SURROUNDING GEOMETRY VOLUMES -			GEOMETRY REGION	64 IS AN ARRAY PLACEMENT BOUNDARY REGION

62	1	64	1.14051E+04	CM**3	1.14051E+04	CM**3
	2	65	8.02729E+02	CM**3	1.22079E+04	CM**3
70	1	66	2.19355E+04	CM**3	6.78281E+04	CM**3
	2	67	1.60653E+04	CM**3	8.38934E+04	CM**3
	3	68	1.78831E+05	CM**3	2.62724E+05	CM**3
	4	69	5.01461E+04	CM**3	3.12870E+05	CM**3
	5	70	2.55540E+05	CM**3	5.68410E+05	CM**3
	6	71	1.39278E+04	CM**3	5.82338E+05	CM**3
	7	72	1.59118E+05	CM**3	7.41456E+05	CM**3
80	1	73	1.18444E+05	CM**3	1.18444E+05	CM**3
	2	74	1.02013E+05	CM**3	2.20456E+05	CM**3
	3	75	6.02374E+04	CM**3	2.80694E+05	CM**3
81	1	76	1.66245E+04	CM**3	1.66245E+04	CM**3
	2	77	9.57276E+04	CM**3	1.12352E+05	CM**3
	3	78	9.56257E+04	CM**3	2.07978E+05	CM**3
	4	79	5.68278E+04	CM**3	2.64806E+05	CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 80 IS AN ARRAY PLACEMENT BOUNDARY REGION						
82	1	80	4.25278E+06	CM**3	4.25278E+06	CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	56	1	4	5.47504E+02 CM**3
		2	1	2.17138E+04 CM**3
		3	5	1.01511E+04 CM**3
		4	2	1.97494E+03 CM**3
		5	9	1.11161E+04 CM**3
5	4	1	2	1.79281E+03 CM**3
6	4	1	2	1.53669E+03 CM**3
10	2	1	3	3.02133E+03 CM**3
		2	2	9.18290E+02 CM**3
		3	12	3.80764E+02 CM**3
11	2	1	3	3.02133E+03 CM**3
		2	2	9.18290E+02 CM**3
		3	12	3.80764E+02 CM**3
12	2	1	3	3.02133E+03 CM**3
		2	2	9.18290E+02 CM**3
		3	12	3.80764E+02 CM**3
13	2	1	3	3.02133E+03 CM**3
		2	2	9.18290E+02 CM**3
		3	12	3.80764E+02 CM**3
14	2	1	3	3.02133E+03 CM**3
		2	2	9.18290E+02 CM**3
		3	12	3.80764E+02 CM**3
15	2	1	3	3.02133E+03 CM**3
		2	2	9.18290E+02 CM**3
		3	12	3.80764E+02 CM**3
16	2	1	3	3.02133E+03 CM**3
		2	2	9.18290E+02 CM**3
		3	12	3.80764E+02 CM**3
17	20	1	13	3.31711E+03 CM**3
		2	14	2.75508E+02 CM**3
		3	12	4.09185E+02 CM**3
20	2	1	3	3.50558E+04 CM**3
		2	2	7.89790E+03 CM**3
21	2	1	3	2.28103E+04 CM**3
		2	2	1.60546E+03 CM**3
22	2	1	3	2.28103E+04 CM**3
		2	2	1.60546E+03 CM**3
30	2	1	12	4.38710E+04 CM**3
		2	2	3.21306E+04 CM**3
		3	6	3.57661E+05 CM**3
		4	2	1.00292E+05 CM**3
		5	8	5.11080E+05 CM**3
		6	2	2.78555E+04 CM**3
		7	8	3.18236E+05 CM**3
41	84	1	4	8.21256E+02 CM**3
		2	10	3.25707E+04 CM**3
		3	5	1.52267E+04 CM**3
		4	2	2.96242E+03 CM**3
		5	11	1.66741E+04 CM**3
45	6	1	2	2.68921E+03 CM**3
46	6	1	2	2.30504E+03 CM**3
50	3	1	12	6.48058E+03 CM**3
51	3	1	12	6.48058E+03 CM**3

52	3	1	12	6.48058E+03	CM**3
53	3	1	12	6.48058E+03	CM**3
54	3	1	12	6.48058E+03	CM**3
55	3	1	12	6.48058E+03	CM**3
56	3	1	12	6.49056E+03	CM**3
		2	12	0.00000E+00	CM**3
60	3	1		5.25837E+04	CM**3
		2	2	1.18469E+04	CM**3
61	3	1		3.42154E+04	CM**3
		2	2	2.40819E+03	CM**3
62	3	1		3.42154E+04	CM**3
		2	2	2.40819E+03	CM**3
70	3	1	12	6.58065E+04	CM**3
		2	2	4.81959E+04	CM**3
		3	6	5.36492E+05	CM**3
		4	2	1.50438E+05	CM**3
		5	8	7.66620E+05	CM**3
		6	2	4.17833E+04	CM**3
		7	8	4.77353E+05	CM**3
80	1	1	2	1.18444E+05	CM**3
		2	9	1.02013E+05	CM**3
		3	8	6.02374E+04	CM**3
81	1	1	6	1.66245E+04	CM**3
		2	2	9.57276E+04	CM**3
		3	8	9.56257E+04	CM**3
		4	8	5.68278E+04	CM**3
82	1	1		4.25278E+06	CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	2.17138E+04 CM**3	1.26338E+05
2	6.62328E+05 CM**3	5.24564E+06
3	2.11493E+04 CM**3	2.11106E+04
4	1.36876E+03 CM**3	8.98326E+03
5	2.53779E+04 CM**3	5.32939E+04
6	9.10777E+05 CM**3	1.03319E+07
8	2.38799E+06 CM**3	2.38363E+14
9	1.11161E+04 CM**3	3.70362E+04
10	3.25707E+04 CM**3	1.89507E+05
11	1.66741E+04 CM**3	4.45219E+04
12	1.58116E+05 CM**3	1.57827E+15
13	3.31711E+03 CM**3	2.57176E+04
14	2.75508E+02 CM**3	2.11891E+03

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***
***          BIASING INFORMATION          ***
***
*** A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S. ***
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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....
..... 0.03200 MINUTES WERE USED PROCESSING DATA. ....

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VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 1.07645E-02

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 4.98221E+01 -X=-4.98221E+01 +Y= 4.98221E+01 -Y=-4.98221E+01 +Z= 2.14960E+02 -Z=-2.13360E+02

THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 777 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

223 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

1.79800 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 1.83467 MINUTES.

TRIGA - PREF. FLOOD CANISTER

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
1	9.04076E-01	1.87017E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	8.72359E-01	1.91683E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KEHO MESSAGE NUMBER K5-132 WARNING... ONLY 973 INDEPENDENT FISSION POINTS WERE GENERATED						
3	8.77401E-01	1.96083E+00	8.77401E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	8.96040E-01	2.00200E+00	8.86720E-01	9.31981E-03	0.00000E+00	0.00000E+00
5	8.93147E-01	2.04417E+00	8.88962E-01	5.79149E-03	0.00000E+00	0.00000E+00
6	8.75129E-01	2.08800E+00	8.85429E-01	5.34401E-03	0.00000E+00	0.00000E+00
7	9.12265E-01	2.12750E+00	8.90796E-01	6.77804E-03	0.00000E+00	0.00000E+00
8	9.07510E-01	2.16950E+00	8.93582E-01	6.19574E-03	0.00000E+00	0.00000E+00
9	8.90479E-01	2.21167E+00	8.93139E-01	5.25508E-03	0.00000E+00	0.00000E+00
10	9.09255E-01	2.25383E+00	8.95153E-01	4.97700E-03	0.00000E+00	0.00000E+00
11	9.08515E-01	2.29500E+00	8.96638E-01	4.63359E-03	0.00000E+00	0.00000E+00
12	8.92590E-01	2.33800E+00	8.96233E-01	4.16413E-03	0.00000E+00	0.00000E+00
13	8.79348E-01	2.37917E+00	8.94698E-01	4.06737E-03	0.00000E+00	0.00000E+00
14	8.80056E-01	2.42133E+00	8.93478E-01	3.90833E-03	0.00000E+00	0.00000E+00
15	8.85894E-01	2.46250E+00	8.92895E-01	3.64216E-03	0.00000E+00	0.00000E+00
16	9.18410E-01	2.50283E+00	8.94717E-01	3.83301E-03	0.00000E+00	0.00000E+00
17	8.84402E-01	2.54033E+00	8.94029E-01	3.63401E-03	0.00000E+00	0.00000E+00
18	8.85021E-01	2.58150E+00	8.93466E-01	3.44562E-03	0.00000E+00	0.00000E+00
19	9.74563E-01	2.61900E+00	8.98237E-01	5.76472E-03	0.00000E+00	0.00000E+00
20	9.41390E-01	2.65750E+00	9.00634E-01	5.94029E-03	0.00000E+00	0.00000E+00
21	8.89588E-01	2.69950E+00	9.00053E-01	5.64894E-03	0.00000E+00	0.00000E+00
22	8.85700E-01	2.74083E+00	8.99335E-01	5.40690E-03	0.00000E+00	0.00000E+00
23	8.81833E-01	2.78283E+00	8.98502E-01	5.21007E-03	0.00000E+00	0.00000E+00
24	8.74236E-01	2.82400E+00	8.97399E-01	5.08859E-03	0.00000E+00	0.00000E+00
25	9.22286E-01	2.86167E+00	8.98461E-01	4.98126E-03	0.00000E+00	0.00000E+00
26	8.85436E-01	2.90367E+00	8.97937E-01	4.80006E-03	0.00000E+00	0.00000E+00
27	8.89771E-01	2.94400E+00	8.97611E-01	4.61563E-03	0.00000E+00	0.00000E+00
28	9.00682E-01	2.98333E+00	8.97729E-01	4.43613E-03	0.00000E+00	0.00000E+00
29	8.93443E-01	3.02450E+00	8.97570E-01	4.27162E-03	0.00000E+00	0.00000E+00
30	8.87394E-01	3.06483E+00	8.97207E-01	4.13225E-03	0.00000E+00	0.00000E+00
31	9.42163E-01	3.10417E+00	8.98757E-01	4.27797E-03	0.00000E+00	0.00000E+00
32	9.44103E-01	3.14450E+00	9.00266E-01	4.40065E-03	0.00000E+00	0.00000E+00
33	8.96528E-01	3.18300E+00	8.99148E-01	4.25804E-03	0.00000E+00	0.00000E+00
34	9.04644E-01	3.22233E+00	9.00282E-01	4.12503E-03	0.00000E+00	0.00000E+00
35	8.62652E-01	3.26250E+00	8.99142E-01	4.15752E-03	0.00000E+00	0.00000E+00
36	8.98804E-01	3.30283E+00	8.99132E-01	4.03340E-03	0.00000E+00	0.00000E+00
37	8.91865E-01	3.34033E+00	8.98925E-01	3.92196E-03	0.00000E+00	0.00000E+00
38	9.29874E-01	3.37967E+00	8.99784E-01	3.90722E-03	0.00000E+00	0.00000E+00
39	9.12129E-01	3.41917E+00	8.99118E-01	3.81477E-03	0.00000E+00	0.00000E+00
40	8.95307E-01	3.45850E+00	8.99991E-01	3.71518E-03	0.00000E+00	0.00000E+00
41	8.84003E-01	3.49867E+00	8.99581E-01	3.64181E-03	0.00000E+00	0.00000E+00
42	9.10453E-01	3.54000E+00	8.99853E-01	3.55999E-03	0.00000E+00	0.00000E+00
43	8.98455E-01	3.57933E+00	8.99818E-01	3.47224E-03	0.00000E+00	0.00000E+00
44	9.07561E-01	3.62050E+00	9.00003E-01	3.39357E-03	0.00000E+00	0.00000E+00
45	8.94583E-01	3.65900E+00	8.99877E-01	3.31611E-03	0.00000E+00	0.00000E+00
46	8.81784E-01	3.69917E+00	8.99466E-01	3.26586E-03	0.00000E+00	0.00000E+00
47	8.53810E-01	3.74050E+00	8.98452E-01	3.34980E-03	0.00000E+00	0.00000E+00
48	9.24237E-01	3.77883E+00	8.99012E-01	3.32378E-03	0.00000E+00	0.00000E+00
49	8.84761E-01	3.82000E+00	8.98709E-01	3.26640E-03	0.00000E+00	0.00000E+00
50	9.05456E-01	3.86133E+00	8.98849E-01	3.20071E-03	0.00000E+00	0.00000E+00
51	9.03071E-01	3.90067E+00	8.98926E-01	3.13589E-03	0.00000E+00	0.00000E+00
52	8.59549E-01	3.94267E+00	8.98148E-01	3.17191E-03	0.00000E+00	0.00000E+00
53	8.88460E-01	3.98667E+00	8.97958E-01	3.11488E-03	0.00000E+00	0.00000E+00
54	8.44593E-01	4.02783E+00	8.96932E-01	3.02220E-03	0.00000E+00	0.00000E+00
55	9.15333E-01	4.06633E+00	8.97279E-01	3.17983E-03	0.00000E+00	0.00000E+00
56	8.91137E-01	4.10667E+00	8.97165E-01	3.12246E-03	0.00000E+00	0.00000E+00
57	8.94424E-01	4.14783E+00	8.97115E-01	3.06556E-03	0.00000E+00	0.00000E+00
58	9.17595E-01	4.18717E+00	8.97481E-01	3.03246E-03	0.00000E+00	0.00000E+00
59	9.14172E-01	4.22750E+00	8.97774E-01	2.99314E-03	0.00000E+00	0.00000E+00
60	9.49548E-01	4.26683E+00	8.98666E-01	3.07356E-03	0.00000E+00	0.00000E+00
61	9.66389E-01	4.30433E+00	8.99814E-01	3.23173E-03	0.00000E+00	0.00000E+00
62	9.04482E-01	4.34500E+00	8.98892E-01	3.17837E-03	0.00000E+00	0.00000E+00
63	8.86045E-01	4.38767E+00	8.98665E-01	3.13406E-03	0.00000E+00	0.00000E+00
64	9.08831E-01	4.42893E+00	8.99814E-01	3.08668E-03	0.00000E+00	0.00000E+00
65	8.84092E-01	4.47100E+00	8.99564E-01	3.04752E-03	0.00000E+00	0.00000E+00
66	9.07861E-01	4.51117E+00	8.99694E-01	3.00233E-03	0.00000E+00	0.00000E+00
67	8.81999E-01	4.55233E+00	8.99422E-01	2.96829E-03	0.00000E+00	0.00000E+00
68	9.59277E-01	4.59367E+00	9.00328E-01	3.06042E-03	0.00000E+00	0.00000E+00
69	9.03907E-01	4.63300E+00	9.00382E-01	3.01487E-03	0.00000E+00	0.00000E+00
70	8.89708E-01	4.67500E+00	9.00225E-01	2.97435E-03	0.00000E+00	0.00000E+00
71	9.28087E-01	4.71533E+00	9.00629E-01	2.95861E-03	0.00000E+00	0.00000E+00
72	9.12438E-01	4.7567E+00	9.00757E-01	2.92091E-03	0.00000E+00	0.00000E+00
73	9.21470E-01	4.79500E+00	9.01099E-01	2.89416E-03	0.00000E+00	0.00000E+00
KEHO MESSAGE NUMBER K5-132 WARNING... ONLY 999 INDEPENDENT FISSION POINTS WERE GENERATED						
74	9.9549E-01	4.83433E+00	9.01010E-01	2.85476E-03	0.00000E+00	0.00000E+00
75	8.78585E-01	4.87467E+00	9.00703E-01	2.83209E-03	0.00000E+00	0.00000E+00
76	9.28678E-01	4.91483E+00	9.01081E-01	2.81902E-03	0.00000E+00	0.00000E+00
77	9.39995E-01	4.95333E+00	9.01600E-01	2.82916E-03	0.00000E+00	0.00000E+00
78	9.44460E-01	4.99000E+00	9.02164E-01	2.84808E-03	0.00000E+00	0.00000E+00
79	9.28185E-01	5.02750E+00	9.02502E-01	2.83109E-03	0.00000E+00	0.00000E+00
80	9.24221E-01	5.06683E+00	9.02780E-01	2.80839E-03	0.00000E+00	0.00000E+00
81	9.03422E-01	5.10533E+00	9.02789E-01	2.77263E-03	0.00000E+00	0.00000E+00
82	8.94376E-01	5.14283E+00	9.02683E-01	2.73977E-03	0.00000E+00	0.00000E+00
83	9.04437E-01	5.18217E+00	9.02705E-01	2.70532E-03	0.00000E+00	0.00000E+00
84	9.30003E-01	5.22250E+00	9.03038E-01	2.69327E-03	0.00000E+00	0.00000E+00
85	8.81359E-01	5.26183E+00	9.02777E-01	2.67342E-03	0.00000E+00	0.00000E+00
86	8.86321E-01	5.30300E+00	9.02581E-01	2.64865E-03	0.00000E+00	0.00000E+00
87	8.88946E-01	5.34417E+00	9.02420E-01	2.62222E-03	0.00000E+00	0.00000E+00
88	8.74919E-01	5.38267E+00	9.02101E-01	2.61120E-03	0.00000E+00	0.00000E+00
89	8.84182E-01	5.42383E+00	9.01895E-01	2.58922E-03	0.00000E+00	0.00000E+00

90	9.51887E-01	5.46417E+00	9.02463E-01	2.62191E-03	0.00000E+00	0.00000E+00
91	9.10704E-01	5.50350E+00	9.02555E-01	2.59394E-03	0.00000E+00	0.00000E+00
92	9.55197E-01	5.54283E+00	9.03140E-01	2.63080E-02	0.00000E+00	0.00000E+00
93	9.04253E-01	5.58317E+00	9.03153E-01	2.60176E-03	0.00000E+00	0.00000E+00
94	9.29614E-01	5.62167E+00	9.03440E-01	2.58935E-03	0.00000E+00	0.00000E+00
95	9.23929E-01	5.66183E+00	9.03660E-01	2.57081E-03	0.00000E+00	0.00000E+00
96	9.16325E-01	5.70217E+00	9.03795E-01	2.54688E-03	0.00000E+00	0.00000E+00
97	8.97809E-01	5.74250E+00	9.03732E-01	2.52072E-03	0.00000E+00	0.00000E+00
98	9.07023E-01	5.78267E+00	9.03766E-01	2.49456E-03	0.00000E+00	0.00000E+00
99	9.01865E-01	5.82217E+00	9.03747E-01	2.46878E-03	0.00000E+00	0.00000E+00
100	9.05907E-01	5.86150E+00	9.03769E-01	2.44356E-03	0.00000E+00	0.00000E+00
101	8.99187E-01	5.90083E+00	9.03723E-01	2.41920E-03	0.00000E+00	0.00000E+00
102	9.36295E-01	5.93933E+00	9.04048E-01	2.41693E-03	0.00000E+00	0.00000E+00
103	9.48025E-01	5.97767E+00	9.04484E-01	2.43217E-03	0.00000E+00	0.00000E+00
104	8.99526E-01	6.01800E+00	9.04435E-01	2.40870E-03	0.00000E+00	0.00000E+00
105	9.20268E-01	6.05733E+00	9.04589E-01	2.39015E-03	0.00000E+00	0.00000E+00
106	9.20011E-01	6.09667E+00	9.04737E-01	2.37170E-03	0.00000E+00	0.00000E+00
107	9.18232E-01	6.13617E+00	9.04866E-01	2.35251E-03	0.00000E+00	0.00000E+00
108	9.29778E-01	6.17550E+00	9.05101E-01	2.34204E-03	0.00000E+00	0.00000E+00
109	8.60972E-01	6.21567E+00	9.04688E-01	2.35641E-03	0.00000E+00	0.00000E+00
110	8.66153E-01	6.25883E+00	9.04331E-01	2.36160E-03	0.00000E+00	0.00000E+00
111	8.82695E-01	6.29900E+00	9.04133E-01	2.34824E-03	0.00000E+00	0.00000E+00
112	8.96748E-01	6.33833E+00	9.04066E-01	2.32777E-03	0.00000E+00	0.00000E+00
113	9.15508E-01	6.37967E+00	9.04169E-01	2.30900E-03	0.00000E+00	0.00000E+00
114	8.74156E-01	6.41983E+00	9.03901E-01	2.30393E-03	0.00000E+00	0.00000E+00
115	8.57220E-01	6.46383E+00	9.03488E-01	2.32052E-03	0.00000E+00	0.00000E+00
116	8.94261E-01	6.50417E+00	9.03407E-01	2.30150E-03	0.00000E+00	0.00000E+00
117	9.12838E-01	6.54167E+00	9.03489E-01	2.28287E-03	0.00000E+00	0.00000E+00
118	8.82770E-01	6.58183E+00	9.03310E-01	2.27014E-03	0.00000E+00	0.00000E+00
119	9.12993E-01	6.62217E+00	9.03393E-01	2.25217E-03	0.00000E+00	0.00000E+00
120	8.95400E-01	6.66150E+00	9.03325E-01	2.23403E-03	0.00000E+00	0.00000E+00
121	8.37777E-01	6.70267E+00	9.02774E-01	2.28264E-03	0.00000E+00	0.00000E+00
122	9.12525E-01	6.74300E+00	9.02856E-01	2.26495E-03	0.00000E+00	0.00000E+00
123	8.57572E-01	6.78417E+00	9.02481E-01	2.27716E-03	0.00000E+00	0.00000E+00
124	8.84956E-01	6.82717E+00	9.02338E-01	2.26298E-03	0.00000E+00	0.00000E+00
125	8.87165E-01	6.86933E+00	9.02214E-01	2.24790E-03	0.00000E+00	0.00000E+00
126	9.30569E-01	6.91050E+00	9.02443E-01	2.24139E-03	0.00000E+00	0.00000E+00
127	9.09475E-01	6.94983E+00	9.02499E-01	2.22410E-03	0.00000E+00	0.00000E+00
128	9.20301E-01	6.98833E+00	9.02641E-01	2.21089E-03	0.00000E+00	0.00000E+00
129	9.28321E-01	7.02867E+00	9.02843E-01	2.20272E-03	0.00000E+00	0.00000E+00
130	9.33353E-01	7.06800E+00	9.03081E-01	2.19840E-03	0.00000E+00	0.00000E+00
131	8.91192E-01	7.10917E+00	9.02989E-01	2.18324E-03	0.00000E+00	0.00000E+00
132	9.13478E-01	7.15033E+00	9.03070E-01	2.16788E-03	0.00000E+00	0.00000E+00
133	8.89571E-01	7.18967E+00	9.02967E-01	2.15373E-03	0.00000E+00	0.00000E+00
134	9.04478E-01	7.23000E+00	9.02978E-01	2.13739E-03	0.00000E+00	0.00000E+00
135	9.36960E-01	7.27217E+00	9.03234E-01	2.13659E-03	0.00000E+00	0.00000E+00
136	9.11904E-01	7.31233E+00	9.03298E-01	2.12157E-03	0.00000E+00	0.00000E+00
137	9.24856E-01	7.35267E+00	9.03458E-01	2.11184E-03	0.00000E+00	0.00000E+00
138	9.33102E-01	7.39200E+00	9.03676E-01	2.10756E-03	0.00000E+00	0.00000E+00
139	8.96111E-01	7.43233E+00	9.03621E-01	2.09285E-03	0.00000E+00	0.00000E+00
140	8.78600E-01	7.47267E+00	9.03440E-01	2.08552E-03	0.00000E+00	0.00000E+00
141	8.82909E-01	7.51467E+00	9.03292E-01	2.07573E-03	0.00000E+00	0.00000E+00
142	8.85458E-01	7.55583E+00	9.03164E-01	2.06478E-03	0.00000E+00	0.00000E+00
143	8.82365E-01	7.59800E+00	9.03017E-01	2.05538E-03	0.00000E+00	0.00000E+00
144	8.84668E-01	7.63650E+00	9.02888E-01	2.04494E-03	0.00000E+00	0.00000E+00
145	8.92455E-01	7.67583E+00	9.02815E-01	2.03190E-03	0.00000E+00	0.00000E+00
146	9.09940E-01	7.71700E+00	9.02864E-01	2.01835E-03	0.00000E+00	0.00000E+00
147	8.78237E-01	7.75733E+00	9.02694E-01	2.01157E-03	0.00000E+00	0.00000E+00
148	8.81926E-01	7.79950E+00	9.02552E-01	2.00280E-03	0.00000E+00	0.00000E+00
149	9.21255E-01	7.83883E+00	9.02679E-01	1.99319E-03	0.00000E+00	0.00000E+00
150	8.79603E-01	7.87817E+00	9.02523E-01	1.98581E-03	0.00000E+00	0.00000E+00
151	9.06244E-01	7.91933E+00	9.02548E-01	1.97259E-03	0.00000E+00	0.00000E+00
152	8.61988E-01	7.96050E+00	9.02278E-01	1.97796E-03	0.00000E+00	0.00000E+00
153	8.99009E-01	8.00093E+00	9.02256E-01	1.96494E-03	0.00000E+00	0.00000E+00
154	9.16344E-01	8.04383E+00	9.02349E-01	1.95417E-03	0.00000E+00	0.00000E+00
155	9.16876E-01	8.08417E+00	9.02444E-01	1.94367E-03	0.00000E+00	0.00000E+00
156	9.04525E-01	8.12533E+00	9.02456E-01	1.93186E-03	0.00000E+00	0.00000E+00
157	8.60196E-01	8.16650E+00	9.02185E-01	1.93784E-03	0.00000E+00	0.00000E+00
158	8.74514E-01	8.20583E+00	9.02008E-01	1.93353E-03	0.00000E+00	0.00000E+00
159	8.54413E-01	8.24517E+00	9.01704E-01	1.94494E-03	0.00000E+00	0.00000E+00
160	8.67244E-01	8.28917E+00	9.01486E-01	1.94486E-03	0.00000E+00	0.00000E+00
161	8.78436E-01	8.33033E+00	9.01341E-01	1.93802E-03	0.00000E+00	0.00000E+00
162	8.86632E-01	8.37433E+00	9.01249E-01	1.93806E-03	0.00000E+00	0.00000E+00
163	9.49903E-01	8.41450E+00	9.01552E-01	1.93973E-03	0.00000E+00	0.00000E+00
164	8.98499E-01	8.45667E+00	9.01533E-01	1.92782E-03	0.00000E+00	0.00000E+00
165	8.89727E-01	8.49517E+00	9.01460E-01	1.91732E-03	0.00000E+00	0.00000E+00
166	8.67233E-01	8.53533E+00	9.01252E-01	1.91689E-03	0.00000E+00	0.00000E+00
167	8.77722E-01	8.57750E+00	9.01109E-01	1.91064E-03	0.00000E+00	0.00000E+00
168	8.76178E-01	8.61867E+00	9.00959E-01	1.90503E-03	0.00000E+00	0.00000E+00
169	8.58492E-01	8.66083E+00	9.00705E-01	1.91058E-03	0.00000E+00	0.00000E+00
170	9.16818E-01	8.70017E+00	9.00801E-01	1.90160E-03	0.00000E+00	0.00000E+00
171	8.91225E-01	8.74133E+00	9.00744E-01	1.89116E-03	0.00000E+00	0.00000E+00
172	8.88805E-01	8.78167E+00	9.00674E-01	1.88131E-03	0.00000E+00	0.00000E+00
173	9.07403E-01	8.82100E+00	9.00713E-01	1.87069E-03	0.00000E+00	0.00000E+00
174	9.09396E-01	8.85850E+00	9.00764E-01	1.86047E-03	0.00000E+00	0.00000E+00
175	9.37713E-01	8.89883E+00	9.00977E-01	1.86198E-03	0.00000E+00	0.00000E+00
176	9.37022E-01	8.93917E+00	9.01184E-01	1.86280E-03	0.00000E+00	0.00000E+00
177	8.90419E-01	8.97933E+00	9.01123E-01	1.85314E-03	0.00000E+00	0.00000E+00
178	9.48373E-01	9.01783E+00	9.01391E-01	1.86204E-03	0.00000E+00	0.00000E+00
179	9.61307E-01	9.05533E+00	9.01843E-01	1.90575E-03	0.00000E+00	0.00000E+00
180	9.23410E-01	9.09467E+00	9.01964E-01	1.89688E-03	0.00000E+00	0.00000E+00
181	8.68850E-01	9.13683E+00	9.01779E-01	1.89728E-03	0.00000E+00	0.00000E+00
182	9.32886E-01	9.17983E+00	9.01952E-01	1.89461E-03	0.00000E+00	0.00000E+00
183	8.48080E-01	9.22200E+00	9.01654E-01	1.90748E-03	0.00000E+00	0.00000E+00
184	9.23443E-01	9.26050E+00	9.01774E-01	1.90074E-03	0.00000E+00	0.00000E+00



185	8.79917E-01	9.30067E+00	9.01654E-01	1.89410E-03	0.00000E+00	0.00000E+00
186	9.41142E-01	9.34100E+00	9.01869E-01	1.89596E-03	0.00000E+00	0.00000E+00
187	8.74248E-01	9.36217E+00	9.01720E-01	1.89158E-03	0.00000E+00	0.00000E+00
188	8.97478E-01	9.42250E+00	9.01697E-01	1.88152E-03	0.00000E+00	0.00000E+00
189	9.45809E-01	9.46183E+00	9.01933E-01	1.88624E-03	0.00000E+00	0.00000E+00
190	8.97201E-01	9.50300E+00	9.01908E-01	1.87635E-03	0.00000E+00	0.00000E+00
191	8.72023E-01	9.54417E+00	9.01750E-01	1.87309E-03	0.00000E+00	0.00000E+00
192	9.11518E-01	9.58350E+00	9.01801E-01	1.86391E-03	0.00000E+00	0.00000E+00
193	9.17643E-01	9.62483E+00	9.01884E-01	1.85598E-03	0.00000E+00	0.00000E+00
194	8.98645E-01	9.66500E+00	9.01867E-01	1.84637E-03	0.00000E+00	0.00000E+00
195	9.12174E-01	9.70617E+00	9.01920E-01	1.83755E-03	0.00000E+00	0.00000E+00
196	9.17972E-01	9.74650E+00	9.02003E-01	1.82992E-03	0.00000E+00	0.00000E+00
197	9.04652E-01	9.78583E+00	9.02017E-01	1.82057E-03	0.00000E+00	0.00000E+00
198	9.30746E-01	9.82617E+00	9.02163E-01	1.81718E-03	0.00000E+00	0.00000E+00
199	9.36365E-01	9.86467E+00	9.02337E-01	1.81625E-03	0.00000E+00	0.00000E+00
200	9.11116E-01	9.90400E+00	9.02381E-01	1.80759E-03	0.00000E+00	0.00000E+00
201	9.02267E-01	9.94333E+00	9.02381E-01	1.79849E-03	0.00000E+00	0.00000E+00
202	8.97385E-01	9.98367E+00	9.02356E-01	1.78965E-03	0.00000E+00	0.00000E+00
203	9.01324E-01	1.00238E+01	9.02351E-01	1.78073E-03	0.00000E+00	0.00000E+00
204	9.35640E-01	1.00623E+01	9.02515E-01	1.77954E-03	0.00000E+00	0.00000E+00
205	9.11747E-01	1.01027E+01	9.02561E-01	1.77133E-03	0.00000E+00	0.00000E+00
206	9.28577E-01	1.01420E+01	9.02688E-01	1.76724E-03	0.00000E+00	0.00000E+00
207	8.86183E-01	1.01823E+01	9.02608E-01	1.76044E-03	0.00000E+00	0.00000E+00
208	9.13975E-01	1.02217E+01	9.02663E-01	1.75274E-03	0.00000E+00	0.00000E+00
209	9.10363E-01	1.02618E+01	9.02700E-01	1.74465E-03	0.00000E+00	0.00000E+00
210	8.70834E-01	1.03022E+01	9.02547E-01	1.74299E-03	0.00000E+00	0.00000E+00
211	8.99743E-01	1.03415E+01	9.02534E-01	1.73468E-03	0.00000E+00	0.00000E+00
212	9.01309E-01	1.03818E+01	9.02528E-01	1.72641E-03	0.00000E+00	0.00000E+00
213	9.15588E-01	1.04222E+01	9.02590E-01	1.71932E-03	0.00000E+00	0.00000E+00
214	9.01142E-01	1.04623E+01	9.02583E-01	1.71121E-03	0.00000E+00	0.00000E+00
215	9.31863E-01	1.05008E+01	9.02720E-01	1.70869E-03	0.00000E+00	0.00000E+00
216	8.80298E-01	1.05420E+01	9.02616E-01	1.70391E-03	0.00000E+00	0.00000E+00
217	8.97514E-01	1.05795E+01	9.02592E-01	1.69613E-03	0.00000E+00	0.00000E+00
218	8.67453E-01	1.06198E+01	9.02429E-01	1.69608E-03	0.00000E+00	0.00000E+00
219	9.02086E-01	1.06610E+01	9.02428E-01	1.68825E-03	0.00000E+00	0.00000E+00
220	8.76765E-01	1.07013E+01	9.02310E-01	1.68461E-03	0.00000E+00	0.00000E+00
221	8.61957E-01	1.07443E+01	9.02126E-01	1.68699E-03	0.00000E+00	0.00000E+00
222	8.85954E-01	1.07847E+01	9.02052E-01	1.68091E-03	0.00000E+00	0.00000E+00
223	9.30038E-01	1.08258E+01	9.02179E-01	1.67807E-03	0.00000E+00	0.00000E+00
224	8.59055E-01	1.08670E+01	9.01985E-01	1.68175E-03	0.00000E+00	0.00000E+00
225	8.90887E-01	1.09073E+01	9.01935E-01	1.67493E-03	0.00000E+00	0.00000E+00
226	8.67557E-01	1.09493E+01	9.01781E-01	1.67449E-03	0.00000E+00	0.00000E+00
227	8.92607E-01	1.09897E+01	9.01741E-01	1.66753E-03	0.00000E+00	0.00000E+00
228	9.04082E-01	1.10300E+01	9.01751E-01	1.66017E-03	0.00000E+00	0.00000E+00
229	9.13059E-01	1.10665E+01	9.01801E-01	1.65359E-03	0.00000E+00	0.00000E+00
230	8.44714E-01	1.11068E+01	9.01550E-01	1.66525E-03	0.00000E+00	0.00000E+00
231	9.18847E-01	1.11443E+01	9.01626E-01	1.65968E-03	0.00000E+00	0.00000E+00
232	9.20580E-01	1.11847E+01	9.01708E-01	1.65450E-03	0.00000E+00	0.00000E+00
233	9.03397E-01	1.12250E+01	9.01716E-01	1.64734E-03	0.00000E+00	0.00000E+00
234	9.25214E-01	1.12633E+01	9.01817E-01	1.64335E-03	0.00000E+00	0.00000E+00
235	9.09047E-01	1.13027E+01	9.01848E-01	1.63658E-03	0.00000E+00	0.00000E+00
236	9.03164E-01	1.13430E+01	9.01853E-01	1.62958E-03	0.00000E+00	0.00000E+00
237	8.91437E-01	1.13823E+01	9.01809E-01	1.62323E-03	0.00000E+00	0.00000E+00
238	8.98044E-01	1.14227E+01	9.01793E-01	1.61642E-03	0.00000E+00	0.00000E+00
239	8.93984E-01	1.14648E+01	9.01760E-01	1.60992E-03	0.00000E+00	0.00000E+00
240	9.03590E-01	1.15050E+01	9.01768E-01	1.60316E-03	0.00000E+00	0.00000E+00
241	8.77447E-01	1.15472E+01	9.01666E-01	1.59868E-03	0.00000E+00	0.00000E+00
242	8.90656E-01	1.15865E+01	9.01620E-01	1.59366E-03	0.00000E+00	0.00000E+00
243	9.31421E-01	1.16240E+01	9.01744E-01	1.59184E-03	0.00000E+00	0.00000E+00
244	9.15134E-01	1.16625E+01	9.01799E-01	1.58622E-03	0.00000E+00	0.00000E+00
245	9.18443E-01	1.17010E+01	9.01808E-01	1.58116E-03	0.00000E+00	0.00000E+00
246	9.12851E-01	1.17403E+01	9.01913E-01	1.57531E-03	0.00000E+00	0.00000E+00
247	8.73823E-01	1.17807E+01	9.01798E-01	1.57305E-03	0.00000E+00	0.00000E+00
248	8.83525E-01	1.18218E+01	9.01724E-01	1.56840E-03	0.00000E+00	0.00000E+00
249	9.02901E-01	1.18612E+01	9.01729E-01	1.56205E-03	0.00000E+00	0.00000E+00
250	9.14466E-01	1.19005E+01	9.01780E-01	1.55658E-03	0.00000E+00	0.00000E+00
251	8.69192E-01	1.19417E+01	9.01649E-01	1.55583E-03	0.00000E+00	0.00000E+00
252	9.56482E-01	1.19810E+01	9.01868E-01	1.56504E-03	0.00000E+00	0.00000E+00
253	9.21722E-01	1.20213E+01	9.01948E-01	1.56080E-03	0.00000E+00	0.00000E+00
254	8.89467E-01	1.20617E+01	9.01698E-01	1.55538E-03	0.00000E+00	0.00000E+00
255	8.68811E-01	1.21010E+01	9.01767E-01	1.55473E-03	0.00000E+00	0.00000E+00
256	8.66813E-01	1.21440E+01	9.01630E-01	1.55470E-03	0.00000E+00	0.00000E+00
257	8.45242E-01	1.21852E+01	9.01408E-01	1.56430E-03	0.00000E+00	0.00000E+00
258	8.81422E-01	1.22263E+01	9.01330E-01	1.56014E-03	0.00000E+00	0.00000E+00
259	8.72048E-01	1.22695E+01	9.01216E-01	1.55822E-03	0.00000E+00	0.00000E+00
260	8.94444E-01	1.23097E+01	9.01190E-01	1.55239E-03	0.00000E+00	0.00000E+00
261	8.96433E-01	1.23518E+01	9.01172E-01	1.54650E-03	0.00000E+00	0.00000E+00
262	9.00041E-01	1.23922E+01	9.01167E-01	1.54055E-03	0.00000E+00	0.00000E+00
263	9.28054E-01	1.24315E+01	9.01270E-01	1.53808E-03	0.00000E+00	0.00000E+00
264	9.04845E-01	1.24745E+01	9.01284E-01	1.53226E-03	0.00000E+00	0.00000E+00
265	8.92530E-01	1.25157E+01	9.01251E-01	1.52679E-03	0.00000E+00	0.00000E+00
266	9.23130E-01	1.25560E+01	9.01334E-01	1.52325E-03	0.00000E+00	0.00000E+00
267	9.35102E-01	1.25943E+01	9.01461E-01	1.52283E-03	0.00000E+00	0.00000E+00
268	9.23878E-01	1.26338E+01	9.01545E-01	1.51944E-03	0.00000E+00	0.00000E+00
269	9.38841E-01	1.26722E+01	9.01685E-01	1.52017E-03	0.00000E+00	0.00000E+00
270	8.77446E-01	1.27133E+01	9.01595E-01	1.51718E-03	0.00000E+00	0.00000E+00
271	8.60170E-01	1.27555E+01	9.01441E-01	1.51935E-03	0.00000E+00	0.00000E+00
272	9.26670E-01	1.27948E+01	9.01534E-01	1.51660E-03	0.00000E+00	0.00000E+00
273	9.05651E-01	1.28352E+01	9.01549E-01	1.51107E-03	0.00000E+00	0.00000E+00
274	9.26331E-01	1.28745E+01	9.01640E-01	1.50826E-03	0.00000E+00	0.00000E+00
275	9.44616E-01	1.29148E+01	9.01798E-01	1.51095E-03	0.00000E+00	0.00000E+00
276	8.99085E-01	1.29542E+01	9.01788E-01	1.50545E-03	0.00000E+00	0.00000E+00
277	9.17390E-01	1.29927E+01	9.01845E-01	1.50104E-03	0.00000E+00	0.00000E+00
278	9.07392E-01	1.30328E+01	9.01865E-01	1.49573E-03	0.00000E+00	0.00000E+00
279	8.77619E-01	1.30723E+01	9.01777E-01	1.49285E-03	0.00000E+00	0.00000E+00

280	8.80491E-01	1.31117E+01	9.01701E-01	1.48948E-03	0.00000E+00	0.00000E+00
281	8.86274E-01	1.31555E+01	9.01645E-01	1.48516E-03	0.00000E+00	0.00000E+00
282	8.87369E-01	1.31950E+01	9.01594E-01	1.48072E-03	0.00000E+00	0.00000E+00
283	8.76059E-01	1.32352E+01	9.01504E-01	1.47824E-03	0.00000E+00	0.00000E+00
284	8.24297E-01	1.32745E+01	9.01584E-01	1.47520E-03	0.00000E+00	0.00000E+00
285	8.76306E-01	1.33158E+01	9.01495E-01	1.47269E-03	0.00000E+00	0.00000E+00
286	8.99561E-01	1.33570E+01	9.01488E-01	1.46751E-03	0.00000E+00	0.00000E+00
287	9.48609E-01	1.33972E+01	9.01654E-01	1.47167E-03	0.00000E+00	0.00000E+00
288	8.96657E-01	1.34393E+01	9.01636E-01	1.46662E-03	0.00000E+00	0.00000E+00
289	8.63808E-01	1.34805E+01	9.01504E-01	1.46743E-03	0.00000E+00	0.00000E+00
290	9.33175E-01	1.35208E+01	9.01614E-01	1.46646E-03	0.00000E+00	0.00000E+00
291	9.15746E-01	1.35612E+01	9.01663E-01	1.46219E-03	0.00000E+00	0.00000E+00
292	9.05808E-01	1.36023E+01	9.01677E-01	1.45721E-03	0.00000E+00	0.00000E+00
293	8.98464E-01	1.36435E+01	9.01666E-01	1.45224E-03	0.00000E+00	0.00000E+00
294	9.04152E-01	1.36810E+01	9.01675E-01	1.44728E-03	0.00000E+00	0.00000E+00
295	9.36498E-01	1.37222E+01	9.01794E-01	1.44722E-03	0.00000E+00	0.00000E+00
296	9.24006E-01	1.37625E+01	9.01869E-01	1.44427E-03	0.00000E+00	0.00000E+00
297	8.90428E-01	1.38018E+01	9.01831E-01	1.43989E-03	0.00000E+00	0.00000E+00
298	9.25237E-01	1.38448E+01	9.01910E-01	1.43719E-03	0.00000E+00	0.00000E+00
299	9.20910E-01	1.38842E+01	9.01974E-01	1.43377E-03	0.00000E+00	0.00000E+00
300	9.56676E-01	1.39255E+01	9.02157E-01	1.44070E-03	0.00000E+00	0.00000E+00
301	8.73738E-01	1.39675E+01	9.02062E-01	1.43901E-03	0.00000E+00	0.00000E+00
302	9.09099E-01	1.40060E+01	9.02086E-01	1.43440E-03	0.00000E+00	0.00000E+00
303	9.39367E-01	1.40463E+01	9.02209E-01	1.43498E-03	0.00000E+00	0.00000E+00
304	9.32934E-01	1.40857E+01	9.02311E-01	1.43383E-03	0.00000E+00	0.00000E+00
305	8.48076E-01	1.41268E+01	9.02132E-01	1.44026E-03	0.00000E+00	0.00000E+00
306	8.96296E-01	1.41690E+01	9.02113E-01	1.43564E-03	0.00000E+00	0.00000E+00
307	9.16037E-01	1.42073E+01	9.02159E-01	1.43166E-03	0.00000E+00	0.00000E+00
308	8.97034E-01	1.42468E+01	9.02142E-01	1.42707E-03	0.00000E+00	0.00000E+00
309	9.40162E-01	1.42888E+01	9.02266E-01	1.42779E-03	0.00000E+00	0.00000E+00
310	8.89182E-01	1.43282E+01	9.02203E-01	1.42378E-03	0.00000E+00	0.00000E+00
311	8.97302E-01	1.43695E+01	9.02207E-01	1.41926E-03	0.00000E+00	0.00000E+00
312	9.31583E-01	1.44088E+01	9.02302E-01	1.41794E-03	0.00000E+00	0.00000E+00
313	9.08951E-01	1.44490E+01	9.02323E-01	1.41344E-03	0.00000E+00	0.00000E+00
314	8.84113E-01	1.44922E+01	9.02265E-01	1.41011E-03	0.00000E+00	0.00000E+00
315	8.77123E-01	1.45333E+01	9.02195E-01	1.40789E-03	0.00000E+00	0.00000E+00
316	8.66591E-01	1.45745E+01	9.02071E-01	1.40797E-03	0.00000E+00	0.00000E+00
317	9.04364E-01	1.46138E+01	9.02079E-01	1.40351E-03	0.00000E+00	0.00000E+00
318	9.05676E-01	1.46550E+01	9.02090E-01	1.39911E-03	0.00000E+00	0.00000E+00
319	9.12467E-01	1.46962E+01	9.02123E-01	1.39507E-03	0.00000E+00	0.00000E+00
320	8.99628E-01	1.47357E+01	9.02115E-01	1.39070E-03	0.00000E+00	0.00000E+00
321	9.33467E-01	1.47758E+01	9.02213E-01	1.38981E-03	0.00000E+00	0.00000E+00
322	9.08438E-01	1.48152E+01	9.02233E-01	1.38560E-03	0.00000E+00	0.00000E+00
323	9.03057E-01	1.48547E+01	9.02235E-01	1.38129E-03	0.00000E+00	0.00000E+00
324	9.38377E-01	1.48930E+01	9.02347E-01	1.38155E-03	0.00000E+00	0.00000E+00
325	8.81011E-01	1.49360E+01	9.02231E-01	1.37885E-03	0.00000E+00	0.00000E+00
326	9.22087E-01	1.49755E+01	9.02343E-01	1.37595E-03	0.00000E+00	0.00000E+00
327	9.07395E-01	1.50167E+01	9.02358E-01	1.37179E-03	0.00000E+00	0.00000E+00
328	9.16492E-01	1.50578E+01	9.02401E-01	1.36827E-03	0.00000E+00	0.00000E+00
329	9.17257E-01	1.50972E+01	9.02447E-01	1.36483E-03	0.00000E+00	0.00000E+00
330	8.62294E-01	1.51393E+01	9.02324E-01	1.36616E-03	0.00000E+00	0.00000E+00
331	8.74989E-01	1.51832E+01	9.02241E-01	1.36453E-03	0.00000E+00	0.00000E+00
332	8.43565E-01	1.52263E+01	9.02064E-01	1.37196E-03	0.00000E+00	0.00000E+00
333	9.46004E-01	1.52675E+01	9.02196E-01	1.37424E-03	0.00000E+00	0.00000E+00
334	8.56627E-01	1.53095E+01	9.02059E-01	1.37695E-03	0.00000E+00	0.00000E+00
335	8.65279E-01	1.53508E+01	9.01949E-01	1.37725E-03	0.00000E+00	0.00000E+00
336	9.19088E-01	1.53928E+01	9.02000E-01	1.37408E-03	0.00000E+00	0.00000E+00
337	9.03546E-01	1.54322E+01	9.02005E-01	1.36998E-03	0.00000E+00	0.00000E+00
338	8.79064E-01	1.54743E+01	9.01936E-01	1.36760E-03	0.00000E+00	0.00000E+00
339	9.18345E-01	1.55137E+01	9.01985E-01	1.36440E-03	0.00000E+00	0.00000E+00
340	9.14702E-01	1.55530E+01	9.02023E-01	1.36088E-03	0.00000E+00	0.00000E+00
341	8.97884E-01	1.55952E+01	9.02010E-01	1.35691E-03	0.00000E+00	0.00000E+00
342	9.05251E-01	1.56355E+01	9.02000E-01	1.35295E-03	0.00000E+00	0.00000E+00
343	8.85792E-01	1.56757E+01	9.01972E-01	1.34982E-03	0.00000E+00	0.00000E+00
344	8.99656E-01	1.57152E+01	9.01966E-01	1.34586E-03	0.00000E+00	0.00000E+00
345	8.89882E-01	1.57563E+01	9.01930E-01	1.34241E-03	0.00000E+00	0.00000E+00
346	9.40461E-01	1.57993E+01	9.02042E-01	1.34318E-03	0.00000E+00	0.00000E+00
347	8.69895E-01	1.58442E+01	9.01949E-01	1.34252E-03	0.00000E+00	0.00000E+00
348	9.42479E-01	1.58835E+01	9.02066E-01	1.34375E-03	0.00000E+00	0.00000E+00
349	8.88683E-01	1.59247E+01	9.02028E-01	1.34043E-03	0.00000E+00	0.00000E+00
350	9.15809E-01	1.59632E+01	9.02067E-01	1.33716E-03	0.00000E+00	0.00000E+00
351	9.45735E-01	1.60035E+01	9.02192E-01	1.33918E-03	0.00000E+00	0.00000E+00
352	8.06980E-01	1.60428E+01	9.02206E-01	1.33542E-03	0.00000E+00	0.00000E+00
353	8.83981E-01	1.60813E+01	9.02154E-01	1.33262E-03	0.00000E+00	0.00000E+00
354	9.45833E-01	1.61233E+01	9.02278E-01	1.33461E-03	0.00000E+00	0.00000E+00
355	9.06550E-01	1.61637E+01	9.02290E-01	1.33088E-03	0.00000E+00	0.00000E+00
356	8.55788E-01	1.62040E+01	9.02159E-01	1.33360E-03	0.00000E+00	0.00000E+00
357	8.62294E-01	1.62442E+01	9.02047E-01	1.33457E-03	0.00000E+00	0.00000E+00
358	9.13265E-01	1.62835E+01	9.02078E-01	1.33119E-03	0.00000E+00	0.00000E+00
359	9.16733E-01	1.63220E+01	9.02119E-01	1.32809E-03	0.00000E+00	0.00000E+00
360	9.34686E-01	1.63613E+01	9.02210E-01	1.32750E-03	0.00000E+00	0.00000E+00
361	9.04736E-01	1.64005E+01	9.02217E-01	1.32381E-03	0.00000E+00	0.00000E+00
362	9.54986E-01	1.64410E+01	9.02364E-01	1.32824E-03	0.00000E+00	0.00000E+00
363	8.83360E-01	1.64822E+01	9.02311E-01	1.32561E-03	0.00000E+00	0.00000E+00
364	9.04672E-01	1.65233E+01	9.02318E-01	1.32195E-03	0.00000E+00	0.00000E+00
365	8.88081E-01	1.65618E+01	9.02275E-01	1.31889E-03	0.00000E+00	0.00000E+00
366	8.85611E-01	1.66040E+01	9.02233E-01	1.31606E-03	0.00000E+00	0.00000E+00
367	9.29305E-01	1.66433E+01	9.02307E-01	1.31455E-03	0.00000E+00	0.00000E+00
368	9.68192E-01	1.66845E+01	9.02214E-01	1.31426E-03	0.00000E+00	0.00000E+00
369	9.28952E-01	1.67267E+01	9.02287E-01	1.31270E-03	0.00000E+00	0.00000E+00
370	8.92545E-01	1.67668E+01	9.02260E-01	1.30939E-03	0.00000E+00	0.00000E+00
371	9.59783E-01	1.68072E+01	9.02416E-01	1.31511E-03	0.00000E+00	0.00000E+00
372	9.17828E-01	1.68465E+01	9.02459E-01	1.31221E-03	0.00000E+00	0.00000E+00
373	9.11716E-01	1.68850E+01	9.02483E-01	1.30891E-03	0.00000E+00	0.00000E+00
374	8.58140E-01	1.69235E+01	9.02363E-01	1.31082E-03	0.00000E+00	0.00000E+00

375	9.07467E-01	1.69673E+01	9.02377E-01	1.30737E-03	0.00000E+00	0.00000E+00
376	9.07179E-01	1.70077E+01	9.02390E-01	1.30393E-03	0.00000E+00	0.00000E+00
377	8.93386E-01	1.70498E+01	9.02366E-01	1.30067E-03	0.00000E+00	0.00000E+00
378	8.78099E-01	1.70900E+01	9.02301E-01	1.29881E-03	0.00000E+00	0.00000E+00
379	8.96291E-01	1.71313E+01	9.02285E-01	1.29548E-03	0.00000E+00	0.00000E+00
380	8.96982E-01	1.71715E+01	9.02271E-01	1.29211E-03	0.00000E+00	0.00000E+00
381	8.96383E-01	1.72118E+01	9.02256E-01	1.28879E-03	0.00000E+00	0.00000E+00
382	8.83649E-01	1.72512E+01	9.02207E-01	1.28632E-03	0.00000E+00	0.00000E+00
383	8.60988E-01	1.72952E+01	9.02099E-01	1.28749E-03	0.00000E+00	0.00000E+00
384	9.19223E-01	1.73372E+01	9.02144E-01	1.28490E-03	0.00000E+00	0.00000E+00
385	9.26637E-01	1.73803E+01	9.02208E-01	1.28314E-03	0.00000E+00	0.00000E+00
386	9.09613E-01	1.74197E+01	9.02227E-01	1.27994E-03	0.00000E+00	0.00000E+00
387	9.04452E-01	1.74598E+01	9.02233E-01	1.27662E-03	0.00000E+00	0.00000E+00
388	8.78504E-01	1.74993E+01	9.02171E-01	1.27479E-03	0.00000E+00	0.00000E+00
389	8.86236E-01	1.75405E+01	9.02130E-01	1.27216E-03	0.00000E+00	0.00000E+00
390	8.85948E-01	1.75817E+01	9.02088E-01	1.26956E-03	0.00000E+00	0.00000E+00
391	8.79488E-01	1.76238E+01	9.02030E-01	1.26763E-03	0.00000E+00	0.00000E+00
392	8.81480E-01	1.76632E+01	9.01977E-01	1.26547E-03	0.00000E+00	0.00000E+00
393	8.79957E-01	1.77025E+01	9.01921E-01	1.26349E-03	0.00000E+00	0.00000E+00
394	9.56408E-01	1.77418E+01	9.02060E-01	1.26790E-03	0.00000E+00	0.00000E+00
395	8.58242E-01	1.77840E+01	9.01949E-01	1.26958E-03	0.00000E+00	0.00000E+00
396	8.88565E-01	1.78242E+01	9.01915E-01	1.26680E-03	0.00000E+00	0.00000E+00
397	8.52183E-01	1.78655E+01	9.01789E-01	1.26985E-03	0.00000E+00	0.00000E+00
398	9.47417E-01	1.79057E+01	9.01904E-01	1.27187E-03	0.00000E+00	0.00000E+00
399	9.14630E-01	1.79468E+01	9.01936E-01	1.26907E-03	0.00000E+00	0.00000E+00
400	9.09073E-01	1.79882E+01	9.01954E-01	1.26600E-03	0.00000E+00	0.00000E+00
401	9.52264E-01	1.80312E+01	9.02080E-01	1.26910E-03	0.00000E+00	0.00000E+00
402	8.98030E-01	1.80713E+01	9.02070E-01	1.26597E-03	0.00000E+00	0.00000E+00
403	9.12665E-01	1.81108E+01	9.02096E-01	1.26308E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

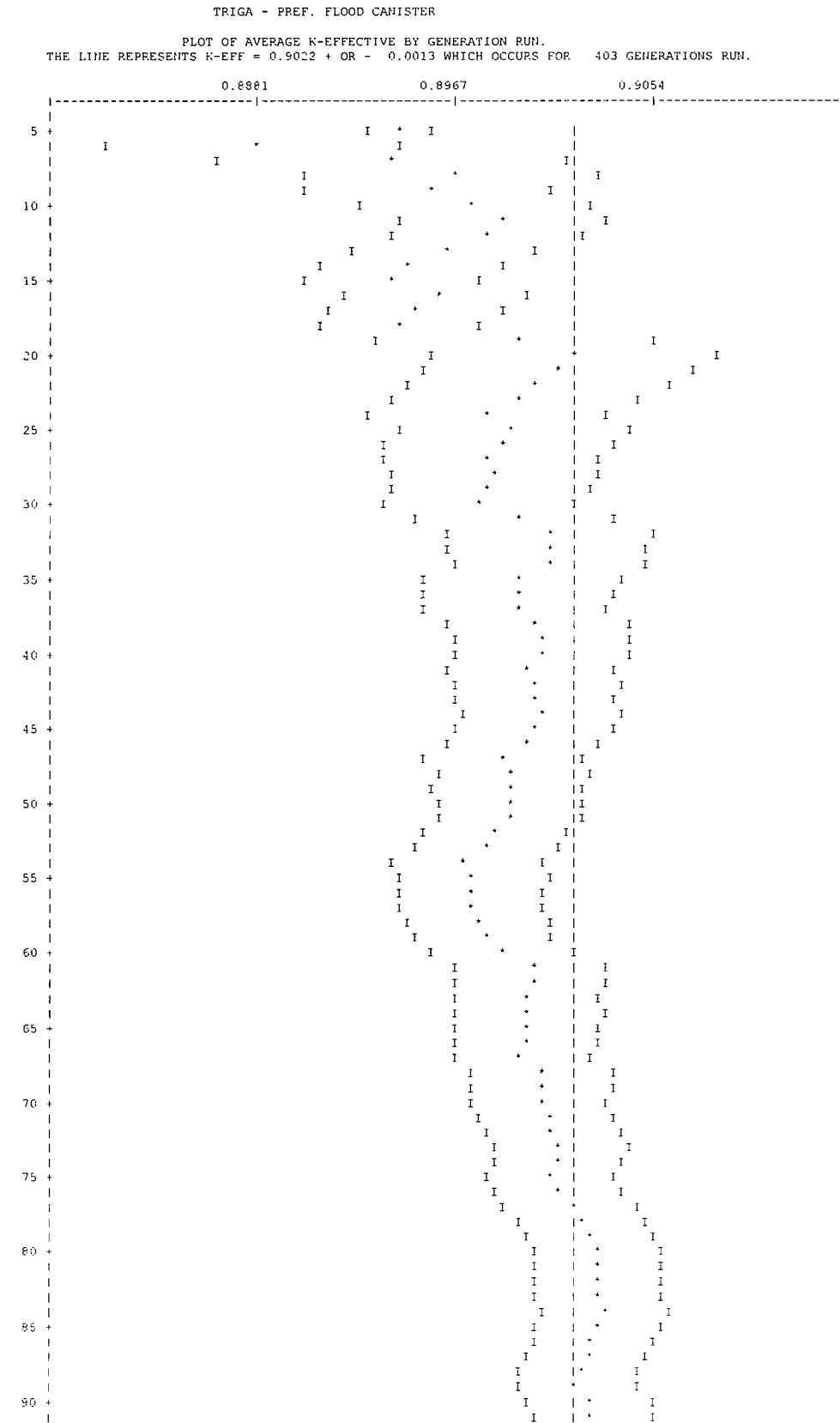
NAC-LWT Cask SAR  
Revision 43

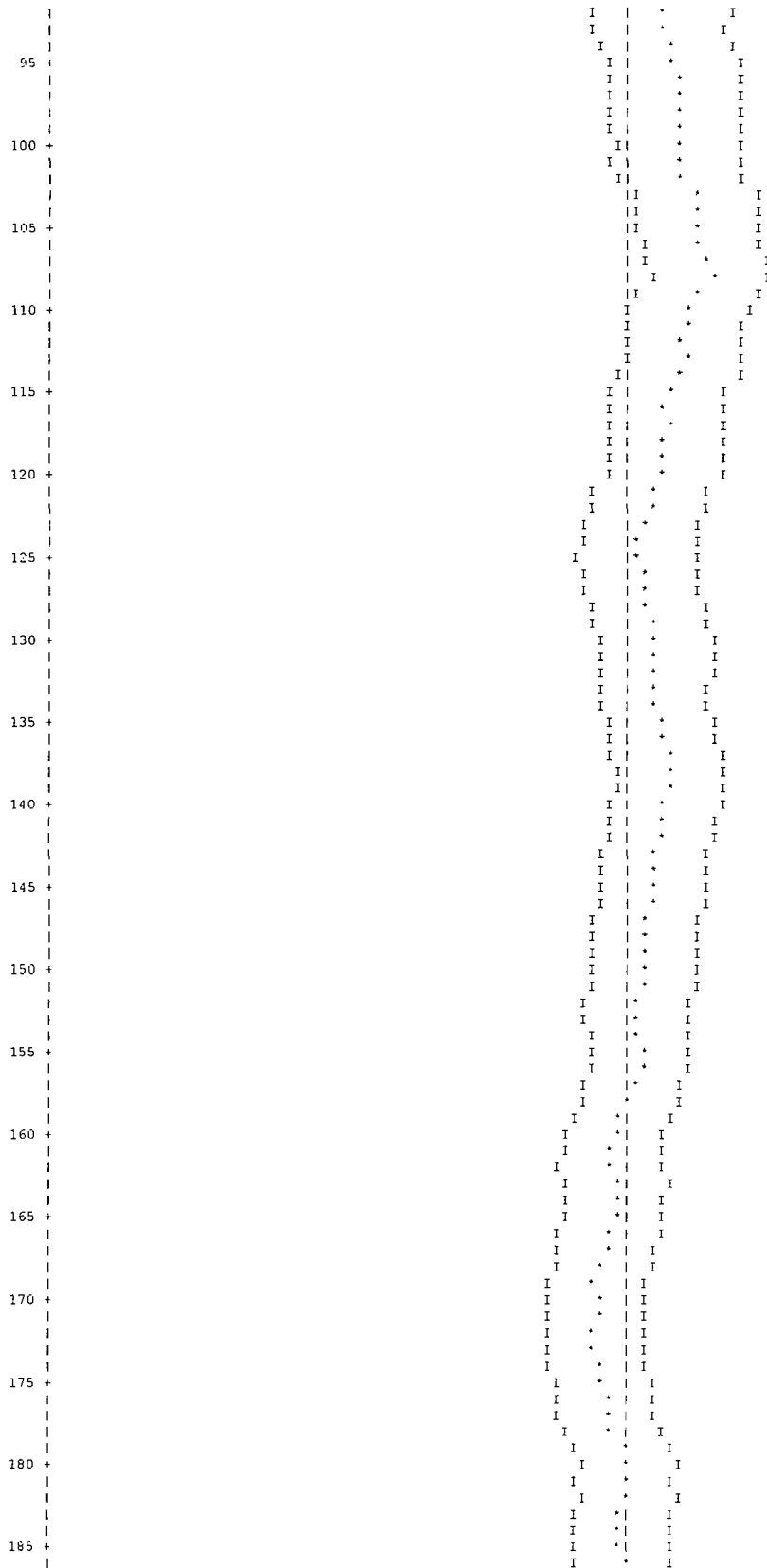
January 2015

TRIGA - PREF. FLOOD CANISTER

LIFETIME = 4.68411E-05 + OR - 1.44136E-07 GENERATION TIME = 1.71707E-05 + OR - 5.28871E-08  
 NU BAR = 2.42239E+00 + OR - 1.20609E-05 AVERAGE FISSION GROUP = 2.15384E+01 + OR - 5.20178E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 2.49898E-01 + OR - 9.08878E-04

NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT		95 PER CENT		99 PER CENT		NUMBER OF HISTORIES
			CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	
3	0.90216	+ OR - 0.00126	0.90089	TO 0.90342	0.89963	TO 0.90469	0.89836	TO 0.90595	400000
4	0.90217	+ OR - 0.00127	0.90091	TO 0.90344	0.89964	TO 0.90471	0.89837	TO 0.90596	399000
5	0.90220	+ OR - 0.00127	0.90093	TO 0.90347	0.89965	TO 0.90474	0.89838	TO 0.90601	398000
6	0.90226	+ OR - 0.00127	0.90099	TO 0.90354	0.89972	TO 0.90481	0.89845	TO 0.90608	397000
7	0.90224	+ OR - 0.00128	0.90096	TO 0.90351	0.89969	TO 0.90479	0.89841	TO 0.90606	396000
8	0.90223	+ OR - 0.00128	0.90095	TO 0.90350	0.89967	TO 0.90478	0.89839	TO 0.90606	395000
9	0.90226	+ OR - 0.00128	0.90097	TO 0.90354	0.89969	TO 0.90482	0.89841	TO 0.90610	394000
10	0.90224	+ OR - 0.00128	0.90095	TO 0.90352	0.89967	TO 0.90481	0.89838	TO 0.90609	393000
11	0.90222	+ OR - 0.00129	0.90093	TO 0.90351	0.89965	TO 0.90480	0.89836	TO 0.90608	392000
12	0.90225	+ OR - 0.00129	0.90096	TO 0.90354	0.89967	TO 0.90483	0.89837	TO 0.90612	391000
17	0.90241	+ OR - 0.00130	0.90111	TO 0.90371	0.89980	TO 0.90501	0.89850	TO 0.90632	386000
22	0.90224	+ OR - 0.00130	0.90094	TO 0.90354	0.89964	TO 0.90484	0.89834	TO 0.90614	381000
27	0.90239	+ OR - 0.00131	0.90108	TO 0.90371	0.89977	TO 0.90502	0.89846	TO 0.90633	376000
32	0.90224	+ OR - 0.00132	0.90092	TO 0.90356	0.89961	TO 0.90488	0.89829	TO 0.90620	371000
37	0.90240	+ OR - 0.00133	0.90107	TO 0.90373	0.89973	TO 0.90506	0.89840	TO 0.90640	366000
42	0.90234	+ OR - 0.00135	0.90100	TO 0.90369	0.89965	TO 0.90504	0.89830	TO 0.90639	361000
47	0.90256	+ OR - 0.00136	0.90120	TO 0.90391	0.89984	TO 0.90527	0.89848	TO 0.90663	356000
52	0.90266	+ OR - 0.00137	0.90129	TO 0.90403	0.89992	TO 0.90540	0.89855	TO 0.90677	351000
57	0.90289	+ OR - 0.00138	0.90151	TO 0.90427	0.90013	TO 0.90564	0.89876	TO 0.90702	346000
62	0.90248	+ OR - 0.00138	0.90111	TO 0.90386	0.89973	TO 0.90524	0.89835	TO 0.90661	341000
67	0.90261	+ OR - 0.00139	0.90122	TO 0.90401	0.89983	TO 0.90540	0.89843	TO 0.90680	336000
72	0.90237	+ OR - 0.00140	0.90097	TO 0.90377	0.89957	TO 0.90517	0.89817	TO 0.90658	331000
77	0.90221	+ OR - 0.00141	0.90080	TO 0.90362	0.89939	TO 0.90504	0.89797	TO 0.90645	326000
82	0.90195	+ OR - 0.00142	0.90053	TO 0.90337	0.89910	TO 0.90480	0.89768	TO 0.90622	321000
87	0.90201	+ OR - 0.00144	0.90057	TO 0.90345	0.89913	TO 0.90489	0.89769	TO 0.90633	316000
92	0.90179	+ OR - 0.00144	0.90035	TO 0.90324	0.89891	TO 0.90468	0.89747	TO 0.90612	311000
97	0.90159	+ OR - 0.00146	0.90013	TO 0.90305	0.89867	TO 0.90451	0.89721	TO 0.90597	306000
102	0.90145	+ OR - 0.00148	0.89997	TO 0.90293	0.89849	TO 0.90441	0.89701	TO 0.90589	301000
107	0.90111	+ OR - 0.00149	0.89962	TO 0.90261	0.89813	TO 0.90410	0.89664	TO 0.90559	296000
112	0.90135	+ OR - 0.00150	0.89985	TO 0.90285	0.89835	TO 0.90436	0.89685	TO 0.90586	291000
117	0.90154	+ OR - 0.00152	0.90002	TO 0.90305	0.89850	TO 0.90457	0.89699	TO 0.90608	286000
122	0.90177	+ OR - 0.00152	0.90025	TO 0.90330	0.89873	TO 0.90482	0.89720	TO 0.90634	281000
127	0.90191	+ OR - 0.00154	0.90038	TO 0.90345	0.89884	TO 0.90499	0.89730	TO 0.90652	276000
132	0.90163	+ OR - 0.00155	0.90007	TO 0.90318	0.89852	TO 0.90474	0.89696	TO 0.90629	271000
137	0.90141	+ OR - 0.00157	0.89983	TO 0.90298	0.89826	TO 0.90456	0.89668	TO 0.90613	266000
142	0.90152	+ OR - 0.00160	0.89993	TO 0.90312	0.89833	TO 0.90471	0.89674	TO 0.90631	261000
147	0.90176	+ OR - 0.00162	0.90014	TO 0.90338	0.89852	TO 0.90500	0.89690	TO 0.90662	256000
152	0.90199	+ OR - 0.00164	0.90035	TO 0.90363	0.89871	TO 0.90526	0.89707	TO 0.90690	251000
157	0.90204	+ OR - 0.00166	0.90038	TO 0.90370	0.89872	TO 0.90536	0.89706	TO 0.90702	246000
162	0.90266	+ OR - 0.00167	0.90099	TO 0.90433	0.89932	TO 0.90600	0.89765	TO 0.90767	241000
167	0.90279	+ OR - 0.00168	0.90110	TO 0.90447	0.89942	TO 0.90615	0.89774	TO 0.90783	236000
172	0.90314	+ OR - 0.00170	0.90144	TO 0.90484	0.89974	TO 0.90654	0.89804	TO 0.90824	231000
177	0.90285	+ OR - 0.00172	0.90113	TO 0.90457	0.89940	TO 0.90630	0.89768	TO 0.90802	226000
182	0.90221	+ OR - 0.00170	0.90052	TO 0.90391	0.89882	TO 0.90561	0.89712	TO 0.90731	221000
187	0.90242	+ OR - 0.00170	0.90072	TO 0.90412	0.89902	TO 0.90582	0.89732	TO 0.90752	216000
192	0.90236	+ OR - 0.00172	0.90064	TO 0.90408	0.89892	TO 0.90580	0.89720	TO 0.90752	211000
197	0.90217	+ OR - 0.00176	0.90041	TO 0.90393	0.89866	TO 0.90569	0.89690	TO 0.90745	206000
202	0.90184	+ OR - 0.00179	0.90005	TO 0.90363	0.89826	TO 0.90541	0.89648	TO 0.90720	201000
207	0.90156	+ OR - 0.00182	0.89974	TO 0.90338	0.89793	TO 0.90520	0.89611	TO 0.90701	196000
212	0.90162	+ OR - 0.00186	0.89977	TO 0.90348	0.89791	TO 0.90533	0.89605	TO 0.90719	191000
217	0.90152	+ OR - 0.00189	0.89963	TO 0.90342	0.89774	TO 0.90531	0.89584	TO 0.90721	186000
222	0.90215	+ OR - 0.00192	0.90023	TO 0.90407	0.89832	TO 0.90598	0.89640	TO 0.90790	181000
227	0.90255	+ OR - 0.00194	0.90061	TO 0.90449	0.89868	TO 0.90643	0.89674	TO 0.90837	176000
232	0.90262	+ OR - 0.00196	0.90066	TO 0.90458	0.89870	TO 0.90654	0.89674	TO 0.90850	171000
237	0.90250	+ OR - 0.00201	0.90049	TO 0.90452	0.89848	TO 0.90653	0.89646	TO 0.90854	166000
242	0.90281	+ OR - 0.00207	0.90074	TO 0.90487	0.89867	TO 0.90694	0.89660	TO 0.90901	161000
247	0.90256	+ OR - 0.00211	0.90045	TO 0.90468	0.89834	TO 0.90679	0.89623	TO 0.90890	156000
252	0.90247	+ OR - 0.00214	0.90034	TO 0.90461	0.89820	TO 0.90675	0.89606	TO 0.90888	151000
257	0.90330	+ OR - 0.00214	0.90116	TO 0.90544	0.89902	TO 0.90758	0.89687	TO 0.90972	146000
262	0.90381	+ OR - 0.00220	0.90161	TO 0.90601	0.89941	TO 0.90821	0.89721	TO 0.91041	141000
267	0.90333	+ OR - 0.00225	0.90108	TO 0.90559	0.89882	TO 0.90784	0.89657	TO 0.91010	136000
272	0.90326	+ OR - 0.00228	0.90097	TO 0.90554	0.89869	TO 0.90782	0.89641	TO 0.91010	131000
277	0.90265	+ OR - 0.00234	0.90031	TO 0.90498	0.89797	TO 0.90732	0.89563	TO 0.90966	126000
282	0.90326	+ OR - 0.00241	0.90085	TO 0.90567	0.89844	TO 0.90808	0.89603	TO 0.91049	121000
287	0.90318	+ OR - 0.00246	0.90073	TO 0.90564	0.89827	TO 0.90809	0.89582	TO 0.91055	116000
292	0.90319	+ OR - 0.00252	0.90067	TO 0.90571	0.89814	TO 0.90824	0.89562	TO 0.91076	111000
297	0.90284	+ OR - 0.00261	0.90022	TO 0.90545	0.89761	TO 0.90806	0.89500	TO 0.91068	106000
302	0.90213	+ OR - 0.00266	0.89947	TO 0.90479	0.89681	TO 0.90744	0.89416	TO 0.91010	101000
307	0.90190	+ OR - 0.00269	0.89921	TO 0.90459	0.89652	TO 0.90727	0.89384	TO 0.90996	96000
312	0.90140	+ OR - 0.00278	0.89862	TO 0.90418	0.89584	TO 0.90695	0.89306	TO 0.90973	91000
317	0.90216	+ OR - 0.00289	0.89927	TO 0.90505	0.89638	TO 0.90794	0.89349	TO 0.91093	86000
322	0.90156	+ OR - 0.00304	0.89852	TO 0.90460	0.89548	TO 0.90764	0.89244	TO 0.91068	81000
327	0.90098	+ OR - 0.00318	0.89780	TO 0.90416	0.89462	TO 0.90734	0.89144	TO 0.91052	76000
332	0.90225	+ OR - 0.00322	0.89903	TO 0.90547	0.89581	TO 0.90869	0.89259	TO 0.91191	71000
337	0.90256	+ OR - 0.00327	0.89929	TO 0.90583	0.89602	TO 0.90910	0.89275	TO 0.91237	66000
342	0.90252	+ OR - 0.00350	0.89902	TO 0.90603	0.89552	TO 0.90953	0.89201	TO 0.91303	61000
347	0.90300	+ OR - 0.00359	0.89931	TO 0.90669	0.89562	TO 0.91038	0.89193	TO 0.91407	56000
352	0.90134	+ OR - 0.00386	0.89748	TO 0.90520	0.89362	TO 0.90907	0.88976	TO 0.91293	51000
357	0.90248	+ OR - 0.00394	0.89854	TO 0.90641	0.89461	TO 0.91035	0.89067	TO 0.91429	46000
362	0.89975	+ OR - 0.00411	0.89564	TO 0.90385	0.89154	TO 0.90796	0.88743	TO 0.91206	41000
367	0.89996	+ OR - 0.00455	0.89541	TO 0.90452	0.89085	TO 0.90907	0.88630	TO 0.91362	36000
372	0.89778	+ OR - 0.00466	0.89313	TO 0.90244	0.88847	TO 0.90710	0.88381	TO 0.91176	31000
377	0.89821	+ OR - 0.00529	0.89292	TO 0.90350	0.88762	TO 0.90879	0.88233	TO 0.91409	26000
382	0.90010	+ OR - 0.00646	0.89264	TO 0.90655	0.88718	TO 0.91301	0.88072	TO 0.91547	21000
387	0.89882	+ OR - 0.00795	0.89097	TO 0.90666	0.88313	TO 0.91451	0.87529	TO 0.92236	16000
392	0.90631	+ OR - 0.01076	0.89555	TO 0.91708	0.88478	TO 0.92784	0.87402	TO 0.93861	11000
397	0.92235	+ OR - 0.00903	0.91332	TO 0.93137	0.90429	TO 0.94040	0.89527	TO 0.94943	6000







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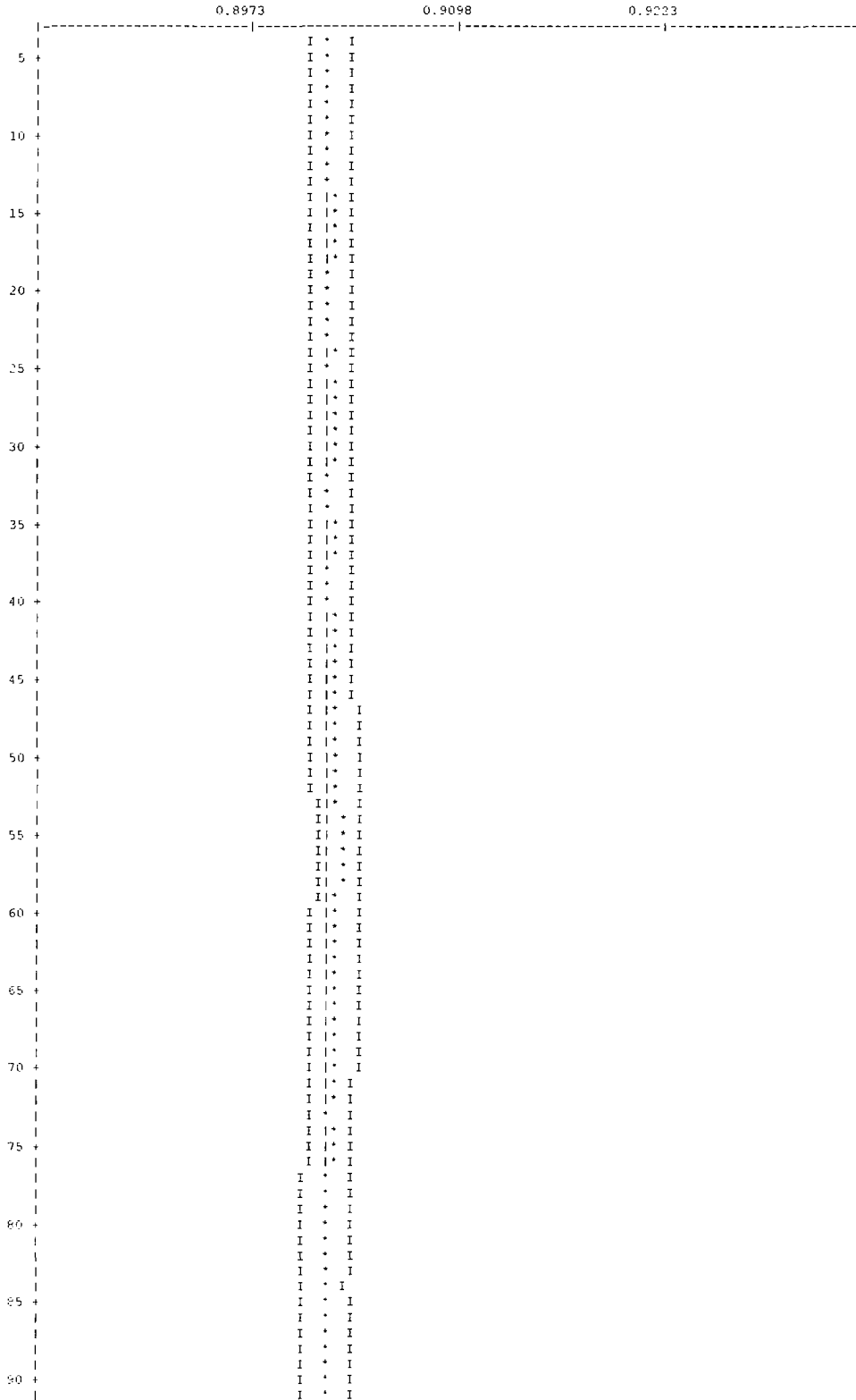


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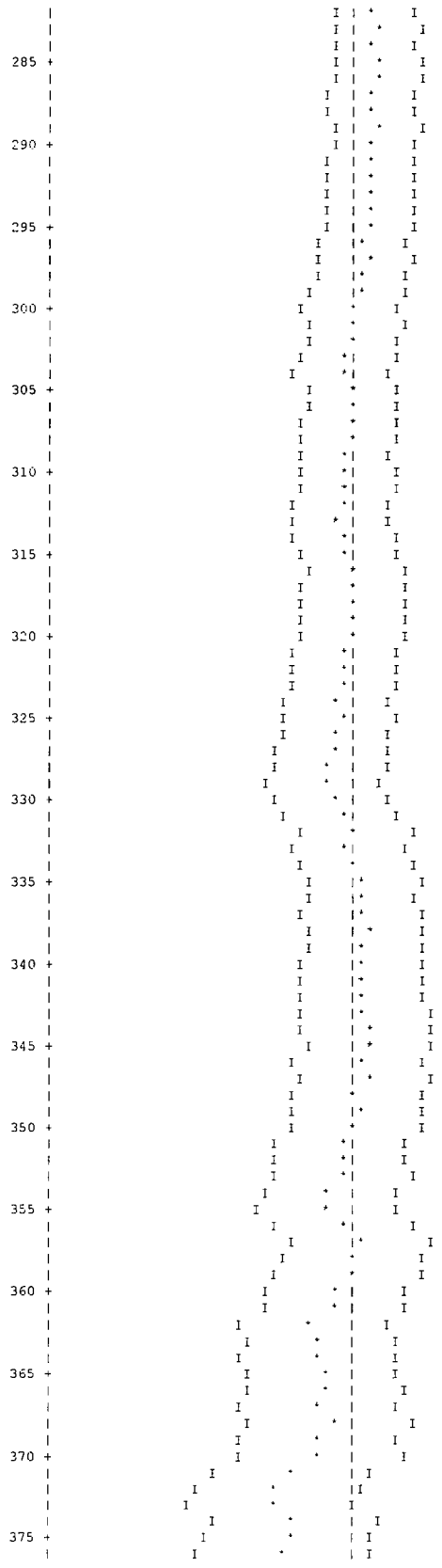
TRIGA - PREF. FLOOD CANISTER

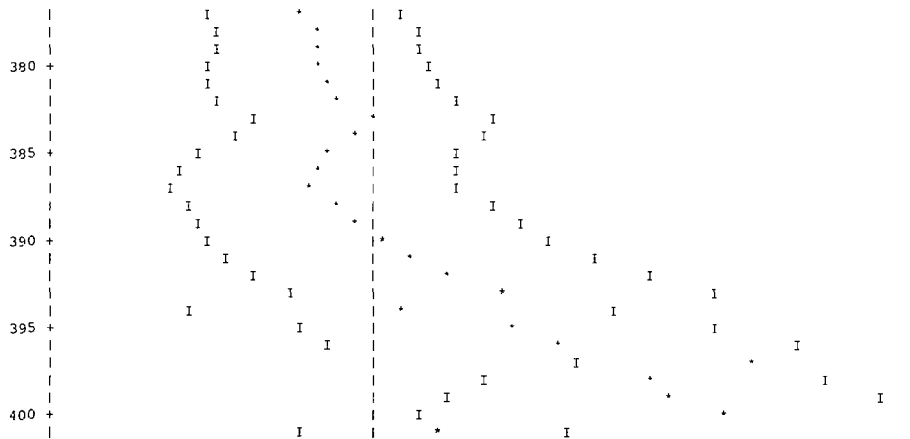
PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS  $K\text{-EFF} = 0.9022 \pm 0.0013$  WHICH OCCURS FOR 3 GENERATIONS SKIPPED.



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TRIGA - PREF. FLOOD CANISTER

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0006			5.25117E-04	1.6403	1.09426E-03	1.6064	0.00000E+00	0.0000
2	0.0027			2.44675E-03	0.4783	3.09180E-03	0.4792	0.00000E+00	0.0000
3	0.0035			3.19630E-03	0.4015	2.24915E-03	0.3565	0.00000E+00	0.0000
4	0.0021			1.92481E-03	0.4747	1.29146E-03	0.4038	0.00000E+00	0.0000
5	0.0030			2.69630E-03	0.3626	2.48810E-03	0.3219	0.00000E+00	0.0000
6	0.0043			3.83930E-03	0.2702	7.50637E-03	0.3222	0.00000E+00	0.0000
7	0.0050			4.47319E-03	0.2301	1.51095E-02	0.3541	0.00000E+00	0.0000
8	0.0051			4.63561E-03	0.2304	1.37660E-02	0.3414	0.00000E+00	0.0000
9	0.0071			6.41831E-03	0.2365	1.66960E-02	0.2673	0.00000E+00	0.0000
10	0.0151			1.35898E-02	0.2296	4.04688E-02	0.2976	0.00000E+00	0.0000
11	0.0319			2.87714E-02	0.2356	7.29025E-02	0.2655	0.00000E+00	0.0000
12	0.0418			3.77037E-02	0.2483	4.99995E-02	0.2607	0.00000E+00	0.0000
13	0.0374			3.37502E-02	0.2645	5.75641E-02	0.2679	0.00000E+00	0.0000
14	0.0302			2.72559E-02	0.2485	6.73208E-02	0.2565	0.00000E+00	0.0000
15	0.0060			5.41042E-03	0.3577	2.80413E-02	0.4811	0.00000E+00	0.0000
16	0.0041			3.66578E-03	0.4459	1.58181E-02	0.5686	0.00000E+00	0.0000
17	0.0061			5.52764E-03	0.6393	9.31682E-03	0.6235	0.00000E+00	0.0000
18	0.0082			7.42696E-03	0.6274	9.20261E-03	0.6153	0.00000E+00	0.0000
19	0.0100			8.99048E-03	0.4909	1.44742E-02	0.6135	0.00000E+00	0.0000
20	0.0399			3.59549E-02	0.3201	4.76949E-02	0.3671	0.00000E+00	0.0000
21	0.0206			1.86150E-02	0.4835	1.85951E-02	0.4952	0.00000E+00	0.0000
22	0.0468			4.22116E-02	0.4027	3.79346E-02	0.4197	0.00000E+00	0.0000
23	0.1284			1.15860E-01	0.2645	9.92098E-02	0.2428	0.00000E+00	0.0000
24	0.1877			1.69342E-01	0.2533	1.33525E-01	0.2296	0.00000E+00	0.0000
25	0.1396			1.25961E-01	0.2961	9.58818E-02	0.2492	0.00000E+00	0.0000
26	0.1566			1.41266E-01	0.3219	1.04837E-01	0.2740	0.00000E+00	0.0000
27	0.0562			5.06990E-02	0.5058	3.50944E-02	0.4716	0.00000E+00	0.0000
SYSTEM TOTAL =				9.02158E-01	0.1402	1.00117E+00	0.0449	0.00000E+00	0.0000

ELAPSED TIME 18.11267 MINUTES

RANDOM NUMBER= 676267006D12

TRIGA - PREF. FLOOD CANISTER

```
FREQUENCY FOR GENERATIONS 4 TO 403
0.8363 TO 0.8444 **
0.8444 TO 0.8525 *****
0.8525 TO 0.8607 *****
0.8607 TO 0.8688 *****
0.8688 TO 0.8769 *****
0.8769 TO 0.8850 *****
0.8850 TO 0.8932 *****
0.8932 TO 0.9013 *****
0.9013 TO 0.9094 *****
0.9094 TO 0.9175 *****
0.9175 TO 0.9257 *****
0.9257 TO 0.9338 *****
0.9338 TO 0.9419 *****
0.9419 TO 0.9500 *****
0.9500 TO 0.9582 *****
0.9582 TO 0.9663 **
0.9663 TO 0.9744 *
0.9744 TO 0.9825 **
```

```
FREQUENCY FOR GENERATIONS 104 TO 403
0.8363 TO 0.8444 **
0.8444 TO 0.8525 *****
0.8525 TO 0.8607 *****
0.8607 TO 0.8688 *****
0.8688 TO 0.8769 *****
0.8769 TO 0.8850 *****
0.8850 TO 0.8932 *****
0.8932 TO 0.9013 *****
0.9013 TO 0.9094 *****
0.9094 TO 0.9175 *****
0.9175 TO 0.9257 *****
0.9257 TO 0.9338 *****
0.9338 TO 0.9419 *****
0.9419 TO 0.9500 *****
0.9500 TO 0.9582 *****
0.9582 TO 0.9663 *
0.9663 TO 0.9744 *
0.9744 TO 0.9825 *
```

```
FREQUENCY FOR GENERATIONS 204 TO 403
0.8363 TO 0.8444 *
0.8444 TO 0.8525 *****
0.8525 TO 0.8607 *****
0.8607 TO 0.8688 *****
0.8688 TO 0.8769 *****
0.8769 TO 0.8850 *****
0.8850 TO 0.8932 *****
0.8932 TO 0.9013 *****
0.9013 TO 0.9094 *****
0.9094 TO 0.9175 *****
0.9175 TO 0.9257 *****
0.9257 TO 0.9338 *****
0.9338 TO 0.9419 *****
0.9419 TO 0.9500 *****
0.9500 TO 0.9582 *****
0.9582 TO 0.9663 *
0.9663 TO 0.9744 *
0.9744 TO 0.9825 *
```

\_TRIGA - PREF. FLOOD CANISTER

```
FREQUENCY FOR GENERATIONS 304 TO 403
0.8363 TO 0.8444 *
0.8444 TO 0.8525 **
0.8525 TO 0.8607 *****
0.8607 TO 0.8688 *****
0.8688 TO 0.8769 **
0.8769 TO 0.8850 *****
0.8850 TO 0.8932 *****
0.8932 TO 0.9013 *****
0.9013 TO 0.9094 *****
0.9094 TO 0.9175 *****
0.9175 TO 0.9257 *****
0.9257 TO 0.9338 *****
0.9338 TO 0.9419 *****
0.9419 TO 0.9500 *****
0.9500 TO 0.9582 ***
0.9582 TO 0.9663 *
0.9663 TO 0.9744 *
0.9744 TO 0.9825 *
```

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 18.11350 MINUTES  
.....  
\*  
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Figure 6.6.5-3 Summary of CSAS Input/Output for TRIGA Benchmark Core 132

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
TRIGA BENCHMARK CORE 132
27GROUPNDF4 LATTICECELL
'FUEL ELEMENT - FUEL
U-235 1 0.0 3.682E-4 297. END
U-238 1 0.0 1.463E-3 297. END
ZR 1 0.0 3.502E-2 297. END
H 1 0.0 5.778E-2 297. END
'FUEL ELEMENT / FOLLOWER - CLAD, FUEL FOLLOWER SEPERATOR
SS304 2 1.0 297.0 END
'MODERATOR
H2O 3 1.0 297.0 END
'CORE REFLECTOR GRAPHITE SHELL, GRID PLATES, TRANSIENT TUBE, SOURCE CLAD
AL 4 1.0 297.0 END
'CENTER ROD
ZR 5 1.0 297.0 END
'GRAPHITE CORE REFLECTOR, FUEL ELEMENT REFLECTORS
C 6 DEN=1.6 1.0 297.0 END
'FUEL FOLLOWER - FUEL
U-235 7 0.0 3.756E-4 297. END
U-238 7 0.0 1.494E-3 297. END
ZR 7 0.0 3.492E-2 297. END
H 7 0.0 5.762E-2 297. END
'POISON IN FUEL FOLLOWER AND AIR FOLLOWER
B4C 8 DEN=2.48 1.0 297. END
'MATERIAL FOR PELLET - CLAD GAP, VOID AND TRANSIENT AIR ROD
H2O 9 DEN=1.0E-20 1.0 297. END
'MATERIAL FOR TIPS OF STEEL FUEL ELEMENT
H2O 10 1.0 297. END
'MATERIAL FOR TIPS OF SOURCE ELEMENT
H2O 11 1.0 297. END
END COMP
'LATTICE CELL CARD IGNORES ZIRC ROD IN MIDDLE - SUBSTITUTES FUEL MATRIX
TRIANGPITCH 3.9775 3.6449 1 3 3.75412 2 3.65252 9 END
MORE DATA
RES=7 CYLINDER 1.69545 DAN(7)=5.57216E-01
END MORE
TRIGA BENCHMARK CORE 132
READ PARAM TME=170.0 GEN=403 NFG=1000 RUN=YES FLT=NO
END PARAM
READ GEOM
UNIT 1
COM='TRIGA FUEL ELEMENT'
CYLINDER 5 1 0.3175 2P19.05
CYLINDER 1 1 1.8225 2P19.05
CYLINDER 6 1 1.8225 +27.888 -27.864
CYLINDER 9 1 1.8263 +27.888 -27.864
CYLINDER 2 1 1.8771 2P30.64
CYLINDER 10 1 1.8771 2P36.03
UNIT 2
COM='TRIGA FUEL FOLLOWER'
CYLINDER 5 1 0.3175 2P19.05
CYLINDER 7 1 1.6650 2P19.05
CYLINDER 9 1 1.6650 +19.6850 -19.0500
CYLINDER 2 1 1.6650 +20.9550 -21.5900
CYLINDER 8 1 1.6650 +59.0550 -21.5900
CYLINDER 9 1 1.6650 +59.3725 -21.5900
CYLINDER 2 1 1.6650 +60.6424 -21.5900
CYLINDER 9 1 1.6955 +69.1250 -36.8300
CYLINDER 2 1 1.7463 +73.0250 -38.1000
UNIT 3
COM='TRIGA TRANSIENT AIR ROD + TUBE'
CYLINDER 9 1 1.5164 2P19.05
CYLINDER 9 1 1.5164 +19.6850 -19.0500
CYLINDER 4 1 1.5164 +20.9550 -21.5900
CYLINDER 8 1 1.5164 +59.0550 -21.5900
CYLINDER 9 1 1.5164 +59.3725 -21.5900
CYLINDER 4 1 1.5164 +60.6424 -21.5900
CYLINDER 9 1 1.5164 +69.1250 -36.8300
CYLINDER 4 1 1.5875 +73.0250 -38.1000
CYLINDER 3 1 1.6000 +73.0250 -38.1000
CYLINDER 4 1 1.9000 +73.0250 -38.1000
UNIT 4
COM='SOURCE ROD'
CYLINDER 9 1 1.8263 +27.888 -27.864
CYLINDER 4 1 1.8771 2P30.64
CYLINDER 11 1 1.8771 2P36.03
UNIT 5
COM='WATER FOR EMPTY LOCATIONS'
CYLINDER 3 1 1.8771 2P36.03
GLOBAL UNIT 10
COM='ACTIVE CORE CONFIGURATION'
CYLINDER 3 1 22.06 73.025 -36.10
'RING A
HOLE 1 0.0000 0.0000 0.0000
'RING B
HOLE 1 3.5109 2.0270 0.0000
HOLE 1 0.0000 4.0540 0.0000
HOLE 1 -3.5109 2.0270 0.0000
HOLE 1 -3.5109 -2.0270 0.0000
```



```

HOLE 1 0.0000 -4.0540 0.0000
HOLE 1 3.5109 -2.0270 0.0000
* RING C
HOLE 2 7.9810 0.0000 0.0000
HOLE 1 6.9117 3.9905 0.0000
HOLE 1 3.9905 6.9117 0.0000
HOLE 1 0.0000 7.9810 0.0000
HOLE 1 -3.9905 6.9117 0.0000
HOLE 1 -6.9117 3.9905 0.0000
HOLE 3 -7.9810 0.0000 0.0000
HOLE 1 -6.9117 -3.9905 0.0000
HOLE 1 -3.9905 -6.9117 0.0000
HOLE 1 0.0000 -7.9810 0.0000
HOLE 1 3.9905 -6.9117 0.0000
HOLE 1 6.9117 -3.9905 0.0000
* RING D
HOLE 1 11.7566 2.0730 0.0000
HOLE 1 10.3386 5.9690 0.0000
HOLE 1 7.6736 9.1450 0.0000
HOLE 1 4.0830 11.2181 0.0000
HOLE 2 0.0000 11.9380 0.0000
HOLE 1 -4.0830 11.2181 0.0000
HOLE 1 -7.6736 9.1450 0.0000
HOLE 1 -10.3386 5.9690 0.0000
HOLE 1 -11.7566 2.0730 0.0000
HOLE 1 -11.7566 -2.0730 0.0000
HOLE 1 -10.3386 -5.9690 0.0000
HOLE 1 -7.6736 -9.1450 0.0000
HOLE 1 -4.0830 -11.2181 0.0000
HOLE 2 0.0000 -11.9380 0.0000
HOLE 1 4.0830 -11.2181 0.0000
HOLE 1 7.6736 -9.1450 0.0000
HOLE 1 10.3386 -5.9690 0.0000
HOLE 1 11.7566 -2.0730 0.0000
* RING E
HOLE 5 15.9160 0.0000 0.0000
HOLE 5 15.3737 4.1194 0.0000
HOLE 5 13.7837 7.9580 0.0000
HOLE 5 11.2543 11.2543 0.0000
HOLE 5 7.9580 13.7837 0.0000
HOLE 5 4.1194 15.3737 0.0000
HOLE 5 0.0000 15.9160 0.0000
HOLE 4 -4.1194 15.3737 0.0000
HOLE 5 -7.9580 13.7837 0.0000
HOLE 1 -11.2543 11.2543 0.0000
HOLE 1 -13.7837 7.9580 0.0000
HOLE 1 -15.3737 4.1194 0.0000
HOLE 1 -15.9160 0.0000 0.0000
HOLE 1 -15.3737 -4.1194 0.0000
HOLE 1 -13.7837 -7.9580 0.0000
HOLE 1 -11.2543 -11.2543 0.0000
HOLE 5 -7.9580 -13.7837 0.0000
HOLE 5 -4.1194 -15.3737 0.0000
HOLE 5 0.0000 -15.9160 0.0000
HOLE 5 4.1194 -15.3737 0.0000
HOLE 5 7.9580 -13.7837 0.0000
HOLE 5 11.2543 -11.2543 0.0000
HOLE 5 13.7837 -7.9580 0.0000
HOLE 5 15.3737 -4.1194 0.0000
* RADIAL REFLECTORS EXTENDED BEYOND FUEL FOLLOWER HEIGHT
CYLINDER 4 1 32.66 73.025 -38.10
CYLINDER 6 1 53.23 73.025 -38.10
CYLINDER 4 1 54.50 73.025 -38.10
CUBOID 3 1 4P100.0 +200.00 -100.00
END GEOM
READ BOUNDS ALL=VOID END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CORE CENTER'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=300
XUL=-5.0 YUL=5.0 ZUL=0.0
XLR=5.0 YLR=-5.0 ZLR=0.0 END
TTL='X-Y PLOT OF ACTIVE CORE'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=300
XUL=-20.0 YUL=20.0 ZUL=0.0
XLR=20.0 YLR=-20.0 ZLR=0.0 END
TTL='X-Y PLOT OF CORE'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=300
XUL=-55.0 YUL=55.0 ZUL=0.0
XLR=55.0 YLR=-55.0 ZLR=0.0 END
TTL='Y-Z PLOT OF CORE'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-30.0 ZUL=30.0
XLR=0.0 YLR=+30.0 ZLR=-30.0 END
TTL='Y-Z PLOT OF CORE (INCLUDING FOLLOWER)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-30.0 ZUL=80.0
XLR=0.0 YLR=+30.0 ZLR=-40.0 END
TTL='X-Z PLOT OF CORE'
SCR=YES PIC=MAT LPI=10
UAX=1.0 WDN=-1.0

```

YUL=-20.0 YUL=0.0 ZUL=30.0  
XLR=+20.0 YLR=0.0 ZLR=-30.0  
END PLOT  
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.

MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.59 (SECONDS).

SECONDARY MODULE 000002 HAS BEEN CALLED.

MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 18.62 (SECONDS).

SECONDARY MODULE 000009 HAS BEEN CALLED.

MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 4709.75 (SECONDS).

MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 4732.60 (SECONDS).

```

CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  55555555555
CC         CC  SS       SS  AA       AA  SS       SS  22       22  55
CC         SS  SS       AA  AA       AA  SS       SS  22       55
CC         SS  SS       AA  AA       AA  SS       SS  22       55
CC         SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  22       55555555555
CC         SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  22       55555555555
CC         SS  AA       AA  SS       SS  22       55
CC         SS  SS  AA       AA  SS       SS  22       55
CC         CC  SS  SS  AA       AA  SS       SS  22       55
CCCCCCCCC  SSSSSSSSS  AA       AA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AA       AA  SSSSSSSSS  222222222  55555555555
    
```

```

SSSSSSSSS  CCCCCCCCC  AAAAAAAAA  LL         EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AAAAAAAAA  LL         EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SS         SS  CC       CC  AA       AA  LL         EE         PP         PP  CC       CC
SS         CC  CC       AA  AA       AA  LL         EE         PP         PP  CC       CC
SS         CC  AA       AA  AA       AA  LL         EE         PP         PP  CC       CC
SSSSSSSSS  CC         AAAAAAAAA  LL         EEEEEEEEE  PPPPPPPPP  CC
SSSSSSSSS  CC         AAAAAAAAA  LL         EEEEEEEEE  PPPPPPPPP  CC
SS         SS  CC       AA  AA       AA  LL         EE         PP         CC
SS         SS  CC       AA  AA       AA  LL         EE         PP         CC
SS         CC  CC       AA  AA       AA  LL         EE         PP         CC
SSSSSSSSS  CCCCCCCCC  AA       AA  LLLLLLLLL  EEEEEEEEE  PP         CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AA       AA  LLLLLLLLL  EEEEEEEEE  PP         CCCCCCCCC
    
```

```

11         11         //         0000000         44         //         9999999999         77777777777
111        111        //         000000000         444        //         9999999999999         77777777777
1111       1111       //         00         00         4444         //         99         99         77         77
11         11         //         00         00         44         44         //         99         99         77         77
11         11         //         00         00         44         44         //         99         99         77         77
11         11         //         00         00         44         44         //         9999999999999         77
11         11         //         00         00         44         44         //         9999999999999         77
11         11         //         00         00         44444444444         //         99         77
11         11         //         00         00         4444444444444         //         99         77
11         11         //         00         00         4444444444444         //         99         77
11         11         //         00         00         44         //         99         77
111111111  111111111  //         000000000         44         //         9999999999999         77
111111111  111111111  //         0000000         44         //         9999999999999         77
    
```

```

11         77777777777  2222222222  99999999999  0000000  11
111        77777777777  22222222222  99999999999  000000000  111
1111       77         77         :::         22         22         99         99         :::         00         00         1111
11         77         77         :::         22         22         99         99         :::         00         00         11
11         77         77         :::         22         22         99         99         :::         00         00         11
11         77         77         :::         22         22         9999999999999  00         00         11
11         77         77         :::         22         22         9999999999999  00         00         11
11         77         77         :::         22         22         9999999999999  00         00         11
11         77         77         :::         22         22         9999999999999  00         00         11
11         77         77         :::         22         22         9999999999999  00         00         11
111111111  77         77         :::         22222222222  9999999999999  000000000  111111111
111111111  77         77         :::         22222222222  9999999999999  0000000         111111111
    
```



```
'FUEL ELEMENT - FUEL
'FUEL ELEMENT / FOLLOWER - CLAD, FUEL FOLLOWER SEPERATOR
'MODERATOR
'CORE REFLECTOR GRAPHITE SHELL, GRID PLATES, TRANSIENT TUBE, SOURCE CLAD
'CENTER ROD
'GRAPHITE CORE REFLECTOR, FUEL ELEMENT REFLECTORS
'FUEL FOLLOWER - FUEL
'POISON IN FUEL FOLLOWER AND AIR FOLLOWER
'MATERIAL FOR PELLET - CLAD GAP, VOID AND TRANSIENT AIR ROD
'MATERIAL FOR TIPS OF STEEL FUEL ELEMENT
'MATERIAL FOR TIPS OF SOURCE ELEMENT
'LATTICE CELL CARD IGNORES ZIRC ROD IN MIDDLE - SUBSTITUTES FUEL MATRIX
'FUEL ELEMENT - FUEL
  TRIGA BENCHMARK CORE 132

**** PROBLEM PARAMETERS ****
LIB 27GROUPDF4  LIBRARY
MXK           11 MIXTURES
MSC           17 COMPOSITION SPECIFICATIONS
IZM           4 MATERIAL ZONES
GE LATTICECELL GEOMETRY
MORE          1 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLN          0 FUEL SOLUTIONS

**** PROBLEM COMPOSITION DESCRIPTION ****

SC U-235      STANDARD COMPOSITION
MX           1 MIXTURE NO.
DEN 3.6820E-04 ATOMIC DENSITY
ROTH 1.0000 THEORETICAL DENSITY
NEL 1 NO. ELEMENTS
ICF 1 0/1 MIXTURE/COMPOUND
TEMP 297.0 DEG KELVIN
          92235 1.00 ATOM/MOLECULE
END

SC U-238      STANDARD COMPOSITION
MX           1 MIXTURE NO.
DEN 1.4630E-03 ATOMIC DENSITY
ROTH 1.0000 THEORETICAL DENSITY
NEL 1 NO. ELEMENTS
ICF 1 0/1 MIXTURE/COMPOUND
TEMP 297.0 DEG KELVIN
          92238 1.00 ATOM/MOLECULE
END

SC ZR        STANDARD COMPOSITION
MX           1 MIXTURE NO.
DEN 3.5020E-02 ATOMIC DENSITY
ROTH 6.4900 THEORETICAL DENSITY
NEL 1 NO. ELEMENTS
ICF 1 0/1 MIXTURE/COMPOUND
TEMP 297.0 DEG KELVIN
          40000 1.00 ATOM/MOLECULE
END

SC H         STANDARD COMPOSITION
MX           1 MIXTURE NO.
DEN 5.7780E-02 ATOMIC DENSITY
ROTH 1.0000 THEORETICAL DENSITY
NEL 1 NO. ELEMENTS
ICF 1 0/1 MIXTURE/COMPOUND
TEMP 297.0 DEG KELVIN
          1001 1.00 ATOM/MOLECULE

'FUEL ELEMENT / FOLLOWER - CLAD, FUEL FOLLOWER SEPERATOR
  END

SC SS304     STANDARD COMPOSITION
MX           2 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 7.9200 THEORETICAL DENSITY
NEL 4 NO. ELEMENTS
ICF 0 0/1 MIXTURE/COMPOUND
TEMP 297.0 DEG KELVIN
          24304 19.000 WT%
          25055  3.000 WT%
          26304 69.500 WT%
          28304  9.500 WT%

'MODERATOR
  END
```

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9882 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

\*CORE REFLECTOR GRAPHITE SHELL, GRID PLATES, TRANSIENT TUBE, SOURCE CLAD  
END

SC AL STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

\*CENTER ROD  
END

SC ZR STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 6.4900 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
40000 1.00 ATOM/MOLECULE

\*GRAPHITE CORE REFLECTOR, FUEL ELEMENT REFLECTORS  
END

SC C STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 1.6000 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
6012 1.00 ATOM/MOLECULE

\*FUEL FOLLOWER - FUEL  
END

SC U-235 STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
DEN 3.7580E-04 ATOMIC DENSITY  
ROTH 1.0000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
92235 1.00 ATOM/MOLECULE  
END

SC U-238 STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
DEN 1.4940E-03 ATOMIC DENSITY  
ROTH 1.0000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
92238 1.00 ATOM/MOLECULE  
END

SC ZR STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
DEN 3.4920E-02 ATOMIC DENSITY  
ROTH 6.4900 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
40000 1.00 ATOM/MOLECULE  
END

SC H STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
DEN 5.7620E-02 ATOMIC DENSITY  
ROTH 1.0000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
1001 1.00 ATOM/MOLECULE

\*POISON IN FUEL FOLLOWER AND AIR FOLLOWER  
END

SC B4C STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.4800 SPECIFIED DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 297.0 DEG KELVIN  
5000 4.00 ATOMS/MOLECULE

```

                    5010  18.431 WT%
                    5011  81.569 WT%
        6012      1.00 ATOM/MOLECULE

'MATERIAL FOR PELLET - CLAD GAP, VOID AND TRANSIENT AIR ROD
END

SC H2O          STANDARD COMPOSITION
MX              9 MIXTURE NO.
VF              1.0000 VOLUME FRACTION
ROTH           0.0000 SPECIFIED DENSITY
NEL            2 NO. ELEMENTS
ICP            1 0/1 MIXTURE/COMPOUND
TEMP           297.0 DEG KELVIN
              1001      2.00 ATOMS/MOLECULE
              8016      1.00 ATOM/MOLECULE

'MATERIAL FOR TIPS OF STEEL FUEL ELEMENT
END

SC H2O          STANDARD COMPOSITION
MX              10 MIXTURE NO.
VF              1.0000 VOLUME FRACTION
ROTH           0.9982 THEORETICAL DENSITY
NEL            2 NO. ELEMENTS
ICP            1 0/1 MIXTURE/COMPOUND
TEMP           297.0 DEG KELVIN
              1001      2.00 ATOMS/MOLECULE
              8016      1.00 ATOM/MOLECULE

'MATERIAL FOR TIPS OF SOURCE ELEMENT
END

SC H2O          STANDARD COMPOSITION
MX              11 MIXTURE NO.
VF              1.0000 VOLUME FRACTION
ROTH           0.9982 THEORETICAL DENSITY
NEL            2 NO. ELEMENTS
ICP            1 0/1 MIXTURE/COMPOUND
TEMP           297.0 DEG KELVIN
              1001      2.00 ATOMS/MOLECULE
              8016      1.00 ATOM/MOLECULE

END

**** PROBLEM GEOMETRY ****

'LATTICE CELL CARD IGNORES ZIRC ROD IN MIDDLE - SUBSTITUTES FUEL MATRIX
CTP TRIANGPITCH CELL TYPE
PITCH          3.9775 CM CENTER TO CENTER SPACING
FUELOD         3.6449 CM FUEL DIAMETER OR SLAB THICKNESS
MFUEL          1 MIXTURE NO. OF FUEL
MMOD           3 MIXTURE NO. OF MODERATOR
CLADOD         3.7541 CM CLAD OUTER DIAMETER
MCLAD          2 MIXTURE NO. OF CLAD
GAPOD          3.6525 CM GAP OUTER DIAMETER
MGAP           9 MIXTURE NO. OF GAP

**** SPECIAL PARAMETERS ****

ISN            8 ORDER OF ANGULAR QUADRATURE
IIM            20 INNER ITERATION MAXIMUM
ICM            25 OUTER ITERATION MAXIMUM
SZF            1.00000E+00 SIZE FACTOR FOR SPATIAL MESH
EPS            1.00000E-04 OVERALL PROBLEM CONVERGENCE
PTC            1.00000E-04 SCALAR FLUX CONVERGENCE
BKL            1.42089E+00 BUCKLING FACTOR
IUS            0 THERMAL UPSCATTER SCALING
BAL           FINE BALANCE TABLE PRINT FLAG
DY             0.00000E+00 BUCKLING HEIGHT
DZ             0.00000E+00 BUCKLING DEPTH
IPN            0 DIFFUSION COEFFICIENT OPTION
FRD            0 LOGICAL UNIT NUMBER TO READ FLUX GUESS
FWP           -1 LOGICAL UNIT NUMBER TO WRITE FLUX GUESS
MSH            2001 NUMBER OF INTERVALS FOR RES. INTGRNS
MLV            2 MAX LVALUE FOR RES. INTGRNS
AKS            0 LOGICAL UNIT NUMBER TO WRITE ANISN LIB
RES            7 MIXTURE WITH SPECIAL RESONANCE CORRECTION
*             CYLINDER GEOMETRY FOR SPECIAL RESONANCE CORRECTION
*             1.69545E+00 DIMENSION (LBAR) FOR SPECIAL RESONANCE CORRECTION

DANCOFF FACTOR SPECIFICATION
MIXTURE       FACTOR
              7      0.55722

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL
ZONE 2 IS GAP
ZONE 3 IS CLAD
ZONE 4 IS MOD

```

```

.....
***
***              TRIGA BENCHMARK CORE 132
***
.....
***              ***** DATA LIBRARY INFORMATION *****
***
***              UNIT NUMBER          DATA SET NAME          VOLUME
***              -----          -----          -----
***              UNIT FUNCTION
***
***              89      G:\scale43\DATA LIB\FT89F001          STANDARD COMPOSITION LIBRARY
***
***              82      G:\scale43\DATA LIB\FT82F001          CROSS SECTION LIBRARY
***
***              11      C:\PROJECTS\triga\sg61102.13.5.2\core132b\FT          SHOPT CROSS SECTION LIBRARY
***
***              90      C:\PROJECTS\triga\sg61102.13.5.2\core132b\FT          INPUT DATA DIRECT ACCESS
***
.....
***
***              STANDARD COMPOSITION LIBRARY DATA
***              -----
***
***              UNIT NUMBER : 89
***
***              DATASET NAME : G:\scale43\DATA LIB\FT89F001
***
***              LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
***              637 STANDARD COMPOSITIONS, 490 NUCLIDES
***              90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***              CREATION DATE: 6/30/95
***
***
***              CROSS SECTION LIBRARY DATA
***              -----
***
***              UNIT NUMBER : 82
***
***              DATASET NAME : G:\scale43\DATA LIB\FT82F001
***
***              LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***              BASED ON ENDF-B VERSION 4 DATA
***              COMPILED FOR NRC 1/27/89
***              LAST UPDATED
***              L.M.PETRIE - ORNL
***              08/12/94
***
.....

```

```

..... 0 IO'S WERE USED BEFORE READING KENO V DATA .....
..... 0 IO'S WERE USED READING THE KENO V PARAMETER DATA .....

```

```

'RING A
' RING B
' RING C
' RING D
' RING E
' RADIAL REFLECTORS EXTENDED BEYOND FUEL FOLLOWER HEIGHT

```

```

***** 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.







```

.....
***
***              TRIGA BENCHMARK CORE 132              ***
***
.....
***              ***** NUMERIC PARAMETERS *****              ***
***
***      TME      MAXIMUM PROBLEM TIME (MIN)              170.00      ***
***
***      TBA      TIME PER GENERATION (MIN)                0.50      ***
***
***      GEN      NUMBER OF GENERATIONS                    403      ***
***
***      HPG      NUMBER PER GENERATION                    1000     ***
***
***      HSK      NUMBER OF GENERATIONS TO BE SKIPPED      3      ***
***
***      BEG      BEGINNING GENERATION NUMBER              1      ***
***
***      RES      GENERATIONS BETWEEN CHECKPOINTS          0      ***
***
***      X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS      1      ***
***
***      NBK      NEUTRON BANK SIZE                        1025     ***
***
***      NNB      EXTRA POSITIONS IN NEUTRON BANK         0      ***
***
***      NFB      FISSION BANK SIZE                        1000     ***
***
***      NFE      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                    BB27100001 ***
***
***      NBS      NUMBER OF D.A. BLOCKS ON UNIT 8          200      ***
***
***      NLS      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      ***
***
.....

```

```

.....
***
***                                TRIGA BENCHMARK CORE 132                                ***
***
***** 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            HUE COMPUTE NU-BAR & AVG FISSION  YES ***
***
*** MKU COMPUTE MATRIX K-EFF BY UNIT NUMBER    NO            MKP COMPUTE MATRIX K-EFF BY UNIT   NO ***
***
*** CKU COMPUTE COFACTOR K-EFF BY UNIT NUMBER  NO            CKP COMPUTE COFACTOR K-EFF BY UNIT NO ***
***
*** FMU PRINT FISSION PROD MATRIX BY UNIT NUMB NO            FMP PRINT FISSION PROD MATRIX BY   NO ***
***
*** MKH COMPUTE MATRIX K-EFF BY HOLE NUMBER     NO            MKA COMPUTE MATRIX K-EFF BY ARRAY NO ***
***
*** CKH COMPUTE COFACTOR K-EFF BY HOLE NUMBER  NO            CKA COMPUTE COFACTOR K-EFF BY ARR NO ***
***
*** FMH PRINT FISSION PROD MATRIX BY HOLE NUMB NO            FMA PRINT FISSION PROD MATRIX BY   NO ***
***
*** HHL COLLECT MATRIX BY HIGHEST HOLE LEVEL   NO            HAL COLLECT MATRIX BY HIGHEST ARR NO ***
***
*** AMX PRINT ALL MIXED CROSS SECTIONS          NO            FAR PRINT FIS. AND ABS. BY REGION NO ***
***
*** XS1 PRINT 1-D MIXTURE X-SECTIONS           NO            GAS PRINT FAR BY GROUP              NO ***
***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS           NO            PAX PRINT XSEC-ALBEDO CORRELATION NO ***
***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES    NO            PWT PRINT WEIGHT AVERAGE ARRAY     NO ***
***
*** PKI PRINT FISSION SPECTRUM                 NO            PGM PRINT INPUT GEOMETRY            NO ***
***
*** P1D PRINT EXTRA 1-D CROSS SECTIONS         NO            BUG PRINT DEBUG INFORMATION         NO ***
***
***                                           TRK PRINT TRACKING INFORMATION      NO ***
***
.....

```

PARAMETER INPUT COMPLETED

..... 0 IO'S WERE USED READING THE PARAMETER DATA .....

\*\*\*\*\* DATA READING COMPLETED \*\*\*\*\*



TRIGA BENCHMARK CORE 132

MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD = 3.0E-05

MIXTURE =	1	DENSITY (G/CC) =	6.1233			NUCLIDE TITLE		
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT				
08/12/94	1001001	5.77800E-02	1.57889E-02	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	1040000	3.50200E-02	8.66297E-01	40000	91.2196	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED
08/12/94	1092235	3.68200E-04	2.34691E-02	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED
08/12/94	1092238	1.46300E-03	9.44446E-02	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED
MIXTURE =	2	DENSITY (G/CC) =	7.9200			NUCLIDE TITLE		
08/12/94	2024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED	
08/12/94	2025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED
08/12/94	2026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED	
08/12/94	2028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED	
MIXTURE =	3	DENSITY (G/CC) =	0.99917			NUCLIDE TITLE		
08/12/94	3001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	3008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE =	4	DENSITY (G/CC) =	2.7020			NUCLIDE TITLE		
08/12/94	4013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375 (5)	UPDATED	
MIXTURE =	5	DENSITY (G/CC) =	6.4900			NUCLIDE TITLE		
08/12/94	5040000	4.28457E-02	1.00000E+00	40000	91.2196	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED
MIXTURE =	6	DENSITY (G/CC) =	1.6000			NUCLIDE TITLE		
08/12/94	6006012	8.02952E-02	1.00000E+00	6000	12.0001	CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED
MIXTURE =	7	DENSITY (G/CC) =	6.1231			NUCLIDE TITLE		
08/12/94	7001001	5.76200E-02	1.57457E-02	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	7040000	3.49200E-02	8.63851E-01	40000	91.2196	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED
08/12/94	7092235	3.75800E-04	2.39543E-02	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED
08/12/94	7092238	1.49400E-03	9.64488E-02	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED
MIXTURE =	8	DENSITY (G/CC) =	2.4800			NUCLIDE TITLE		
08/12/94	8005010	2.15194E-02	1.44273E-01	5010	10.0130	B-10 1273 218NGP 042375 P-3 293K	UPDATED	
08/12/94	8005011	8.66182E-02	6.38512E-01	5011	11.0096	BORON-11	ENDF/B-IV MAT 1160	UPDATED
08/12/94	8006012	2.70344E-02	2.17215E-01	6000	12.0001	CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED
MIXTURE =	9	DENSITY (G/CC) =	0.99937E-20			NUCLIDE TITLE		
08/12/94	9001001	6.68896E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	9008016	3.34448E-22	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE =	10	DENSITY (G/CC) =	0.99817			NUCLIDE TITLE		
08/12/94	10001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	10008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE =	11	DENSITY (G/CC) =	0.99817			NUCLIDE TITLE		
08/12/94	11001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94	11008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED

1001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
3001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
7001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
9001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
10001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
11001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
8005010	B-10 1273 218HGP 042375 P-3 293K		UPDATED 08/12/94
8005011	BORON-11	ENDF/B-IV MAT 1160	UPDATED 08/12/94
6006012	CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94
8006012	CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94
3008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
9008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
10008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
11008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
4013027	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94
2024304	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
2025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
2026304	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
2028304	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
1040000	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94
5040000	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94
7040000	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94
1092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
7092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
1092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94
7092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      1 WERE CORRECTED FOR BAD MOMENTS.

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      7 WERE CORRECTED FOR BAD MOMENTS.

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      3 WERE CORRECTED FOR BAD MOMENTS.

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      9 WERE CORRECTED FOR BAD MOMENTS.

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      10 WERE CORRECTED FOR BAD MOMENTS.

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      11 WERE CORRECTED FOR BAD MOMENTS.

..... 0 IO'S WERE USED MIXING CROSS-SECTIONS .....

1-D CROSS SECTION ARRAY ID NUMBERS  
1 2002 1452 27 18 1018

..... 0 IO'S WERE USED PREPARING THE CROSS SECTIONS .....

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*****
***          TFIGA BENCHMARK CORE 132          ***
*****
***** ADDITIONAL INFORMATION *****
*****
*** NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          NO ***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1      GLOBAL APRAY NUMBER          0 ***
*** NO. OF SCATTERING ANGLES IN XSECS    2      NUMBER OF UNITS IN THE GLOBAL X DIR.  0 ***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 17      NUMBER OF UNITS IN THE GLOBAL Y DIR.  0 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK 10      NUMBER OF UNITS IN THE GLOBAL Z DIR.  0 ***
*** NUMBER OF MIXTUPES USED              11      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                  61 ***
*** TOTAL INPUT GEOMETRY REGIONS          34      MAXIMUM HOLE NESTING LEVEL        1 ***
*** NUMBER OF GEOMETRY REGIONS USED       34      USE NESTED ARRAYS                NO ***
*** LARGEST GEOMETRY UNIT NUMBER          10      NUMBER OF APRAYS USED            0 ***
*** LARGEST APRAY NUMBER                   1      MAXIMUM ARRAY NESTING LEVEL        0 ***
***
*** +X BOUNDARY CONDITION                  VOID    -X BOUNDARY CONDITION            VOID ***
*** +Y BOUNDARY CONDITION                  VOID    -Y BOUNDARY CONDITION            VOID ***
*** +Z BOUNDARY CONDITION                  VOID    -Z BOUNDARY CONDITION            VOID ***
*****

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TRIGA BENCHMARK CORE 132

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
----- UNIT 1 -----							
TRIGA FUEL ELEMENT							
1 CYLINDER	5	1	RADIUS = 0.31750	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2 CYLINDER	1	1	RADIUS = 1.8225	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3 CYLINDER	6	1	RADIUS = 1.8225	+Z = 27.888	-Z = -27.864	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4 CYLINDER	9	1	RADIUS = 1.8263	+Z = 27.888	-Z = -27.864	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
5 CYLINDER	2	1	RADIUS = 1.8771	+Z = 30.640	-Z = -30.640	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
6 CYLINDER	10	1	RADIUS = 1.8771	+Z = 36.030	-Z = -36.030	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
----- UNIT 2 -----							
TRIGA FUEL FOLLOWER							
1 CYLINDER	5	1	RADIUS = 0.31750	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2 CYLINDER	7	1	RADIUS = 1.6650	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3 CYLINDER	9	1	RADIUS = 1.6650	+Z = 19.685	-Z = -19.050	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4 CYLINDER	2	1	RADIUS = 1.6650	+Z = 20.955	-Z = -21.590	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
5 CYLINDER	8	1	RADIUS = 1.6650	+Z = 59.055	-Z = -21.590	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
6 CYLINDER	9	1	RADIUS = 1.6650	+Z = 59.373	-Z = -21.590	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
7 CYLINDER	2	1	RADIUS = 1.6650	+Z = 60.642	-Z = -21.590	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
8 CYLINDER	9	1	RADIUS = 1.6955	+Z = 69.125	-Z = -36.830	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
9 CYLINDER	2	1	RADIUS = 1.7463	+Z = 73.025	-Z = -38.100	CENTERLINE IS AT X = 0.00000 Y = 0.00000	

TRIGA BENCHMARK CORE 132

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 3 -----

TRIGA TRANSIENT AIR ROD + TUBE

1	CYLINDER	9	1	RADIUS = 1.5164	+Z = 19.050	-Z = -19.050	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
2	CYLINDER	9	1	RADIUS = 1.5164	+Z = 19.685	-Z = -19.050	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3	CYLINDER	4	1	RADIUS = 1.5164	+Z = 20.955	-Z = -21.590	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
4	CYLINDER	8	1	RADIUS = 1.5164	+Z = 59.055	-Z = -21.590	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
5	CYLINDER	9	1	RADIUS = 1.5164	+Z = 59.373	-Z = -21.590	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
6	CYLINDER	4	1	RADIUS = 1.5164	+Z = 60.642	-Z = -21.590	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
7	CYLINDER	9	1	RADIUS = 1.5164	+Z = 69.125	-Z = -36.830	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
8	CYLINDER	4	1	RADIUS = 1.5875	+Z = 73.025	-Z = -38.100	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
9	CYLINDER	3	1	RADIUS = 1.6000	+Z = 73.025	-Z = -38.100	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
10	CYLINDER	4	1	RADIUS = 1.9000	+Z = 73.025	-Z = -38.100	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

----- UNIT 4 -----

SOURCE ROD

1	CYLINDER	9	1	RADIUS = 1.8263	+Z = 27.888	-Z = -27.864	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
2	CYLINDER	4	1	RADIUS = 1.8771	+Z = 30.640	-Z = -30.640	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3	CYLINDER	11	1	RADIUS = 1.8771	+Z = 36.030	-Z = -36.030	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

----- UNIT 5 -----

WATER FOR EMPTY LOCATIONS

1	CYLINDER	3	1	RADIUS = 1.8771	+Z = 36.030	-Z = -36.030	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
---	----------	---	---	-----------------	-------------	--------------	------------------	-------------	-------------

TRIGA BENCHMARK CORE 132

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

\*\*\*\*\* GLOBAL \*\*\*\*\*  
----- UNIT 10 -----

ACTIVE CORE CONFIGURATION

HOLE NUMBER	IS UNIT NUMBER	AT X	Y	Z	CENTERLINE IS AT X	Y
1 CYLINDER	3 1	RADIUS = 22.060	+Z = 73.025	-Z = -38.100	0.00000	0.00000
HOLE NUMBER	1	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	2	AT X = 3.5109	Y = 2.0270	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	3	AT X = 0.00000	Y = 4.0540	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	4	AT X = -3.5109	Y = 2.0270	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	5	AT X = -3.5109	Y = -2.0270	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	6	AT X = 0.00000	Y = -4.0540	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	7	AT X = 3.5109	Y = -2.0270	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	8	AT X = 7.9810	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	2
HOLE NUMBER	9	AT X = 6.9117	Y = 3.9905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	10	AT X = 3.9905	Y = 6.9117	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	11	AT X = 0.00000	Y = 7.9810	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	12	AT X = -3.9905	Y = 6.9117	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	13	AT X = -6.9117	Y = 3.9905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	14	AT X = -7.9810	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	3
HOLE NUMBER	15	AT X = -6.9117	Y = -3.9905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	16	AT X = -3.9905	Y = -6.9117	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	17	AT X = 0.00000	Y = -7.9810	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	18	AT X = 3.9905	Y = -6.9117	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	19	AT X = 6.9117	Y = -3.9905	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	20	AT X = 11.757	Y = 2.0730	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	21	AT X = 10.339	Y = 5.9690	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	22	AT X = 7.6736	Y = 9.1450	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	23	AT X = 4.0830	Y = 11.218	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	24	AT X = 0.00000	Y = 11.938	Z = 0.00000	IS UNIT NUMBER	2
HOLE NUMBER	25	AT X = -4.0830	Y = 11.218	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	26	AT X = -7.6736	Y = 9.1450	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	27	AT X = -10.339	Y = 5.9690	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	28	AT X = -11.757	Y = 2.0730	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	29	AT X = -11.757	Y = -2.0730	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	30	AT X = -10.339	Y = -5.9690	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	31	AT X = -7.6736	Y = -9.1450	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	32	AT X = -4.0830	Y = -11.218	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	33	AT X = 0.00000	Y = -11.938	Z = 0.00000	IS UNIT NUMBER	2
HOLE NUMBER	34	AT X = 4.0830	Y = -11.218	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	35	AT X = 7.6736	Y = -9.1450	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	36	AT X = 10.339	Y = -5.9690	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	37	AT X = 11.757	Y = -2.0730	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	38	AT X = 15.916	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	5
HOLE NUMBER	39	AT X = 15.374	Y = 4.1194	Z = 0.00000	IS UNIT NUMBER	5
HOLE NUMBER	40	AT X = 13.784	Y = 7.9580	Z = 0.00000	IS UNIT NUMBER	5
HOLE NUMBER	41	AT X = 11.254	Y = 11.254	Z = 0.00000	IS UNIT NUMBER	5

HOLE NUMBER	42	AT X =	7.9580	Y =	13.784	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	43	AT X =	4.1194	Y =	15.374	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	44	AT X =	0.00000	Y =	15.916	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	45	AT X =	-4.1194	Y =	15.374	Z =	0.00000	IS UNIT NUMBER	4
HOLE NUMBER	46	AT X =	-7.9580	Y =	13.784	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	47	AT X =	-11.254	Y =	11.254	Z =	0.00000	IS UNIT NUMBER	1
HOLE NUMBER	48	AT X =	-13.784	Y =	7.9580	Z =	0.00000	IS UNIT NUMBER	1
HOLE NUMBER	49	AT X =	-15.374	Y =	4.1194	Z =	0.00000	IS UNIT NUMBER	1
HOLE NUMBER	50	AT X =	-15.916	Y =	0.00000	Z =	0.00000	IS UNIT NUMBER	1
HOLE NUMBER	51	AT X =	-15.374	Y =	-4.1194	Z =	0.00000	IS UNIT NUMBER	1
HOLE NUMBER	52	AT X =	-13.784	Y =	-7.9580	Z =	0.00000	IS UNIT NUMBER	1
HOLE NUMBER	53	AT X =	-11.254	Y =	-11.254	Z =	0.00000	IS UNIT NUMBER	1
HOLE NUMBER	54	AT X =	-7.9580	Y =	-13.784	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	55	AT X =	-4.1194	Y =	-15.374	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	56	AT X =	0.00000	Y =	-15.916	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	57	AT X =	4.1194	Y =	-15.374	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	58	AT X =	7.9580	Y =	-13.784	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	59	AT X =	11.254	Y =	-11.254	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	60	AT X =	13.784	Y =	-7.9580	Z =	0.00000	IS UNIT NUMBER	5
HOLE NUMBER	61	AT X =	15.374	Y =	-4.1194	Z =	0.00000	IS UNIT NUMBER	5
2 CYLINDER	4	1	RADIUS =	22.660	+Z =	73.025	-Z =	-38.100	CENTERLINE IS AT X = 0.00000 Y = 0.00000
3 CYLINDER	6	1	RADIUS =	53.230	+Z =	73.025	-Z =	-38.100	CENTERLINE IS AT X = 0.00000 Y = 0.00000
4 CYLINDER	4	1	RADIUS =	54.500	+Z =	73.025	-Z =	-38.100	CENTERLINE IS AT X = 0.00000 Y = 0.00000
5 CUBOID	3	1	+X =	100.00	-X =	-100.00	+Y =	100.00	-Y = -100.00 +Z = 200.00 -Z = -100.00

TRIGA BENCHMARK CORE 132  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1		1	1.20660E+01 CM**3	1.20660E+01 CM**3
		2	3.85501E+02 CM**3	3.97567E+02 CM**3
		3	1.84195E+02 CM**3	5.81762E+02 CM**3
		4	2.42853E+00 CM**3	5.84191E+02 CM**3
		5	9.41431E+01 CM**3	6.78334E+02 CM**3
		6	1.19328E+02 CM**3	7.97662E+02 CM**3
2		7	1.20660E+01 CM**3	1.20660E+01 CM**3
		8	3.19755E+02 CM**3	3.31821E+02 CM**3
		9	5.53033E+00 CM**3	3.37351E+02 CM**3
		10	3.31821E+01 CM**3	3.70533E+02 CM**3
		11	3.31821E+02 CM**3	7.02354E+02 CM**3
		12	2.76514E+00 CM**3	7.05119E+02 CM**3
		13	1.10598E+01 CM**3	7.16179E+02 CM**3
		14	2.40722E+02 CM**3	9.56901E+02 CM**3
		15	1.07731E+02 CM**3	1.06463E+03 CM**3
3		16	2.75234E+02 CM**3	2.75234E+02 CM**3
		17	4.58725E+00 CM**3	2.79821E+02 CM**3
		18	2.75234E+01 CM**3	3.07345E+02 CM**3
		19	2.75234E+02 CM**3	5.82579E+02 CM**3
		20	2.29358E+00 CM**3	5.84873E+02 CM**3
		21	9.17377E+00 CM**3	5.94046E+02 CM**3
		22	1.71372E+02 CM**3	7.65418E+02 CM**3
		23	1.14392E+02 CM**3	8.79910E+02 CM**3
		24	1.39099E+01 CM**3	8.93720E+02 CM**3
		25	3.66565E+02 CM**3	1.26029E+03 CM**3
4		26	5.84191E+02 CM**3	5.84191E+02 CM**3
		27	9.41431E+01 CM**3	6.78334E+02 CM**3
		28	1.19328E+02 CM**3	7.97662E+02 CM**3
5	1	29	7.97662E+02 CM**3	7.97662E+02 CM**3
10		30	1.19971E+05 CM**3	1.69892E+05 CM**3
		31	9.36731E+03 CM**3	1.79259E+05 CM**3
		32	8.09919E+05 CM**3	9.89178E+05 CM**3
		33	4.77641E+04 CM**3	1.03694E+06 CM**3
		34	1.09631E+07 CM**3	1.20000E+07 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	40	1	5	4.82639E+02 CM**3
		2	1	1.54200E+04 CM**3
		3	6	7.36782E+03 CM**3
		4	9	9.71411E+01 CM**3
		5	2	3.76573E+03 CM**3
		6	10	4.77313E+03 CM**3
2	3	1	5	3.61979E+01 CM**3
		2	7	9.59264E+02 CM**3
		3	9	1.65910E+01 CM**3
		4	2	9.95462E+01 CM**3
		5	8	9.95462E+02 CM**3
		6	9	8.29541E+00 CM**3
		7	2	3.31794E+01 CM**3
		8	9	7.22167E+02 CM**3
		9	2	3.23192E+02 CM**3
3	1	1	9	2.75234E+02 CM**3
		2	9	4.58725E+00 CM**3
		3	4	2.75234E+01 CM**3
		4	8	2.75234E+02 CM**3
		5	9	2.29358E+00 CM**3
		6	4	9.17377E+00 CM**3
		7	9	1.71372E+02 CM**3
		8	4	1.14392E+02 CM**3
		9	3	1.39099E+01 CM**3
		10	4	3.66565E+02 CM**3
4	1	1	9	5.84191E+02 CM**3
		2	4	9.41431E+01 CM**3
		3	11	1.19328E+02 CM**3
5	16	1	3	1.27626E+04 CM**3
10	1	1	3	1.19971E+05 CM**3
		2	4	9.36731E+03 CM**3
		3	6	8.09919E+05 CM**3
		4	4	4.77641E+04 CM**3
		5	3	1.09631E+07 CM**3

TOTAL MIXTURE VOLUMES  
MIXTURE TOTAL VOLUME MASS (G)  
1 1.54200E+04 CM\*\*3 9.44217E+04

2	4.22164E+03	CM**3	3.34354E+04
3	1.10958E+07	CM**3	1.10755E+07
4	5.77432E+04	CM**3	1.56022E+05
5	5.18837E+02	CM**3	3.36725E+03
6	8.17287E+05	CM**3	1.30767E+06
7	9.59264E+02	CM**3	5.87369E+03
8	1.27070E+03	CM**3	3.15139E+03
9	1.88187E+03	CM**3	1.88182E-17
10	4.77313E+03	CM**3	4.76440E+03
11	1.19328E+02	CM**3	1.19110E+02

```
.....  
***  
***          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  .....  
.....  0.01917 MINUTES WERE USED PROCESSING DATA.  .....
```

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 1.36494E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED UNIFORMLY THROUGHOUT THE ENTIRE VOLUME DEFINED BY THE OUTERMOST GEOMETRY CARD.  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 286 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

714 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

0.45383 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.48000 MINUTES.

TRIGA BENCHMARK CORE 132

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
1	9.90066E-01	6.69167E+01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.54729E-01	8.73333E+01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	1.01630E+00	1.06100E+00	1.01630E+00	0.00000E+00	0.00000E+00	0.00000E+00
4	1.02972E+00	1.25133E+00	1.02301E+00	6.71005E-03	0.00000E+00	0.00000E+00
5	1.00278E+00	1.43900E+00	1.01627E+00	7.77803E-03	0.00000E+00	0.00000E+00
6	1.01937E+00	1.64600E+00	1.01704E+00	5.55454E-03	0.00000E+00	0.00000E+00
7	1.03377E+00	1.87667E+00	1.02039E+00	5.44954E-03	0.00000E+00	0.00000E+00
8	1.00198E+00	2.09817E+00	1.01732E+00	5.40470E-03	0.00000E+00	0.00000E+00
9	1.01694E+00	2.31883E+00	1.01726E+00	4.56813E-03	0.00000E+00	0.00000E+00
10	1.01818E+00	2.57600E+00	1.01738E+00	3.95778E-03	0.00000E+00	0.00000E+00
11	1.00697E+00	2.77367E+00	1.01622E+00	3.67718E-03	0.00000E+00	0.00000E+00
12	9.96509E-01	2.97333E+00	1.01425E+00	3.83451E-03	0.00000E+00	0.00000E+00
13	1.00385E+00	3.17100E+00	1.01331E+00	3.59514E-03	0.00000E+00	0.00000E+00
14	9.81735E-01	3.38517E+00	1.01067E+00	4.20624E-03	0.00000E+00	0.00000E+00
15	1.00748E+00	3.56650E+00	1.01043E+00	3.87695E-03	0.00000E+00	0.00000E+00
16	1.03674E+00	3.75050E+00	1.01231E+00	4.05174E-03	0.00000E+00	0.00000E+00
17	1.03622E+00	3.93633E+00	1.01390E+00	4.09493E-03	0.00000E+00	0.00000E+00
18	1.03617E+00	4.15150E+00	1.01529E+00	4.07554E-03	0.00000E+00	0.00000E+00
19	1.06124E+00	4.36833E+00	1.01800E+00	4.68619E-02	0.00000E+00	0.00000E+00
20	1.05429E+00	4.57250E+00	1.02001E+00	4.85647E-03	0.00000E+00	0.00000E+00
21	1.04751E+00	4.77033E+00	1.02146E+00	4.81638E-03	0.00000E+00	0.00000E+00
22	1.01609E+00	4.98817E+00	1.02119E+00	4.57711E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING... ONLY 998 INDEPENDENT FISSION POINTS WERE GENERATED					
23	9.92956E-01	5.20050E+00	1.01985E+00	4.55660E-03	0.00000E+00	0.00000E+00
24	1.00897E+00	5.42200E+00	1.01935E+00	4.37256E-03	0.00000E+00	0.00000E+00
25	1.00615E+00	5.64183E+00	1.01978E+00	4.21738E-03	0.00000E+00	0.00000E+00
26	1.01045E+00	5.86050E+00	1.01943E+00	4.05272E-03	0.00000E+00	0.00000E+00
27	1.03570E+00	6.07017E+00	1.01912E+00	3.94911E-03	0.00000E+00	0.00000E+00
28	1.02711E+00	6.34667E+00	1.01943E+00	3.80563E-03	0.00000E+00	0.00000E+00
29	1.00323E+00	6.53800E+00	1.01883E+00	3.71080E-03	0.00000E+00	0.00000E+00
30	1.01250E+00	6.72100E+00	1.01860E+00	3.58296E-03	0.00000E+00	0.00000E+00
31	1.03971E+00	6.93800E+00	1.01933E+00	3.52295E-03	0.00000E+00	0.00000E+00
32	1.05112E+00	7.13933E+00	1.02039E+00	3.57380E-03	0.00000E+00	0.00000E+00
33	1.05016E+00	7.34167E+00	1.02135E+00	3.58750E-03	0.00000E+00	0.00000E+00
34	1.03762E+00	7.59800E+00	1.02186E+00	3.51056E-03	0.00000E+00	0.00000E+00
35	1.03970E+00	7.77833E+00	1.02240E+00	3.44521E-03	0.00000E+00	0.00000E+00
36	1.02001E+00	7.96517E+00	1.02233E+00	3.34309E-03	0.00000E+00	0.00000E+00
37	9.98559E-01	8.16650E+00	1.02165E+00	3.31645E-03	0.00000E+00	0.00000E+00
38	1.04102E+00	8.35317E+00	1.02219E+00	3.26760E-03	0.00000E+00	0.00000E+00
39	9.90869E-01	8.54633E+00	1.02134E+00	3.28887E-03	0.00000E+00	0.00000E+00
40	1.02550E+00	8.73400E+00	1.02145E+00	3.20302E-03	0.00000E+00	0.00000E+00
41	1.02549E+00	8.94733E+00	1.02156E+00	3.12152E-02	0.00000E+00	0.00000E+00
42	1.06222E+00	9.14967E+00	1.02257E+00	3.20781E-03	0.00000E+00	0.00000E+00
43	1.04336E+00	9.34550E+00	1.02308E+00	3.16942E-03	0.00000E+00	0.00000E+00
44	1.04717E+00	9.55617E+00	1.02265E+00	3.14577E-03	0.00000E+00	0.00000E+00
45	1.00780E+00	9.80050E+00	1.02328E+00	3.09379E-03	0.00000E+00	0.00000E+00
46	9.73152E-01	1.00128E+01	1.02214E+00	3.23026E-03	0.00000E+00	0.00000E+00
47	1.04382E+00	1.01942E+01	1.02263E+00	3.19419E-03	0.00000E+00	0.00000E+00
48	1.00242E+00	1.03955E+01	1.02219E+00	3.15471E-03	0.00000E+00	0.00000E+00
49	1.00848E+00	1.06143E+01	1.02190E+00	3.10061E-03	0.00000E+00	0.00000E+00
50	1.05426E+00	1.07983E+01	1.02257E+00	3.10931E-03	0.00000E+00	0.00000E+00
.						
.						
.						
375	1.04806E+00	7.31462E+01	1.01963E+00	1.31907E-03	0.00000E+00	0.00000E+00
376	1.02214E+00	7.33393E+01	1.01963E+00	1.31555E-03	0.00000E+00	0.00000E+00
377	1.03756E+00	7.35197E+01	1.01968E+00	1.31291E-03	0.00000E+00	0.00000E+00
378	1.01067E+00	7.37118E+01	1.01966E+00	1.30963E-03	0.00000E+00	0.00000E+00
379	1.01200E+00	7.38940E+01	1.01964E+00	1.30631E-03	0.00000E+00	0.00000E+00
380	9.67656E-01	7.40917E+01	1.01950E+00	1.31009E-03	0.00000E+00	0.00000E+00
381	9.71851E-01	7.43490E+01	1.01937E+00	1.31266E-03	0.00000E+00	0.00000E+00
382	1.01611E+00	7.45367E+01	1.01936E+00	1.30923E-03	0.00000E+00	0.00000E+00
383	1.04389E+00	7.47280E+01	1.01943E+00	1.30738E-03	0.00000E+00	0.00000E+00
384	1.04429E+00	7.49065E+01	1.01949E+00	1.30557E-03	0.00000E+00	0.00000E+00
385	1.02223E+00	7.50905E+01	1.01950E+00	1.30218E-03	0.00000E+00	0.00000E+00
386	1.01190E+00	7.52808E+01	1.01948E+00	1.29893E-03	0.00000E+00	0.00000E+00
387	9.76853E-01	7.54722E+01	1.01937E+00	1.30029E-03	0.00000E+00	0.00000E+00
388	9.80079E-01	7.56598E+01	1.01927E+00	1.30069E-03	0.00000E+00	0.00000E+00
389	9.99331E-01	7.58558E+01	1.01922E+00	1.29855E-03	0.00000E+00	0.00000E+00
390	1.01031E+00	7.60362E+01	1.01919E+00	1.29540E-03	0.00000E+00	0.00000E+00
391	1.00446E+00	7.62275E+01	1.01916E+00	1.29262E-03	0.00000E+00	0.00000E+00
392	1.01847E+00	7.64097E+01	1.01915E+00	1.28931E-03	0.00000E+00	0.00000E+00
393	1.02785E+00	7.66055E+01	1.01918E+00	1.28620E-03	0.00000E+00	0.00000E+00
394	1.00712E+00	7.67867E+01	1.01915E+00	1.28328E-03	0.00000E+00	0.00000E+00
395	1.00600E+00	7.69817E+01	1.01911E+00	1.28045E-03	0.00000E+00	0.00000E+00
396	1.00266E+00	7.71675E+01	1.01907E+00	1.27788E-03	0.00000E+00	0.00000E+00
397	1.03346E+00	7.73497E+01	1.01911E+00	1.27516E-03	0.00000E+00	0.00000E+00
398	9.94492E-01	7.75383E+01	1.01904E+00	1.27345E-03	0.00000E+00	0.00000E+00
399	1.00279E+00	7.77268E+01	1.01900E+00	1.27090E-03	0.00000E+00	0.00000E+00
400	9.95518E-01	7.79228E+01	1.01895E+00	1.26907E-03	0.00000E+00	0.00000E+00
401	1.00146E+00	7.81105E+01	1.01890E+00	1.26665E-03	0.00000E+00	0.00000E+00
402	1.01212E+00	7.83008E+01	1.01888E+00	1.26359E-03	0.00000E+00	0.00000E+00
403	1.03095E+00	7.84948E+01	1.01891E+00	1.26080E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

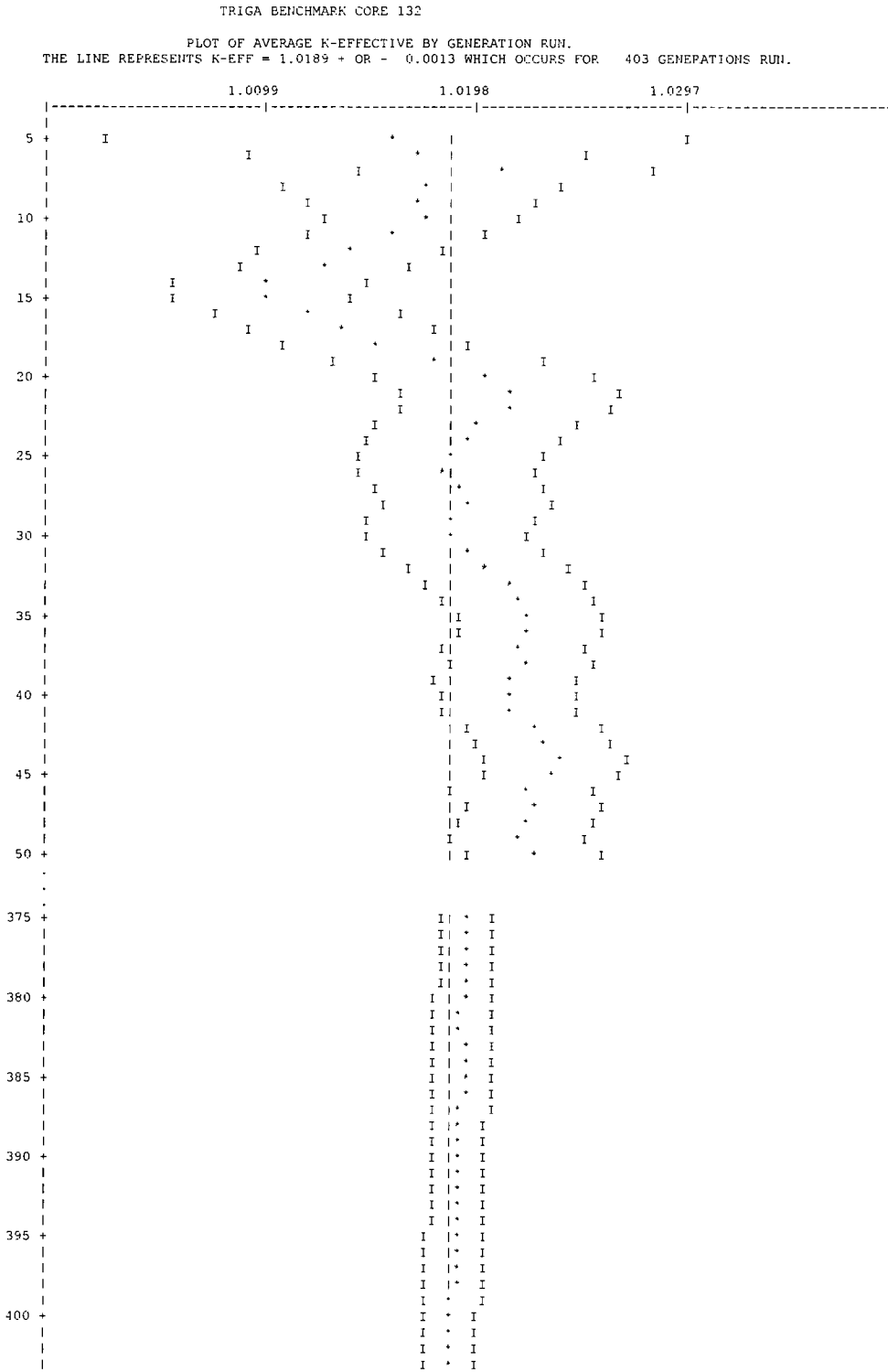
EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.



TRIGA BENCHMARK CORE 132

LIFETIME = 3.94638E-04 + OR - 1.93196E-06      GENERATION TIME = 5.91769E-05 + OR - 2.84702E-07  
 NU BAR = 2.42133E+00 + OR - 1.07360E-05      AVERAGE FISSION GROUP = 2.39237E+01 + OR - 1.86297E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 4.92227E-02 + OR - 8.38504E-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	1.01892	+ OR - 0.00126	1.01766 TO 1.02018	1.01639 TO 1.02145	1.01513 TO 1.02271	400000
4	1.01869	+ OR - 0.00127	1.01763 TO 1.02016	1.01636 TO 1.02143	1.01509 TO 1.02269	399000
5	1.01893	+ OR - 0.00127	1.01766 TO 1.02020	1.01640 TO 1.02147	1.01513 TO 1.02274	398000
6	1.01893	+ OR - 0.00127	1.01766 TO 1.02021	1.01639 TO 1.02148	1.01512 TO 1.02275	397000
7	1.01890	+ OR - 0.00128	1.01762 TO 1.02017	1.01635 TO 1.02145	1.01507 TO 1.02272	396000
8	1.01894	+ OR - 0.00128	1.01766 TO 1.02022	1.01638 TO 1.02149	1.01511 TO 1.02277	395000
9	1.01894	+ OR - 0.00128	1.01766 TO 1.02022	1.01638 TO 1.02151	1.01510 TO 1.02279	394000
10	1.01895	+ OR - 0.00128	1.01766 TO 1.02023	1.01638 TO 1.02151	1.01509 TO 1.02280	393000
11	1.01898	+ OR - 0.00129	1.01769 TO 1.02026	1.01640 TO 1.02155	1.01511 TO 1.02284	392000
12	1.01903	+ OR - 0.00129	1.01774 TO 1.02032	1.01646 TO 1.02161	1.01517 TO 1.02290	391000
17	1.01911	+ OR - 0.00130	1.01781 TO 1.02041	1.01651 TO 1.02171	1.01521 TO 1.02301	386000
22	1.01879	+ OR - 0.00131	1.01749 TO 1.02010	1.01618 TO 1.02141	1.01488 TO 1.02271	381000
27	1.01890	+ OR - 0.00132	1.01758 TO 1.02022	1.01626 TO 1.02154	1.01494 TO 1.02286	376000
32	1.01879	+ OR - 0.00133	1.01746 TO 1.02013	1.01613 TO 1.02146	1.01480 TO 1.02279	371000
37	1.01865	+ OR - 0.00134	1.01731 TO 1.02000	1.01596 TO 1.02134	1.01462 TO 1.02269	366000
42	1.01851	+ OR - 0.00135	1.01715 TO 1.01986	1.01580 TO 1.02122	1.01445 TO 1.02257	361000
47	1.01845	+ OR - 0.00136	1.01708 TO 1.01981	1.01572 TO 1.02117	1.01436 TO 1.02253	356000
52	1.01826	+ OR - 0.00137	1.01689 TO 1.01962	1.01552 TO 1.02099	1.01415 TO 1.02236	351000
57	1.01844	+ OR - 0.00138	1.01706 TO 1.01981	1.01568 TO 1.02119	1.01430 TO 1.02257	346000
62	1.01859	+ OR - 0.00139	1.01720 TO 1.01998	1.01582 TO 1.02136	1.01443 TO 1.02275	341000
67	1.01838	+ OR - 0.00139	1.01699 TO 1.01977	1.01559 TO 1.02117	1.01420 TO 1.02256	336000
72	1.01931	+ OR - 0.00138	1.01692 TO 1.01969	1.01554 TO 1.02108	1.01415 TO 1.02246	331000
77	1.01810	+ OR - 0.00139	1.01671 TO 1.01949	1.01531 TO 1.02089	1.01392 TO 1.02228	326000
82	1.01786	+ OR - 0.00141	1.01645 TO 1.01927	1.01504 TO 1.02068	1.01363 TO 1.02209	321000
87	1.01782	+ OR - 0.00142	1.01639 TO 1.01924	1.01497 TO 1.02066	1.01355 TO 1.02209	316000
92	1.01811	+ OR - 0.00142	1.01669 TO 1.01952	1.01528 TO 1.02094	1.01386 TO 1.02235	311000



TRIGA BENCHMARK CORE 132

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0007			6.81725E-04	1.4853	1.04545E-03	1.4928	1.99488E-06	100.0000
2	0.0026			2.67107E-03	0.4956	2.13243E-03	0.4103	0.00000E+00	0.0000
3	0.0029			2.98939E-03	0.3705	1.42941E-03	0.3850	4.14554E-06	70.9381
4	0.0014			1.43671E-03	0.4812	7.46236E-04	0.4800	0.00000E+00	0.0000
5	0.0011			1.08995E-03	0.3473	7.63441E-04	0.3447	0.00000E+00	0.0000
6	0.0013			1.31336E-03	0.2603	1.14364E-03	0.3140	4.51767E-06	70.8510
7	0.0014			1.37623E-03	0.2504	1.31768E-03	0.5203	2.16748E-06	100.0000
8	0.0014			1.42902E-03	0.2662	2.03957E-03	0.5155	0.00000E+00	0.0000
9	0.0020			1.99323E-03	0.2647	4.33175E-03	0.4412	0.00000E+00	0.0000
10	0.0042			4.23199E-03	0.2603	7.67783E-03	0.4133	0.00000E+00	0.0000
11	0.0089			9.10698E-03	0.2651	1.78049E-02	0.3152	0.00000E+00	0.0000
12	0.0125			1.27480E-02	0.3194	1.62040E-02	0.3492	0.00000E+00	0.0000
13	0.0123			1.24965E-02	0.3095	1.77071E-02	0.3515	0.00000E+00	0.0000
14	0.0103			1.04777E-02	0.2955	2.39434E-02	0.2961	0.00000E+00	0.0000
15	0.0020			1.99127E-03	0.3974	2.93190E-03	0.7563	0.00000E+00	0.0000
16	0.0013			1.36728E-03	0.4905	1.80865E-03	0.8180	0.00000E+00	0.0000
17	0.0021			2.15716E-03	0.7060	1.76437E-03	0.8976	0.00000E+00	0.0000
18	0.0029			2.93392E-03	0.7810	1.98813E-03	0.8501	0.00000E+00	0.0000
19	0.0035			3.57281E-03	0.5512	2.71908E-03	0.7157	0.00000E+00	0.0000
20	0.0150			1.52983E-02	0.3606	1.14311E-02	0.3683	0.00000E+00	0.0000
21	0.0084			8.59775E-03	0.5722	5.91742E-03	0.5320	0.00000E+00	0.0000
22	0.0218			2.21960E-02	0.4063	1.56538E-02	0.3761	0.00000E+00	0.0000
23	0.0934			9.51206E-02	0.2289	8.12793E-02	0.1547	0.00000E+00	0.0000
24	0.2190			2.23163E-01	0.1811	2.08073E-01	0.1064	1.08861E-06	100.0000
25	0.1994			2.03202E-01	0.1732	1.94962E-01	0.0978	1.34462E-06	100.0000
26	0.2626			2.67571E-01	0.1754	2.64169E-01	0.0991	0.00000E+00	0.0000
27	0.1057			1.07708E-01	0.2645	1.09243E-01	0.1501	0.00000E+00	0.0000
SYSTEM TOTAL =				1.01892E+00	0.1240	1.00023E+00	0.0424	1.52588E-05	35.9576

ELAPSED TIME 78.48766 MINUTES

RANDOM NUMBER= 88142D71A0C

TRIGA BENCHMARK CORE 132

FREQUENCY FOR GENERATIONS 4 TO 403

```
0.9284 TO 0.9365 *
0.9365 TO 0.9446
0.9446 TO 0.9527
0.9527 TO 0.9608
0.9608 TO 0.9689 *****
0.9689 TO 0.9770 *****
0.9770 TO 0.9851 *****
0.9851 TO 0.9932 *****
0.9932 TO 1.0013 *****
1.0013 TO 1.0094 *****
1.0094 TO 1.0175 *****
1.0175 TO 1.0256 *****
1.0256 TO 1.0337 *****
1.0337 TO 1.0418 *****
1.0418 TO 1.0499 *****
1.0499 TO 1.0580 *****
1.0580 TO 1.0661 *****
1.0661 TO 1.0742 *****
1.0742 TO 1.0823 *****
1.0823 TO 1.0904 *
1.0904 TO 1.0985 *
1.0985 TO 1.1066 *
```

FREQUENCY FOR GENERATIONS 104 TO 403

```
0.9284 TO 0.9365
0.9365 TO 0.9446
0.9446 TO 0.9527
0.9527 TO 0.9608
0.9608 TO 0.9689 *****
0.9689 TO 0.9770 *****
0.9770 TO 0.9851 *****
0.9851 TO 0.9932 *****
0.9932 TO 1.0013 *****
1.0013 TO 1.0094 *****
1.0094 TO 1.0175 *****
1.0175 TO 1.0256 *****
1.0256 TO 1.0337 *****
1.0337 TO 1.0418 *****
1.0418 TO 1.0499 *****
1.0499 TO 1.0580 *****
1.0580 TO 1.0661 *****
1.0661 TO 1.0742 *****
1.0742 TO 1.0823 *****
1.0823 TO 1.0904 *
1.0904 TO 1.0985 *
1.0985 TO 1.1066 *
```

FREQUENCY FOR GENERATIONS 204 TO 403

```
0.9284 TO 0.9365
0.9365 TO 0.9446
0.9446 TO 0.9527
0.9527 TO 0.9608
0.9608 TO 0.9689 *****
0.9689 TO 0.9770 *****
0.9770 TO 0.9851 *****
0.9851 TO 0.9932 *****
0.9932 TO 1.0013 *****
1.0013 TO 1.0094 *****
1.0094 TO 1.0175 *****
1.0175 TO 1.0256 *****
1.0256 TO 1.0337 *****
1.0337 TO 1.0418 *****
1.0418 TO 1.0499 *****
1.0499 TO 1.0580 *****
1.0580 TO 1.0661 *****
1.0661 TO 1.0742 *****
1.0742 TO 1.0823 *****
1.0823 TO 1.0904 *
1.0904 TO 1.0985 *
1.0985 TO 1.1066 *
```

.....  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 78.48766 MINUTES  
.....

### 6.6.6 TRIGA Fuel Cluster Rods

This section contains abbreviated output files from the most reactive nonpoisoned and poisoned basket configurations for TRIGA fuel cluster rods as determined in Section 6.4.6. Also included are maximum reactivity LEU, Figure 6.6.6-3, and revised HEU fuel mass and H/Zr ratio files, Figure 6.6.6-4, used to generate the results in Section 6.4.6.5

Figure 6.6.6-1 TRIGA Fuel Cluster Rods – Base Fuel Configuration - Nonpoisoned Basket

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PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
TRIGA - PREF. FLOOD CANISTER
27GROUPHDF4 INFHOMMEDIUM
'FUEL
U-235 1 0.0 2.3348E-04 END
U-238 1 0.0 1.6469E-05 END
ZR 1 0.0 5.4438E-03 END
H 1 0.0 8.5589E-03 END
H2O 1 0.8402 293.0 END
'CLAD, BASKET, AND CASK
SS304 2 1.0 293.0 END
'CANISTER INTERNAL MODERATOR
H2O 3 1.0 293.0 END
'ZIRCONIUM ROD
ZR 4 1.0 293.0 END
'GRAPHITE REFLECTOR
C 5 1.0 293.0 END
'LEAD SHIELD
PB 6 1.0 293.0 END
'NEUTRON SHIELD
H2O 7 1E-20 293.0 END
'CASK EXTERNAL MATERIAL
H2O 8 1E-20 293.0 END
'END FITTING FOR FUEL ELEMENT
SS304 9 0.337137 293.0 END
H2O 9 1E-20 293.0 END
'SECOND FUEL MATERIAL FOR UN-CANISTERED
U-235 10 0.0 9.052980E-4 END
U-238 10 0.0 3.849480E-4 END
ZR 10 0.0 3.446510E-2 END
H 10 0.0 5.514420E-2 END
'SECOND END-FITTING MATERIAL FOR UN-CANISTERED FUEL
SS304 11 0.337137 293.0 END
H2O 11 1E-20 293.0 END
'CASK INTERIOR MODERATOR MATERIAL
H2O 12 1.0E-20 293.0 END
'NEUTRON ABSORBER PLATE WITH BORON
FE 13 DEN=7.76 0.6717 293.0 END
C 13 DEN=7.76 0.0001 293.0 END
SI 13 DEN=7.76 0.0033 293.0 END
MN 13 DEN=7.76 0.0060 293.0 END
P 13 DEN=7.75 0.0001 293.0 END
CR 13 DEN=7.76 0.1849 293.0 END
NI 13 DEN=7.76 0.1233 293.0 END
B-10 13 DEN=7.76 0.0073 293.0 END
B-11 13 DEN=7.76 0.0007 293.0 END
N 13 DEN=7.76 0.0017 293.0 END
'NEUTRON ABSORBER PLATE WITHOUT BORON
FE 14 DEN=7.76 0.6717 293.0 END
C 14 DEN=7.76 0.0001 293.0 END
SI 14 DEN=7.76 0.0033 293.0 END
MN 14 DEN=7.76 0.0060 293.0 END
P 14 DEN=7.75 0.0001 293.0 END
CR 14 DEN=7.76 0.1849 293.0 END
NI 14 DEN=7.76 0.1233 293.0 END
N 14 DEN=7.76 0.0017 293.0 END
'FUEL FOR RODS
U-235 21 0.0 1.46137E-03 END
U-238 21 0.0 1.03065E-04 END
ZR 21 0.0 3.40686E-02 END
H 21 0.0 5.35638E-02 END
'CLAD INCOLOY
NI 22 0 0.028516 END
FE 22 0 0.033820 END
CR 22 0 0.021151 END
C 22 0 0.000399 END
MN 22 0 0.001306 END
S 22 0 0.000022 END
SI 22 0 0.001703 END
CU 22 0 0.000560 END
AL 22 0 0.000266 END
TI 22 0 0.000150 END
'CASK INTERNAL MODERATOR
H2O 23 1.0E-20 293.0 END
'LEAD SHIELD
PB 26 1.0 293.0 END
'NEUTRON SHIELD
H2O 27 1E-20 293.0 END
'CASK EXTERNAL MATERIAL
H2O 28 1E-20 293.0 END
'END FITTING FOR FUEL ELEMENT
SS304 29 .4568 293.0 END
H2O 29 DEN=.5031 1.0E-20 293.0 END
' BASKET, AND CASK NEED TO LOOK AT HOW THIS IS USED
'AL FUEL HOLDER
AL 30 1.0 293.0 END

```

```
END COMP
MORE DATA
RES=21 CYLINDER 0.6477 DAN(21)=.38879
END MORE
TRIGA - PREF. FLOOD CANISTER
READ PARAM TME=170.0 GEN=203 NPG=500 RUN=YES PLT=NO
TBA=2.0 END PARAM
READ GEOM
UNIT 1
COM='TRIGA FUEL (SMEARED)'
CYLINDER 1 1 3.9623 60.959 0.001
UNIT 5
COM='3.38 in Width / 0.28 in Thickness DIVIDER CENTER STACK (SEALED)'
CUBOID 2 1 2P4.2672 0.7112 0.0 +74.29 -8.255
UNIT 6
COM='3.38 in Width / 0.24 in Thickness DIVIDER OUTSIDE STACK (SEALED)'
CUBOID 2 1 2P4.2672 0.6096 0.0 +74.29 -8.255
UNIT 7
COM='SEALED CANISTER'
CYLINDER 3 1 3.9624 +60.96 0.0
HOLE 1 0.0 0.0 0.0
CYLINDER 2 1 4.1275 +63.50 -1.27
CYLINDER 12 1 4.1275 +74.29 -8.255
UNIT 10
COM='TRIGA ELEMENTS IN Top of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 0.1397 0.0
UNIT 11
COM='TRIGA ELEMENTS IN Bottom of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 -0.1397 0.0
UNIT 12
COM='TRIGA ELEMENTS IN Bottom Right of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 +0.1397 -0.1397 0.0
UNIT 13
COM='TRIGA ELEMENTS IN Top Right of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 +0.1397 +0.1397 0.0
UNIT 14
COM='TRIGA ELEMENTS IN Bottom Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 -0.1397 -0.1397 0.0
UNIT 15
COM='TRIGA ELEMENTS IN Top Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 -0.1397 +0.1397 0.0
UNIT 16
COM='TRIGA BASKET 3.38 in x 3.38 in CENTER OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
UNIT 17
COM='HORIZONTAL X-X POISON SHEET + WATER'
CUBOID 13 1 2P3.8227 0.3175 0.0 +73.02 -6.985
CUBOID 14 1 2P4.1402 0.3175 0.0 +73.02 -6.985
CUBOID 12 1 2P4.2672 0.3175 0.0 +74.29 -8.255
UNIT 18
COM='HORIZONTAL X-X POISON SHEET + WATER'
CUBOID 13 1 2P3.8227 0.3175 0.0 2P34.163
CUBOID 14 1 2P4.1402 0.3175 0.0 2P34.163
CUBOID 12 1 2P4.2672 0.3175 0.0 2P36.703
UNIT 20
COM='CENTER COLUMN OF THREE OPENINGS w/ 0.28 in plate (SEALED)'
ARRAY 1 -4.2672 -13.5128 -8.255
REPLICATE 2 1 4R0.7112 2R0.0 1
UNIT 21
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'
ARRAY 2 -4.2672 -8.8392 -8.255
REPLICATE 2 1 0.0 0.3048 2R0.3048 2R0.0 1
UNIT 22
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'
ARRAY 3 -4.2672 -8.8392 -8.255
REPLICATE 2 1 0.3048 0.0 2R0.3048 2R0.0 1
UNIT 30
COM='NAC-LWT TRIGA BASKET (SEALED)'
CYLINDER 12 1 17.1 +74.29 -8.255
HOLE 20 0.0 0.0 0.0
HOLE 21 -9.2457 0.0 0.0
HOLE 22 +9.2457 0.0 0.0
CYLINDER 2 1 18.9103 +74.93 -8.890
CYLINDER 6 1 33.4645 +74.93 -8.890
CYLINDER 2 1 36.5188 +74.93 -8.890
CYLINDER 7 1 49.2227 +74.93 -8.890
CYLINDER 2 1 49.8221 +74.93 -8.890
CUBOID 8 1 4P121.92 +74.93 -8.890
UNIT 41
COM='TRIGA FUEL ELEMENT'
CYLINDER 21 1 0.6477 2P27.94
CYLINDER 22 1 0.68834 2P27.94
CYLINDER 29 1 0.68834 43.48 -33.04
UNIT 42
COM='HORIZONTAL X-X POISON SHEET + WATER'
CUBOID 13 1 2P3.8227 0.3175 0.0 39.38 -28.94
CUBOID 14 1 2P4.1402 0.3175 0.0 39.38 -28.94
CUBOID 23 1 2P4.2672 0.3175 0.0 43.48 -33.04
UNIT 45
```

```
COM='DIVIDER CENTER STACK'  
CUBOID 2 1 2P4.2672 0.7112 0.0 43.48 -33.04  
UNIT 46  
COM='DIVIDER OUTSIDE STACK'  
CUBOID 2 1 2P4.2672 0.6096 0.0 43.48 -33.04  
UNIT 410  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, CENTERED'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 0.0 0.0 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
UNIT 411  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, RIGHT'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 0.1167 0.0 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
UNIT 412  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, LEFT'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 -0.1167 0.0 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
UNIT 413  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 0.0 0.1167 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
UNIT 414  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 0.0 -0.1167 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
UNIT 415  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP RIGHT'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 0.0826 0.0826 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
UNIT 416  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP LEFT'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 -0.0826 0.0826 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
UNIT 417  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM RIGHT'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 0.0826 -0.0826 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
UNIT 418  
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM LEFT'  
CYLINDER 23 1 0.80518 43.48 -33.04  
HOLE 41 -0.0826 -0.0826 0.0  
CYLINDER 30 1 0.9525 43.48 -33.04  
  
UNIT 420  
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, CENTER OPENING'  
CUBOID 23 1 4P4.1529 43.48 -33.04  
HOLE 415 -2.8576 -2.8576 0  
HOLE 413 -0.9525 -2.8576 0  
HOLE 413 0.9525 -2.8576 0  
HOLE 416 2.8576 -2.8576 0  
HOLE 411 -2.8576 -0.9525 0  
HOLE 415 -0.9525 -0.9525 0  
HOLE 416 0.9525 -0.9525 0  
HOLE 412 2.8576 -0.9525 0  
HOLE 411 -2.8576 0.9525 0  
HOLE 417 -0.9525 0.9525 0  
HOLE 418 0.9525 0.9525 0  
HOLE 412 -2.8576 0.9525 0  
HOLE 417 -2.8576 2.8576 0  
HOLE 414 -0.9525 2.8576 0  
HOLE 414 0.9525 2.8576 0  
HOLE 418 2.8576 2.8576 0  
CUBOID 23 1 4P4.1529 43.48 -33.04  
' CHECK 4.1 CM ABOVE*****  
UNIT 421  
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM OPENING'  
CUBOID 23 1 4P4.1529 43.48 -33.04  
HOLE 415 -2.8576 -2.8576 0  
HOLE 413 -0.9525 -2.8576 0  
HOLE 413 0.9525 -2.8576 0  
HOLE 416 2.8576 -2.8576 0  
HOLE 411 -2.8576 -0.9525 0  
HOLE 415 -0.9525 -0.9525 0  
HOLE 416 0.9525 -0.9525 0  
HOLE 412 2.8576 -0.9525 0  
HOLE 411 -2.8576 0.9525 0  
HOLE 417 -0.9525 0.9525 0  
HOLE 418 0.9525 0.9525 0  
HOLE 412 -2.8576 0.9525 0  
HOLE 417 -2.8576 2.8576 0  
HOLE 414 -0.9525 2.8576 0  
HOLE 414 0.9525 2.8576 0  
HOLE 418 2.8576 2.8576 0  
CUBOID 23 1 4P4.1529 43.48 -33.04  
' CHECK 4.1 CM ABOVE*****  
UNIT 422  
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP OPENING'
```



```
CUBOID 23 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
HOLE 413 0.9525 -2.8576 0
HOLE 416 2.8576 -2.8576 0
HOLE 411 -2.8576 -0.9525 0
HOLE 415 -0.9525 -0.9525 0
HOLE 416 0.9525 -0.9525 0
HOLE 412 2.8576 -0.9525 0
HOLE 411 -2.8576 0.9525 0
HOLE 417 -0.9525 0.9525 0
HOLE 418 0.9525 0.9525 0
HOLE 412 2.8576 0.9525 0
HOLE 417 -2.8576 2.8576 0
HOLE 414 -0.9525 2.8576 0
HOLE 414 0.9525 2.8576 0
HOLE 418 2.8576 2.8576 0
CUBOID 23 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 423
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM LEFT OPENING'
CUBOID 23 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
HOLE 413 0.9525 -2.8576 0
HOLE 416 2.8576 -2.8576 0
HOLE 411 -2.8576 -0.9525 0
HOLE 415 -0.9525 -0.9525 0
HOLE 416 0.9525 -0.9525 0
HOLE 412 2.8576 -0.9525 0
HOLE 411 -2.8576 0.9525 0
HOLE 417 -0.9525 0.9525 0
HOLE 418 0.9525 0.9525 0
HOLE 412 2.8576 0.9525 0
HOLE 417 -2.8576 2.8576 0
HOLE 414 -0.9525 2.8576 0
HOLE 414 0.9525 2.8576 0
HOLE 418 2.8576 2.8576 0
CUBOID 23 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 424
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP LEFT OPENING'
CUBOID 23 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
HOLE 413 0.9525 -2.8576 0
HOLE 416 2.8576 -2.8576 0
HOLE 411 -2.8576 -0.9525 0
HOLE 415 -0.9525 -0.9525 0
HOLE 416 0.9525 -0.9525 0
HOLE 412 2.8576 -0.9525 0
HOLE 411 -2.8576 0.9525 0
HOLE 417 -0.9525 0.9525 0
HOLE 418 0.9525 0.9525 0
HOLE 412 2.8576 0.9525 0
HOLE 417 -2.8576 2.8576 0
HOLE 414 -0.9525 2.8576 0
HOLE 414 0.9525 2.8576 0
HOLE 418 2.8576 2.8576 0
CUBOID 23 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 425
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM RIGHT OPENING'
CUBOID 23 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
HOLE 413 0.9525 -2.8576 0
HOLE 416 2.8576 -2.8576 0
HOLE 411 -2.8576 -0.9525 0
HOLE 415 -0.9525 -0.9525 0
HOLE 416 0.9525 -0.9525 0
HOLE 412 2.8576 -0.9525 0
HOLE 411 -2.8576 0.9525 0
HOLE 417 -0.9525 0.9525 0
HOLE 418 0.9525 0.9525 0
HOLE 412 2.8576 0.9525 0
HOLE 417 -2.8576 2.8576 0
HOLE 414 -0.9525 2.8576 0
HOLE 414 0.9525 2.8576 0
HOLE 418 2.8576 2.8576 0
CUBOID 23 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 426
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP RIGHT OPENING'
CUBOID 23 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
HOLE 413 0.9525 -2.8576 0
HOLE 416 2.8576 -2.8576 0
HOLE 411 -2.8576 -0.9525 0
HOLE 415 -0.9525 -0.9525 0
HOLE 416 0.9525 -0.9525 0
HOLE 412 2.8576 -0.9525 0
HOLE 411 -2.8576 0.9525 0
HOLE 417 -0.9525 0.9525 0
```

```

HOLE          418  0.9525 0.9525  0
HOLE          412  2.8576 0.9525  0
HOLE          417 -2.8576 2.8576  0
HOLE          414 -0.9525 2.8576  0
HOLE          414  0.9525 2.8576  0
HOLE          418  2.8576 2.8576  0
CUBOID        23 1 4P4.1528 43.48 -33.04
UNIT 430
COM='FUEL INSERT IN, CENTER OPENING'
CUBOID        23 1 4P4.2672 43.48 -33.04
UNIT 431
COM='FUEL INSERT IN, BOTTOM OPENING'
CUBOID        23 1 4P4.2672 43.48 -33.04
HOLE 421      0.0 -0.1143 0.0
UNIT 432
COM='FUEL INSERT IN, TOP OPENING'
CUBOID        23 1 4P4.2672 43.48 -33.04
HOLE 422      0.0 0.1143 0.0
UNIT 433
COM='FUEL INSERT IN, BOTTOM LEFT OPENING'
CUBOID        23 1 4P4.2672 43.48 -33.04
HOLE 423     -0.1143 -0.1143 0.0
UNIT 434
COM='FUEL INSERT IN, TOP LEFT OPENING'
CUBOID        23 1 4P4.2672 43.48 -33.04
HOLE 424     -0.1143 0.1143 0.0
UNIT 435
COM='FUEL INSERT IN, BOTOM RIGHT OPENING'
CUBOID        23 1 4P4.2672 43.48 -33.04
HOLE 425      0.1143 -0.1143 0.0
UNIT 436
COM='FUEL INSERT IN, TOP RIGHT OPENING'
CUBOID        23 1 4P4.2672 43.48 -33.04
HOLE 426      0.1143 0.1143 0.0
UNIT 440
COM='CENTER COLUMN OF THREE OPENINGS'
ARRAY 41     -4.2672 -13.5128 -33.04
REPLICATE 2 1 4R0.7112 2R0.0 1
UNIT 441
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 42     -4.2672 -8.8392 -33.04
REPLICATE 2 1 0.0 0.3408 2R0.3408 2R0.0 1
UNIT 442
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 43     -4.2672 -8.8392 -33.04
REPLICATE 2 1 0.3408 0.0 2R0.3408 2R0.0 1
UNIT 450
COM='38 TRIGA FUEL ELEMENTS IN EACH LWT BASKET'
CYLINDER 23 1 17.1500 43.485 -33.045
HOLE 440      0.0 0.0 0.0
HOLE 441     -9.2457 0.0 0.0
HOLE 442      9.2457 0.0 0.0
CYLINDER 2 1 18.9103 43.485 -33.045
CYLINDER 26 1 33.4645 43.485 -33.045
CYLINDER 2 1 36.5188 43.485 -33.045
CYLINDER 27 1 49.2227 43.485 -33.045
CYLINDER 2 1 49.8221 43.485 -33.045
CUBOID 28 1 4P121.92 43.485 -33.045
UNIT 80
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 2 1 36.5188 2P14.1351
CYLINDER 8 1 49.8221 2P14.1351
CUBOID 8 1 4P121.92 2P14.1351
UNIT 81
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 6 1 26.3525 2P3.81
CYLINDER 2 1 36.6188 +13.97 -12.7
CYLINDER 8 1 49.8221 +13.97 -12.7
CUBOID 8 1 4P121.92 +13.97 -12.7
GLOBAL UNIT 82
COM='STACK OF 5 BASKETS IN CASK'
ARRAY 20     -121.92 -121.92 -221.3
END GEOM
READ ARRAY
ARA=1 NUX=1 NUZ=5 NUY=1 FILL 10 5 16 5 11 END FILL
ARA=2 NUX=1 NUZ=3 NUY=1 FILL 13 6 12 END FILL
ARA=3 NUX=1 NUZ=2 NUY=1 FILL 15 6 14 END FILL
ARA=41 NUX=1 NUZ=5 NUY=1 FILL 432 45 430 45 431 END FILL
ARA=42 NUX=1 NUZ=3 NUY=1 FILL 436 46 435 END FILL
ARA=43 NUX=1 NUZ=3 NUY=1 FILL 434 46 433 END FILL
ARA=20 NUX=1 NUZ=1 NUY=7 FILL 81 30 3R450 30 80 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CASK (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDM=-1.0 MAX=800
XUL=-50.0 YUL=50.0 ZUL=149.352
XLR=50.0 YLR=-50.0 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDM=-1.0 MAX=800
XUL=-17.2 YUL=17.2 ZUL=149.352
XLR=17.2 YLR=-17.2 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CAVITY MID PLANE)'

```

```
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=0.0
XLR=17.2 YLR=-17.2 ZLR=0.0 END
TTL='X-Y PLOT OF CENTER OPENING (CANISTER ELEVATION) '
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=7.0 ZUL=149.352
XLR=7.0 YLR=-7.0 ZLR=149.352 END
TTL='X-Y PLOT OF PERIPHERAL OPENING (CANISTER ELEVATION) '
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=16.0 ZUL=149.352
XLR=7.0 YLR=4.0 ZLR=149.352 END
TTL='Y-Z PLOT OF BASKET (CENTER OF FUEL ELEMENTS,CANISTER ELEVATION) '
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-14.0 ZUL=186.69
XLR=2.12 YLR=-4.5 ZLR=112.014 END
TTL='Y-Z PLOT OF BASKET (CASK) '
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-51 ZUL=220.0
XLR=2.12 YLR=+51 ZLR=-220.0
END PLOT
END DATA
```

SECONDARY MODULE 000008 HAS BEEN CALLED.

MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.38 (SECONDS).

SECONDARY MODULE 000002 HAS BEEN CALLED.

MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 15.38 (SECONDS).

SECONDARY MODULE 000009 HAS BEEN CALLED.

MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 309.67 (SECONDS).

MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 327.58 (SECONDS).

```

CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  55555555555
CC          SS          SS          AA          AA          SS          SS          22          22          55
CC          SS          SS          AA          AA          SS          SS          22          22          55
CC          SS          SS          AA          AA          SS          SS          22          22          55
CC          SSSSSSSSS  AAAAAAAAA  SSSSSSSSS          22          55555555555
CC          SSSSSSSSS  AAAAAAAAA  SSSSSSSSS          22          55555555555
CC          SS          SS          AA          AA          SS          SS          22          22          55
CC          SS          SS          AA          AA          SS          SS          22          22          55
CC          CC          SS          SS          AA          AA          SS          SS          22          55          55
CCCCCCCCC  SSSSSSSSS  AA          AA          SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AA          AA          SSSSSSSSS  222222222  55555555555
    
```

```

SSSSSSSSS  CCCCCCCCC  AAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SS          SS          CC          CC          AA          AA          LL          EE          PP          PP          CC          CC
SS          SS          CC          CC          AA          AA          LL          EE          PP          PP          CC          CC
SS          SS          CC          CC          AA          AA          LL          EE          PP          PP          CC          CC
SSSSSSSSS  CC          AAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CC
SSSSSSSSS  CC          AAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CC
SS          SS          CC          AA          AA          LL          EE          PP          CC          CC
SS          SS          CC          AA          AA          LL          EE          PP          CC          CC
SS          SS          CC          AA          AA          LL          EE          PP          CC          CC
SSSSSSSSS  CCCCCCCCC  AA          AA          LLLLLLLLL  EEEEEEEEE  PP          CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AA          AA          LLLLLLLLL  EEEEEEEEE  PP          CCCCCCCCC
    
```

```

0000000    11          //          0000000    44          //          999999999  999999999
000000000  111          //          000000000  444          //          99999999999 99999999999
00          00          1111          //          00          00          4444          //          99          99  99          99
00          00          11          //          00          00          44  44          //          99          99  99          99
00          00          11          //          00          00          44  44          //          99          99  99          99
00          00          11          //          00          00          44  44          //          99999999999 99999999999
00          00          11          //          00          00          44  44          //          99999999999 99999999999
00          00          11          //          00          00          44444444444  //          99          99
00          00          11          //          00          00          44444444444  //          99          99
00          00          11          //          00          00          44          //          99          99
000000000  1111111  //          000000000  44          //          99999999999 99999999999
0000000    1111111  //          0000000    44          //          99999999999 99999999999
    
```

```

11          66666666666  3333333333  77777777777  0000000  3333333333
111         66666666666  33333333333  77777777777  000000000 33333333333
1111        66          :::  33          33  77          77          :::  00          00  33
11          66          :::  33          33  77          77          :::  00          00  33
11          66          :::  33          33  77          77          :::  00          00  33
11          66666666666  333          77          77          00          00  333
11          66666666666  333          77          77          00          00  333
11          66          66          :::  33          77          :::  00          00  33
11          66          66          :::  33          77          :::  00          00  33
11          66          66          :::  33          77          :::  00          00  33
111111111  66666666666  33333333333  77          77          000000000 33333333333
111111111  66666666666  33333333333  77          77          0000000    33333333333
    
```



```
**** PROBLEM GEOMETRY ****

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

**** SPECIAL PARAMETERS ****

ISN        8 ORDER OF ANGULAR QUADATURE
IIM        20 INNER ITERATION MAXIMUM
ICH        25 OUTER ITERATION MAXIMUM
SEF 1.00000E+00 SIZE FACTOR FOR SPATIAL MESH
EPS 1.00000E-04 OVERALL PROBLEM CONVERGENCE
PTC 1.00000E-04 SCALAR FLUX CONVERGENCE
BKL 1.42089E+00 BUCKLING FACTOR
IUS        0 THERMAL UPSCATTER SCALING
BAL        FINE BALANCE TABLE PRINT FLAG
EY 0.00000E+00 BUCKLING HEIGHT
EZ 0.00000E+00 BUCKLING DEPTH
IPN        0 DIFFUSION COEFFICIENT OPTION
FRD        0 LOGICAL UNIT NUMBER TO READ FLUX GUESS
FWR       -1 LOGICAL UNIT NUMBER TO WRITE FLUX GUESS
MSH       2001 NUMBER OF INTERVALS FOR RES. INTGRTRS
MLV        2 MAX LVALUE FOR RES. INTGRTRS
AXS        0 LOGICAL UNIT NUMBER TO WRITE ANISN LIB
RES        21 MIXTURE WITH SPECIAL RESONANCE CORRECTION
*          CYLINDER GEOMETRY FOR SPECIAL RESONANCE CORRECTION
*          6.47700E-01 DIMENSION (LEAF) FOR SPECIAL RESONANCE CORRECTION

DANCOFF FACTOR SPECIFICATION
MIXTURE   FACTOR
  21      0.38879
```

```

.....
***
***              TRIGA - PREF. FLOOD CANISTER              ***
***
.....
***              ***** DATA LIBRARY INFORMATION *****              ***
***
***              UNIT NUMBER          DATA SET NAME          VOLUME          UNIT FUNCTION          ***
***              -----          -----          -----          -----          ***
***              89          G:\scale43\DATALIB\FT89F001          STANEARD COMPOSITION LIBRARY          ***
***              82          G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY          ***
***              11          D:\projects\triga\mev\moddensk\fixu_8_ala\FT          SHORT CROSS SECTION LIBRARY          ***
***              90          D:\projects\triga\mev\moddensk\fixu_8_ala\FT          INPUT DATA DIRECT ACCESS          ***
***
.....
***              STANDARD COMPOSITION LIBRARY DATA              ***
***              -----              ***
***              UNIT NUMBER : 89              ***
***              DATASET NAME : G:\scale43\DATALIB\FT89F001              ***
***              LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY              ***
***              637 STANDARD COMPOSITIONS, 490 NUCLIDES              ***
***              90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRBUIONS.              ***
***              CREATION DATE: 6/30/95              ***
***
***              CROSS SECTION LIBRARY DATA              ***
***              -----              ***
***              UNIT NUMBER : 82              ***
***              DATASET NAME : G:\scale43\DATALIB\FT82F001              ***
***              LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY              ***
***              BASED ON ENDF-B VERSION 4 DATA              ***
***              COMPILED FOR NRC 1/27/89              ***
***              LAST UPDATED              08/12/94              ***
***              L.M.PETRIE - OFNL              ***
***
.....

```

```

..... 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 .....

```

```

KK      KK  EEEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEEE  NNN     NN  000000000000     VV      VV
KK      KK  EE             NNNN    NN  00      00     VV      VV
KK      KK  EE             NN  NN    NN  00      00     VV      VV
KK      KK  EE             NN  NN    NN  00      00     VV      VV
KKKKKKK  EEEEEEEEEEEE  NN  NN    NN  00      00     VV      VV
KKKKKKK  EEEEEEEEEEEE  NN  NN    NN  00      00     VV      VV
KK      KK  EE             NN  NN    NN  00      00     VV      VV
KK      KK  EE             NN  NN    NN  00      00     VV      VV
KK      KK  EE             NN  NN    NN  00      00     VV      VV
KK      KK  EEEEEEEEEEEE  NN      NN  000000000000     VVV     VV
KK      KK  EEEEEEEEEEEE  NN      NN  0000000000      V

```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE             PP      PP  CC      CC
SSSSSSSSSS  CC      AA      AA  LL      EEEEEEEEEEEE  PPPPPPPPPP  CC
SSSSSSSSSS  CC      AA      AA  LL      EEEEEEEEEEEE  PPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE             PP      CC
SS      SS  CC      AA      AA  LL      EE             PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC

```

```

0000000      11      //      0000000      44      //      9999999999  9999999999
000000000    111     //      000000000    444     //      999999999999  999999999999
00      00    1111   //      00      00    4444   //      99      99  99      99
00      00    11     //      00      00    44  44   //      99      99  99      99
00      00    11     //      00      00    44  44   //      99      99  99      99
00      00    11     //      00      00    44  44   //      999999999999  999999999999
00      00    11     //      00      00    44  44   //      999999999999  999999999999
00      00    11     //      00      00    444444444444  //      99      99
00      00    11     //      00      00    44444444444444  //      99      99
00      00    11     //      00      00    44444444444444  //      99      99
000000000    1111111 //      000000000    44      //      999999999999  999999999999
0000000      1111111 //      0000000      44      //      999999999999  999999999999

```

```

11      666666666666  33333333333  777777777777  2222222222  11
111     666666666666  333333333333  777777777777  222222222222  111
1111    66      :::   33      33  77      77      :::   22      22  1111
11      66      :::   33      33  77      77      :::   22      22  11
11      66      :::   33      33  77      77      :::   22      22  11
11      666666666666  333      77      22      11
11      666666666666  333      77      22      11
11      66      66      :::   33      77      :::   22      11
11      66      66      :::   33      77      :::   22      11
11      66      66      :::   33      77      :::   22      11
11111111  666666666666  333333333333  77      222222222222  11111111
11111111  666666666666  333333333333  77      222222222222  11111111

```





```

.....
***
***          TRIGA - PREF. FLOOD CANISTER          ***
***
*****          NUMERIC PARAMETERS          *****
***
***          TME          MAXIMUM PROBLEM TIME (MIN)          170.00          ***
***
***          TBA          TIME PER GENERATION (MIN)          2.00          ***
***
***          GEN          NUMBER OF GENERATIONS          203          ***
***
***          NPG          NUMBER PER GENERATION          500          ***
***
***          NSK          NUMBER OF GENERATIONS TO BE SKIPPED          3          ***
***
***          BEG          BEGINNING GENERATION NUMBER          1          ***
***
***          RES          GENERATIONS BETWEEN CHECKPOINTS          0          ***
***
***          X1D          NUMBER OF EXTRA 1-D CROSS SECTIONS          1          ***
***
***          NBK          NEUTRON BANK SIZE          525          ***
***
***          XNB          EXTRA POSITIONS IN NEUTRON BANK          0          ***
***
***          NFB          FISSION BANK SIZE          500          ***
***
***          YFB          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          BB827100001          ***
***
***          NBS          NUMBER OF D.A. BLOCKS ON UNIT 6          200          ***
***
***          NLS          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          ***
***
.....

```



```

.....
***
***          TRIGA - PREF. FLOOD CANISTER          ***
***
.....
***
***          ***** ADDITIONAL INFORMATION *****
***
*** NUMBER OF ENERGY GROUPS          27          USE LATTICE GEOMETRY          YES ***
***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1          GLOBAL ARRAY NUMBER          20 ***
***
*** NO. OF SCATTERING ANGLES IN XSECS  2          NUMBER OF UNITS IN THE GLOBAL X DIR.  1 ***
***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 26          NUMBER OF UNITS IN THE GLOBAL Y DIR.  1 ***
***
*** ENTRIES/NEUTRON IN THE FISSION BANK 19          NUMBER OF UNITS IN THE GLOBAL Z DIR.  7 ***
***
*** NUMBER OF MIXTURES USED            15          USE A GLOBAL REFLECTOR          YES ***
***
*** NUMBER OF BIAS ID'S USED           1          USE NESTED HOLES                YES ***
***
*** NUMBER OF DIFFERENTIAL ALBEDOS USED 0          NUMBER OF HOLES                 140 ***
***
*** TOTAL INPUT GEOMETRY REGIONS       100         MAXIMUM HOLE NESTING LEVEL       4 ***
***
*** NUMBER OF GEOMETRY REGIONS USED     97          USE NESTED ARRAYS              YES ***
***
*** LARGEST GEOMETRY UNIT NUMBER        450         NUMBER OF ARRAYS USED           7 ***
***
*** LARGEST ARRAY NUMBER                43          MAXIMUM ARRAY NESTING LEVEL     2 ***
***
*** +X BOUNDARY CONDITION               MIR        -X BOUNDARY CONDITION           MIR ***
***
*** +Y BOUNDARY CONDITION               MIR        -Y BOUNDARY CONDITION           MIR ***
***
*** +Z BOUNDARY CONDITION               MIR        -Z BOUNDARY CONDITION           MIR ***
***
.....

```

```

.....
**
**
**  ARRAY    UNITS IN  UNITS IN  UNITS IN  NESTING  **
**  NUMBER   X DIR.    Y DIR.    Z DIR.    LEVEL   **
**
**    1        1        5        1        2    **
**
**    2        1        3        1        2    **
**
**    3        1        3        1        2    **
**
**  20 GLOBAL  1        1        7        1    **
**
**   41        1        5        1        2    **
**
**   42        1        3        1        2    **
**
**   43        1        3        1        2    **
**
.....

```

..... 0 IO'S WERE USED LOADING THE DATA .....

TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 1 -----								
TRIGA FUEL (SMEARED)								
1	1	1	RADIUS = 3.9623	+Z = 60.959	-Z = 1.00000E-03	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
----- UNIT 5 -----								
3.38 IN WIDTH / 0.28 IN THICKNESS DIVIDER CENTER STACK (SEALED)								
1	2	1	+X = 4.2672	-X = -4.2672	+Y = 0.71120	-Y = 0.00000	+Z = 74.290	-Z = -8.2550
----- UNIT 6 -----								
3.38 IN WIDTH / 0.24 IN THICKNESS DIVIDER OUTSIDE STACK (SEALED)								
1	2	1	+X = 4.2672	-X = -4.2672	+Y = 0.60960	-Y = 0.00000	+Z = 74.290	-Z = -8.2550
----- UNIT 7 -----								
SEALED CANISTER								
1	3	1	RADIUS = 3.9624	+Z = 60.960	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	1		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1	
2	2	1	RADIUS = 4.1275	+Z = 63.500	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3	12	1	RADIUS = 4.1275	+Z = 74.290	-Z = -8.2550	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
----- UNIT 10 -----								
TRIGA ELEMENTS IN TOP OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1	12	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	2		AT X = 0.00000	Y = 0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 11 -----								
TRIGA ELEMENTS IN BOTTOM OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1	12	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	3		AT X = 0.00000	Y = -0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 12 -----								
TRIGA ELEMENTS IN BOTTOM RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1	12	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	4		AT X = 0.13970	Y = -0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 13 -----								
TRIGA ELEMENTS IN TOP RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1	12	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	5		AT X = 0.13970	Y = 0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 14 -----								
TRIGA ELEMENTS IN BOTTOM LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1	12	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	6		AT X = -0.13970	Y = -0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 15 -----								
TRIGA ELEMENTS IN TOP LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1	12	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550

HOLE NUMBER	7	AT X = -0.13970	Y = 0.13970	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 16 -----								
TRIGA BASKET 3.39 IN X 3.38 IN CENTER OPENING (SEALED)								
1 CUBOID	12 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
----- UNIT 20 EXTERNAL TO LATTICE 1 -----								
CENTER COLUMN OF THREE OPENINGS W/ 0.28 IN PLATE (SEALED)								
1 ARRAY NUMBER	1	+X = 4.2672	-X = -4.2672	+Y = 13.513	-Y = -13.513	+Z = 74.290	-Z = -8.2550	
2 CUBOID	2 1	+X = 4.9784	-X = -4.9784	+Y = 14.224	-Y = -14.224	+Z = 74.290	-Z = -8.2550	
TRIGA - PREF. FLOOD CANISTER								
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REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
----- UNIT 21 EXTERNAL TO LATTICE 2 -----								
LEFT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)								
1 ARRAY NUMBER	2	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 74.290	-Z = -8.2550	
2 CUBOID	2 1	+X = 4.2672	-X = -4.5720	+Y = 9.1440	-Y = -9.1440	+Z = 74.290	-Z = -8.2550	
----- UNIT 22 EXTERNAL TO LATTICE 3 -----								
RIGHT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)								
1 ARRAY NUMBER	3	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 74.290	-Z = -8.2550	
2 CUBOID	2 1	+X = 4.5720	-X = -4.2672	+Y = 9.1440	-Y = -9.1440	+Z = 74.290	-Z = -8.2550	
----- UNIT 30 -----								
NAC-LWT TRIGA BASKET (SEALED)								
1 CYLINDER	12 1	RADIUS = 17.100	+Z = 74.290	-Z = -8.2550	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
HOLE NUMBER	8	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	20		
HOLE NUMBER	9	AT X = -9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	21		
HOLE NUMBER	10	AT X = 9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	22		
2 CYLINDER	2 1	RADIUS = 18.910	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
3 CYLINDER	6 1	RADIUS = 33.465	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
4 CYLINDER	2 1	RADIUS = 36.519	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
5 CYLINDER	7 1	RADIUS = 49.223	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
6 CYLINDER	2 1	RADIUS = 49.822	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
7 CUBOID	8 1	+X = 121.92	-X = -121.92	+Y = 121.92	-Y = -121.92	+Z = 74.930	-Z = -8.8900	
----- UNIT 41 -----								
TRIGA FUEL ELEMENT								
1 CYLINDER	21 1	RADIUS = 0.64770	+Z = 27.940	-Z = -27.940	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
2 CYLINDER	22 1	RADIUS = 0.68834	+Z = 27.940	-Z = -27.940	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
3 CYLINDER	29 1	RADIUS = 0.68834	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
TRIGA - PREF. FLOOD CANISTER								
-----								
REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
----- UNIT 45 -----								
DIVIDER CENTER STACK								
1 CUBOID	2 1	+X = 4.2672	-X = -4.2672	+Y = 0.71120	-Y = 0.00000	+Z = 43.480	-Z = -33.040	
----- UNIT 46 -----								
DIVIDER OUTSIDE STACK								
1 CUBOID	2 1	+X = 4.2672	-X = -4.2672	+Y = 0.60960	-Y = 0.00000	+Z = 43.480	-Z = -33.040	

----- UNIT 80 -----

SIMPLIFIED LID STRUCTURE NAC-LWT

1	CYLINDER	2	1	RADIUS = 36.519	+Z = 14.135	-Z = -14.135	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2	CYLINDER	8	1	RADIUS = 49.822	+Z = 14.135	-Z = -14.135	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CUBOID	8	1	+X = 121.92	-X = -121.92	+Y = 121.92	-Y = -121.92	+Z = 14.135 -Z = -14.135

----- UNIT 81 -----

SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT

1	CYLINDER	6	1	RADIUS = 26.353	+Z = 3.8100	-Z = -3.8100	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2	CYLINDER	2	1	RADIUS = 36.619	+Z = 13.970	-Z = -12.700	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CYLINDER	8	1	RADIUS = 49.822	+Z = 13.970	-Z = -12.700	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4	CUBOID	8	1	+X = 121.92	-X = -121.92	+Y = 121.92	-Y = -121.92	+Z = 13.970 -Z = -12.700

\*\*\*\*\* GLOBAL \*\*\*\*\*  
----- UNIT 82 EXTERNAL TO LATTICE 20 -----

STACK OF 5 BASKETS IN CASK

1	ARRAY NUMBER	20		+X = 121.92	-X = -121.92	+Y = 121.92	-Y = -121.92	+Z = 230.87 -Z = -221.30
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----- UNIT 411 -----

TRIGA FUEL ELEMENTS IN AL TUBE, RIGHT

1	CYLINDER	23	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	12		AT X = 0.11670	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	41
2	CYLINDER	30	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
				TRIGA - PREF. FLOOD CANISTER				

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 412 -----

TRIGA FUEL ELEMENTS IN AL TUBE, LEFT

1	CYLINDER	23	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	13		AT X = -0.11670	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	41
2	CYLINDER	30	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 413 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP

1	CYLINDER	23	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	14		AT X = 0.00000	Y = 0.11670	Z = 0.00000	IS UNIT NUMBER	41
2	CYLINDER	30	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 414 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM

1	CYLINDER	23	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	15		AT X = 0.00000	Y = -0.11670	Z = 0.00000	IS UNIT NUMBER	41
2	CYLINDER	30	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 415 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP RIGHT

1	CYLINDER	23	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	16		AT X = 8.26000E-02	Y = 8.26000E-02	Z = 0.00000	IS UNIT NUMBER	41
2	CYLINDER	30	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 416 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP LEFT

```

1 CYLINDER      23 1 RADIUS = 0.80518    +Z = 43.480    -Z = -33.040    CENTERLINE IS AT X = 0.00000    Y = 0.00000
  HOLE NUMBER   17      AT X = -8.26000E-02  Y = 8.26000E-02  Z = 0.00000    IS UNIT NUMBER   41
2 CYLINDER      30 1 RADIUS = 0.95250    +Z = 43.480    -Z = -33.040    CENTERLINE IS AT X = 0.00000    Y = 0.00000
  TRIGA - PREF. FLOOD CANISTER

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GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

REGION MEDIA BIAS NUM ID

----- UNIT 417 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM RIGHT

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1 CYLINDER      23 1 RADIUS = 0.80518    +Z = 43.480    -Z = -33.040    CENTERLINE IS AT X = 0.00000    Y = 0.00000
  HOLE NUMBER   18      AT X = 8.26000E-02  Y = -8.26000E-02 Z = 0.00000    IS UNIT NUMBER   41
2 CYLINDER      30 1 RADIUS = 0.95250    +Z = 43.480    -Z = -33.040    CENTERLINE IS AT X = 0.00000    Y = 0.00000

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----- UNIT 418 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM LEFT

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1 CYLINDER      23 1 RADIUS = 0.80518    +Z = 43.480    -Z = -33.040    CENTERLINE IS AT X = 0.00000    Y = 0.00000
  HOLE NUMBER   19      AT X = -8.26000E-02 Y = -8.26000E-02 Z = 0.00000    IS UNIT NUMBER   41
2 CYLINDER      30 1 RADIUS = 0.95250    +Z = 43.480    -Z = -33.040    CENTERLINE IS AT X = 0.00000    Y = 0.00000
  TRIGA - PREF. FLOOD CANISTER

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GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

REGION MEDIA BIAS NUM ID

----- UNIT 421 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM OPENING

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1 CUBOID        23 1    +X = 4.1529    -X = -4.1529    +Y = 4.1529    -Y = -4.1529    +Z = 43.480    -Z = -33.040
  HOLE NUMBER   36      AT X = -2.8576    Y = -2.8576    Z = 0.00000    IS UNIT NUMBER   415
  HOLE NUMBER   37      AT X = -0.95250    Y = -2.8576    Z = 0.00000    IS UNIT NUMBER   413
  HOLE NUMBER   38      AT X = 0.95250     Y = -2.8576    Z = 0.00000    IS UNIT NUMBER   413
  HOLE NUMBER   39      AT X = 2.8576     Y = -2.8576    Z = 0.00000    IS UNIT NUMBER   416
  HOLE NUMBER   40      AT X = -2.8576    Y = -0.95250    Z = 0.00000    IS UNIT NUMBER   411
  HOLE NUMBER   41      AT X = -0.95250    Y = -0.95250    Z = 0.00000    IS UNIT NUMBER   415
  HOLE NUMBER   42      AT X = 0.95250     Y = -0.95250    Z = 0.00000    IS UNIT NUMBER   416
  HOLE NUMBER   43      AT X = 2.8576     Y = -0.95250    Z = 0.00000    IS UNIT NUMBER   412
  HOLE NUMBER   44      AT X = -2.8576    Y = 0.95250     Z = 0.00000    IS UNIT NUMBER   411
  HOLE NUMBER   45      AT X = -0.95250    Y = 0.95250     Z = 0.00000    IS UNIT NUMBER   417
  HOLE NUMBER   46      AT X = 0.95250     Y = 0.95250     Z = 0.00000    IS UNIT NUMBER   418
  HOLE NUMBER   47      AT X = 2.8576     Y = 0.95250     Z = 0.00000    IS UNIT NUMBER   412
  HOLE NUMBER   48      AT X = -2.8576    Y = 2.8576     Z = 0.00000    IS UNIT NUMBER   417
  HOLE NUMBER   49      AT X = -0.95250    Y = 2.8576     Z = 0.00000    IS UNIT NUMBER   414
  HOLE NUMBER   50      AT X = 0.95250     Y = 2.8576     Z = 0.00000    IS UNIT NUMBER   414
  HOLE NUMBER   51      AT X = 2.8576     Y = 2.8576     Z = 0.00000    IS UNIT NUMBER   418
2 CUBOID        23 1    +X = 4.1529    -X = -4.1529    +Y = 4.1529    -Y = -4.1529    +Z = 43.480    -Z = -33.040
  TRIGA - PREF. FLOOD CANISTER

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GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

REGION MEDIA BIAS NUM ID

----- UNIT 422 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP OPENING

```

1 CUBOID        23 1    +X = 4.1529    -X = -4.1529    +Y = 4.1529    -Y = -4.1529    +Z = 43.480    -Z = -33.040
  HOLE NUMBER   52      AT X = -2.8576    Y = -2.8576    Z = 0.00000    IS UNIT NUMBER   415
  HOLE NUMBER   53      AT X = -0.95250    Y = -2.8576    Z = 0.00000    IS UNIT NUMBER   413
  HOLE NUMBER   54      AT X = 0.95250     Y = -2.8576    Z = 0.00000    IS UNIT NUMBER   413
  HOLE NUMBER   55      AT X = 2.8576     Y = -2.8576    Z = 0.00000    IS UNIT NUMBER   416

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HOLE NUMBER	56	AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	57	AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	58	AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	59	AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	60	AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	61	AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	62	AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418
HOLE NUMBER	63	AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	64	AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	65	AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	66	AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	67	AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
TRIGA - PREF. FLOOD CANISTER						
REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				

----- UNIT 423 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM LEFT OPENING

1 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
HOLE NUMBER	68	AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	69	AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	70	AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	71	AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	72	AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	73	AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	74	AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	75	AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	76	AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	77	AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	78	AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418
HOLE NUMBER	79	AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	80	AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	81	AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	82	AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	83	AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
TRIGA - PREF. FLOOD CANISTER						

REGION MEDIA BIAS NUM ID GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 424 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP LEFT OPENING

1 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
HOLE NUMBER	84	AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	85	AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	86	AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	87	AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	88	AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	89	AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415

HOLE NUMBER	90	AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	91	AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	92	AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	93	AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	94	AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418
HOLE NUMBER	95	AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	96	AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	97	AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	98	AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	99	AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
TRIGA - PREF. FLOOD CANISTER						

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 425 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM RIGHT OPENING

1 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
HOLE NUMBER	100	AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	101	AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	102	AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	103	AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	104	AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	105	AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	106	AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	107	AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	108	AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	109	AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	110	AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418
HOLE NUMBER	111	AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	112	AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	113	AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	114	AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	115	AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
TRIGA - PREF. FLOOD CANISTER						

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 426 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP RIGHT OPENING

1 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
HOLE NUMBER	116	AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	117	AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	118	AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	119	AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	120	AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	121	AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	122	AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	123	AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	124	AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411

HOLE NUMBER	125	AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417		
HOLE NUMBER	126	AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418		
HOLE NUMBER	127	AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412		
HOLE NUMBER	128	AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417		
HOLE NUMBER	129	AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414		
HOLE NUMBER	130	AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414		
HOLE NUMBER	131	AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418		
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040	
----- UNIT 430 -----								
FUEL INSERT IN, CENTER OPENING								
1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040	
----- UNIT 431 -----								
FUEL INSERT IN, BOTTOM OPENING								
1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040	
HOLE NUMBER	132	AT X = 0.00000	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	421		
TRIGA - PREF. FLOOD CANISTER								
REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
----- UNIT 432 -----								
FUEL INSERT IN, TOP OPENING								
1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040	
HOLE NUMBER	133	AT X = 0.00000	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	422		
----- UNIT 433 -----								
FUEL INSERT IN, BOTTOM LEFT OPENING								
1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040	
HOLE NUMBER	134	AT X = -0.11430	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	423		
----- UNIT 434 -----								
FUEL INSERT IN, TOP LEFT OPENING								
1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040	
HOLE NUMBER	135	AT X = -0.11430	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	424		
----- UNIT 435 -----								
FUEL INSERT IN, BOTOM RIGHT OPENING								
1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040	
HOLE NUMBER	136	AT X = 0.11430	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	425		
----- UNIT 436 -----								
FUEL INSERT IN, TOP RIGHT OPENING								
1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040	
HOLE NUMBER	137	AT X = 0.11430	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	426		
----- UNIT 440 EXTERNAL TO LATTICE 41 -----								
CENTER COLUMN OF THREE OPENINGS								
1 ARRAY NUMBER	41	+X = 4.2672	-X = -4.2672	+Y = 13.513	-Y = -13.513	+Z = 43.480	-Z = -33.040	
2 CUBOID	2 1	+X = 4.9784	-X = -4.9784	+Y = 14.224	-Y = -14.224	+Z = 43.480	-Z = -33.040	
TRIGA - PREF. FLOOD CANISTER								
REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
----- UNIT 441 EXTERNAL TO LATTICE 42 -----								
LEFT OUTSIDE COLUMN OF TWO OPENINGS								

1 ARRAY NUMBER	42	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 43.480	-Z = -33.040
2 CUBOID	2 1	+X = 4.2672	-X = -4.6080	+Y = 9.1800	-Y = -9.1800	+Z = 43.480	-Z = -33.040

----- UNIT 442 EXTERNAL TO LATTICE 43 -----

RIGHT OUTSIDE COLUMN OF TWO OPENINGS

1 ARRAY NUMBER	43	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 43.480	-Z = -33.040
2 CUBOID	2 1	+X = 4.6080	-X = -4.2672	+Y = 9.1800	-Y = -9.1800	+Z = 43.480	-Z = -33.040

----- UNIT 450 -----

28 TRIGA FUEL ELEMENTS IN EACH LWT BASKET

1 CYLINDER	23 1	RADIUS = 17.150	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	138	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	440	
HOLE NUMBER	139	AT X = -9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	441	
HOLE NUMBER	140	AT X = 9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	442	
2 CYLINDER	2 1	RADIUS = 18.910	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CYLINDER	26 1	RADIUS = 33.465	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4 CYLINDER	2 1	RADIUS = 36.519	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
5 CYLINDER	27 1	RADIUS = 49.223	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
6 CYLINDER	2 1	RADIUS = 49.822	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
7 CUBOID	28 1	+X = 121.92	-X = -121.92	+Y = 121.92	-Y = -121.92	+Z = 43.485	-Z = -33.045

TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

11  
5  
16  
5  
10

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 2 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

12  
6  
13

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 3 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

14  
6  
15

TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 20 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

81 Z LAYER 2, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

30 Z LAYER 3, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450 Z LAYER 4, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450 Z LAYER 5, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450 Z LAYER 6, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

30 Z LAYER 7, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

80

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 41 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

431  
45  
430  
45  
432

TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 42 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

435  
46  
436

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 43 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

433  
46  
434

TRIGA - PREF. FLOOD CANISTER  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	3.00660E+03 CM**3	3.00660E+03 CM**3
5	1	2	5.01021E+02 CM**3	5.01021E+02 CM**3
6	1	3	4.29446E+02 CM**3	4.29446E+02 CM**3
7	1	4	2.50244E-01 CM**3	3.00685E+03 CM**3
	2	5	4.59706E+02 CM**3	3.46655E+03 CM**3
	3	6	9.51335E+02 CM**3	4.41789E+03 CM**3
10	1	7	1.59436E+03 CM**3	6.01225E+03 CM**3
11	1	8	1.59436E+03 CM**3	6.01225E+03 CM**3
12	1	9	1.59436E+03 CM**3	6.01225E+03 CM**3
13	1	10	1.59436E+03 CM**3	6.01225E+03 CM**3
14	1	11	1.59436E+03 CM**3	6.01225E+03 CM**3
15	1	12	1.59436E+03 CM**3	6.01225E+03 CM**3
16	1	13	6.01225E+03 CM**3	6.01225E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 20 IS AN ARRAY PLACEMENT BOUNDARY REGION				
20	1	20	1.90388E+04 CM**3	1.90388E+04 CM**3
	2	21	4.34218E+03 CM**3	2.33810E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 22 IS AN ARRAY PLACEMENT BOUNDARY REGION				
21	1	22	1.24539E+04 CM**3	1.24539E+04 CM**3
	2	23	8.89567E+02 CM**3	1.33435E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 24 IS AN ARRAY PLACEMENT BOUNDARY REGION				
22	1	24	1.24539E+04 CM**3	1.24539E+04 CM**3
	2	25	8.89567E+02 CM**3	1.33435E+04 CM**3
30	1	26	2.57606E+04 CM**3	7.58286E+04 CM**3
	2	27	1.83375E+04 CM**3	9.41660E+04 CM**3
	3	28	2.00728E+05 CM**3	2.94894E+05 CM**3
	4	29	5.62864E+04 CM**3	3.51181E+05 CM**3
	5	30	2.86831E+05 CM**3	6.38011E+05 CM**3
	6	31	1.56332E+04 CM**3	6.53645E+05 CM**3
	7	32	4.33012E+06 CM**3	4.98377E+06 CM**3
41	1	33	7.36468E+01 CM**3	7.36468E+01 CM**3
	2	34	9.53190E+00 CM**3	8.3178E+01 CM**3
	3	35	3.07231E+01 CM**3	1.13902E+02 CM**3
45	1	39	4.64451E+02 CM**3	4.64451E+02 CM**3
46	1	40	3.98101E+02 CM**3	3.98101E+02 CM**3
80	1	93	1.18444E+05 CM**3	1.18444E+05 CM**3
	2	94	1.02013E+05 CM**3	2.20456E+05 CM**3
	3	95	1.46043E+06 CM**3	1.68089E+06 CM**3
81	1	96	1.66245E+04 CM**3	1.66245E+04 CM**3
	2	97	9.57276E+04 CM**3	1.12352E+05 CM**3
	3	98	9.56257E+04 CM**3	2.07978E+05 CM**3

SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	100 IS AN ARRAY	PLACEMENT	BOUNDARY REGION
	4	99	1.37777E+06 CM**3			1.58574E+06 CM**3
82	1	100	2.68851E+07 CM**3			2.68851E+07 CM**3
411	1	43	4.19496E+01 CM**3			1.55851E+02 CM**3
	2	44	6.22481E+01 CM**3			2.18100E+02 CM**3
412	1	45	4.19496E+01 CM**3			1.55851E+02 CM**3
	2	46	6.22481E+01 CM**3			2.18100E+02 CM**3
413	1	47	4.19496E+01 CM**3			1.55851E+02 CM**3
	2	48	6.22481E+01 CM**3			2.18100E+02 CM**3
414	1	49	4.19496E+01 CM**3			1.55851E+02 CM**3
	2	50	6.22481E+01 CM**3			2.18100E+02 CM**3
415	1	51	4.19496E+01 CM**3			1.55851E+02 CM**3
	2	52	6.22481E+01 CM**3			2.18100E+02 CM**3
416	1	53	4.19496E+01 CM**3			1.55851E+02 CM**3
	2	54	6.22481E+01 CM**3			2.18100E+02 CM**3
417	1	55	4.19496E+01 CM**3			1.55851E+02 CM**3
	2	56	6.22481E+01 CM**3			2.18100E+02 CM**3
418	1	57	4.19496E+01 CM**3			1.55851E+02 CM**3
	2	58	6.22481E+01 CM**3			2.18100E+02 CM**3
421	1	61	1.78924E+03 CM**3			5.27883E+03 CM**3
	2	62	0.00000E+00 CM**3			5.27883E+03 CM**3
422	1	63	1.78924E+03 CM**3			5.27883E+03 CM**3
	2	64	0.00000E+00 CM**3			5.27883E+03 CM**3
423	1	65	1.78924E+03 CM**3			5.27883E+03 CM**3
	2	66	0.00000E+00 CM**3			5.27883E+03 CM**3
424	1	67	1.78924E+03 CM**3			5.27883E+03 CM**3
	2	68	0.00000E+00 CM**3			5.27883E+03 CM**3
425	1	69	1.78924E+03 CM**3			5.27883E+03 CM**3
	2	70	0.00000E+00 CM**3			5.27883E+03 CM**3
426	1	71	1.78924E+03 CM**3			5.27883E+03 CM**3
	2	72	0.00000E+00 CM**3			5.27883E+03 CM**3
430	1	73	5.57341E+03 CM**3			5.57341E+03 CM**3
431	1	74	2.94576E+02 CM**3			5.57341E+03 CM**3
432	1	75	2.94576E+02 CM**3			5.57341E+03 CM**3
433	1	76	2.94576E+02 CM**3			5.57341E+03 CM**3
434	1	77	2.94576E+02 CM**3			5.57341E+03 CM**3
435	1	78	2.94576E+02 CM**3			5.57341E+03 CM**3
436	1	79	2.94576E+02 CM**3			5.57341E+03 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	80 IS AN ARRAY	PLACEMENT	BOUNDARY REGION
440	1	80	1.76491E+04 CM**3			1.76491E+04 CM**3
	2	81	4.02524E+03 CM**3			2.16744E+04 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	82 IS AN ARRAY	PLACEMENT	BOUNDARY REGION
441	1	82	1.15449E+04 CM**3			1.15449E+04 CM**3
	2	83	9.23913E+02 CM**3			1.24688E+04 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	84 IS AN ARRAY	PLACEMENT	BOUNDARY REGION
442	1	84	1.15449E+04 CM**3			1.15449E+04 CM**3
	2	85	9.23913E+02 CM**3			1.24688E+04 CM**3
450	1	86	2.41027E+04 CM**3			7.07147E+04 CM**3
	2	87	1.52615E+04 CM**3			8.59762E+04 CM**3
	3	88	1.83270E+05 CM**3			2.69247E+05 CM**3
	4	89	5.13911E+04 CM**3			3.20638E+05 CM**3
	5	90	2.61884E+05 CM**3			5.82522E+05 CM**3
	6	91	1.42735E+04 CM**3			5.96796E+05 CM**3
	7	92	3.95352E+06 CM**3			4.55032E+06 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	12	1	1	3.60792E+04 CM**3
5	4	1	2	2.00408E+03 CM**3
6	4	1	2	1.71778E+03 CM**3
7	12	1	3	3.00293E+00 CM**3
		2	2	5.51647E+03 CM**3
		3	12	1.14160E+04 CM**3
10	2	1	12	3.18871E+03 CM**3

11	2	1	12	3.18871E+03	CM**3
12	2	1	12	3.18871E+03	CM**3
13	2	1	12	3.18871E+03	CM**3
14	2	1	12	3.18871E+03	CM**3
15	2	1	12	3.18871E+03	CM**3
16	2	1	12	1.20245E+04	CM**3
20	2	1		3.80776E+04	CM**3
		2	2	8.68436E+03	CM**3
21	2	1		2.49079E+04	CM**3
		2	2	1.77913E+03	CM**3
22	2	1		2.49079E+04	CM**3
		2	2	1.77913E+03	CM**3
30	2	1	12	5.15212E+04	CM**3
		2	2	3.66750E+04	CM**3
		3	6	4.01456E+05	CM**3
		4	2	1.12573E+05	CM**3
		5	7	5.73661E+05	CM**3
		6	2	3.12664E+04	CM**3
		7	8	8.66024E+06	CM**3
41	288	1	21	2.12103E+04	CM**3
		2	22	2.74519E+03	CM**3
		3	29	8.84826E+03	CM**3
45	6	1	2	2.78670E+03	CM**3
46	6	1	2	2.38860E+03	CM**3
90	1	1	2	1.18444E+05	CM**3
		2	8	1.02013E+05	CM**3
		3	8	1.46043E+06	CM**3
81	1	1	6	1.66245E+04	CM**3
		2	2	9.57276E+04	CM**3
		3	8	9.56257E+04	CM**3
		4	8	1.37777E+06	CM**3
82	1	1		2.68851E+07	CM**3
411	36	1	23	1.51018E+03	CM**3
		2	30	2.24093E+03	CM**3
412	36	1	23	1.51018E+03	CM**3
		2	30	2.24093E+03	CM**3
413	36	1	23	1.51018E+03	CM**3
		2	30	2.24093E+03	CM**3
414	36	1	23	1.51018E+03	CM**3
		2	30	2.24093E+03	CM**3
415	36	1	23	1.51018E+03	CM**3
		2	30	2.24093E+03	CM**3
416	36	1	23	1.51018E+03	CM**3
		2	30	2.24093E+03	CM**3
417	36	1	23	1.51018E+03	CM**3
		2	30	2.24093E+03	CM**3
418	36	1	23	1.51018E+03	CM**3
		2	30	2.24093E+03	CM**3
421	3	1	23	5.36772E+03	CM**3
		2	23	0.00000E+00	CM**3
422	3	1	23	5.36772E+03	CM**3
		2	23	0.00000E+00	CM**3
423	3	1	23	5.36772E+03	CM**3
		2	23	0.00000E+00	CM**3
424	3	1	23	5.36772E+03	CM**3
		2	23	0.00000E+00	CM**3
425	3	1	23	5.36772E+03	CM**3
		2	23	0.00000E+00	CM**3
426	3	1	23	5.36772E+03	CM**3
		2	23	0.00000E+00	CM**3
430	3	1	23	1.67202E+04	CM**3
431	3	1	23	8.83729E+02	CM**3
432	3	1	23	8.83729E+02	CM**3
433	3	1	23	8.83729E+02	CM**3

434	3	1	23	8.83729E+02	CM**3
435	3	1	23	8.83729E+02	CM**3
436	3	1	23	8.83729E+02	CM**3
440	3	1		5.29474E+04	CM**3
		2	2	1.20757E+04	CM**3
441	3	1		3.46348E+04	CM**3
		2	2	2.77174E+03	CM**3
442	3	1		3.46348E+04	CM**3
		2	2	2.77174E+03	CM**3
450	3	1	23	7.23080E+04	CM**3
		2	2	4.57845E+04	CM**3
		3	26	5.49811E+05	CM**3
		4	2	1.54173E+05	CM**3
		5	27	7.85653E+05	CM**3
		6	2	4.28205E+04	CM**3
		7	28	1.18606E+07	CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	3.60792E+04 CM**3	6.40483E+04
2	6.81739E+05 CM**3	5.39938E+06
3	3.00293E+00 CM**3	2.99744E+00
6	4.18081E+05 CM**3	4.74271E+06
7	5.73661E+05 CM**3	5.72612E-15
8	1.16961E+07 CM**3	1.16747E-13
12	9.40940E+04 CM**3	9.39219E-16
21	2.12103E+04 CM**3	1.24319E+05
22	2.74519E+03 CM**3	2.20507E+04
23	1.38618E+05 CM**3	1.38365E-15
26	5.49811E+05 CM**3	6.23706E+06
27	7.85653E+05 CM**3	7.84216E-15
28	1.18606E+07 CM**3	1.18389E-13
29	8.84826E+03 CM**3	3.48149E+04
30	1.79275E+04 CM**3	4.84400E+04

.....  
 \*\*\*  
 \*\*\* 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 .....

..... 0.02367 MINUTES WERE USED PROCESSING DATA. ....

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 2.13090E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 1.21920E+02 -X=-1.21920E+02 +Y= 1.21920E+02 -Y=-1.21920E+02 +Z= 2.30870E+02 -Z=-2.21300E+02

THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 218 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

282 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

1.79750 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 1.82400 MINUTES.



TRIGA - PREF. FLOOD CANISTER

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
1	8.58385E-01	1.82533E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 WARNING... ONLY 469 INDEPENDENT FISSION POINTS WERE GENERATED						
2	8.20013E-01	1.85267E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	8.93171E-01	1.86833E+00	8.93171E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	8.51732E-01	1.88383E+00	8.72452E-01	2.07145E-02	0.00000E+00	0.00000E+00
5	8.56829E-01	1.89505E+00	9.00597E-01	3.05523E-02	0.00000E+00	0.00000E+00
6	8.56755E-01	1.91682E+00	8.89637E-01	2.42441E-02	0.00000E+00	0.00000E+00
7	8.99010E-01	1.93233E+00	8.91512E-01	1.88727E-02	0.00000E+00	0.00000E+00
8	8.55045E-01	1.94982E+00	8.85434E-01	1.65648E-02	0.00000E+00	0.00000E+00
9	8.17044E-01	1.96717E+00	8.75664E-01	1.70718E-02	0.00000E+00	0.00000E+00
10	8.89217E-01	1.98367E+00	8.77358E-01	1.48814E-02	0.00000E+00	0.00000E+00
11	8.79461E-01	2.00200E+00	8.77592E-01	1.31262E-02	0.00000E+00	0.00000E+00
12	8.57589E-01	2.01850E+00	8.75591E-01	1.19096E-02	0.00000E+00	0.00000E+00
13	8.97931E-01	2.03483E+00	8.77622E-01	1.09624E-02	0.00000E+00	0.00000E+00
14	8.95053E-01	2.05133E+00	8.79075E-01	1.01122E-02	0.00000E+00	0.00000E+00
15	8.46539E-01	2.06783E+00	8.76572E-01	9.63264E-03	0.00000E+00	0.00000E+00
16	8.58684E-01	2.08533E+00	8.75294E-01	9.00916E-03	0.00000E+00	0.00000E+00
17	8.95472E-01	2.10083E+00	8.76639E-01	8.49427E-03	0.00000E+00	0.00000E+00
18	8.72854E-01	2.11633E+00	8.76403E-01	7.94918E-03	0.00000E+00	0.00000E+00
19	9.02891E-01	2.13200E+00	8.77961E-01	7.62778E-03	0.00000E+00	0.00000E+00
20	8.69112E-01	2.14850E+00	8.77469E-01	7.20833E-03	0.00000E+00	0.00000E+00
21	8.67503E-01	2.16483E+00	8.76945E-01	6.83854E-03	0.00000E+00	0.00000E+00
22	8.92655E-01	2.18133E+00	8.77730E-01	6.53499E-03	0.00000E+00	0.00000E+00
23	8.57401E-01	2.19883E+00	8.76762E-01	6.29095E-03	0.00000E+00	0.00000E+00
24	8.51490E-01	2.21517E+00	8.75614E-01	6.10719E-03	0.00000E+00	0.00000E+00
25	8.34943E-01	2.23267E+00	8.73845E-01	6.09765E-03	0.00000E+00	0.00000E+00
26	8.67554E-01	2.24917E+00	8.73583E-01	5.84394E-03	0.00000E+00	0.00000E+00
27	8.79591E-01	2.26567E+00	8.73824E-01	5.61046E-03	0.00000E+00	0.00000E+00
28	9.12288E-01	2.28017E+00	8.75303E-01	5.58968E-03	0.00000E+00	0.00000E+00
29	8.77621E-01	2.29667E+00	8.75389E-01	5.37936E-03	0.00000E+00	0.00000E+00
30	8.77030E-01	2.31317E+00	8.75447E-01	5.18401E-03	0.00000E+00	0.00000E+00
31	8.76863E-01	2.32967E+00	8.75496E-01	5.00230E-03	0.00000E+00	0.00000E+00
32	8.07900E-01	2.34617E+00	8.73243E-01	5.33213E-03	0.00000E+00	0.00000E+00
33	7.94050E-01	2.36350E+00	8.70698E-01	5.75529E-03	0.00000E+00	0.00000E+00
34	9.13671E-01	2.38100E+00	8.72032E-01	5.73213E-03	0.00000E+00	0.00000E+00
35	9.09756E-01	2.39650E+00	8.73175E-01	5.67211E-03	0.00000E+00	0.00000E+00
36	8.66713E-01	2.41300E+00	8.72985E-01	5.50604E-03	0.00000E+00	0.00000E+00
37	8.91592E-01	2.43033E+00	8.73516E-01	5.37278E-03	0.00000E+00	0.00000E+00
38	8.89052E-01	2.44683E+00	8.73948E-01	5.23920E-03	0.00000E+00	0.00000E+00
39	8.53232E-01	2.46417E+00	8.73388E-01	5.12630E-03	0.00000E+00	0.00000E+00
40	8.47542E-01	2.48167E+00	8.72708E-01	5.03572E-03	0.00000E+00	0.00000E+00
41	8.32282E-01	2.49917E+00	8.71671E-01	5.01323E-03	0.00000E+00	0.00000E+00
42	8.80644E-01	2.51550E+00	8.71896E-01	4.89144E-03	0.00000E+00	0.00000E+00
43	8.46160E-01	2.53383E+00	8.71268E-01	4.81176E-03	0.00000E+00	0.00000E+00
44	8.17915E-01	2.55033E+00	8.69998E-01	4.86459E-03	0.00000E+00	0.00000E+00
45	8.47782E-01	2.56767E+00	8.69481E-01	4.77812E-03	0.00000E+00	0.00000E+00
46	8.87207E-01	2.58417E+00	8.69884E-01	4.68561E-03	0.00000E+00	0.00000E+00
47	8.98788E-01	2.60067E+00	8.70526E-01	4.62512E-03	0.00000E+00	0.00000E+00
48	8.66389E-01	2.61717E+00	8.70436E-01	4.52435E-03	0.00000E+00	0.00000E+00
49	8.62631E-01	2.63367E+00	8.70270E-01	4.43015E-03	0.00000E+00	0.00000E+00
50	9.25740E-01	2.65000E+00	8.71426E-01	4.48820E-03	0.00000E+00	0.00000E+00
51	8.58742E-01	2.66750E+00	8.71167E-01	4.40327E-03	0.00000E+00	0.00000E+00
52	8.46911E-01	2.68483E+00	8.70680E-01	4.34173E-03	0.00000E+00	0.00000E+00
53	8.82070E-01	2.70050E+00	8.70903E-01	4.26159E-03	0.00000E+00	0.00000E+00
54	9.29469E-01	2.71600E+00	8.72029E-01	4.32794E-03	0.00000E+00	0.00000E+00
55	9.03988E-01	2.73067E+00	8.72632E-01	4.28809E-03	0.00000E+00	0.00000E+00
56	8.92218E-01	2.74617E+00	8.72995E-01	4.22354E-03	0.00000E+00	0.00000E+00
57	8.80188E-01	2.76267E+00	8.73126E-01	4.14810E-03	0.00000E+00	0.00000E+00
58	8.89059E-01	2.77917E+00	8.73410E-01	4.08228E-03	0.00000E+00	0.00000E+00
59	8.53596E-01	2.79567E+00	8.73063E-01	4.02603E-03	0.00000E+00	0.00000E+00
60	9.09480E-01	2.81117E+00	8.73690E-01	4.00553E-03	0.00000E+00	0.00000E+00
61	8.90852E-01	2.82767E+00	8.73981E-01	3.94778E-03	0.00000E+00	0.00000E+00
62	8.50242E-01	2.84500E+00	8.73586E-01	3.90154E-03	0.00000E+00	0.00000E+00
63	8.97337E-01	2.86150E+00	8.73975E-01	3.85676E-03	0.00000E+00	0.00000E+00
64	8.65665E-01	2.87800E+00	8.73841E-01	3.79641E-03	0.00000E+00	0.00000E+00
65	8.43750E-01	2.89533E+00	8.73363E-01	3.76607E-03	0.00000E+00	0.00000E+00
66	8.94593E-01	2.91183E+00	8.73695E-01	3.72157E-03	0.00000E+00	0.00000E+00
67	8.51098E-01	2.92750E+00	8.73347E-01	3.68033E-03	0.00000E+00	0.00000E+00
68	8.94845E-01	2.94400E+00	8.73675E-01	3.63888E-03	0.00000E+00	0.00000E+00
69	8.58716E-01	2.96033E+00	8.73451E-01	3.59110E-03	0.00000E+00	0.00000E+00
70	9.39102E-01	2.97600E+00	8.74417E-01	3.66726E-03	0.00000E+00	0.00000E+00
71	9.04811E-01	2.99250E+00	8.74857E-01	3.64047E-03	0.00000E+00	0.00000E+00
72	8.68414E-01	3.00800E+00	8.75051E-01	3.59331E-03	0.00000E+00	0.00000E+00
73	8.60679E-01	3.02350E+00	8.74849E-01	3.54812E-03	0.00000E+00	0.00000E+00
74	9.05985E-01	3.04100E+00	8.75281E-01	3.52512E-03	0.00000E+00	0.00000E+00
75	8.47041E-01	3.05750E+00	8.74894E-01	3.49795E-03	0.00000E+00	0.00000E+00
76	8.70802E-01	3.07567E+00	8.74839E-01	3.45000E-03	0.00000E+00	0.00000E+00
77	9.12350E-01	3.09133E+00	8.75339E-01	3.44102E-03	0.00000E+00	0.00000E+00
78	8.84373E-01	3.10783E+00	8.75458E-01	3.39752E-03	0.00000E+00	0.00000E+00
79	8.15890E-01	3.12333E+00	8.74684E-01	3.44119E-03	0.00000E+00	0.00000E+00
80	8.72068E-01	3.13983E+00	8.74651E-01	3.39695E-03	0.00000E+00	0.00000E+00
81	9.60401E-01	3.15633E+00	8.75736E-01	3.52496E-03	0.00000E+00	0.00000E+00
82	8.57043E-01	3.17283E+00	8.75503E-01	3.48845E-03	0.00000E+00	0.00000E+00
83	8.97511E-01	3.18933E+00	8.75779E-01	3.45621E-03	0.00000E+00	0.00000E+00
84	9.23655E-01	3.20567E+00	8.75144E-01	3.47249E-03	0.00000E+00	0.00000E+00
85	9.14504E-01	3.22133E+00	8.75618E-01	3.46301E-03	0.00000E+00	0.00000E+00
86	8.98612E-01	3.23783E+00	8.75894E-01	3.43265E-03	0.00000E+00	0.00000E+00
87	8.83572E-01	3.25433E+00	8.75984E-01	3.39323E-03	0.00000E+00	0.00000E+00
88	8.62041E-01	3.26983E+00	8.75822E-01	3.35746E-03	0.00000E+00	0.00000E+00
89	9.12080E-01	3.28717E+00	8.76239E-01	3.34471E-03	0.00000E+00	0.00000E+00
90	9.35211E-01	3.30367E+00	8.76909E-01	3.37371E-03	0.00000E+00	0.00000E+00

91	9.22995E-01	3.31933E+00	8.77427E-01	3.37554E-03	0.00000E+00	0.00000E+00
92	8.88973E-01	3.33667E+00	8.77555E-01	3.34029E-03	0.00000E+00	0.00000E+00
93	8.77943E-01	3.35317E+00	8.7759E-01	3.30338E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 WARNING... ONLY 489 INDEPENDENT FISSION POINTS WERE GENERATED						
94	8.30893E-01	3.36967E+00	8.77052E-01	3.30642E-03	0.00000E+00	0.00000E+00
95	8.14119E-01	3.38600E+00	8.77451E-01	3.29487E-03	0.00000E+00	0.00000E+00
96	8.23056E-01	3.40250E+00	8.77936E-01	3.29554E-03	0.00000E+00	0.00000E+00
97	8.83169E-01	3.42000E+00	8.77991E-01	3.26113E-03	0.00000E+00	0.00000E+00
98	9.13851E-01	3.43550E+00	8.78364E-01	3.24853E-03	0.00000E+00	0.00000E+00
99	8.95378E-01	3.45100E+00	8.78540E-01	3.21965E-03	0.00000E+00	0.00000E+00
100	9.08199E-01	3.46667E+00	8.78943E-01	3.20096E-03	0.00000E+00	0.00000E+00
101	8.96026E-01	3.48217E+00	8.79016E-01	3.17321E-03	0.00000E+00	0.00000E+00
102	8.34000E-01	3.49867E+00	8.78566E-01	3.17341E-03	0.00000E+00	0.00000E+00
103	8.47904E-01	3.51517E+00	8.78262E-01	3.15647E-03	0.00000E+00	0.00000E+00
104	7.96188E-01	3.53250E+00	8.77458E-01	3.22729E-03	0.00000E+00	0.00000E+00
105	8.78224E-01	3.55000E+00	8.77465E-01	3.19581E-03	0.00000E+00	0.00000E+00
106	8.60681E-01	3.56633E+00	8.77304E-01	3.16905E-03	0.00000E+00	0.00000E+00
107	9.01017E-01	3.58100E+00	8.77530E-01	3.14683E-03	0.00000E+00	0.00000E+00
108	8.32264E-01	3.59850E+00	8.77103E-01	3.14612E-03	0.00000E+00	0.00000E+00
109	8.84434E-01	3.61500E+00	8.77171E-01	3.11733E-03	0.00000E+00	0.00000E+00
110	8.87295E-01	3.63050E+00	8.77265E-01	3.08976E-03	0.00000E+00	0.00000E+00
111	8.71837E-01	3.64883E+00	8.77215E-01	3.06168E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 WARNING... ONLY 479 INDEPENDENT FISSION POINTS WERE GENERATED						
112	8.13694E-01	3.66617E+00	8.76638E-01	3.08819E-03	0.00000E+00	0.00000E+00
113	8.78333E-01	3.68267E+00	8.76653E-01	3.06028E-03	0.00000E+00	0.00000E+00
114	9.43140E-01	3.69917E+00	8.77246E-01	3.09039E-03	0.00000E+00	0.00000E+00
115	9.10904E-01	3.71567E+00	8.77544E-01	3.07736E-03	0.00000E+00	0.00000E+00
116	8.57323E-01	3.73217E+00	8.77367E-01	3.05540E-03	0.00000E+00	0.00000E+00
117	9.55281E-01	3.74767E+00	8.78044E-01	3.10357E-03	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 WARNING... ONLY 495 INDEPENDENT FISSION POINTS WERE GENERATED						
118	8.45758E-01	3.76417E+00	8.77766E-01	3.08926E-03	0.00000E+00	0.00000E+00
119	9.02391E-01	3.78067E+00	8.77977E-01	3.06997E-03	0.00000E+00	0.00000E+00
120	8.45014E-01	3.79800E+00	8.77697E-01	3.05663E-03	0.00000E+00	0.00000E+00
121	8.56319E-01	3.81533E+00	8.77518E-01	3.03616E-03	0.00000E+00	0.00000E+00
122	8.19759E-01	3.83467E+00	8.77036E-01	3.04898E-03	0.00000E+00	0.00000E+00
123	8.31123E-01	3.85117E+00	8.76657E-01	3.04739E-03	0.00000E+00	0.00000E+00
124	8.42923E-01	3.86850E+00	8.76380E-01	3.03493E-03	0.00000E+00	0.00000E+00
125	8.39454E-01	3.88583E+00	8.76080E-01	3.02509E-03	0.00000E+00	0.00000E+00
126	8.43608E-01	3.90233E+00	8.75818E-01	3.01200E-03	0.00000E+00	0.00000E+00
127	8.52193E-01	3.91883E+00	8.75629E-01	2.99378E-03	0.00000E+00	0.00000E+00
128	8.68966E-01	3.93533E+00	8.75576E-01	2.97040E-03	0.00000E+00	0.00000E+00
129	8.54054E-01	3.95083E+00	8.75407E-01	2.95178E-03	0.00000E+00	0.00000E+00
130	8.49799E-01	3.96733E+00	8.75207E-01	2.93546E-03	0.00000E+00	0.00000E+00
131	8.41240E-01	3.98567E+00	8.74944E-01	2.92449E-03	0.00000E+00	0.00000E+00
132	8.91364E-01	4.00217E+00	8.74993E-01	2.90233E-03	0.00000E+00	0.00000E+00
133	8.72153E-01	4.01767E+00	8.74971E-01	2.88017E-03	0.00000E+00	0.00000E+00
134	8.74716E-01	4.03417E+00	8.74969E-01	2.85827E-03	0.00000E+00	0.00000E+00
135	8.81139E-01	4.05067E+00	8.75016E-01	2.83707E-03	0.00000E+00	0.00000E+00
136	9.26220E-01	4.06617E+00	8.75399E-01	2.84173E-03	0.00000E+00	0.00000E+00
137	8.59309E-01	4.08183E+00	8.75279E-01	2.82312E-03	0.00000E+00	0.00000E+00
138	8.90454E-01	4.09733E+00	8.75391E-01	2.80451E-03	0.00000E+00	0.00000E+00
139	8.37620E-01	4.11383E+00	8.75115E-01	2.79758E-03	0.00000E+00	0.00000E+00
140	8.97867E-01	4.12933E+00	8.75280E-01	2.78212E-03	0.00000E+00	0.00000E+00
141	9.24712E-01	4.14583E+00	8.75636E-01	2.78483E-03	0.00000E+00	0.00000E+00
142	8.98803E-01	4.16233E+00	8.75801E-01	2.76982E-03	0.00000E+00	0.00000E+00
143	9.30603E-01	4.17700E+00	8.76190E-01	2.77743E-03	0.00000E+00	0.00000E+00
144	8.13329E-01	4.19350E+00	8.75747E-01	2.79311E-03	0.00000E+00	0.00000E+00
145	8.83161E-01	4.21093E+00	8.75799E-01	2.77398E-03	0.00000E+00	0.00000E+00
146	8.00468E-01	4.22733E+00	8.75276E-01	2.80388E-03	0.00000E+00	0.00000E+00
147	8.75398E-01	4.24383E+00	8.75277E-01	2.78449E-03	0.00000E+00	0.00000E+00
148	8.69677E-01	4.26033E+00	8.75238E-01	2.76566E-03	0.00000E+00	0.00000E+00
149	8.83526E-01	4.27767E+00	8.75295E-01	2.74732E-03	0.00000E+00	0.00000E+00
150	8.46287E-01	4.29417E+00	8.75099E-01	2.73572E-03	0.00000E+00	0.00000E+00
151	8.92387E-01	4.31150E+00	8.75215E-01	2.71978E-03	0.00000E+00	0.00000E+00
152	8.48212E-01	4.32800E+00	8.75035E-01	2.70758E-03	0.00000E+00	0.00000E+00
153	9.22360E-01	4.34267E+00	8.75348E-01	2.70778E-03	0.00000E+00	0.00000E+00
154	9.11516E-01	4.35917E+00	8.75586E-01	2.70041E-03	0.00000E+00	0.00000E+00
155	9.15952E-01	4.37467E+00	8.75850E-01	2.69565E-03	0.00000E+00	0.00000E+00
156	8.97890E-01	4.39117E+00	8.75993E-01	2.68191E-03	0.00000E+00	0.00000E+00
157	8.44649E-01	4.40767E+00	8.75791E-01	2.67211E-03	0.00000E+00	0.00000E+00
158	8.66426E-01	4.42333E+00	8.75731E-01	2.65571E-03	0.00000E+00	0.00000E+00
159	8.25915E-01	4.43967E+00	8.75414E-01	2.65774E-03	0.00000E+00	0.00000E+00
160	9.05299E-01	4.45617E+00	8.75603E-01	2.64763E-03	0.00000E+00	0.00000E+00
161	8.78218E-01	4.47267E+00	8.75619E-01	2.63098E-03	0.00000E+00	0.00000E+00
162	9.11280E-01	4.48917E+00	8.75842E-01	2.62397E-03	0.00000E+00	0.00000E+00
163	9.09611E-01	4.50567E+00	8.76052E-01	2.61604E-03	0.00000E+00	0.00000E+00
164	8.83771E-01	4.52117E+00	8.76099E-01	2.60026E-03	0.00000E+00	0.00000E+00
165	8.53787E-01	4.53867E+00	8.75963E-01	2.58790E-03	0.00000E+00	0.00000E+00
166	8.73619E-01	4.55500E+00	8.75949E-01	2.57211E-03	0.00000E+00	0.00000E+00
167	9.13407E-01	4.57067E+00	8.76176E-01	2.56653E-03	0.00000E+00	0.00000E+00
168	9.40557E-01	4.58533E+00	8.76564E-01	2.58033E-03	0.00000E+00	0.00000E+00
169	8.76389E-01	4.60183E+00	8.76563E-01	2.56484E-03	0.00000E+00	0.00000E+00
170	8.93145E-01	4.61733E+00	8.76622E-01	2.55143E-03	0.00000E+00	0.00000E+00
171	8.87750E-01	4.63383E+00	8.76728E-01	2.53714E-03	0.00000E+00	0.00000E+00
172	8.90461E-01	4.64933E+00	8.76808E-01	2.52347E-03	0.00000E+00	0.00000E+00
173	9.18830E-01	4.66500E+00	8.77054E-01	2.52067E-03	0.00000E+00	0.00000E+00
174	9.09051E-01	4.68050E+00	8.77240E-01	2.51287E-03	0.00000E+00	0.00000E+00
175	8.86993E-01	4.69700E+00	8.77297E-01	2.49894E-03	0.00000E+00	0.00000E+00
176	9.60004E-01	4.71167E+00	8.77197E-01	2.48652E-03	0.00000E+00	0.00000E+00
177	8.62551E-01	4.72717E+00	8.77113E-01	2.47369E-03	0.00000E+00	0.00000E+00
178	8.22895E-01	4.74267E+00	8.76805E-01	2.47881E-03	0.00000E+00	0.00000E+00
179	8.87612E-01	4.75917E+00	8.76866E-01	2.46552E-03	0.00000E+00	0.00000E+00
180	8.77614E-01	4.77483E+00	8.76871E-01	2.45162E-03	0.00000E+00	0.00000E+00
181	9.00075E-01	4.79133E+00	8.77000E-01	2.44134E-03	0.00000E+00	0.00000E+00
182	9.02042E-01	4.80683E+00	8.77139E-01	2.43173E-03	0.00000E+00	0.00000E+00

183	8.18851E-01	4.82417E+00	8.76817E-01	2.43960E-03	0.00000E+00	0.00000E+00
184	8.93587E-01	4.84067E+00	8.76909E-01	2.42791E-03	0.00000E+00	0.00000E+00
185	8.64996E-01	4.85617E+00	8.76844E-01	2.41548E-03	0.00000E+00	0.00000E+00
186	8.82922E-01	4.87267E+00	8.76877E-01	2.40255E-03	0.00000E+00	0.00000E+00
187	9.09855E-01	4.88833E+00	8.77056E-01	2.39617E-03	0.00000E+00	0.00000E+00
188	8.59406E-01	4.90483E+00	8.76961E-01	2.38514E-03	0.00000E+00	0.00000E+00
189	8.93490E-01	4.92117E+00	8.77049E-01	2.37399E-03	0.00000E+00	0.00000E+00
190	9.06273E-01	4.93867E+00	8.77205E-01	2.36644E-03	0.00000E+00	0.00000E+00
191	8.69597E-01	4.95417E+00	8.77164E-01	2.35423E-03	0.00000E+00	0.00000E+00
192	8.66903E-01	4.97167E+00	8.77110E-01	2.34243E-03	0.00000E+00	0.00000E+00
193	8.32013E-01	4.98983E+00	8.76874E-01	2.34207E-03	0.00000E+00	0.00000E+00
194	8.05299E-01	5.00733E+00	8.76501E-01	2.35947E-03	0.00000E+00	0.00000E+00
195	8.87950E-01	5.02383E+00	8.76561E-01	2.34797E-03	0.00000E+00	0.00000E+00
196	8.62069E-01	5.04033E+00	8.76486E-01	2.33703E-03	0.00000E+00	0.00000E+00
197	8.19291E-01	5.05667E+00	8.76193E-01	2.34344E-03	0.00000E+00	0.00000E+00
198	8.54419E-01	5.07417E+00	8.76082E-01	2.3410E-03	0.00000E+00	0.00000E+00
199	8.75956E-01	5.09067E+00	8.76081E-01	2.32222E-03	0.00000E+00	0.00000E+00
200	8.45077E-01	5.10700E+00	8.75924E-01	2.31576E-03	0.00000E+00	0.00000E+00
201	8.59187E-01	5.12350E+00	8.75840E-01	2.30563E-03	0.00000E+00	0.00000E+00
202	8.66802E-01	5.14100E+00	8.75795E-01	2.29452E-03	0.00000E+00	0.00000E+00
203	9.14057E-01	5.15750E+00	8.75986E-01	2.29099E-03	0.00000E+00	0.00000E+00

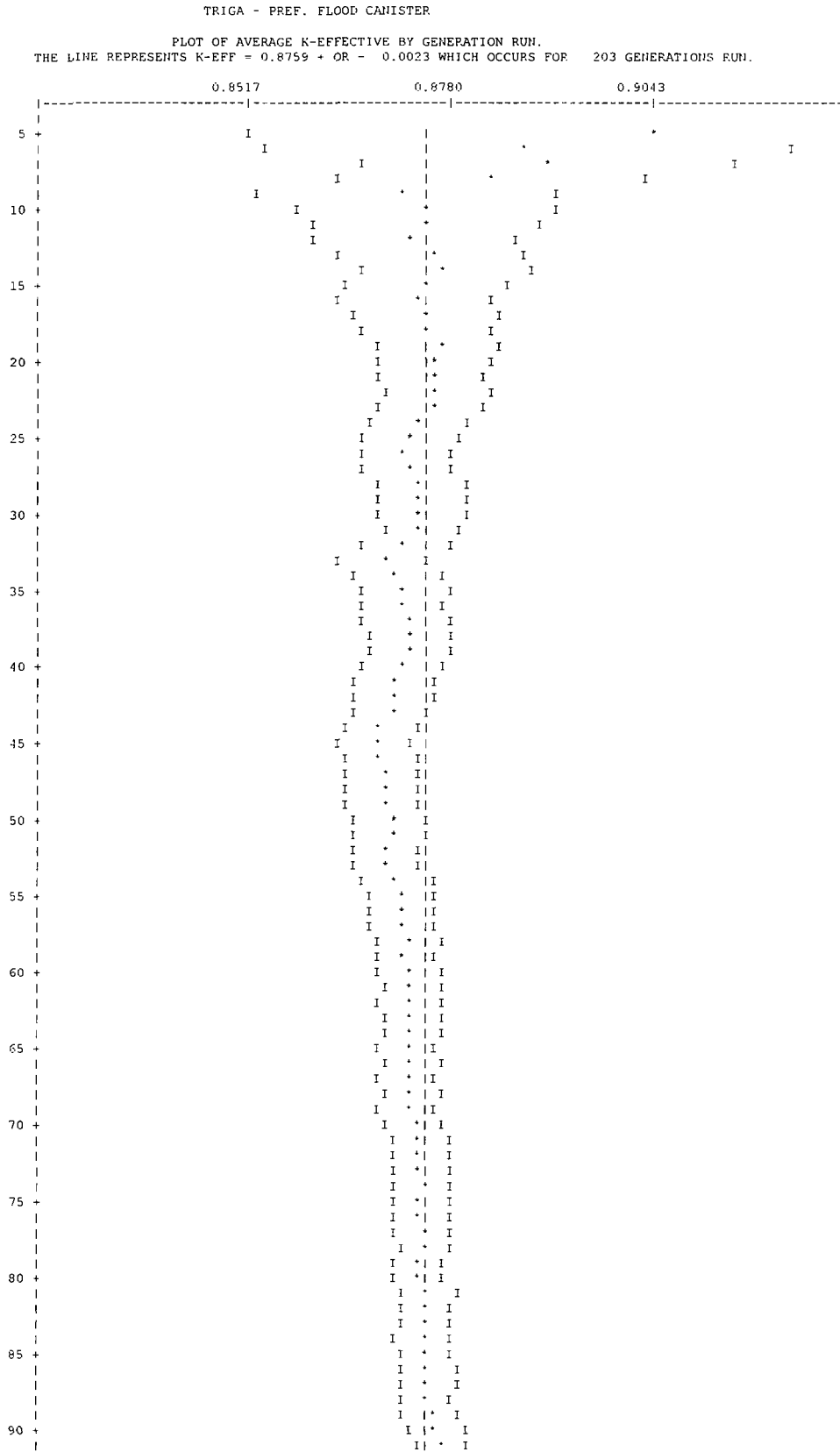
KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

TRIGA - PREF. FLOOD CANISTER

LIFETIME = 2.48937E-04 + OR - 2.49939E-06      GENERATION TIME = 4.88200E-05 + OR - 4.78127E-07  
NU BAR = 2.42071E+00 + OR - 1.83810E-05      AVERAGE FISSION GROUP = 2.23328E+01 + OR - 1.33962E-02  
ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.36279E-01 + OR - 1.30059E-03

NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT		95 PER CENT		99 PER CENT		NUMBER OF HISTORIES
			CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	
3	0.87590	+ OR - 0.00230	0.87360	TO 0.87820	0.87130	TO 0.88050	0.86900	TO 0.88280	100000
4	0.87602	+ OR - 0.00231	0.87371	TO 0.87833	0.87140	TO 0.88064	0.86909	TO 0.88295	99500
5	0.87561	+ OR - 0.00228	0.87333	TO 0.87790	0.87104	TO 0.88018	0.86876	TO 0.88247	99000
6	0.87571	+ OR - 0.00229	0.87341	TO 0.87800	0.87112	TO 0.88030	0.86883	TO 0.88259	98500
7	0.87559	+ OR - 0.00230	0.87329	TO 0.87789	0.87098	TO 0.88019	0.86868	TO 0.88250	98000
8	0.87569	+ OR - 0.00231	0.87338	TO 0.87801	0.87107	TO 0.88032	0.86876	TO 0.88263	97500
9	0.87600	+ OR - 0.00230	0.87369	TO 0.87830	0.87139	TO 0.88061	0.86909	TO 0.88291	97000
10	0.87593	+ OR - 0.00231	0.87361	TO 0.87824	0.87130	TO 0.88056	0.86898	TO 0.88287	96500
11	0.87591	+ OR - 0.00233	0.87358	TO 0.87824	0.87126	TO 0.88056	0.86893	TO 0.88289	96000
12	0.87601	+ OR - 0.00234	0.87367	TO 0.87834	0.87133	TO 0.88068	0.86899	TO 0.88302	95500
17	0.87593	+ OR - 0.00239	0.87355	TO 0.87832	0.87116	TO 0.88070	0.86878	TO 0.88309	93000
22	0.87579	+ OR - 0.00244	0.87335	TO 0.87824	0.87090	TO 0.88068	0.86846	TO 0.88313	90500
27	0.87629	+ OR - 0.00250	0.87380	TO 0.87879	0.87130	TO 0.88129	0.86980	TO 0.88378	88000
32	0.87647	+ OR - 0.00253	0.87394	TO 0.87900	0.87141	TO 0.88153	0.86988	TO 0.88406	85500
37	0.87651	+ OR - 0.00254	0.87397	TO 0.87904	0.87143	TO 0.88158	0.86989	TO 0.88412	83000
42	0.87700	+ OR - 0.00259	0.87441	TO 0.87959	0.87182	TO 0.88218	0.86923	TO 0.88477	80500
47	0.87756	+ OR - 0.00263	0.87493	TO 0.88019	0.87231	TO 0.88282	0.86968	TO 0.88544	78000
52	0.87774	+ OR - 0.00268	0.87506	TO 0.88042	0.87238	TO 0.88311	0.86970	TO 0.88579	75500
57	0.87706	+ OR - 0.00274	0.87432	TO 0.87981	0.87158	TO 0.88255	0.86883	TO 0.88529	73000
62	0.87701	+ OR - 0.00282	0.87419	TO 0.87982	0.87137	TO 0.88264	0.86856	TO 0.88546	70500
67	0.87725	+ OR - 0.00290	0.87435	TO 0.88014	0.87145	TO 0.88304	0.86856	TO 0.88593	68000
72	0.87648	+ OR - 0.00295	0.87353	TO 0.87944	0.87058	TO 0.88239	0.86762	TO 0.88534	65500
77	0.87637	+ OR - 0.00304	0.87333	TO 0.87941	0.87030	TO 0.88244	0.86726	TO 0.88548	63000
82	0.87630	+ OR - 0.00304	0.87327	TO 0.87934	0.87023	TO 0.88238	0.86719	TO 0.88542	60500
87	0.87599	+ OR - 0.00311	0.87288	TO 0.87909	0.86977	TO 0.88220	0.86667	TO 0.88531	58000
92	0.87471	+ OR - 0.00315	0.87156	TO 0.87786	0.86841	TO 0.88101	0.86526	TO 0.88417	55500
97	0.87419	+ OR - 0.00322	0.87097	TO 0.87741	0.86775	TO 0.88063	0.86453	TO 0.88384	53000
102	0.87343	+ OR - 0.00330	0.87013	TO 0.87673	0.86683	TO 0.88003	0.86353	TO 0.88333	50500
107	0.87430	+ OR - 0.00335	0.87095	TO 0.87765	0.86760	TO 0.88100	0.86425	TO 0.88435	48000
112	0.87520	+ OR - 0.00343	0.87176	TO 0.87863	0.86833	TO 0.88206	0.86490	TO 0.88550	45500
117	0.87323	+ OR - 0.00338	0.86985	TO 0.87661	0.86647	TO 0.87999	0.86309	TO 0.88338	43000
122	0.87443	+ OR - 0.00347	0.87096	TO 0.87790	0.86749	TO 0.88136	0.86403	TO 0.88483	40500
127	0.87657	+ OR - 0.00355	0.87302	TO 0.88013	0.86946	TO 0.88368	0.86591	TO 0.88724	38000
132	0.87780	+ OR - 0.00374	0.87407	TO 0.88154	0.87033	TO 0.88528	0.86659	TO 0.88901	35500
137	0.87743	+ OR - 0.00394	0.87349	TO 0.88137	0.86955	TO 0.88531	0.86561	TO 0.88925	33000
142	0.87641	+ OR - 0.00411	0.87230	TO 0.88051	0.86820	TO 0.88462	0.86409	TO 0.88872	30500
147	0.87782	+ OR - 0.00398	0.87384	TO 0.88180	0.86986	TO 0.88579	0.86587	TO 0.88977	28000
152	0.87878	+ OR - 0.00428	0.87451	TO 0.88306	0.87023	TO 0.88733	0.86596	TO 0.89161	25500
157	0.87664	+ OR - 0.00442	0.87222	TO 0.88107	0.86779	TO 0.88549	0.86337	TO 0.88991	23000
162	0.87655	+ OR - 0.00467	0.87187	TO 0.88127	0.86720	TO 0.88589	0.86253	TO 0.89057	20500
167	0.87511	+ OR - 0.00510	0.87001	TO 0.88021	0.86492	TO 0.88530	0.85982	TO 0.89040	18000
172	0.87147	+ OR - 0.00542	0.86606	TO 0.87689	0.86064	TO 0.88231	0.85522	TO 0.88773	15500
177	0.86839	+ OR - 0.00594	0.86245	TO 0.87434	0.85651	TO 0.88028	0.85057	TO 0.88622	13000
182	0.86610	+ OR - 0.00658	0.85952	TO 0.87267	0.85294	TO 0.87925	0.84636	TO 0.88583	10500
187	0.86361	+ OR - 0.00733	0.85628	TO 0.87094	0.84895	TO 0.87827	0.84163	TO 0.88560	8000
192	0.85656	+ OR - 0.00933	0.84723	TO 0.86588	0.83791	TO 0.87521	0.82858	TO 0.88453	5500
197	0.86925	+ OR - 0.00994	0.85931	TO 0.87919	0.84937	TO 0.88913	0.83943	TO 0.89907	3000

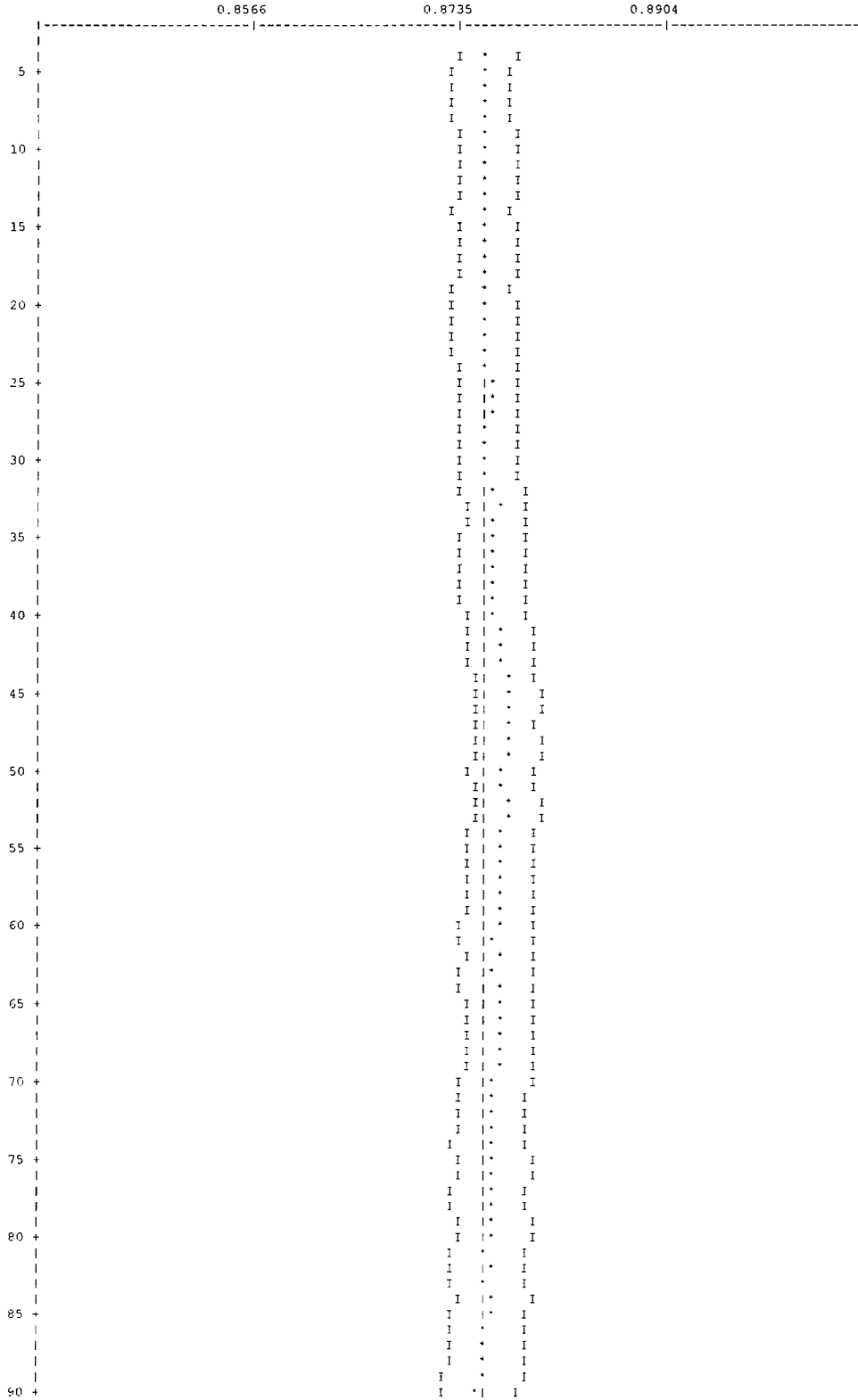


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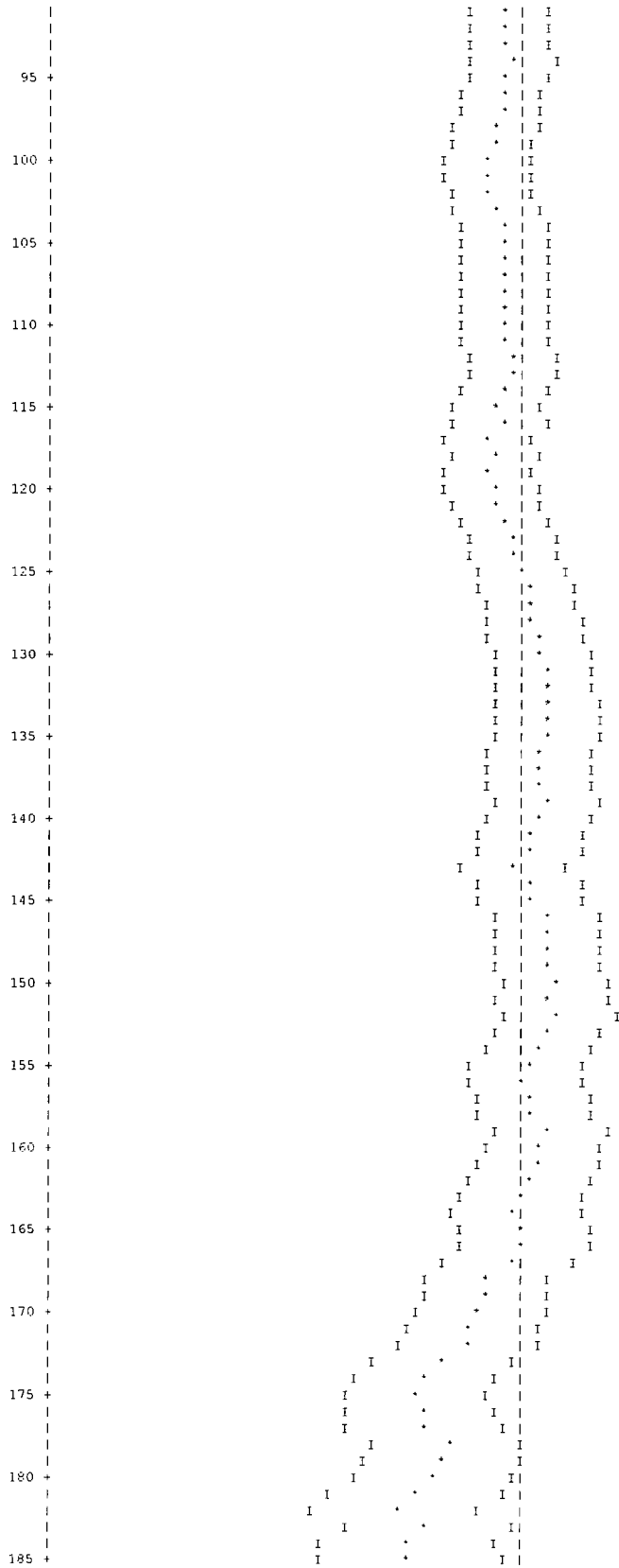
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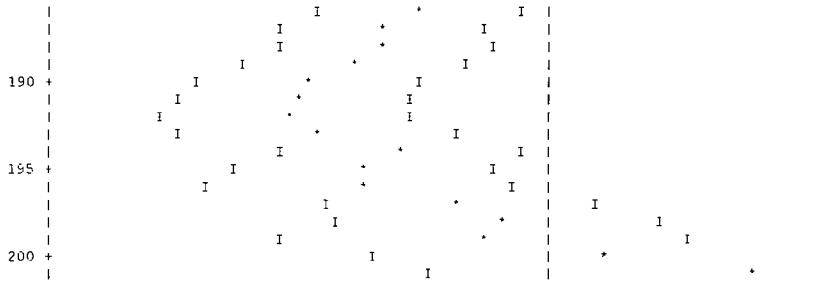
TRIGA - PREF. FLOOD CANISTER

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS K-EFF = 0.8756 + OR - 0.0023 WHICH OCCURS FOR 5 GENERATIONS SKIPPED.









TRIGA - PREF. FLOOD CANISTER

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION	SKIPPING 3 GENERATIONS
1	0.0003			2.56018E-04	3.8496	1.25699E-03	3.1723	0.00000E+00	0.0000	
2	0.0014			1.22398E-03	1.4507	3.43821E-03	0.9921	0.00000E+00	0.0000	
3	0.0018			1.61485E-03	1.0573	1.72678E-03	0.7770	0.00000E+00	0.0000	
4	0.0012			1.06025E-03	1.3116	9.63316E-04	0.9001	0.00000E+00	0.0000	
5	0.0020			1.71122E-03	1.1056	2.36902E-03	0.7948	0.00000E+00	0.0000	
6	0.0032			2.76174E-03	0.7774	9.11862E-03	0.7192	0.00000E+00	0.0000	
7	0.0043			3.77211E-03	0.6579	2.04285E-02	0.6548	0.00000E+00	0.0000	
8	0.0044			3.87077E-03	0.6914	1.71484E-02	0.6295	0.00000E+00	0.0000	
9	0.0059			5.18781E-03	0.6946	1.76786E-02	0.5515	0.00000E+00	0.0000	
10	0.0129			1.13315E-02	0.7029	4.47269E-02	0.5519	0.00000E+00	0.0000	
11	0.0270			2.36314E-02	0.6591	5.84033E-02	0.5306	0.00000E+00	0.0000	
12	0.0351			3.07643E-02	0.6069	4.62759E-02	0.5061	0.00000E+00	0.0000	
13	0.0313			2.73796E-02	0.6250	5.51179E-02	0.4853	0.00000E+00	0.0000	
14	0.0251			2.20157E-02	0.5789	6.43131E-02	0.5476	0.00000E+00	0.0000	
15	0.0049			4.26451E-03	0.7710	3.08925E-02	0.8220	0.00000E+00	0.0000	
16	0.0032			2.80705E-03	1.0406	1.72502E-02	0.8815	0.00000E+00	0.0000	
17	0.0049			4.27848E-03	1.3408	9.67304E-03	0.8741	0.00000E+00	0.0000	
18	0.0065			5.67280E-03	1.2992	8.93018E-03	0.8323	0.00000E+00	0.0000	
19	0.0077			6.75195E-03	1.1157	1.43218E-02	0.7983	0.00000E+00	0.0000	
20	0.0306			2.68092E-02	0.6428	4.39716E-02	0.6909	0.00000E+00	0.0000	
21	0.0157			1.37874E-02	1.0465	1.62441E-02	0.8753	0.00000E+00	0.0000	
22	0.0358			3.13575E-02	0.7425	3.18522E-02	0.7699	0.00000E+00	0.0000	
23	0.1040			9.10929E-02	0.4225	8.49914E-02	0.4693	0.00000E+00	0.0000	
24	0.1842			1.61359E-01	0.4232	1.29973E-01	0.4082	0.00000E+00	0.0000	
25	0.1569			1.37437E-01	0.4836	1.02516E-01	0.4616	0.00000E+00	0.0000	
26	0.2046			1.79249E-01	0.4884	1.23471E-01	0.5002	0.00000E+00	0.0000	
27	0.0850			7.44517E-02	0.7552	4.55169E-02	0.7639	0.00000E+00	0.0000	
SYSTEM TOTAL =				8.75900E-01	0.2627	1.00257E+00	0.0915	0.00000E+00	0.0000	

ELAPSED TIME 5.15750 MINUTES

RANDOM NUMBER= 464866E647B1

TRIGA - PREF. FLOOD CANISTER

```
                                FREQUENCY FOR GENERATIONS    4 TO 203
0.7920 TO 0.8099          *****
0.8099 TO 0.8278          *****
0.8278 TO 0.8457          *****
0.8457 TO 0.8636          *****
0.8636 TO 0.8815          *****
0.8815 TO 0.8994          *****
0.8994 TO 0.9173          *****
0.9173 TO 0.9352          *****
0.9352 TO 0.9530          *****
0.9530 TO 0.9709          *****
```

```
                                FREQUENCY FOR GENERATIONS   54 TO 203
0.7920 TO 0.8099          ***
0.8099 TO 0.8278          *****
0.8278 TO 0.8457          *****
0.8457 TO 0.8636          *****
0.8636 TO 0.8815          *****
0.8815 TO 0.8994          *****
0.8994 TO 0.9173          *****
0.9173 TO 0.9352          *****
0.9352 TO 0.9530          *****
0.9530 TO 0.9709          **
```

```
                                FREQUENCY FOR GENERATIONS  104 TO 203
0.7920 TO 0.8099          ***
0.8099 TO 0.8278          *****
0.8278 TO 0.8457          *****
0.8457 TO 0.8636          *****
0.8636 TO 0.8815          *****
0.8815 TO 0.8994          *****
0.8994 TO 0.9173          *****
0.9173 TO 0.9352          *****
0.9352 TO 0.9530          **
0.9530 TO 0.9709          *
```

```
                                FREQUENCY FOR GENERATIONS  154 TO 203
0.7920 TO 0.8099          *
0.8099 TO 0.8278          ****
0.8278 TO 0.8457          ***
0.8457 TO 0.8636          *****
0.8636 TO 0.8815          *****
0.8815 TO 0.8994          *****
0.8994 TO 0.9173          *****
0.9173 TO 0.9352          *
0.9352 TO 0.9530          *
0.9530 TO 0.9709
```

```
.....
*
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 5.15750 MINUTES
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*
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Figure 6.6.6-2 TRIGA Fuel Cluster Rods – Base Fuel Configuration - Poisoned Basket

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PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
TRIGA - PREF. FLOOD CANISTER
27GROUPHPF4 INFHOMMEDIUM
'FUEL
U-235 1 0.0 2.305966E-04 END
U-238 1 0.0 1.62631E-05 END
ZR 1 0.0 5.37586E-03 END
H 1 0.0 8.45211E-03 END
H2O 1 0.84220 293.0 END
'CLAD, BASKET, AND CASK
SS304 2 1.0 293.0 END
'CANISTER INTERNAL MODERATOR
H2O 3 1.0 293.0 END
'ZIRCONIUM ROD
ZR 4 1.0 293.0 END
'GRAPHITE REFLECTOR
C 5 1.0 293.0 END
'LEAD SHIELD
PB 6 1.0 293.0 END
'NEUTRON SHIELD
H2O 7 1E-20 293.0 END
'CASK EXTERNAL MATERIAL
H2O 8 1E-20 293.0 END
'END FITTING FOR FUEL ELEMENT
SS304 9 0.337137 293.0 END
H2O 9 1E-20 293.0 END
'SECOND FUEL MATERIAL FOR UN-CANISTERED
U-235 10 0.0 9.052980E-4 END
U-238 10 0.0 3.849480E-4 END
ZR 10 0.0 3.446510E-2 END
H 10 0.0 5.514420E-2 END
'SECOND END-FITTING MATERIAL FOR UN-CANISTERED FUEL
SS304 11 0.337137 293.0 END
H2O 11 DEN=0.662863 1.00E-3 293.0 END
'CASK INTERIOR MODERATOR MATERIAL
H2O 12 1.00E-3 293.0 END
'NEUTRON ABSORBER PLATE WITH BORON
FE 13 DEN=7.76 0.6717 293.0 END
C 13 DEN=7.76 0.0001 293.0 END
SI 13 DEN=7.76 0.0033 293.0 END
MN 13 DEN=7.76 0.0060 293.0 END
P 13 DEN=7.75 0.0001 293.0 END
CR 13 DEN=7.76 0.1849 293.0 END
HI 13 DEN=7.76 0.1233 293.0 END
B-10 13 DEN=7.76 0.0073 293.0 END
B-11 13 DEN=7.76 0.0007 293.0 END
N 13 DEN=7.76 0.0017 293.0 END
'NEUTRON ABSORBER PLATE WITHOUT BORON
FE 14 DEN=7.76 0.6717 293.0 END
C 14 DEN=7.76 0.0001 293.0 END
SI 14 DEN=7.76 0.0033 293.0 END
MN 14 DEN=7.76 0.0060 293.0 END
P 14 DEN=7.75 0.0001 293.0 END
CR 14 DEN=7.76 0.1849 293.0 END
HI 14 DEN=7.76 0.1233 293.0 END
H 14 DEN=7.76 0.0017 293.0 END
'FUEL FOR PODS
U-235 21 0.0 1.46137E-03 END
U-238 21 0.0 1.03055E-04 END
ZR 21 0.0 3.40686E-02 END
H 21 0.0 5.35639E-02 END
'CLAD INCOLOY
HI 22 0 0.028516 END
FE 22 0 0.033820 END
CP 22 0 0.021151 END
C 22 0 0.000399 END
MN 22 0 0.001306 END
S 22 0 0.000022 END
SI 22 0 0.001703 END
CU 22 0 0.000560 END
AL 22 0 0.000266 END
TI 22 0 0.000150 END
'CASK INTERNAL MODERATOR
H2O 23 1.00E-3 293.0 END
'LEAD SHIELD
PB 26 1.0 293.0 END
'NEUTRON SHIELD
H2O 27 1E-20 293.0 END
'CASK EXTERNAL MATERIAL
H2O 28 1E-20 293.0 END
'END FITTING FOR FUEL ELEMENT
SS304 29 .4968 293.0 END
H2O 29 DEN=.5031 1.00E-3 293.0 END
' BASKET, AND CASK NEED TO LOOK AT HOW THIS IS USED
SS304 212 1.0 293.0 END
'NEUTRON ABSORBER PLATE WITH BORON
FE 210 DEN=7.76 0.6717 293.0 END
C 210 DEN=7.76 0.0001 293.0 END

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```
SI 210 DEN=7.76 0.0033 293.0 END
MN 210 DEN=7.76 0.0060 293.0 END
P 210 DEN=7.75 0.0001 293.0 END
CR 210 DEN=7.76 0.1849 293.0 END
NI 210 DEN=7.76 0.1233 293.0 END
B-10 210 DEN=7.76 0.0073 293.0 END
B-11 210 DEN=7.76 0.0007 293.0 END
N 210 DEN=7.76 0.0017 293.0 END
'NEUTRON ABSORBER PLATE WITHOUT BORON
FE 211 DEN=7.76 0.6717 293.0 END
C 211 DEN=7.76 0.0001 293.0 END
SI 211 DEN=7.76 0.0033 293.0 END
MN 211 DEN=7.76 0.0060 293.0 END
P 211 DEN=7.75 0.0001 293.0 END
CR 211 DEN=7.76 0.1849 293.0 END
NI 211 DEN=7.76 0.1233 293.0 END
N 211 DEN=7.76 0.0017 293.0 END
'AL FUEL HOLDER
AL 215 1.0 293.0 END
END COMP
MORE DATA
RES=21 CYLINDER 0.6477 DAN(21)=.38879
END MORE
TRIGA - PREF. FLOOD CANISTER
READ PARAM TME=170.0 GEN=203 NPG=500 RUN=YES PLT=NO
TBA=2.0 END PARAM
READ GEOM
UNIT 1
COM='TRIGA FUEL (SMEARED)'
CYLINDER 1 1 3.9877 60.959 0.001
UNIT 5
COM='3.38 in Width / 0.28 in Thickness DIVIDER CENTER STACK (SEALED)'
CUBOID 2 1 2P4.2672 0.7112 0.0 +74.29 -8.255
UNIT 6
COM='3.38 in Width / 0.24 in Thickness DIVIDER OUTSIDE STACK (SEALED)'
CUBOID 2 1 2P4.2672 0.6096 0.0 +74.29 -8.255
UNIT 7
COM='SEALED CANISTER'
CYLINDER 3 1 3.9878 +60.96 0.0
HOLE 1 0.0 0.0 0.0
CYLINDER 2 1 4.1529 +63.50 -1.27
CYLINDER 12 1 4.1529 +74.29 -8.255
UNIT 10
COM='TRIGA ELEMENTS IN Top of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 0.1142 0.0
UNIT 11
COM='TRIGA ELEMENTS IN Bottom of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 -0.1142 0.0
UNIT 12
COM='TRIGA ELEMENTS IN Bottom Right of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 +0.1142 -0.1142 0.0
UNIT 13
COM='TRIGA ELEMENTS IN Top Right of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 +0.1142 +0.1142 0.0
UNIT 14
COM='TRIGA ELEMENTS IN Bottom Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 -0.1142 -0.1142 0.0
UNIT 15
COM='TRIGA ELEMENTS IN Top Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 -0.1142 +0.1142 0.0
UNIT 16
COM='TRIGA BASKET 3.38 in x 3.38 in CENTER OPENING (SEALED)'
CUBOID 12 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 0.0 0.0
UNIT 17
COM='HORIZONTAL X-X POISON SHEET + WATER'
CUBOID 13 1 2P3.8227 0.3175 0.0 +73.02 -6.985
CUBOID 14 1 2P4.1402 0.3175 0.0 +73.02 -6.985
CUBOID 12 1 2P4.2672 0.3175 0.0 +74.29 -8.255
UNIT 18
COM='HORIZONTAL X-X POISON SHEET + WATER'
CUBOID 13 1 2P3.8227 0.3175 0.0 2P34.163
CUBOID 14 1 2P4.1402 0.3175 0.0 2P34.163
CUBOID 12 1 2P4.2672 0.3175 0.0 2P36.703
UNIT 20
COM='CENTER COLUMN OF THREE OPENINGS w/ 0.28 in plate (SEALED)'
ARRAY 1 -4.2672 -13.8303 -8.255
REPLICATE 2 1 4R0.7112 2R0.0 1
UNIT 21
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'
ARRAY 2 -4.2672 -8.9979 -8.255
REPLICATE 2 1 0.0 0.3048 2R0.3048 2R0.0 1
UNIT 22
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'
ARRAY 3 -4.2672 -8.9979 -8.255
REPLICATE 2 1 0.3048 0.0 2R0.3048 2R0.0 1
UNIT 30
COM='NAC-LWT TRIGA BASKET (SEALED)'
CYLINDER 12 1 17.1 +74.29 -8.255
```

```
HOLE 20 0.0 0.0 0.0
HOLE 21 -9.2457 0.0 0.0
HOLE 22 +9.2457 0.0 0.0
CYLINDER 2 1 18.9103 +74.93 -8.890
CYLINDER 6 1 23.4645 +74.93 -8.890
CYLINDER 2 1 36.5188 +74.93 -8.890
CYLINDER 7 1 49.2227 +74.93 -8.890
CYLINDER 2 1 49.8221 +74.93 -8.890
CUBOID 8 1 4P49.8221 +74.93 -8.890
UNIT 41
COM='TRIGA FUEL ELEMENT'
CYLINDER 21 1 0.6477 2P27.94
CYLINDER 22 1 0.68834 2P27.94
CYLINDER 29 1 0.68834 43.48 -33.04
UNIT 42
COM='HORIZONTAL X-X POISON SHEET + WATER'
CUBOID 210 1 2P3.8227 0.3175 0.0 39.38 -28.94
CUBOID 211 1 2P4.1402 0.3175 0.0 39.38 -28.94
CUBOID 23 1 2P4.2672 0.3175 0.0 43.48 -33.04
UNIT 45
COM='DIVIDER CENTER STACK'
CUBOID 212 1 2P4.2672 0.7112 0.0 43.48 -33.04
UNIT 46
COM='DIVIDER OUTSIDE STACK'
CUBOID 212 1 2P4.2672 0.6096 0.0 43.48 -33.04
UNIT 410
COM='TRIGA FUEL ELEMENTS IN AL TUBE, CENTERED'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 0.0 0.0 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 411
COM='TRIGA FUEL ELEMENTS IN AL TUBE, RIGHT'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 0.12127 0.0 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 412
COM='TRIGA FUEL ELEMENTS IN AL TUBE, LEFT'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 -0.12127 0.0 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 413
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 0.0 0.12127 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 414
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 0.0 -0.12127 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 415
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP RIGHT'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 0.08574 0.08574 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 416
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP LEFT'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 -0.08574 0.08574 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 417
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM RIGHT'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 0.08574 -0.08574 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 418
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM LEFT'
CYLINDER 23 1 0.809625 43.48 -33.04
HOLE 41 -0.08574 -0.08574 0.0
CYLINDER 215 1 0.94805 43.48 -33.04
UNIT 420
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, CENTER OPENING'
CUBOID 23 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8443 -2.8443 0
HOLE 413 -0.94810 -2.8443 0
HOLE 413 0.94810 -2.8443 0
HOLE 416 2.8443 -2.8443 0
HOLE 411 -2.8443 -0.94810 0
HOLE 415 -0.94810 -0.94810 0
HOLE 416 0.94810 -0.94810 0
HOLE 412 2.8443 -0.94810 0
HOLE 411 -2.8443 0.94810 0
HOLE 417 -0.94810 0.94810 0
HOLE 416 0.94810 0.94810 0
HOLE 412 2.8443 0.94810 0
HOLE 417 -2.8443 2.8443 0
HOLE 414 -0.94810 2.8443 0
HOLE 414 0.94810 2.8443 0
HOLE 418 2.8443 2.8443 0
CUBOID 23 1 4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 421
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM OPENING'
CUBOID 23 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8443 -2.8443 0
```

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HOLE      413  -0.94810 -2.8443    0
HOLE      413   0.94810 -2.8443    0
HOLE      416   2.8443  -2.8443    0
HOLE      411  -2.8443  -0.94810   0
HOLE      415  -0.94810 -0.94810   0
HOLE      416   0.94810 -0.94810   0
HOLE      412   2.8443  -0.94810   0
HOLE      411  -2.8443   0.94810   0
HOLE      417  -0.94810  0.94810   0
HOLE      418   0.94810  0.94810   0
HOLE      412   2.8443   0.94810   0
HOLE      417  -2.8443   2.8443    0
HOLE      414  -0.94810  2.8443    0
HOLE      414   0.94810  2.8443    0
HOLE      418   2.8443   2.8443    0
CUBOID    23 1  4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 422
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP OPENING'
CUBOID    23 1  4P4.1529 43.48 -33.04
HOLE      415  -2.8443  -2.8443    0
HOLE      413  -0.94810 -2.8443    0
HOLE      413   0.94810 -2.8443    0
HOLE      416   2.8443  -2.8443    0
HOLE      411  -2.8443  -0.94810   0
HOLE      415  -0.94810 -0.94810   0
HOLE      416   0.94810 -0.94810   0
HOLE      412   2.8443  -0.94810   0
HOLE      411  -2.8443   0.94810   0
HOLE      417  -0.94810  0.94810   0
HOLE      418   0.94810  0.94810   0
HOLE      412   2.8443   0.94810   0
HOLE      417  -2.8443   2.8443    0
HOLE      414  -0.94810  2.8443    0
HOLE      414   0.94810  2.8443    0
HOLE      418   2.8443   2.8443    0
CUBOID    23 1  4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 423
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM LEFT OPENING'
CUBOID    23 1  4P4.1529 43.48 -33.04
HOLE      415  -2.8443  -2.8443    0
HOLE      413  -0.94810 -2.8443    0
HOLE      413   0.94810 -2.8443    0
HOLE      416   2.8443  -2.8443    0
HOLE      411  -2.8443  -0.94810   0
HOLE      415  -0.94810 -0.94810   0
HOLE      416   0.94810 -0.94810   0
HOLE      412   2.8443  -0.94810   0
HOLE      411  -2.8443   0.94810   0
HOLE      417  -0.94810  0.94810   0
HOLE      418   0.94810  0.94810   0
HOLE      412   2.8443   0.94810   0
HOLE      417  -2.8443   2.8443    0
HOLE      414  -0.94810  2.8443    0
HOLE      414   0.94810  2.8443    0
HOLE      418   2.8443   2.8443    0
CUBOID    23 1  4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 424
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP LEFT OPENING'
CUBOID    23 1  4P4.1529 43.48 -33.04
HOLE      415  -2.8443  -2.8443    0
HOLE      413  -0.94810 -2.8443    0
HOLE      413   0.94810 -2.8443    0
HOLE      416   2.8443  -2.8443    0
HOLE      411  -2.8443  -0.94810   0
HOLE      415  -0.94810 -0.94810   0
HOLE      416   0.94810 -0.94810   0
HOLE      412   2.8443  -0.94810   0
HOLE      411  -2.8443   0.94810   0
HOLE      417  -0.94810  0.94810   0
HOLE      418   0.94810  0.94810   0
HOLE      412   2.8443   0.94810   0
HOLE      417  -2.8443   2.8443    0
HOLE      414  -0.94810  2.8443    0
HOLE      414   0.94810  2.8443    0
HOLE      418   2.8443   2.8443    0
CUBOID    23 1  4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 425
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM RIGHT OPENING'
CUBOID    23 1  4P4.1529 43.48 -33.04
HOLE      415  -2.8443  -2.8443    0
HOLE      413  -0.94810 -2.8443    0
HOLE      413   0.94810 -2.8443    0
HOLE      416   2.8443  -2.8443    0
HOLE      411  -2.8443  -0.94810   0
HOLE      415  -0.94810 -0.94810   0
HOLE      416   0.94810 -0.94810   0
HOLE      412   2.8443  -0.94810   0
HOLE      411  -2.8443   0.94810   0
HOLE      417  -0.94810  0.94810   0
HOLE      418   0.94810  0.94810   0
HOLE      412   2.8443   0.94810   0
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HOLE          417  -2.8443  2.8443   0
HOLE          414  -0.94810 2.8443   0
HOLE          414   0.94810 2.8443   0
HOLE          418   2.8443  2.8443   0
CUBOID        23  1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 426
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP RIGHT OPENING'
CUBOID        23  1 4P4.1529 43.48 -33.04
HOLE          415  -2.8443 -2.8443   0
HOLE          413  -0.94810 -2.8443   0
HOLE          413   0.94810 -2.8443   0
HOLE          416   2.8443 -2.8443   0
HOLE          411  -2.8443 -0.94810   0
HOLE          415  -0.94810 -0.94810   0
HOLE          416   0.94810 -0.94810   0
HOLE          412   2.8443 -0.94810   0
HOLE          411  -2.8443  0.94810   0
HOLE          417  -0.94810 0.94810   0
HOLE          418   0.94810 0.94810   0
HOLE          412   2.8443  0.94810   0
HOLE          417  -2.8443  2.8443   0
HOLE          414  -0.94810 2.8443   0
HOLE          414   0.94810 2.8443   0
HOLE          418   2.8443  2.8443   0
CUBOID        23  1 4P4.1529 43.48 -33.04
UNIT 430
COM='FUEL INSERT IN, CENTER OPENING'
CUBOID        23  1 4P4.2672 43.48 -33.04
HOLE 420      0.0 0.0 0.0
UNIT 431
COM='FUEL INSERT IN, BOTTOM OPENING'
CUBOID        23  1 4P4.2672 43.48 -33.04
HOLE 421      0.0 -0.1143 0.0
UNIT 432
COM='FUEL INSERT IN, TOP OPENING'
CUBOID        23  1 4P4.2672 43.48 -33.04
HOLE 422      0.0 0.1143 0.0
UNIT 433
COM='FUEL INSERT IN, BOTTOM LEFT OPENING'
CUBOID        23  1 4P4.2672 42.48 -33.04
HOLE 423     -0.1143 -0.1143 0.0
UNIT 434
COM='FUEL INSERT IN, TOP LEFT OPENING'
CUBOID        23  1 4P4.2672 43.48 -33.04
HOLE 424     -0.1143 0.1143 0.0
UNIT 435
COM='FUEL INSERT IN, BOTOM RIGHT OPENING'
CUBOID        23  1 4P4.2672 43.48 -33.04
HOLE 425      0.1143 -0.1143 0.0
UNIT 436
COM='FUEL INSERT IN, TOP RIGHT OPENING'
CUBOID        23  1 4P4.2672 43.48 -33.04
HOLE 426      0.1143 0.1143 0.0
UNIT 440
COM='CENTER COLUMN OF THREE OPENINGS'
ARRAY 41     -4.2672 -13.8303 -33.04
REPLICATE 212 1 4R0.7112 2R0.0 1
UNIT 441
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 42     -4.2672 -8.9979 -33.04
REPLICATE 212 1 0.0 0.3408 2R0.3408 2R0.0 1
UNIT 442
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 43     -4.2672 -8.9979 -33.04
REPLICATE 212 1 0.3408 0.0 2R0.3408 2R0.0 1
UNIT 450
COM='28 TRIGA FUEL ELEMENTS IN EACH LWT BASKET'
CYLINDER 23  1 17.1500 43.485 -33.045
HOLE 440      0.0 0.0 0.0
HOLE 441     -9.2457 0.0 0.0
HOLE 442     +9.2457 0.0 0.0
CYLINDER 212  1 18.9103 43.485 -33.045
CYLINDER 26  1 33.4645 43.485 -33.045
CYLINDER 212  1 36.5188 43.485 -33.045
CYLINDER 27  1 49.2227 43.485 -33.045
CYLINDER 212  1 49.8221 43.485 -33.045
CUBOID 28  1 4P49.8221 43.485 -33.045
UNIT 80
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 2  1 36.5188 2F14.1351
CYLINDER 8  1 49.8221 2F14.1351
CUBOID 8  1 4P49.8221 2F14.1351
UNIT 81
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 6  1 26.3525 2F3.81
CYLINDER 2  1 36.5188 +13.97 -12.7
CYLINDER 8  1 49.8221 +13.97 -12.7
CUBOID 8  1 4P49.8221 +13.97 -12.7
GLOBAL UNIT 82
COM='STACK OF 5 BASKETS IN CASK'
ARRAY 20     -49.8221 -49.8221 -221.3
END GEOM
READ ARRAY
ARA=1 NUX=1 MUY=7 NUZ=1 FILL 10 5 17 16 17 5 11 END FILL
```



```
ARA=2 NUX=1 NUY=4 NUZ=1 FILL 13 17 6 12 END FILL
ARA=3 NUX=1 NUY=4 NUZ=1 FILL 15 17 6 14 END FILL
ARA=41 NUX=1 NUY=7 NUZ=1 FILL 432 45 42 430 42 45 431 END FILL
ARA=42 NUX=1 NUY=4 NUZ=1 FILL 436 46 42 435 END FILL
ARA=43 NUX=1 NUY=4 NUZ=1 FILL 434 46 42 433 END FILL
ARA=20 NUX=1 NUY=1 NUZ=7 FILL 81 30 3R450 30 80 END FILL
END ARA
READ BOUNDS ALL=MIR END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CASK (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-50.0 YUL=50.0 ZUL=149.352
XLR=50.0 YLR=-50.0 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=149.352
XLR=17.2 YLR=-17.2 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CAVITY MID PLANE)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=0.0
XLR=17.2 YLR=-17.2 ZLR=0.0 END
TTL='X-Y PLOT OF CENTER OPENING (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=7.0 ZUL=149.352
XLR=7.0 YLR=-7.0 ZLR=149.352 END
TTL='X-Y PLOT OF PERIPHERAL OPENING (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=16.0 ZUL=149.352
XLR=7.0 YLR=4.0 ZLR=149.352 END
TTL='Y-Z PLOT OF BASKET (CENTER OF FUEL ELEMENTS,CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-14.0 ZUL=186.69
XLR=2.12 YLR=-4.5 ZLR=112.014 END
TTL='Y-Z PLOT OF BASKET (CASK)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-51 ZUL=220.0
XLR=2.12 YLR=+51 ZLR=-220.0
END PLOT
END DATA
```

SECONDARY MODULE 000008 HAS BEEN CALLED.

MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.59 (SECONDS).

SECONDARY MODULE 000002 HAS BEEN CALLED.

MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 15.55 (SECONDS).

SECONDARY MODULE 000009 HAS BEEN CALLED.

MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 202.62 (SECONDS).

MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 220.91 (SECONDS).

```
CCCCCCCCC  SSSSSSSSS  AAAAAAAA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  55555555555
CC      CC  SS      SS  AA      AA  SS      SS  22      22  55      55
CC      SS  AA      AA  SS      SS  22      22  55      55
CC      SS  AA      AA  SS      SS  22      22  55      55
CC      SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  22      22  55555555555
CC      SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  22      22  55555555555
CC      SS      SS  AA      AA  SS      SS  22      22  55      55
CC      SS      SS  AA      AA  SS      SS  22      22  55      55
CC      CC  SS      SS  AA      AA  SS      SS  22      22  55      55
CCCCCCCCC  SSSSSSSSS  AA      AA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AA      AA  SSSSSSSSS  222222222  55555555555
```

```
SSSSSSSSS  CCCCCCCCC  AAAAAAAA  LL      EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AAAAAAAA  LL      EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE      PP      PP  CC      CC
SS      CC  AA      AA  LL      EE      PP      PP  CC      CC
SS      CC  AA      AA  LL      EE      PP      PP  CC      CC
SSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEE  -----  FPPPPPPPP  CC
SSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEE  -----  PPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE      PP      CC
SS      SS  CC      AA      AA  LL      EE      PP      CC
SS      SS  CC      AA      AA  LL      EE      PP      CC
SSSSSSSSS  CCCCCCCCC  AA      AA  LLLLLLLLL  EEEEEEEEE  PPP      CC      CC
SSSSSSSSS  CCCCCCCCC  AA      AA  LLLLLLLLL  EEEEEEEEE  PP      CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AA      AA  LLLLLLLLL  EEEEEEEEE  PP      CCCCCCCCC
```

```
11      222222222  //      222222222  11      //      999999999  888888888
111     222222222  //      222222222  111     //      999999999  888888888
1111    22      22  //      22      22  1111    //      99      99  88      88
11      22      22  //      22      22  11      //      99      99  88      88
11      22      22  //      22      22  11      //      99      99  88      88
11      22      22  //      22      22  11      //      999999999  888888888
11      22      22  //      22      22  11      //      999999999  888888888
11      22      22  //      22      22  11      //      99      99  88      88
11      22      22  //      22      22  11      //      99      99  88      88
1111111  222222222  //      222222222  1111111  //      999999999  888888888
1111111  222222222  //      222222222  1111111  //      999999999  888888888
```

```
0000000  333333333  0000000  0000000  555555555  0000000
00000000 33333333333 000000000 000000000 55555555555 000000000
00      00  33      33  :::  00      00  00      00  :::  55      00      00
00      00  33      33  :::  00      00  00      00  :::  55      00      00
00      00  333     333  :::  00      00  00      00  :::  55555555555  00      00
00      00  333     333  :::  00      00  00      00  :::  55555555555  00      00
00      00  33      33  :::  00      00  00      00  :::  55      55  00      00
00      00  33      33  :::  00      00  00      00  :::  55      55  00      00
00      00  33      33  :::  00      00  00      00  :::  55      55  00      00
00000000 33333333333 000000000 000000000 55555555555 000000000
0000000  333333333  0000000  0000000  555555555  0000000
```







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***
***          TRIGA - PREF. FLOOD CANISTER          ***
***
*****          NUMERIC PARAMETERS          *****
***
***          TME          MAXIMUM PROBLEM TIME (MIN)          170.00          ***
***          TBA          TIME PER GENERATION (MIN)          2.00          ***
***          GEN          NUMBER OF GENERATIONS          203          ***
***          NPG          NUMBER PER GENERATION          500          ***
***          NSK          NUMBER OF GENERATIONS TO BE SKIPPED          3          ***
***          BEG          BEGINNING GENERATION NUMBER          1          ***
***          RES          GENERATIONS BETWEEN CHECKPOINTS          0          ***
***          X1D          NUMBER OF EXTRA 1-D CROSS SECTIONS          1          ***
***          NBK          NEUTRON BANK SIZE          525          ***
***          XNB          EXTRA POSITIONS IN NEUTRON BANK          0          ***
***          NFB          FISSION BANK SIZE          500          ***
***          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          BB827100001          ***
***          NBS          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          ***
.....

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.....
***
***                               TRIGA - PREF. FLOOD CANISTER                               ***
***
***** 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 YES ***
***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO          FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO          FMA PRINT FISSION 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            GAS PRINT FAR BY GROUP                 NO ***
***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS          NO            PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***
***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES   NO            PWT PRINT WEIGHT AVERAGE ARRAY        NO ***
***
*** PKI PRINT FISSION SPECTRUM                NO            FGM PRINT INPUT GEOMETRY              NO ***
***
*** PLD PRINT EXTRA 1-D CROSS SECTIONS        NO            BUG PRINT DEBUG INFORMATION           NO ***
***
***                                           TRK PRINT TRACKING INFORMATION         NO ***
***
.....

```

PARAMETER INPUT COMPLETED

..... 0 IO'S WERE USED READING THE PARAMETER DATA .....

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.....  
***  
***          TRIGA - PREF. FLOOD CANISTER          ***  
***  
.....  
***  
***          ***** ADDITIONAL INFORMATION *****          ***  
***  
*** NUMBER OF ENERGY GROUPS          27          USE LATTICE GEOMETRY          YES ***  
***  
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1          GLOBAL ARRAY NUMBER          20 ***  
***  
*** NO. OF SCATTERING ANGLES IN MSECS    2          NUMBER OF UNITS IN THE GLOBAL X DIR.    1 ***  
***  
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 26          NUMBER OF UNITS IN THE GLOBAL Y DIR.    1 ***  
***  
*** ENTRIES/NEUTRON IN THE FISSION BANK 19          NUMBER OF UNITS IN THE GLOBAL Z DIR.    7 ***  
***  
*** NUMBER OF MIXTURES USED          20          USE A GLOBAL REFLECTOR          YES ***  
***  
*** NUMBER OF BIAS ID'S USED          1          USE NESTED HOLES          YES ***  
***  
*** NUMBER OF DIFFERENTIAL ALBEDOS USED  0          NUMBER OF HOLES          142 ***  
***  
*** TOTAL INPUT GEOMETRY REGIONS        100         MAXIMUM HOLE NESTING LEVEL          4 ***  
***  
*** NUMBER OF GEOMETRY REGIONS USED      95          USE NESTED ARRAYS          YES ***  
***  
*** LARGEST GEOMETRY UNIT NUMBER        450         NUMBER OF ARRAYS USED          7 ***  
***  
*** LARGEST ARRAY NUMBER                43          MAXIMUM ARRAY NESTING LEVEL        2 ***  
***  
***  
*** +X BOUNDARY CONDITION                MIR          -X BOUNDARY CONDITION                MIR ***  
***  
*** +Y BOUNDARY CONDITION                MIR          -Y BOUNDARY CONDITION                MIR ***  
***  
*** +Z BOUNDARY CONDITION                MIR          -Z BOUNDARY CONDITION                MIR ***  
***  
.....
```



TRIGA - PREF. FLOOD CANISTER									
REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
----- UNIT 1 -----									
TRIGA FUEL (SMEARED)									
1	1	1	RADIUS = 3.9877	+Z = 60.959	-Z = 1.00000E-03	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
----- UNIT 5 -----									
3.38 IN WIDTH / 0.28 IN THICKNESS DIVIDER CENTER STACK (SEALED)									
1	1	2	+X = 4.2672	-X = -4.2672	+Y = 0.71120	-Y = 0.00000	+Z = 74.290	-Z = -8.2550	
----- UNIT 6 -----									
3.38 IN WIDTH / 0.24 IN THICKNESS DIVIDER OUTSIDE STACK (SEALED)									
1	1	2	+X = 4.2672	-X = -4.2672	+Y = 0.60960	-Y = 0.00000	+Z = 74.290	-Z = -8.2550	
----- UNIT 7 -----									
SEALED CANISTER									
1	1	3	RADIUS = 3.9878	+Z = 60.960	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
HOLE NUMBER		1	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1		
2	1	2	RADIUS = 4.1529	+Z = 63.500	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
3	1	12	RADIUS = 4.1529	+Z = 74.290	-Z = -8.2550	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
----- UNIT 10 -----									
TRIGA ELEMENTS IN TOP OF 3.38 IN X 3.38 IN OPENING (SEALED)									
1	1	12	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER		2	AT X = 0.00000	Y = 0.11420	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 11 -----									
TRIGA ELEMENTS IN BOTTOM OF 3.38 IN X 3.38 IN OPENING (SEALED)									
1	1	12	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER		3	AT X = 0.00000	Y = -0.11420	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 12 -----									
TRIGA ELEMENTS IN BOTTOM RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)									
1	1	12	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER		4	AT X = 0.11420	Y = -0.11420	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 13 -----									
TRIGA ELEMENTS IN TOP RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)									
1	1	12	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER		5	AT X = 0.11420	Y = 0.11420	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 14 -----									
TRIGA ELEMENTS IN BOTTOM LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)									
1	1	12	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER		6	AT X = -0.11420	Y = -0.11420	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 15 -----									
TRIGA ELEMENTS IN TOP LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)									
1	1	12	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	

HOLE NUMBER	7	AT X = -0.11420	Y = 0.11420	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 16 -----								
TRIGA BASKET 3.38 IN X 3.38 IN CENTER OPENING (SEALED)								
1 CUBOID	12 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER	8	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 17 -----								
HORIZONTAL X-X POISON SHEET + WATER								
1 CUBOID	13 1	+X = 3.8227	-X = -3.8227	+Y = 0.31750	-Y = 0.00000	+Z = 73.020	-Z = -6.9850	
2 CUBOID	14 1	+X = 4.1402	-X = -4.1402	+Y = 0.31750	-Y = 0.00000	+Z = 73.020	-Z = -6.9850	
3 CUBOID	12 1	+X = 4.2672	-X = -4.2672	+Y = 0.31750	-Y = 0.00000	+Z = 74.290	-Z = -8.2550	
TRIGA - PREF. FLOOD CANISTER								
----- UNIT 20 EXTERNAL TO LATTICE 1 -----								
CENTER COLUMN OF THREE OPENINGS W/ 0.28 IN PLATE (SEALED)								
1 ARRAY NUMBER	1	+X = 4.2672	-X = -4.2672	+Y = 13.830	-Y = -13.830	+Z = 74.290	-Z = -8.2550	
2 CUBOID	2 1	+X = 4.9784	-X = -4.9784	+Y = 14.542	-Y = -14.542	+Z = 74.290	-Z = -8.2550	
----- UNIT 21 EXTERNAL TO LATTICE 2 -----								
LEFT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)								
1 ARRAY NUMBER	2	+X = 4.2672	-X = -4.2672	+Y = 8.9980	-Y = -8.9979	+Z = 74.290	-Z = -8.2550	
2 CUBOID	2 1	+X = 4.2672	-X = -4.5720	+Y = 9.3028	-Y = -9.3027	+Z = 74.290	-Z = -8.2550	
----- UNIT 22 EXTERNAL TO LATTICE 3 -----								
RIGHT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)								
1 ARRAY NUMBER	3	+X = 4.2672	-X = -4.2672	+Y = 8.9980	-Y = -8.9979	+Z = 74.290	-Z = -8.2550	
2 CUBOID	2 1	+X = 4.5720	-X = -4.2672	+Y = 9.3028	-Y = -9.3027	+Z = 74.290	-Z = -8.2550	
----- UNIT 30 -----								
NAC-LWT TRIGA BASKET (SEALED)								
1 CYLINDER	12 1	RADIUS = 17.100	+Z = 74.290	-Z = -8.2550	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
HOLE NUMBER	9	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	20		
HOLE NUMBER	10	AT X = -9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	21		
HOLE NUMBER	11	AT X = 9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	22		
2 CYLINDER	2 1	RADIUS = 18.910	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
3 CYLINDER	6 1	RADIUS = 33.465	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
4 CYLINDER	2 1	RADIUS = 36.519	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
5 CYLINDER	7 1	RADIUS = 49.223	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
6 CYLINDER	2 1	RADIUS = 49.822	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
7 CUBOID	8 1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 74.930	-Z = -8.8900	
TRIGA - PREF. FLOOD CANISTER								
----- UNIT 41 -----								
TRIGA FUEL ELEMENT								
1 CYLINDER	21 1	RADIUS = 0.64770	+Z = 27.940	-Z = -27.940	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
2 CYLINDER	22 1	RADIUS = 0.68834	+Z = 27.940	-Z = -27.940	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
3 CYLINDER	29 1	RADIUS = 0.68834	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
----- UNIT 42 -----								

HORIZONTAL X-X POISON SHEET + WATER

1 CUBOID	210	1	+X = 3.8227	-X = -3.8227	+Y = 0.31750	-Y = 0.00000	+Z = 39.380	-Z = -28.940
2 CUBOID	211	1	+X = 4.1402	-X = -4.1402	+Y = 0.31750	-Y = 0.00000	+Z = 39.380	-Z = -28.940
3 CUBOID	23	1	+X = 4.2672	-X = -4.2672	+Y = 0.31750	-Y = 0.00000	+Z = 43.480	-Z = -33.040

----- UNIT 45 -----

DIVIDER CENTER STACK

1 CUBOID	212	1	+X = 4.2672	-X = -4.2672	+Y = 0.71120	-Y = 0.00000	+Z = 43.480	-Z = -33.040
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----- UNIT 46 -----

DIVIDER OUTSIDE STACK

1 CUBOID	212	1	+X = 4.2672	-X = -4.2672	+Y = 0.60960	-Y = 0.00000	+Z = 43.480	-Z = -33.040
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----- UNIT 80 -----

SIMPLIFIED LID STRUCTURE NAC-LWT

1 CYLINDER	2	1	RADIUS = 36.519	+Z = 14.135	-Z = -14.135	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
2 CYLINDER	9	1	RADIUS = 49.822	+Z = 14.135	-Z = -14.135	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CUBOID	8	1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 14.135	-Z = -14.135

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 81 -----

SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT

1 CYLINDER	6	1	RADIUS = 26.353	+Z = 3.8100	-Z = -3.8100	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
2 CYLINDER	2	1	RADIUS = 36.619	+Z = 13.970	-Z = -12.700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CYLINDER	8	1	RADIUS = 49.822	+Z = 13.970	-Z = -12.700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4 CUBOID	8	1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 13.970	-Z = -12.700

\*\*\*\*\* GLOBAL \*\*\*\*\*  
----- UNIT 82 EXTERNAL TO LATTICE 20 -----

STACK OF 5 BASKETS IN CASK

1 ARRAY NUMBER	20		+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 230.87	-Z = -221.30
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----- UNIT 411 -----

TRIGA FUEL ELEMENTS IN AL TUBE, RIGHT

1 CYLINDER	23	1	RADIUS = 0.80963	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	13		AT X = 0.12127	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	215	1	RADIUS = 0.94805	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 412 -----

TRIGA FUEL ELEMENTS IN AL TUBE, LEFT

1 CYLINDER	23	1	RADIUS = 0.80963	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	14		AT X = -0.12127	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	215	1	RADIUS = 0.94805	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 413 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP

1 CYLINDER	23	1	RADIUS = 0.80963	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	15		AT X = 0.00000	Y = 0.12127	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	215	1	RADIUS = 0.94805	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 414 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM

1 CYLINDER	23	1	RADIUS = 0.80963	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
HOLE NUMBER	16		AT X = 0.00000	Y = -0.12127	Z = 0.00000	IS UNIT NUMBER	41	
2 CYLINDER	215	1	RADIUS = 0.94805	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

----- UNIT 415 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP RIGHT

1 CYLINDER	23	1	RADIUS = 0.80963	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
HOLE NUMBER	17		AT X = 8.57400E-02	Y = 8.57400E-02	Z = 0.00000	IS UNIT NUMBER	41	
2 CYLINDER	215	1	RADIUS = 0.94805	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

----- UNIT 416 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP LEFT

1 CYLINDER	23	1	RADIUS = 0.80963	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
HOLE NUMBER	19		AT X = -8.57400E-02	Y = 8.57400E-02	Z = 0.00000	IS UNIT NUMBER	41	
2 CYLINDER	215	1	RADIUS = 0.94805	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

----- UNIT 417 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM RIGHT

1 CYLINDER	23	1	RADIUS = 0.80963	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
HOLE NUMBER	19		AT X = 8.57400E-02	Y = -8.57400E-02	Z = 0.00000	IS UNIT NUMBER	41	
2 CYLINDER	215	1	RADIUS = 0.94805	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

----- UNIT 418 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM LEFT

1 CYLINDER	23	1	RADIUS = 0.80963	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
HOLE NUMBER	20		AT X = -8.57400E-02	Y = -8.57400E-02	Z = 0.00000	IS UNIT NUMBER	41	
2 CYLINDER	215	1	RADIUS = 0.94805	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 420 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, CENTER OPENING

1 CUBOID	23	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	21		AT X = -2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	22		AT X = -0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	23		AT X = 0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	24		AT X = 2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	25		AT X = -2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	26		AT X = -0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	27		AT X = 0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	28		AT X = 2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	29		AT X = -2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	30		AT X = -0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	31		AT X = 0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	32		AT X = 2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	33		AT X = -2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	34		AT X = -0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414	

HOLE NUMBER	35	AT X = 0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	36	AT X = 2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040

TRIGA - PREF. FLOOD CANISTER  
GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 421 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM OPENING

1 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
HOLE NUMBER	37	AT X = -2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	38	AT X = -0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	39	AT X = 0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	40	AT X = 2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	41	AT X = -2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	42	AT X = -0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	43	AT X = 0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	44	AT X = 2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	45	AT X = -2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	46	AT X = -0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	47	AT X = 0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	418
HOLE NUMBER	48	AT X = 2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	49	AT X = -2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	50	AT X = -0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	51	AT X = 0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	52	AT X = 2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040

TRIGA - PREF. FLOOD CANISTER  
GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 422 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP OPENING

1 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
HOLE NUMBER	53	AT X = -2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	54	AT X = -0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	55	AT X = 0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	56	AT X = 2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	57	AT X = -2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	58	AT X = -0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	59	AT X = 0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	60	AT X = 2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	61	AT X = -2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	62	AT X = -0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	63	AT X = 0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	418
HOLE NUMBER	64	AT X = 2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	65	AT X = -2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	66	AT X = -0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	67	AT X = 0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	68	AT X = 2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040

TRIGA - PREF. FLOOD CANISTER  
GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 423 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM LEFT OPENING

1 CUBOID	23	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	69		AT X = -2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	70		AT X = -0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	71		AT X = 0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	72		AT X = 2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	73		AT X = -2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	74		AT X = -0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	75		AT X = 0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	76		AT X = 2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	77		AT X = -2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	78		AT X = -0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	79		AT X = 0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	80		AT X = 2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	81		AT X = -2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	82		AT X = -0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	83		AT X = 0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	84		AT X = 2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	23	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
TRIGA - PREF. FLOOD CANISTER								

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 424 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP LEFT OPENING

1 CUBOID	23	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	85		AT X = -2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	86		AT X = -0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	87		AT X = 0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	88		AT X = 2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	89		AT X = -2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	90		AT X = -0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	91		AT X = 0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	92		AT X = 2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	93		AT X = -2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	94		AT X = -0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	95		AT X = 0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	96		AT X = 2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	97		AT X = -2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	98		AT X = -0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	99		AT X = 0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	100		AT X = 2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	23	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
TRIGA - PREF. FLOOD CANISTER								

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 425 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM RIGHT OPENING

1 CUBOID	23	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	101		AT X = -2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	102		AT X = -0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	103		AT X = 0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	104		AT X = 2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	416	

HOLE NUMBER	105	AT X = -2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	106	AT X = -0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	107	AT X = 0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	108	AT X = 2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	109	AT X = -2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	110	AT X = -0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	111	AT X = 0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	418
HOLE NUMBER	112	AT X = 2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	113	AT X = -2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	114	AT X = -0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	115	AT X = 0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	116	AT X = 2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
TRIGA - PREF. FLOOD CANISTER						

REGION MEDIA BIAS NUM ID GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 426 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP RIGHT OPENING

1 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040
HOLE NUMBER	117	AT X = -2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	118	AT X = -0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	119	AT X = 0.94810	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	413
HOLE NUMBER	120	AT X = 2.8443	Y = -2.8443	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	121	AT X = -2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	122	AT X = -0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	415
HOLE NUMBER	123	AT X = 0.94810	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	416
HOLE NUMBER	124	AT X = 2.8443	Y = -0.94810	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	125	AT X = -2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	411
HOLE NUMBER	126	AT X = -0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	127	AT X = 0.94810	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	418
HOLE NUMBER	128	AT X = 2.8443	Y = 0.94810	Z = 0.00000	IS UNIT NUMBER	412
HOLE NUMBER	129	AT X = -2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	417
HOLE NUMBER	130	AT X = -0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	131	AT X = 0.94810	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	414
HOLE NUMBER	132	AT X = 2.8443	Y = 2.8443	Z = 0.00000	IS UNIT NUMBER	418
2 CUBOID	23 1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480 -Z = -33.040

----- UNIT 430 -----

FUEL INSERT IN, CENTER OPENING

1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480 -Z = -33.040
HOLE NUMBER	133	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	420
TRIGA - PREF. FLOOD CANISTER						

REGION MEDIA BIAS NUM ID GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

----- UNIT 431 -----

FUEL INSERT IN, BOTTOM OPENING

1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480 -Z = -33.040
HOLE NUMBER	134	AT X = 0.00000	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	421

----- UNIT 432 -----

FUEL INSERT IN, TOP OPENING

1 CUBOID	23 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480 -Z = -33.040
HOLE NUMBER	135	AT X = 0.00000	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	422

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----- UNIT 433 -----
FUEL INSERT IN, BOTTOM LEFT OPENING
1 CUBOID      23 1    +X = 4.2672  -X = -4.2672  +Y = 4.2672  -Y = -4.2672  +Z = 43.480  -Z = -33.040
HOLE NUMBER   136    AT X =-0.11430  Y =-0.11430  Z = 0.00000  IS UNIT NUMBER 423

----- UNIT 434 -----
FUEL INSERT IN, TOP LEFT OPENING
1 CUBOID      23 1    +X = 4.2672  -X = -4.2672  +Y = 4.2672  -Y = -4.2672  +Z = 43.480  -Z = -33.040
HOLE NUMBER   137    AT X =-0.11430  Y = 0.11430  Z = 0.00000  IS UNIT NUMBER 424

----- UNIT 435 -----
FUEL INSERT IN, BOTOM RIGHT OPENING
1 CUBOID      23 1    +X = 4.2672  -X = -4.2672  +Y = 4.2672  -Y = -4.2672  +Z = 43.480  -Z = -33.040
HOLE NUMBER   138    AT X = 0.11430  Y =-0.11430  Z = 0.00000  IS UNIT NUMBER 425

----- UNIT 436 -----
FUEL INSERT IN, TOP RIGHT OPENING
1 CUBOID      23 1    +X = 4.2672  -X = -4.2672  +Y = 4.2672  -Y = -4.2672  +Z = 43.480  -Z = -33.040
HOLE NUMBER   139    AT X = 0.11430  Y = 0.11430  Z = 0.00000  IS UNIT NUMBER 426
-
TRIGA - PREF. FLOOD CANISTER

REGION      MEDIA BIAS      GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM
            NUM   ID

----- UNIT 440 EXTERNAL TO LATTICE 41 -----
CENTER COLUMN OF THREE OPENINGS
1 ARRAY NUMBER 41    +X = 4.2672  -X = -4.2672  +Y = 13.830  -Y = -13.830  +Z = 43.480  -Z = -33.040
2 CUBOID      212 1    +X = 4.9784  -X = -4.9784  +Y = 14.542  -Y = -14.542  +Z = 43.480  -Z = -33.040

----- UNIT 441 EXTERNAL TO LATTICE 42 -----
LEFT OUTSIDE COLUMN OF TWO OPENINGS
1 ARRAY NUMBER 42    +X = 4.2672  -X = -4.2672  +Y = 8.9980  -Y = -8.9979  +Z = 43.480  -Z = -33.040
2 CUBOID      212 1    +X = 4.2672  -X = -4.6080  +Y = 9.3388  -Y = -9.3387  +Z = 43.480  -Z = -33.040

----- UNIT 442 EXTERNAL TO LATTICE 43 -----
RIGHT OUTSIDE COLUMN OF TWO OPENINGS
1 ARRAY NUMBER 43    +X = 4.2672  -X = -4.2672  +Y = 8.9980  -Y = -8.9979  +Z = 43.480  -Z = -33.040
2 CUBOID      212 1    +X = 4.6080  -X = -4.2672  +Y = 9.3388  -Y = -9.3387  +Z = 43.480  -Z = -33.040

----- UNIT 450 -----
28 TRIGA FUEL ELEMENTS IN EACH LWT BASKET
1 CYLINDER    23 1    RADIUS = 17.150  +Z = 43.485  -Z = -33.045  CENTERLINE IS AT X = 0.00000  Y = 0.00000
HOLE NUMBER   140    AT X = 0.00000  Y = 0.00000  Z = 0.00000  IS UNIT NUMBER 440
HOLE NUMBER   141    AT X = -9.2457  Y = 0.00000  Z = 0.00000  IS UNIT NUMBER 441
HOLE NUMBER   142    AT X = 9.2457   Y = 0.00000  Z = 0.00000  IS UNIT NUMBER 442
2 CYLINDER    212 1    RADIUS = 18.910  +Z = 43.485  -Z = -33.045  CENTERLINE IS AT X = 0.00000  Y = 0.00000
3 CYLINDER    26 1    RADIUS = 33.465  +Z = 43.485  -Z = -33.045  CENTERLINE IS AT X = 0.00000  Y = 0.00000
4 CYLINDER    212 1    RADIUS = 36.519  +Z = 43.485  -Z = -33.045  CENTERLINE IS AT X = 0.00000  Y = 0.00000
5 CYLINDER    27 1    RADIUS = 49.223  +Z = 43.485  -Z = -33.045  CENTERLINE IS AT X = 0.00000  Y = 0.00000
6 CYLINDER    212 1    RADIUS = 49.822  +Z = 43.485  -Z = -33.045  CENTERLINE IS AT X = 0.00000  Y = 0.00000
7 CUBOID      28 1    +X = 49.822  -X = -49.822  +Y = 49.822  -Y = -49.822  +Z = 43.485  -Z = -33.045
-
TRIGA - PREF. FLOOD CANISTER
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT  Y ROW 1 TO 7 BOTTOM TO TOP

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17  
16  
17  
5  
10

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 2 -----  
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 4 BOTTOM TO TOP  
12  
6  
17  
13

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 3 -----  
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 4 BOTTOM TO TOP  
14  
6  
17  
15

TRIGA - PREF. FLOOD CANISTER  
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 20 -----  
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
81  
Z LAYER 2, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
30  
Z LAYER 3, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
450  
Z LAYER 4, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
450  
Z LAYER 5, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
450  
Z LAYER 6, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
30  
Z LAYER 7, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
80

TRIGA - PREF. FLOOD CANISTER  
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 41 -----  
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 7 BOTTOM TO TOP  
431  
45  
42  
430  
42  
45  
432

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 42 -----  
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 4 BOTTOM TO TOP  
435  
42  
46  
436

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 43 -----  
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 4 BOTTOM TO TOP  
433  
42  
46  
434

TRIGA - PREF. FLOOD CANISTER  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	3.04527E+03 CM**3	3.04527E+03 CM**3
5	1	2	5.01021E+02 CM**3	5.01021E+02 CM**3
6	1	3	4.29446E+02 CM**3	4.29446E+02 CM**3
7	1	4	2.52441E-01 CM**3	3.04552E+03 CM**3
	2	5	4.63830E+02 CM**3	3.50935E+03 CM**3
	3	6	9.63081E+02 CM**3	4.47243E+03 CM**3
10	1	7	1.53981E+03 CM**3	6.01225E+03 CM**3
11	1	8	1.53981E+03 CM**3	6.01225E+03 CM**3
12	1	9	1.53981E+03 CM**3	6.01225E+03 CM**3
13	1	10	1.53981E+03 CM**3	6.01225E+03 CM**3
14	1	11	1.53981E+03 CM**3	6.01225E+03 CM**3
15	1	12	1.53981E+03 CM**3	6.01225E+03 CM**3
16	1	13	1.53981E+03 CM**3	6.01225E+03 CM**3
17	1	14	1.94205E+02 CM**3	1.94205E+02 CM**3
	2	15	1.61308E+01 CM**3	2.10335E+02 CM**3
	3	16	1.33346E+01 CM**3	2.23670E+02 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 20 IS AN ARRAY PLACEMENT BOUNDARY REGION				
20	1	20	1.94861E+04 CM**3	1.94861E+04 CM**3
	2	21	4.41673E+03 CM**3	2.39029E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 22 IS AN ARRAY PLACEMENT BOUNDARY REGION				
21	1	22	1.26776E+04 CM**3	1.26776E+04 CM**3
	2	23	8.97555E+02 CM**3	1.35752E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 24 IS AN ARRAY PLACEMENT BOUNDARY REGION				
22	1	24	1.26776E+04 CM**3	1.26776E+04 CM**3
	2	25	8.97555E+02 CM**3	1.35752E+04 CM**3
30	1	26	2.47754E+04 CM**3	7.58286E+04 CM**3
	2	27	1.83375E+04 CM**3	9.41660E+04 CM**3
	3	28	2.00728E+05 CM**3	2.94894E+05 CM**3
	4	29	5.62864E+04 CM**3	3.51181E+05 CM**3
	5	30	2.86831E+05 CM**3	6.38011E+05 CM**3
	6	31	1.56332E+04 CM**3	6.53645E+05 CM**3
	7	32	1.78602E+05 CM**3	8.32246E+05 CM**3
41	1	33	7.36468E+01 CM**3	7.36468E+01 CM**3
	2	34	9.53190E+00 CM**3	8.31787E+01 CM**3
	3	35	3.07231E+01 CM**3	1.13902E+02 CM**3
42	1	36	1.65841E+02 CM**3	1.65841E+02 CM**3
	2	37	1.37742E+01 CM**3	1.79615E+02 CM**3
	3	38	2.77290E+01 CM**3	2.07344E+02 CM**3
45	1	39	4.64451E+02 CM**3	4.64451E+02 CM**3
46	1	40	3.98101E+02 CM**3	3.98101E+02 CM**3
80	1	93	1.18444E+05 CM**3	1.18444E+05 CM**3
	2	94	1.02013E+05 CM**3	2.20456E+05 CM**3
	3	95	6.02374E+04 CM**3	2.80694E+05 CM**3
81	1	96	1.66245E+04 CM**3	1.66245E+04 CM**3
	2	97	9.57276E+04 CM**3	1.12352E+05 CM**3
	3	98	9.56257E+04 CM**3	2.07978E+05 CM**3
	4	99	5.68278E+04 CM**3	2.64906E+05 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 100 IS AN ARRAY PLACEMENT BOUNDARY REGION				
82	1	100	4.48958E+06 CM**3	4.48958E+06 CM**3
411	1	43	4.36751E+01 CM**3	1.57577E+02 CM**3
	2	44	5.84895E+01 CM**3	2.16066E+02 CM**3
412	1	45	4.36751E+01 CM**3	1.57577E+02 CM**3
	2	46	5.84895E+01 CM**3	2.16066E+02 CM**3
413	1	47	4.36751E+01 CM**3	1.57577E+02 CM**3
	2	48	5.84895E+01 CM**3	2.16066E+02 CM**3
414	1	49	4.36751E+01 CM**3	1.57577E+02 CM**3
	2	50	5.84895E+01 CM**3	2.16066E+02 CM**3
415	1	51	4.36751E+01 CM**3	1.57577E+02 CM**3

	2	52	5.84895E+01 CM**3	2.16066E+02 CM**3
416	1	53	4.36751E+01 CM**3	1.57577E+02 CM**3
	2	54	5.84895E+01 CM**3	2.16066E+02 CM**3
417	1	55	4.36751E+01 CM**3	1.57577E+02 CM**3
	2	56	5.84895E+01 CM**3	2.16066E+02 CM**3
418	1	57	4.36751E+01 CM**3	1.57577E+02 CM**3
	2	58	5.84895E+01 CM**3	2.16066E+02 CM**3
420	1	59	1.82177E+03 CM**3	5.27883E+03 CM**3
	2	60	0.00000E+00 CM**3	5.27883E+03 CM**3
421	1	61	1.82177E+03 CM**3	5.27883E+03 CM**3
	2	62	0.00000E+00 CM**3	5.27883E+03 CM**3
422	1	63	1.82177E+03 CM**3	5.27883E+03 CM**3
	2	64	0.00000E+00 CM**3	5.27883E+03 CM**3
423	1	65	1.82177E+03 CM**3	5.27883E+03 CM**3
	2	66	0.00000E+00 CM**3	5.27883E+03 CM**3
424	1	67	1.82177E+03 CM**3	5.27883E+03 CM**3
	2	68	0.00000E+00 CM**3	5.27883E+03 CM**3
425	1	69	1.82177E+03 CM**3	5.27883E+03 CM**3
	2	70	0.00000E+00 CM**3	5.27883E+03 CM**3
426	1	71	1.82177E+03 CM**3	5.27883E+03 CM**3
	2	72	0.00000E+00 CM**3	5.27883E+03 CM**3
430	1	73	2.94576E+02 CM**3	5.57341E+03 CM**3
431	1	74	2.94576E+02 CM**3	5.57341E+03 CM**3
432	1	75	2.94576E+02 CM**3	5.57341E+03 CM**3
433	1	76	2.94576E+02 CM**3	5.57341E+03 CM**3
434	1	77	2.94576E+02 CM**3	5.57341E+03 CM**3
435	1	78	2.94576E+02 CM**3	5.57341E+03 CM**3
436	1	79	2.94576E+02 CM**3	5.57341E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 80 IS AN ARRAY PLACEMENT BOUNDARY REGION				
440	1	80	1.80638E+04 CM**3	1.80638E+04 CM**3
	2	81	4.09436E+03 CM**3	2.21582E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 82 IS AN ARRAY PLACEMENT BOUNDARY REGION				
441	1	82	1.17523E+04 CM**3	1.17523E+04 CM**3
	2	83	9.32192E+02 CM**3	1.26845E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 84 IS AN ARRAY PLACEMENT BOUNDARY REGION				
442	1	84	1.17523E+04 CM**3	1.17523E+04 CM**3
	2	85	9.32192E+02 CM**3	1.26845E+04 CM**3
450	1	86	2.31876E+04 CM**3	7.07147E+04 CM**3
	2	87	1.52615E+04 CM**3	8.58762E+04 CM**3
	3	88	1.83270E+05 CM**3	2.69247E+05 CM**3
	4	89	5.13911E+04 CM**3	3.20638E+05 CM**3
	5	90	2.61884E+05 CM**3	5.82522E+05 CM**3
	6	91	1.42735E+04 CM**3	5.96796E+05 CM**3
	7	92	1.63068E+05 CM**3	7.59864E+05 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	14	1	1	4.26338E+04 CM**3
5	4	1	2	2.00408E+03 CM**3
6	4	1	2	1.71778E+03 CM**3
7	14	1	3	3.53418E+00 CM**3
		2	2	6.49262E+03 CM**3
		3	12	1.34831E+04 CM**3
10	2	1	12	3.07963E+03 CM**3
11	2	1	12	3.07963E+03 CM**3
12	2	1	12	3.07963E+03 CM**3
13	2	1	12	3.07963E+03 CM**3
14	2	1	12	3.07963E+03 CM**3
15	2	1	12	3.07963E+03 CM**3

16	2	1	12	3.07963E+03	CM**3
17	8	1	13	1.55364E+03	CM**3
		2	14	1.29040E+02	CM**3
		3	12	1.06677E+02	CM**3
20	2	1		3.89722E+04	CM**3
		2	2	8.83347E+03	CM**3
21	2	1		2.53552E+04	CM**3
		2	2	1.79511E+03	CM**3
22	2	1		2.53552E+04	CM**3
		2	2	1.79511E+03	CM**3
30	2	1	12	4.95508E+04	CM**3
		2	2	3.66750E+04	CM**3
		3	6	4.01456E+05	CM**3
		4	2	1.12573E+05	CM**3
		5	7	5.73661E+05	CM**3
		6	2	3.12664E+04	CM**3
		7	8	3.57203E+05	CM**3
41	336	1	21	2.47453E+04	CM**3
		2	22	3.20272E+03	CM**3
		3	29	1.03230E+04	CM**3
42	12	1	210	1.99009E+03	CM**3
		2	211	1.65290E+02	CM**3
		3	23	3.32748E+02	CM**3
45	6	1	212	2.78670E+03	CM**3
46	6	1	212	2.38860E+03	CM**3
80	1	1	2	1.18444E+05	CM**3
		2	8	1.02013E+05	CM**3
		3	8	6.02374E+04	CM**3
81	1	1	6	1.66245E+04	CM**3
		2	2	9.57276E+04	CM**3
		3	8	9.56257E+04	CM**3
		4	8	5.68278E+04	CM**3
82	1	1		4.48958E+06	CM**3
411	42	1	23	1.83435E+03	CM**3
		2	215	2.45656E+03	CM**3
412	42	1	23	1.83435E+03	CM**3
		2	215	2.45656E+03	CM**3
413	42	1	23	1.83435E+03	CM**3
		2	215	2.45656E+03	CM**3
414	42	1	23	1.83435E+03	CM**3
		2	215	2.45656E+03	CM**3
415	42	1	23	1.83435E+03	CM**3
		2	215	2.45656E+03	CM**3
416	42	1	23	1.83435E+03	CM**3
		2	215	2.45656E+03	CM**3
417	42	1	23	1.83435E+03	CM**3
		2	215	2.45656E+03	CM**3
418	42	1	23	1.83435E+03	CM**3
		2	215	2.45656E+03	CM**3
420	3	1	23	5.46531E+03	CM**3
		2	23	0.00000E+00	CM**3
421	3	1	23	5.46531E+03	CM**3
		2	23	0.00000E+00	CM**3
422	3	1	23	5.46531E+03	CM**3
		2	23	0.00000E+00	CM**3
423	3	1	23	5.46531E+03	CM**3
		2	23	0.00000E+00	CM**3
424	3	1	23	5.46531E+03	CM**3
		2	23	0.00000E+00	CM**3
425	3	1	23	5.46531E+03	CM**3
		2	23	0.00000E+00	CM**3
426	3	1	23	5.46531E+03	CM**3
		2	23	0.00000E+00	CM**3
430	3	1	23	8.83729E+02	CM**3
431	3	1	23	8.83729E+02	CM**3

432	3	1	23	8.83729E+02	CM**3
433	3	1	23	8.83729E+02	CM**3
434	3	1	23	8.83729E+02	CM**3
435	3	1	23	8.83729E+02	CM**3
436	3	1	23	8.83729E+02	CM**3
440	3	1		5.41915E+04	CM**3
		2	212	1.22831E+04	CM**3
441	3	1		3.52568E+04	CM**3
		2	212	2.79658E+03	CM**3
442	3	1		3.52568E+04	CM**3
		2	212	2.79658E+03	CM**3
450	3	1	23	6.95629E+04	CM**3
		2	212	4.57845E+04	CM**3
		3	26	5.49811E+05	CM**3
		4	212	1.54173E+05	CM**3
		5	27	7.85653E+05	CM**3
		6	212	4.28205E+04	CM**3
		7	28	4.89205E+05	CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	4.26338E+04 CM**3	7.52714E+04
2	4.17325E+05 CM**3	3.30521E+06
3	3.53418E+00 CM**3	3.52772E+00
6	4.18081E+05 CM**3	4.74271E+06
7	5.73661E+05 CM**3	5.72612E-15
8	6.71907E+05 CM**3	6.70678E-15
12	8.46980E+04 CM**3	8.45431E+01
13	1.55364E+03 CM**3	1.20454E+04
14	1.29040E+02 CM**3	9.92440E+02
21	2.47453E+04 CM**3	1.45038E+05
22	3.20272E+03 CM**3	2.57258E+04
23	1.29014E+05 CM**3	1.28778E+02
26	5.49811E+05 CM**3	5.23706E+06
27	7.85653E+05 CM**3	7.84216E-15
28	4.89205E+05 CM**3	4.88310E-15
29	1.03230E+04 CM**3	4.06226E+04
210	1.99009E+03 CM**3	1.54292E+04
211	1.65290E+02 CM**3	1.27124E+03
212	2.65830E+05 CM**3	2.10537E+06
215	1.96525E+04 CM**3	5.31009E+04

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 \*\*\*  
 \*\*\* BIASING INFORMATION \*\*\*  
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 \*\*\* A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S. \*\*\*  
 \*\*\*  
 \*\*\*\*\*

..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....

..... 0.02467 MINUTES WERE USED PROCESSING DATA. ....

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 1.50079E-02

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 4.98221E+01 -X=-4.98221E+01 +Y= 4.98221E+01 -Y=-4.98221E+01 +Z= 2.30870E+02 -Z=-2.21300E+02

THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

0.66433 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.68267 MINUTES.

TRIGA - PREF. FLOOD CANISTER

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE GENERATED	MATRIX K-EFF DEVIATION
KENO MESSAGE NUMBER K5-132	8.37539E-01	WARNING... ONLY 6.99333E-01	442 INDEPENDENT	FISSION POINTS WERE 0.00000E+00	GENERATED 0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	8.52774E-01	WARNING... ONLY 7.14000E-01	488 INDEPENDENT	FISSION POINTS WERE 0.00000E+00	GENERATED 0.00000E+00	0.00000E+00
1	8.40221E-01	7.26833E-01	8.40221E-01	0.00000E+00	0.00000E+00	0.00000E+00
2	8.80179E-01	7.40500E-01	8.60200E-01	1.99790E-02	0.00000E+00	0.00000E+00
3	8.77375E-01	7.52500E-01	8.65925E-01	1.28775E-02	0.00000E+00	0.00000E+00
4	8.52329E-01	7.65167E-01	8.62526E-01	9.71942E-03	0.00000E+00	0.00000E+00
5	8.64157E-01	7.79000E-01	8.62852E-01	7.53569E-03	0.00000E+00	0.00000E+00
6	8.52553E-01	7.91833E-01	8.61136E-01	6.38780E-03	0.00000E+00	0.00000E+00
7	8.56608E-01	8.05500E-01	8.60489E-01	5.43728E-03	0.00000E+00	0.00000E+00
8	8.10802E-01	8.19167E-01	8.54278E-01	7.79410E-03	0.00000E+00	0.00000E+00
9	8.41128E-01	8.33833E-01	8.52817E-01	7.02732E-03	0.00000E+00	0.00000E+00
10	8.19244E-01	8.48500E-01	8.49459E-01	7.12589E-03	0.00000E+00	0.00000E+00
11	8.45987E-01	8.63167E-01	8.49144E-01	6.45333E-03	0.00000E+00	0.00000E+00
12	8.71782E-01	8.76000E-01	8.51030E-01	6.18574E-03	0.00000E+00	0.00000E+00
13	8.45444E-01	8.89667E-01	8.50601E-01	5.70626E-03	0.00000E+00	0.00000E+00
14	7.71454E-01	9.03500E-01	8.44947E-01	7.73757E-03	0.00000E+00	0.00000E+00
15	8.59059E-01	9.16333E-01	8.45888E-01	7.26446E-03	0.00000E+00	0.00000E+00
16	8.37210E-01	9.29167E-01	8.45346E-01	6.81689E-03	0.00000E+00	0.00000E+00
17	8.47860E-01	9.41833E-01	8.45493E-01	6.40506E-03	0.00000E+00	0.00000E+00
18	8.54899E-01	9.53833E-01	8.46015E-01	6.06128E-03	0.00000E+00	0.00000E+00
19	8.36069E-01	9.66667E-01	8.45492E-01	5.75723E-03	0.00000E+00	0.00000E+00
20	8.28513E-01	9.79500E-01	8.44643E-01	5.52738E-03	0.00000E+00	0.00000E+00
21	8.43649E-01	9.91333E-01	8.44596E-01	5.25780E-03	0.00000E+00	0.00000E+00
22	8.99669E-01	1.00417E+00	8.47099E-01	5.60339E-03	0.00000E+00	0.00000E+00
23	8.14114E-01	1.01783E+00	8.45665E-01	5.54296E-03	0.00000E+00	0.00000E+00
24	8.57507E-01	1.03067E+00	8.46158E-01	5.32987E-03	0.00000E+00	0.00000E+00
25	8.05887E-01	1.04450E+00	8.44547E-01	5.36001E-03	0.00000E+00	0.00000E+00
26	8.80365E-01	1.05733E+00	8.45925E-01	5.33081E-03	0.00000E+00	0.00000E+00
27	8.56343E-01	1.07100E+00	8.46311E-01	5.14406E-03	0.00000E+00	0.00000E+00
28	9.08331E-01	1.08467E+00	8.48526E-01	5.42931E-03	0.00000E+00	0.00000E+00
29	8.66782E-01	1.09850E+00	8.49155E-01	5.27644E-03	0.00000E+00	0.00000E+00
30	8.40028E-01	1.11133E+00	8.48851E-01	5.10660E-03	0.00000E+00	0.00000E+00
31	8.96029E-01	1.12317E+00	8.50373E-01	5.16827E-03	0.00000E+00	0.00000E+00
32	8.15823E-01	1.13783E+00	8.49293E-01	5.11931E-03	0.00000E+00	0.00000E+00
33	7.67288E-01	1.15067E+00	8.46808E-01	5.54926E-03	0.00000E+00	0.00000E+00
34	8.30848E-01	1.16350E+00	8.46339E-01	5.40399E-03	0.00000E+00	0.00000E+00
35	8.23007E-01	1.17717E+00	8.45672E-01	5.28950E-03	0.00000E+00	0.00000E+00
36	8.26258E-01	1.19000E+00	8.45133E-01	5.16868E-03	0.00000E+00	0.00000E+00
37	8.42836E-01	1.20283E+00	8.45071E-01	5.02743E-03	0.00000E+00	0.00000E+00
38	8.29217E-01	1.21567E+00	8.44654E-01	4.91109E-03	0.00000E+00	0.00000E+00
39	8.12012E-01	1.22933E+00	8.43817E-01	4.85618E-03	0.00000E+00	0.00000E+00
40	7.91772E-01	1.24217E+00	8.42516E-01	4.90877E-03	0.00000E+00	0.00000E+00
41	7.68831E-01	1.25500E+00	8.40718E-01	5.11378E-03	0.00000E+00	0.00000E+00
42	8.31359E-01	1.26867E+00	8.40496E-01	4.99551E-03	0.00000E+00	0.00000E+00
43	8.77040E-01	1.28150E+00	8.41345E-01	4.95143E-03	0.00000E+00	0.00000E+00
44	8.86491E-01	1.29433E+00	8.42371E-01	4.94520E-03	0.00000E+00	0.00000E+00
45	8.58182E-01	1.30717E+00	8.42723E-01	4.84681E-03	0.00000E+00	0.00000E+00
46	8.53866E-01	1.32000E+00	8.42965E-01	4.74646E-03	0.00000E+00	0.00000E+00
47	8.26025E-01	1.33367E+00	8.42605E-01	4.65834E-03	0.00000E+00	0.00000E+00
48	8.31626E-01	1.34650E+00	8.42376E-01	4.56599E-03	0.00000E+00	0.00000E+00
49	8.30702E-01	1.35933E+00	8.42138E-01	4.47818E-03	0.00000E+00	0.00000E+00
50	8.43633E-01	1.37117E+00	8.42168E-01	4.38780E-03	0.00000E+00	0.00000E+00
51	8.41469E-01	1.38583E+00	8.42154E-01	4.30093E-03	0.00000E+00	0.00000E+00
52	8.06810E-01	1.39867E+00	8.41470E-01	4.27244E-03	0.00000E+00	0.00000E+00
53	8.57839E-01	1.41150E+00	8.41779E-01	4.20242E-03	0.00000E+00	0.00000E+00
54	8.56385E-01	1.42433E+00	8.42050E-01	4.13272E-03	0.00000E+00	0.00000E+00
55	8.56821E-01	1.43800E+00	8.42316E-01	4.06561E-03	0.00000E+00	0.00000E+00
56	8.08833E-01	1.45183E+00	8.41719E-01	4.03674E-03	0.00000E+00	0.00000E+00
57	8.56866E-01	1.46467E+00	8.41985E-01	3.97419E-03	0.00000E+00	0.00000E+00
58	8.14106E-01	1.47833E+00	8.41504E-01	3.93454E-03	0.00000E+00	0.00000E+00
59	7.76144E-01	1.49117E+00	8.40396E-01	4.02281E-03	0.00000E+00	0.00000E+00
60	8.09639E-01	1.50483E+00	8.39884E-01	3.98828E-03	0.00000E+00	0.00000E+00
61	8.17719E-01	1.51950E+00	8.39520E-01	3.92915E-03	0.00000E+00	0.00000E+00
62	8.20194E-01	1.53333E+00	8.39208E-01	3.88761E-03	0.00000E+00	0.00000E+00
63	8.51247E-01	1.54700E+00	8.39400E-01	3.83017E-03	0.00000E+00	0.00000E+00
64	8.74295E-01	1.56067E+00	8.39945E-01	3.80908E-03	0.00000E+00	0.00000E+00
65	8.51067E-01	1.57450E+00	8.40116E-01	3.75392E-03	0.00000E+00	0.00000E+00
66	8.13783E-01	1.58817E+00	8.39717E-01	3.71807E-03	0.00000E+00	0.00000E+00
67	8.42532E-01	1.60100E+00	8.39759E-01	3.66240E-03	0.00000E+00	0.00000E+00
68	8.28592E-01	1.61383E+00	8.39595E-01	3.61187E-03	0.00000E+00	0.00000E+00
69	8.03059E-01	1.62850E+00	8.39065E-01	3.59832E-03	0.00000E+00	0.00000E+00
70	8.25102E-01	1.64217E+00	8.38866E-01	3.55214E-03	0.00000E+00	0.00000E+00
71	8.28156E-01	1.65600E+00	8.38715E-01	3.50495E-03	0.00000E+00	0.00000E+00
72	8.50376E-01	1.66967E+00	8.38877E-01	3.45976E-03	0.00000E+00	0.00000E+00
73	8.36810E-01	1.68333E+00	8.38849E-01	3.41215E-03	0.00000E+00	0.00000E+00
74	8.55302E-01	1.69700E+00	8.39071E-01	3.37306E-03	0.00000E+00	0.00000E+00
75	8.44892E-01	1.71067E+00	8.39149E-01	3.32869E-03	0.00000E+00	0.00000E+00
76	8.18109E-01	1.72467E+00	8.40188E-01	3.44500E-03	0.00000E+00	0.00000E+00
77	8.45698E-01	1.73733E+00	8.40262E-01	3.40077E-03	0.00000E+00	0.00000E+00
78	8.66703E-01	1.75117E+00	8.40601E-01	3.37396E-03	0.00000E+00	0.00000E+00
79	8.18005E-01	1.76400E+00	8.41581E-01	3.47209E-03	0.00000E+00	0.00000E+00
80	8.75745E-01	1.77683E+00	8.42008E-01	3.45491E-03	0.00000E+00	0.00000E+00
81	7.87991E-01	1.79050E+00	8.41341E-01	3.47655E-03	0.00000E+00	0.00000E+00
82	8.46407E-01	1.80333E+00	8.41403E-01	3.43444E-03	0.00000E+00	0.00000E+00
83	8.41778E-01	1.81617E+00	8.41407E-01	3.39282E-03	0.00000E+00	0.00000E+00
84	8.30200E-01	1.82983E+00	8.41274E-01	3.35484E-03	0.00000E+00	0.00000E+00
85	8.08188E-01	1.84267E+00	8.40885E-01	3.33791E-03	0.00000E+00	0.00000E+00
86	8.06280E-01	1.85550E+00	8.40505E-01	3.32058E-03	0.00000E+00	0.00000E+00
87	8.60229E-01	1.86917E+00	8.40732E-01	3.29001E-03	0.00000E+00	0.00000E+00

90	8.58676E-01	1.88200E+00	8.40936E-01	3.25879E-03	0.00000E+00	0.00000E+00
91	8.94174E-01	1.89483E+00	8.41534E-01	3.27703E-03	0.00000E+00	0.00000E+00
92	8.29862E-01	1.90767E+00	8.41405E-01	3.24301E-03	0.00000E+00	0.00000E+00
93	8.82677E-01	1.92050E+00	8.41858E-01	3.23906E-03	0.00000E+00	0.00000E+00
94	8.51230E-01	1.93333E+00	8.41960E-01	3.20530E-03	0.00000E+00	0.00000E+00
95	8.93158E-01	1.94700E+00	8.42511E-01	3.21808E-03	0.00000E+00	0.00000E+00
96	7.90054E-01	1.96083E+00	8.41952E-01	3.23220E-03	0.00000E+00	0.00000E+00
97	8.91577E-01	1.97367E+00	8.42475E-01	3.24038E-03	0.00000E+00	0.00000E+00
98	7.91467E-01	1.98733E+00	8.41943E-01	3.25017E-03	0.00000E+00	0.00000E+00
99	8.29569E-01	2.00017E+00	8.41816E-01	3.21902E-03	0.00000E+00	0.00000E+00
100	8.59337E-01	2.01200E+00	8.42001E-01	3.19136E-03	0.00000E+00	0.00000E+00
101	8.23664E-01	2.02583E+00	8.41816E-01	3.16439E-03	0.00000E+00	0.00000E+00
102	8.40089E-01	2.03950E+00	8.41788E-01	3.13263E-03	0.00000E+00	0.00000E+00
103	7.54061E-01	2.05317E+00	8.40930E-01	3.22082E-03	0.00000E+00	0.00000E+00
104	7.79450E-01	2.06600E+00	8.40327E-01	3.24555E-03	0.00000E+00	0.00000E+00
105	8.03918E-01	2.07800E+00	8.39973E-01	3.23326E-03	0.00000E+00	0.00000E+00
106	8.19695E-01	2.08983E+00	8.39778E-01	3.20795E-03	0.00000E+00	0.00000E+00
107	8.05942E-01	2.10267E+00	8.39456E-01	3.19356E-03	0.00000E+00	0.00000E+00
108	8.62979E-01	2.11550E+00	8.39678E-01	3.17106E-03	0.00000E+00	0.00000E+00
109	8.85571E-01	2.12833E+00	8.40107E-01	3.17043E-03	0.00000E+00	0.00000E+00
110	8.46888E-01	2.14117E+00	8.40170E-01	3.14156E-03	0.00000E+00	0.00000E+00
111	8.43051E-01	2.15583E+00	8.40196E-01	3.11272E-03	0.00000E+00	0.00000E+00
112	8.60166E-01	2.16850E+00	8.40378E-01	3.08963E-03	0.00000E+00	0.00000E+00
113	8.19775E-01	2.18133E+00	8.40192E-01	3.06729E-03	0.00000E+00	0.00000E+00
114	8.00791E-01	2.19517E+00	8.39840E-01	3.06007E-03	0.00000E+00	0.00000E+00
115	8.07380E-01	2.20983E+00	8.39553E-01	3.04644E-03	0.00000E+00	0.00000E+00
116	8.06710E-01	2.22350E+00	8.39265E-01	3.03331E-03	0.00000E+00	0.00000E+00
117	9.00538E-01	2.23633E+00	8.39798E-01	3.05366E-03	0.00000E+00	0.00000E+00
118	7.96570E-01	2.25000E+00	8.39425E-01	3.05007E-03	0.00000E+00	0.00000E+00
119	8.44206E-01	2.26467E+00	8.39466E-01	3.02417E-03	0.00000E+00	0.00000E+00
120	7.89636E-01	2.27750E+00	8.39044E-01	3.02802E-03	0.00000E+00	0.00000E+00
121	8.44209E-01	2.29117E+00	8.39078E-01	3.00278E-03	0.00000E+00	0.00000E+00
122	8.46086E-01	2.30400E+00	8.39145E-01	2.97822E-03	0.00000E+00	0.00000E+00
123	8.76785E-01	2.31683E+00	8.39456E-01	2.96984E-03	0.00000E+00	0.00000E+00
124	8.09004E-01	2.33067E+00	8.39207E-01	2.95596E-03	0.00000E+00	0.00000E+00
125	8.32096E-01	2.34350E+00	8.39149E-01	2.93240E-03	0.00000E+00	0.00000E+00
126	8.05555E-01	2.35717E+00	8.38878E-01	2.92124E-03	0.00000E+00	0.00000E+00
127	8.38058E-01	2.37083E+00	8.38871E-01	2.89778E-03	0.00000E+00	0.00000E+00
128	8.21160E-01	2.38367E+00	8.38731E-01	2.87813E-03	0.00000E+00	0.00000E+00
129	8.34422E-01	2.39650E+00	8.38697E-01	2.85558E-03	0.00000E+00	0.00000E+00
130	8.47021E-01	2.41033E+00	8.38762E-01	2.83393E-03	0.00000E+00	0.00000E+00
131	7.95347E-01	2.42400E+00	8.38425E-01	2.83194E-03	0.00000E+00	0.00000E+00
132	8.65586E-01	2.43783E+00	8.38634E-01	2.81783E-03	0.00000E+00	0.00000E+00
133	8.32313E-01	2.45050E+00	8.38586E-01	2.79665E-03	0.00000E+00	0.00000E+00
134	8.32251E-01	2.46333E+00	8.38538E-01	2.77580E-03	0.00000E+00	0.00000E+00
135	8.43492E-01	2.47700E+00	8.38575E-01	2.75510E-03	0.00000E+00	0.00000E+00
136	8.67256E-01	2.48983E+00	8.38788E-01	2.74283E-03	0.00000E+00	0.00000E+00
137	8.18395E-01	2.50367E+00	8.38638E-01	2.72662E-03	0.00000E+00	0.00000E+00
138	8.72052E-01	2.51733E+00	8.38884E-01	2.71763E-03	0.00000E+00	0.00000E+00
139	8.77268E-01	2.53107E+00	8.39164E-01	2.71223E-03	0.00000E+00	0.00000E+00
140	8.21243E-01	2.54300E+00	8.39034E-01	2.69562E-03	0.00000E+00	0.00000E+00
141	8.24518E-01	2.55667E+00	8.38940E-01	2.67821E-03	0.00000E+00	0.00000E+00
142	8.42363E-01	2.57050E+00	8.38954E-01	2.65912E-03	0.00000E+00	0.00000E+00
143	7.97553E-01	2.58333E+00	8.38661E-01	2.65647E-03	0.00000E+00	0.00000E+00
144	8.76677E-01	2.59617E+00	8.38929E-01	2.65125E-03	0.00000E+00	0.00000E+00
145	8.32020E-01	2.60883E+00	8.38860E-01	2.63309E-03	0.00000E+00	0.00000E+00
146	8.17946E-01	2.62267E+00	8.38735E-01	2.61879E-03	0.00000E+00	0.00000E+00
147	8.19262E-01	2.63633E+00	8.38601E-01	2.60412E-03	0.00000E+00	0.00000E+00
148	8.22026E-01	2.64833E+00	8.38487E-01	2.58971E-03	0.00000E+00	0.00000E+00
149	8.37377E-01	2.66200E+00	8.38479E-01	2.57105E-03	0.00000E+00	0.00000E+00
150	8.46566E-01	2.67483E+00	8.38534E-01	2.55421E-03	0.00000E+00	0.00000E+00
151	7.74147E-01	2.68850E+00	8.38102E-01	2.53754E-03	0.00000E+00	0.00000E+00
152	9.01631E-01	2.70233E+00	8.38526E-01	2.52118E-03	0.00000E+00	0.00000E+00
153	8.60081E-01	2.71417E+00	8.38668E-01	2.57791E-03	0.00000E+00	0.00000E+00
154	8.95309E-01	2.72783E+00	8.39041E-01	2.58797E-03	0.00000E+00	0.00000E+00
155	8.64145E-01	2.73983E+00	8.39205E-01	2.57613E-03	0.00000E+00	0.00000E+00
156	8.24519E-01	2.75350E+00	8.39110E-01	2.56112E-03	0.00000E+00	0.00000E+00
157	8.42827E-01	2.76550E+00	8.39134E-01	2.54466E-03	0.00000E+00	0.00000E+00
158	8.07941E-01	2.77833E+00	8.38934E-01	2.53619E-03	0.00000E+00	0.00000E+00
159	8.91256E-01	2.79100E+00	8.39268E-01	2.54201E-03	0.00000E+00	0.00000E+00
160	8.78411E-01	2.80383E+00	8.39516E-01	2.53799E-03	0.00000E+00	0.00000E+00
161	8.64680E-01	2.81667E+00	8.39674E-01	2.52694E-03	0.00000E+00	0.00000E+00
162	8.41269E-01	2.82950E+00	8.39684E-01	2.51112E-03	0.00000E+00	0.00000E+00
163	8.53462E-01	2.84233E+00	8.39770E-01	2.49694E-03	0.00000E+00	0.00000E+00
164	8.29559E-01	2.85517E+00	8.39707E-01	2.48228E-03	0.00000E+00	0.00000E+00
165	8.19254E-01	2.86800E+00	8.39581E-01	2.47019E-03	0.00000E+00	0.00000E+00
166	8.46759E-01	2.88267E+00	8.39625E-01	2.45547E-03	0.00000E+00	0.00000E+00
167	8.46334E-01	2.89633E+00	8.39666E-01	2.44088E-03	0.00000E+00	0.00000E+00
168	8.42378E-01	2.91000E+00	8.39682E-01	2.42619E-03	0.00000E+00	0.00000E+00
169	8.60966E-01	2.92383E+00	8.39805E-01	2.41498E-03	0.00000E+00	0.00000E+00
170	7.61102E-01	2.93667E+00	8.39341E-01	2.44586E-03	0.00000E+00	0.00000E+00
171	8.09061E-01	2.95133E+00	8.39162E-01	2.43793E-03	0.00000E+00	0.00000E+00
172	8.40616E-01	2.96417E+00	8.39170E-01	2.42356E-03	0.00000E+00	0.00000E+00
173	8.10715E-01	2.97783E+00	8.39004E-01	2.41509E-03	0.00000E+00	0.00000E+00
174	7.81922E-01	2.99250E+00	8.38672E-01	2.42383E-03	0.00000E+00	0.00000E+00
175	8.18771E-01	3.00533E+00	8.38557E-01	2.41253E-03	0.00000E+00	0.00000E+00
176	8.25260E-01	3.01817E+00	8.38481E-01	2.39984E-03	0.00000E+00	0.00000E+00
177	8.09004E-01	3.03083E+00	8.38312E-01	2.39202E-03	0.00000E+00	0.00000E+00
178	8.47468E-01	3.04367E+00	8.38364E-01	2.37896E-03	0.00000E+00	0.00000E+00
179	8.70548E-01	3.05750E+00	8.38546E-01	2.37246E-03	0.00000E+00	0.00000E+00
180	8.77468E-01	3.07217E+00	8.38765E-01	2.36921E-03	0.00000E+00	0.00000E+00
181	7.97178E-01	3.08583E+00	8.38532E-01	2.36736E-03	0.00000E+00	0.00000E+00
182	8.25331E-01	3.09950E+00	8.38459E-01	2.35532E-03	0.00000E+00	0.00000E+00
183	8.62611E-01	3.11233E+00	8.38592E-01	2.34607E-03	0.00000E+00	0.00000E+00
184	8.46947E-01	3.12617E+00	8.38638E-01	2.33359E-03	0.00000E+00	0.00000E+00

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185	8.81490E-01	3.13900E+00	8.38872E-01	2.33259E-03	0.00000E+00	0.00000E+00
186	8.06054E-01	3.15267E+00	8.38694E-01	2.32672E-03	0.00000E+00	0.00000E+00
187	8.31330E-01	3.16550E+00	8.38654E-01	2.31445E-03	0.00000E+00	0.00000E+00
188	8.50572E-01	3.17833E+00	8.38718E-01	2.30287E-03	0.00000E+00	0.00000E+00
189	8.47532E-01	3.19117E+00	8.38766E-01	2.29101E-03	0.00000E+00	0.00000E+00
190	8.18831E-01	3.20583E+00	8.38656E-01	2.28130E-03	0.00000E+00	0.00000E+00
191	8.44059E-01	3.21767E+00	8.38687E-01	2.26938E-03	0.00000E+00	0.00000E+00
192	8.00406E-01	3.23133E+00	8.39012E-01	2.28066E-03	0.00000E+00	0.00000E+00
193	8.55718E-01	3.24417E+00	8.39099E-01	2.27037E-03	0.00000E+00	0.00000E+00
194	8.18828E-01	3.25800E+00	8.38994E-01	2.26098E-03	0.00000E+00	0.00000E+00
195	8.39110E-01	3.27083E+00	8.38994E-01	2.24923E-03	0.00000E+00	0.00000E+00
196	8.78157E-01	3.28267E+00	8.39196E-01	2.24670E-03	0.00000E+00	0.00000E+00
197	8.45548E-01	3.29550E+00	8.39229E-01	2.23538E-03	0.00000E+00	0.00000E+00
198	8.57079E-01	3.30833E+00	8.39320E-01	2.22581E-03	0.00000E+00	0.00000E+00
199	8.34812E-01	3.32117E+00	8.39397E-01	2.21460E-03	0.00000E+00	0.00000E+00
200	8.44811E-01	3.33400E+00	8.39325E-01	2.20357E-03	0.00000E+00	0.00000E+00
201	8.40696E-01	3.34687E+00	8.39332E-01	2.19248E-03	0.00000E+00	0.00000E+00
202	8.72283E-01	3.35950E+00	8.39497E-01	2.18771E-03	0.00000E+00	0.00000E+00
203	8.29380E-01	3.37233E+00	8.39447E-01	2.17738E-03	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

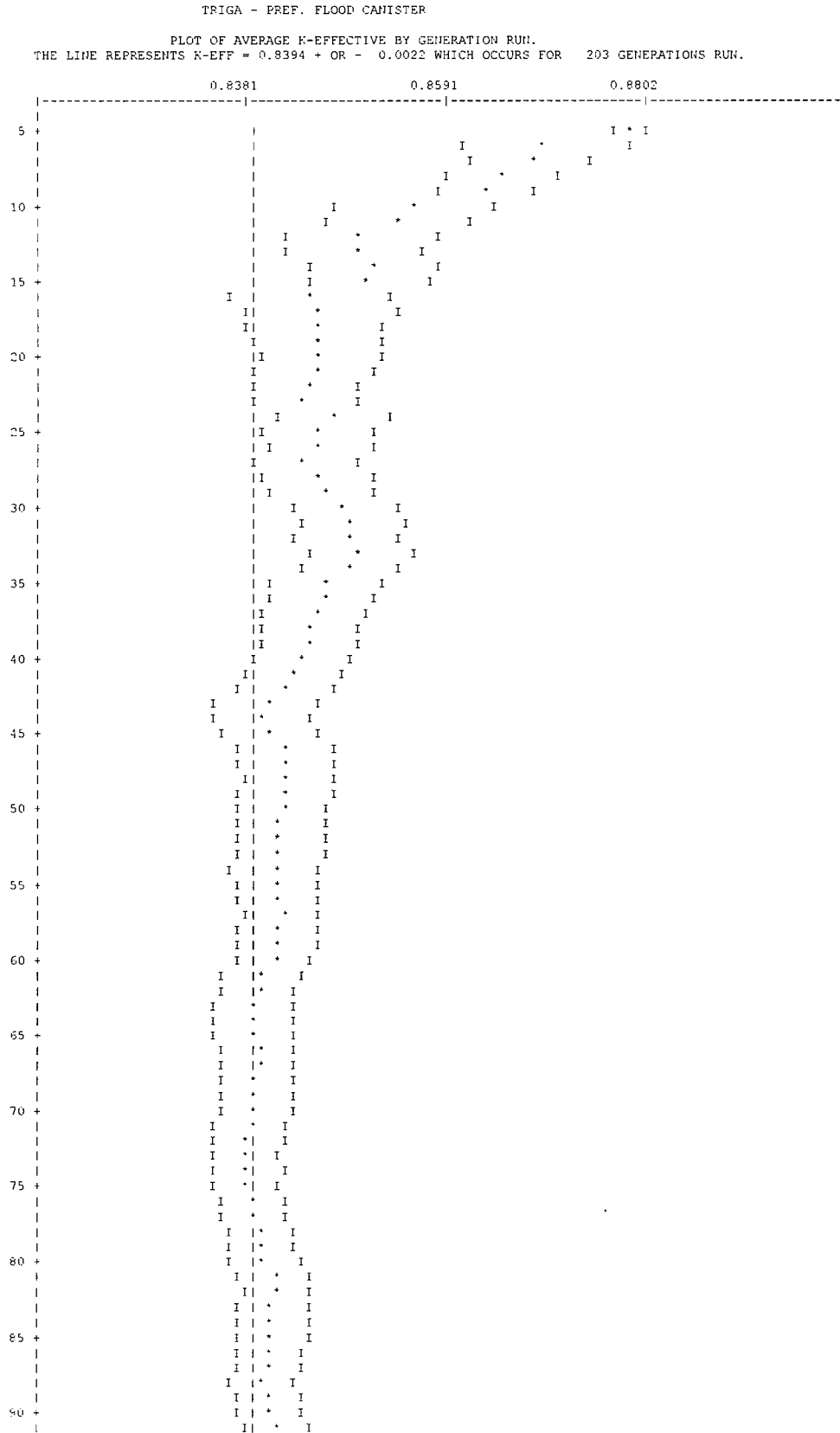
EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.



TRIGA - PREF. FLOOD CANISTER

LIFETIME = 5.96120E-05 + OR - 3.37432E-07      GENERATION TIME = 2.84400E-05 + OR - 1.23388E-07  
 NU BAR = 2.42081E+00 + OR - 1.76618E-05      AVERAGE FISSION GROUP = 2.23764E+01 + OR - 1.22941E-02  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.31694E-01 + OR - 1.11900E-03

NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT		95 PER CENT		99 PER CENT		NUMBER OF HISTORIES
			CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	
3	0.83944	+ OR - 0.00219	0.83725	TO 0.84163	0.83507	TO 0.84382	0.83288	TO 0.84601	100000
4	0.83924	+ OR - 0.00219	0.83705	TO 0.84143	0.83486	TO 0.84362	0.83267	TO 0.84581	99500
5	0.83905	+ OR - 0.00219	0.83685	TO 0.84124	0.83466	TO 0.84343	0.83247	TO 0.84562	99000
6	0.83898	+ OR - 0.00220	0.83678	TO 0.84118	0.83457	TO 0.84338	0.83237	TO 0.84559	98500
7	0.83885	+ OR - 0.00221	0.83664	TO 0.84106	0.83443	TO 0.84327	0.83222	TO 0.84548	98000
8	0.83878	+ OR - 0.00222	0.83656	TO 0.84100	0.83434	TO 0.84322	0.83212	TO 0.84544	97500
9	0.83869	+ OR - 0.00223	0.83646	TO 0.84092	0.83423	TO 0.84315	0.83200	TO 0.84538	97000
10	0.83893	+ OR - 0.00224	0.83660	TO 0.84107	0.83436	TO 0.84330	0.83212	TO 0.84554	96500
11	0.83882	+ OR - 0.00225	0.83657	TO 0.84107	0.83432	TO 0.84332	0.83208	TO 0.84556	96000
12	0.83892	+ OR - 0.00226	0.83666	TO 0.84118	0.83441	TO 0.84344	0.83215	TO 0.84570	95500
17	0.83893	+ OR - 0.00228	0.83665	TO 0.84121	0.83437	TO 0.84349	0.83209	TO 0.84577	93000
22	0.83887	+ OR - 0.00234	0.83653	TO 0.84121	0.83419	TO 0.84355	0.83185	TO 0.84589	90500
27	0.83872	+ OR - 0.00237	0.83635	TO 0.84109	0.83399	TO 0.84346	0.83162	TO 0.84582	88000
32	0.83780	+ OR - 0.00238	0.83542	TO 0.84018	0.83304	TO 0.84256	0.83065	TO 0.84494	85500
37	0.83813	+ OR - 0.00238	0.83575	TO 0.84052	0.83337	TO 0.84290	0.83098	TO 0.84529	83000
42	0.83869	+ OR - 0.00243	0.83625	TO 0.84112	0.83382	TO 0.84355	0.83138	TO 0.84598	80500
47	0.83850	+ OR - 0.00244	0.83607	TO 0.84094	0.83363	TO 0.84337	0.83119	TO 0.84591	78000
52	0.83855	+ OR - 0.00251	0.83603	TO 0.84106	0.83352	TO 0.84357	0.83101	TO 0.84608	75500
57	0.83837	+ OR - 0.00258	0.83579	TO 0.84095	0.83321	TO 0.84352	0.83063	TO 0.84610	73000
62	0.83926	+ OR - 0.00261	0.83665	TO 0.84187	0.83404	TO 0.84448	0.83144	TO 0.84708	70500
67	0.83913	+ OR - 0.00268	0.83645	TO 0.84181	0.83377	TO 0.84449	0.83109	TO 0.84717	68000
72	0.83976	+ OR - 0.00276	0.83700	TO 0.84252	0.83424	TO 0.84527	0.83148	TO 0.84803	65500
77	0.83962	+ OR - 0.00286	0.83676	TO 0.84249	0.83390	TO 0.84535	0.83104	TO 0.84821	63000
82	0.83775	+ OR - 0.00281	0.83495	TO 0.84056	0.83214	TO 0.84336	0.82934	TO 0.84617	60500
87	0.83839	+ OR - 0.00288	0.83551	TO 0.84127	0.83263	TO 0.84416	0.82975	TO 0.84704	58000
92	0.83786	+ OR - 0.00294	0.83492	TO 0.84080	0.83197	TO 0.84374	0.82903	TO 0.84669	55500
97	0.83673	+ OR - 0.00292	0.83381	TO 0.83966	0.83088	TO 0.84258	0.82796	TO 0.84551	53000
102	0.83712	+ OR - 0.00302	0.83409	TO 0.84014	0.83107	TO 0.84317	0.82805	TO 0.84619	50500
107	0.83944	+ OR - 0.00295	0.83649	TO 0.84238	0.83354	TO 0.84533	0.83059	TO 0.84828	48000
112	0.83832	+ OR - 0.00304	0.83528	TO 0.84137	0.83223	TO 0.84441	0.82919	TO 0.84746	45500
117	0.83898	+ OR - 0.00306	0.83592	TO 0.84203	0.83286	TO 0.84509	0.82981	TO 0.84815	43000
122	0.83969	+ OR - 0.00314	0.83675	TO 0.84303	0.83361	TO 0.84617	0.83047	TO 0.84931	40500
127	0.84039	+ OR - 0.00325	0.83714	TO 0.84365	0.83389	TO 0.84690	0.83063	TO 0.85015	38000
132	0.84093	+ OR - 0.00339	0.83754	TO 0.84433	0.83415	TO 0.84772	0.83076	TO 0.85111	35500
137	0.84110	+ OR - 0.00361	0.83749	TO 0.84471	0.83389	TO 0.84831	0.83028	TO 0.85192	33000
142	0.84058	+ OR - 0.00380	0.83678	TO 0.84438	0.83297	TO 0.84818	0.82917	TO 0.85198	30500
147	0.84164	+ OR - 0.00397	0.83766	TO 0.84561	0.83369	TO 0.84958	0.82972	TO 0.85356	28000
152	0.84216	+ OR - 0.00396	0.83819	TO 0.84612	0.83423	TO 0.85008	0.83027	TO 0.85404	25500
157	0.84050	+ OR - 0.00417	0.83633	TO 0.84467	0.83216	TO 0.84883	0.82800	TO 0.85300	23000
162	0.83852	+ OR - 0.00429	0.83423	TO 0.84281	0.82995	TO 0.84709	0.82566	TO 0.85138	20500
167	0.83844	+ OR - 0.00482	0.83362	TO 0.84327	0.82879	TO 0.84809	0.82397	TO 0.85291	18000
172	0.84096	+ OR - 0.00484	0.83613	TO 0.84580	0.83129	TO 0.85063	0.82645	TO 0.85547	15500
177	0.84708	+ OR - 0.00474	0.84234	TO 0.85182	0.83760	TO 0.85657	0.83286	TO 0.86131	13000
182	0.84791	+ OR - 0.00492	0.84299	TO 0.85283	0.83807	TO 0.85775	0.83315	TO 0.86267	10500
187	0.84861	+ OR - 0.00532	0.84329	TO 0.85393	0.83797	TO 0.85924	0.83266	TO 0.86456	8000
192	0.84696	+ OR - 0.00535	0.84161	TO 0.85231	0.83626	TO 0.85766	0.83091	TO 0.86301	5500
197	0.84653	+ OR - 0.00644	0.84009	TO 0.85296	0.83366	TO 0.85940	0.82722	TO 0.86583	3000



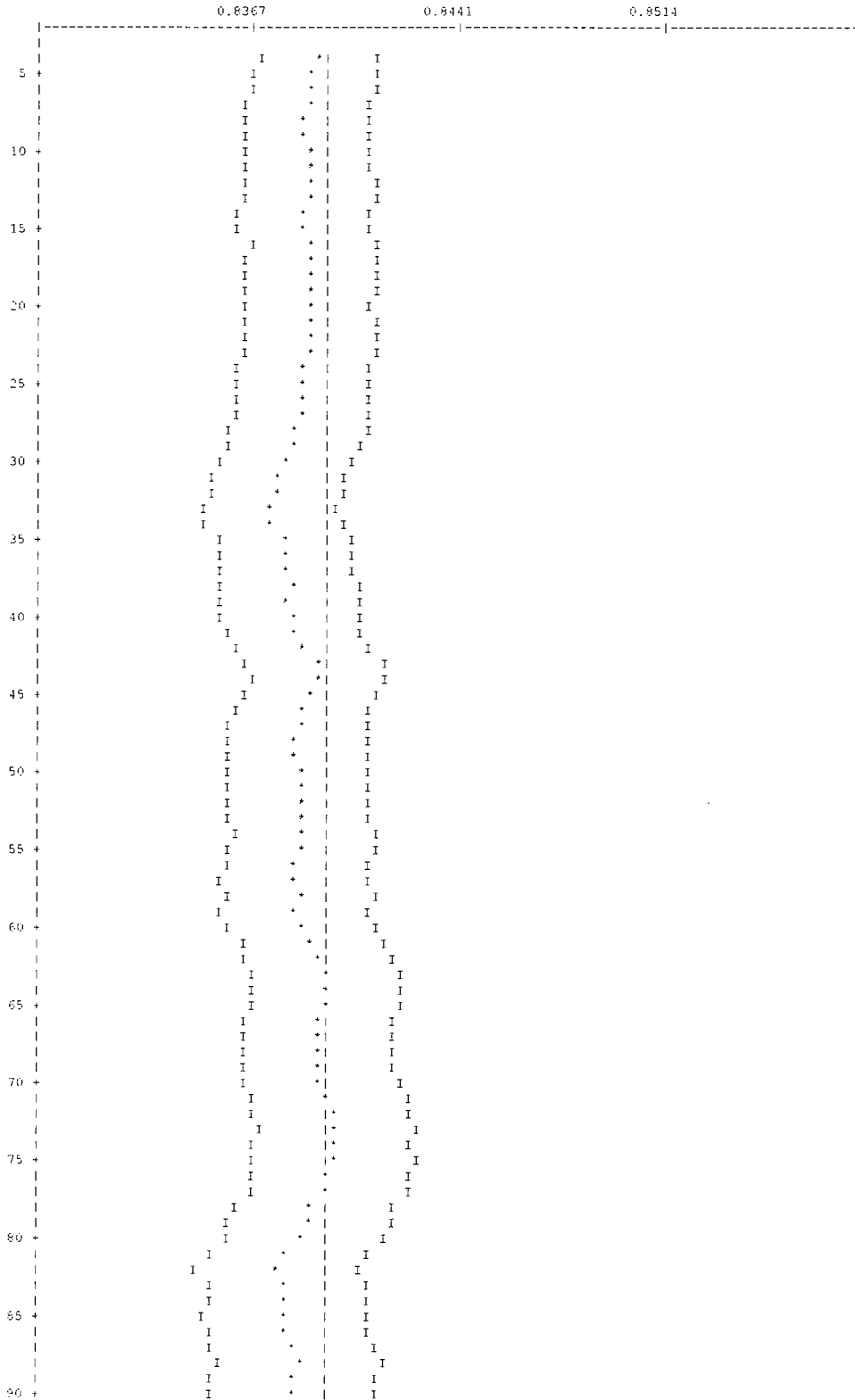


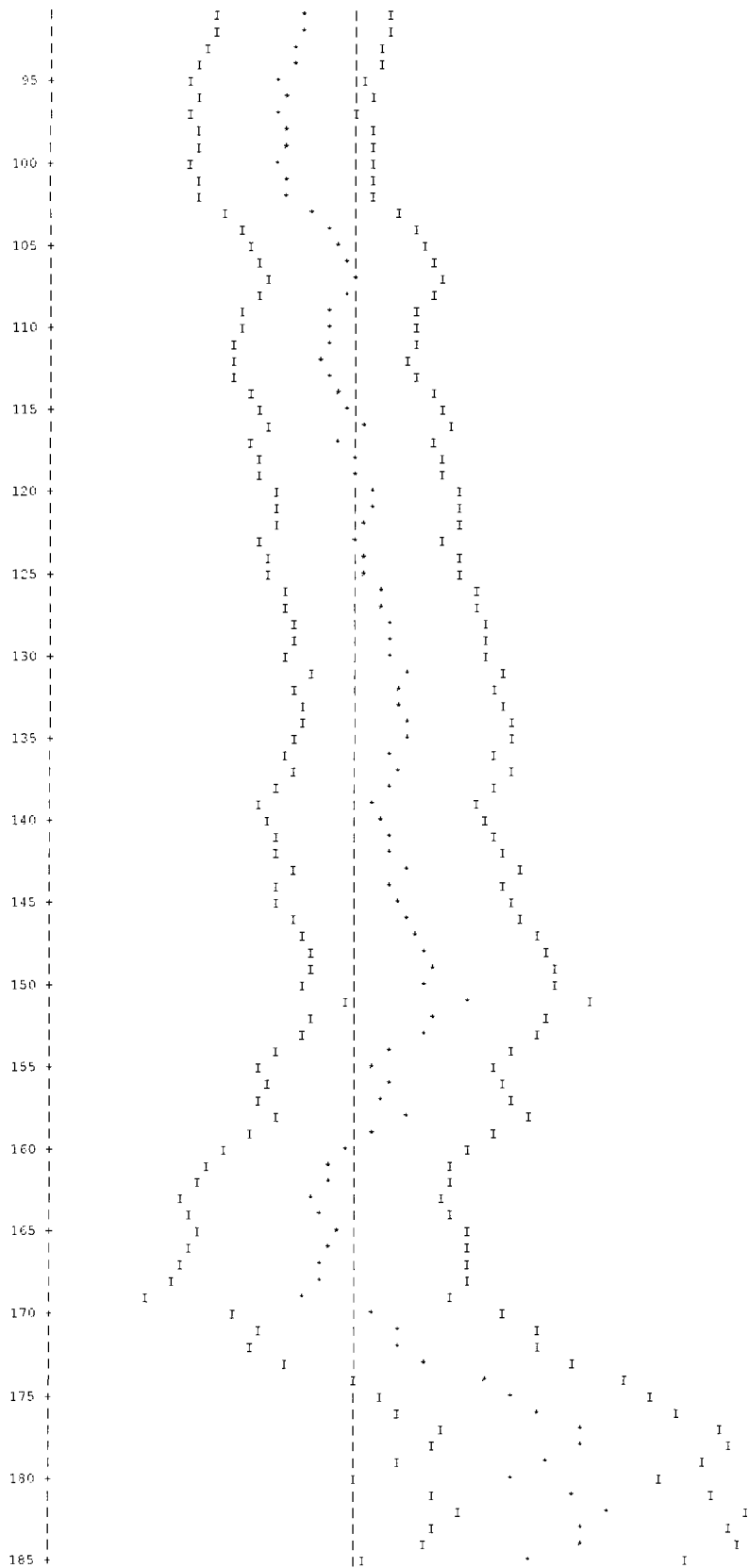
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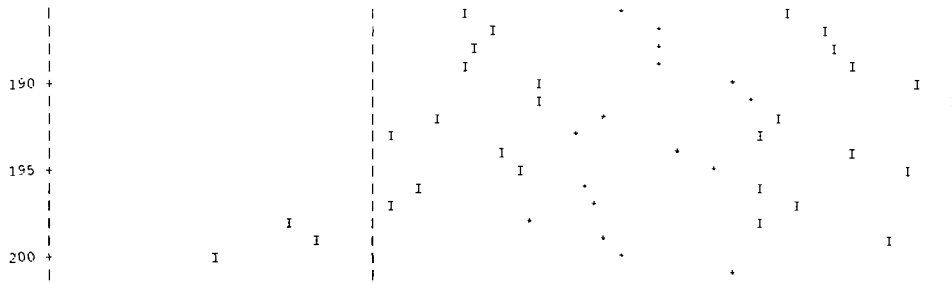
```
|          | I * I  
|          | I * I  
|          | I * I  
190 +     | I * I  
|          | I * I  
|          | I * I  
|          | I * I  
|          | I * I  
195 +     | I * I  
|          | I * I  
|          | I * I  
|          | I * I  
|          | I * I  
200 +     | I * I  
|          | I * I  
|          | I * I  
|          | I * I
```

TRIGA - PREF. FLOOD CANISTER

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS  $K\text{-EFF} = 0.8394 \pm 0R \pm 0.0022$  WHICH OCCURS FOR 3 GENERATIONS SKIPPED.







TRIGA - PREF. FLOOD CANISTER

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0003			2.73895E-04	4.0673	1.33450E-03	2.7746	0.00000E+00	0.0000
2	0.0014			1.19806E-03	1.2584	3.36609E-03	0.8709	0.00000E+00	0.0000
3	0.0020			1.68688E-03	1.1356	1.74259E-03	0.8807	0.00000E+00	0.0000
4	0.0012			1.03640E-03	1.3855	9.49928E-04	0.9596	0.00000E+00	0.0000
5	0.0020			1.67448E-03	0.9764	2.20159E-03	0.7697	0.00000E+00	0.0000
6	0.0032			2.70608E-03	0.8466	8.32387E-03	0.6833	0.00000E+00	0.0000
7	0.0043			3.59833E-03	0.7624	1.82469E-02	0.6440	0.00000E+00	0.0000
8	0.0045			3.73819E-03	0.6936	1.56090E-02	0.6137	0.00000E+00	0.0000
9	0.0060			5.06579E-03	0.6812	1.68395E-02	0.5936	0.00000E+00	0.0000
10	0.0130			1.09527E-02	0.7204	4.19924E-02	0.6180	0.00000E+00	0.0000
11	0.0272			2.28163E-02	0.7072	5.68060E-02	0.5808	0.00000E+00	0.0000
12	0.0348			2.92515E-02	0.6059	4.76650E-02	0.5639	0.00000E+00	0.0000
13	0.0312			2.61532E-02	0.5835	5.60739E-02	0.5881	0.00000E+00	0.0000
14	0.0247			2.07663E-02	0.6049	6.75119E-02	0.5850	0.00000E+00	0.0000
15	0.0046			3.89927E-03	0.8558	3.23231E-02	0.9958	0.00000E+00	0.0000
16	0.0031			2.58234E-03	1.0355	1.77169E-02	1.1768	0.00000E+00	0.0000
17	0.0047			3.93622E-03	1.4643	9.80442E-03	1.4171	0.00000E+00	0.0000
18	0.0061			5.16029E-03	1.3830	9.06051E-03	1.2102	0.00000E+00	0.0000
19	0.0072			6.04149E-03	1.1357	1.45015E-02	1.2141	0.00000E+00	0.0000
20	0.0286			2.40046E-02	0.7267	4.57621E-02	0.8699	0.00000E+00	0.0000
21	0.0149			1.24996E-02	1.1105	1.65394E-02	1.2351	0.00000E+00	0.0000
22	0.0333			2.79547E-02	0.7799	3.18266E-02	0.9733	0.00000E+00	0.0000
23	0.0999			8.38267E-02	0.4921	8.59767E-02	0.5467	0.00000E+00	0.0000
24	0.1837			1.54208E-01	0.4465	1.30478E-01	0.4240	0.00000E+00	0.0000
25	0.1591			1.33568E-01	0.4544	1.01666E-01	0.4660	0.00000E+00	0.0000
26	0.2107			1.76904E-01	0.4336	1.21586E-01	0.4318	0.00000E+00	0.0000
27	0.0881			7.39396E-02	0.6454	4.53166E-02	0.6511	0.00000E+00	0.0000
SYSTEM TOTAL =				8.39443E-01	0.2607	1.00122E+00	0.0876	0.00000E+00	0.0000

ELAPSED TIME 3.37233 MINUTES

PANDOM NUMBER= 1A4E60BC74A8

TRIGA - PREF. FLOOD CANISTER

```
FREQUENCY FOR GENERATIONS 4 TO 203
0.7524 TO 0.7703 ****
0.7703 TO 0.7882 *****
0.7882 TO 0.8061 *****
0.8061 TO 0.8240 *****
0.8240 TO 0.8419 *****
0.8419 TO 0.8598 *****
0.8598 TO 0.8777 *****
0.8777 TO 0.8956 *****
0.8956 TO 0.9134 *****
0.9134 TO 0.9313 **
```

```
FREQUENCY FOR GENERATIONS 54 TO 203
0.7524 TO 0.7703 **
0.7703 TO 0.7882 *****
0.7882 TO 0.8061 *****
0.8061 TO 0.8240 *****
0.8240 TO 0.8419 *****
0.8419 TO 0.8598 *****
0.8598 TO 0.8777 *****
0.8777 TO 0.8956 *****
0.8956 TO 0.9134 ***
0.9134 TO 0.9313 **
```

```
FREQUENCY FOR GENERATIONS 104 TO 203
0.7524 TO 0.7703 *
0.7703 TO 0.7882 ***
0.7882 TO 0.8061 *****
0.8061 TO 0.8240 *****
0.8240 TO 0.8419 *****
0.8419 TO 0.8598 *****
0.8598 TO 0.8777 *****
0.8777 TO 0.8956 *****
0.8956 TO 0.9134 ***
0.9134 TO 0.9313
```

```
FREQUENCY FOR GENERATIONS 154 TO 203
0.7524 TO 0.7703 *
0.7703 TO 0.7882 *
0.7882 TO 0.8061 **
0.8061 TO 0.8240 *****
0.8240 TO 0.8419 *****
0.8419 TO 0.8598 *****
0.8598 TO 0.8777 *****
0.8777 TO 0.8956 *****
0.8956 TO 0.9134 *
0.9134 TO 0.9313
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CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 3.37233 MINUTES



Figure 6.6-3 TRIGA Fuel Cluster Rods - Maximum Reactivity LEU Case

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PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
TRIGA - PREF. FLOOD CANISTER
* ACCIDENT CONDITION CASK APRAY - CASKS TOUCHING
* DAMAGED FUEL PAYLOAD - CANISTER FLOODED AT 0.9982 G/CM^3
* ROD GEOMETRY - DRY CASK MOST REACTIVE CONFIGURATION
* CASK CAVITY MODERATOR DENSITY 1E-20 GM^3
* CASK EXTERIOR MODERATOR DENSITY 1E-20 GM^3
27GROUPDEF4 MULT
*UNCANISTERED FUEL
U-235 1 0.0 1.7323E-03 END
U-238 1 0.0 6.8418E-03 END
ZR 1 0.0 2.9039E-02 END
H 1 0.0 4.9367E-02 END
*CLAD INCOLOY
NI 2 0.0 0.028516 END
FE 2 0.0 0.033820 END
CR 2 0.0 0.021151 END
C 2 0.0 0.000399 END
MN 2 0.0 0.001306 END
S 2 0.0 0.000022 END
SI 2 0.0 0.001703 END
CU 2 0.0 0.000560 END
AL 2 0.0 0.000266 END
TI 2 0.0 0.000150 END
*CASK INTERIOR MODERATOR MATERIAL
H2O 3 1.0E-20 293.0 END
*END FITTING FOR FUEL ELEMENT
SS304 4 0.4968 293.0 END
H2O 4 1.0E-20 293.0 END
*BASKET, AND CASK
SS304 5 1.0 293.0 END
*AL FUEL HOLDPEP
AL 6 1.0 293.0 END
*LEAD SHIELD
PB 7 1.0 293.0 END
*NEUTRON SHIELD
H2O 8 1.0E-20 293.0 END
*CASK EXTERNAL MATERIAL
H2O 9 1.0E-20 293.0 END
*MIXTURE (FUEL) FOR CANISTER
U-235 10 0.0 1.8119E-04 END
U-238 10 0.0 1.1105E-03 END
ZR 10 0.0 4.7136E-03 END
H 10 0.0 8.0131E-03 END
H2O 10 DEN=0.8362 1.0 300.0 END
*CANISTER INTERNAL MODERATOR
H2O 11 DEN=0.9982 1.0 293.0 END
* SECONDARY CASK CAVITY MATERIAL FOR MULTICELL CAPD
H2O 12 1.0E-20 293.0 END
END COMP
BUCKLED CYL WHITE REFLECTED 0.0 57.15 END
1 0.6731 2 0.7112 3 0.80518 6 0.9525 12 1.0748 END ZONE
TRIGA - PREF. FLOOD CANISTER
READ PARAM TME=170.0 GEN=403 NPG=1000 RUN=YES PLT=NO
TBA=2.0 END PARAM
READ GEOM
UNIT 1
COM='TRIGA FUEL (SMEARED) '
CYLINDER 10 1 3.9623 60.959 0.001
UNIT 5
COM='3.38 in Width / 0.28 in Thickness DIVIDER CENTER STACK (SEALED) '
CUBOID 5 1 2P4.2672 0.7112 0.0 +74.29 -8.255
UNIT 6
COM='3.38 in Width / 0.24 in Thickness DIVIDER OUTSIDE STACK (SEALED) '
CUBOID 5 1 2P4.2672 0.6096 0.0 +74.29 -8.255
UNIT 7
COM='SEALED CANISTER '
CYLINDER 11 1 3.9624 +60.96 0.0
HOLE 1 0.0 0.0 0.0
CYLINDER 5 1 4.1275 +63.50 -1.27
CYLINDER 3 1 4.1275 +74.29 -8.255
UNIT 10
COM='TRIGA ELEMENTS IN Top of 3.38 in x 3.38 in OPENING (SEALED) '
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 0.1397 0.0
UNIT 11
COM='TRIGA ELEMENTS IN Bottom of 3.38 in x 3.38 in OPENING (SEALED) '
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 -0.1397 0.0
UNIT 12
COM='TRIGA ELEMENTS IN Bottom Right of 3.38 in x 3.38 in OPENING (SEALED) '
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 +0.1397 -0.1397 0.0
UNIT 13
COM='TRIGA ELEMENTS IN Top Right of 3.38 in x 3.38 in OPENING (SEALED) '
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 +0.1397 +0.1397 0.0
UNIT 14
COM='TRIGA ELEMENTS IN Bottom Left of 3.38 in x 3.38 in OPENING (SEALED) '
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255

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HOLE 7 -0.1397 -0.1397 0.0
UNIT 15
COM='TRIGA ELEMENTS IN Top Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 -0.1397 +0.1397 0.0
UNIT 16
COM='TRIGA BASKET 3.38 in x 3.38 in CENTER OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
UNIT 20
COM='CENTER COLUMN OF THREE OPENINGS w/ 0.28 in plate (SEALED)'
ARRAY 1 -4.2672 -13.5128 -8.255
REPLICATE 5 1 4E0.7112 2R0.0 1
UNIT 21
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'
ARRAY 2 -4.2672 -8.8392 -8.255
REPLICATE 5 1 0.0 0.3048 2R0.3048 2R0.0 1
UNIT 22
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'
ARRAY 3 -4.2672 -8.8392 -8.255
REPLICATE 5 1 0.3048 0.0 2R0.3048 2R0.0 1
UNIT 30
COM='NAC-LWT TRIGA BASKET (SEALED)'
CYLINDER 3 1 17.1 +74.29 -8.255
HOLE 20 0.0 0.0 0.0
HOLE 21 -9.2457 0.0 0.0
HOLE 22 +9.2457 0.0 0.0
CYLINDER 5 1 18.9103 +74.93 -8.890
CYLINDER 7 1 33.4645 +74.93 -8.890
CYLINDER 5 1 36.5188 +74.93 -8.890
CYLINDER 6 1 49.2227 +74.93 -8.890
CYLINDER 5 1 49.8221 +74.93 -8.890
CUBOID 9 1 4P49.8221 +74.93 -8.890
' .....
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UNIT 41
COM='TRIGA FUEL ELEMENT'
CYLINDER 1 1 0.6731 2P28.575
CYLINDER 2 1 0.7112 2P28.575
CYLINDER 4 1 0.7112 43.48 -33.04
UNIT 45
COM='DIVIDER CENTER STACK'
CUBOID 5 1 2P4.2672 0.7112 0.0 43.48 -33.04
UNIT 46
COM='DIVIDER OUTSIDE STACK'
CUBOID 5 1 2P4.2672 0.6096 0.0 43.48 -33.04
UNIT 410
COM='TRIGA FUEL ELEMENTS IN AL TUBE, CENTERED'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0 0.0 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 411
COM='TRIGA FUEL ELEMENTS IN AL TUBE, RIGHT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0938 0.0 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 412
COM='TRIGA FUEL ELEMENTS IN AL TUBE, LEFT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 -0.0938 0.0 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 413
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0 0.0938 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 414
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0 -0.0938 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 415
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP RIGHT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0662 0.0662 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 416
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP LEFT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 -0.0662 0.0662 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 417
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM RIGHT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0662 -0.0662 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 418
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM LEFT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 -0.0662 -0.0662 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
' .....
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UNIT 420
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, CENTER OPENING'
CUBOID 3 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
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HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
HOLE      414   -0.9525  2.8576    0
HOLE      414    0.9525  2.8576    0
HOLE      418    2.8576  2.8576    0
CUBOID    3 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 421
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415   -2.8576 -2.8576    0
HOLE      413   -0.9525 -2.8576    0
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
HOLE      414   -0.9525  2.8576    0
HOLE      414    0.9525  2.8576    0
HOLE      418    2.8576  2.8576    0
CUBOID    3 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 422
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415   -2.8576 -2.8576    0
HOLE      413   -0.9525 -2.8576    0
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
HOLE      414   -0.9525  2.8576    0
HOLE      414    0.9525  2.8576    0
HOLE      418    2.8576  2.8576    0
CUBOID    3 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 423
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM LEFT OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415   -2.8576 -2.8576    0
HOLE      413   -0.9525 -2.8576    0
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
HOLE      414   -0.9525  2.8576    0
HOLE      414    0.9525  2.8576    0
HOLE      418    2.8576  2.8576    0
CUBOID    3 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 424
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP LEFT OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415   -2.8576 -2.8576    0
HOLE      413   -0.9525 -2.8576    0
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
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HOLE 414 -0.9525 2.8576 0
HOLE 414 0.9525 2.8576 0
HOLE 418 2.8576 2.8576 0
CUBOID 3 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE'
UNIT 425
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM RIGHT OPENING'
CUBOID 3 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
HOLE 413 0.9525 -2.8576 0
HOLE 416 2.8576 -2.8576 0
HOLE 411 -2.8576 -0.9525 0
HOLE 415 -0.9525 -0.9525 0
HOLE 416 0.9525 -0.9525 0
HOLE 412 2.8576 -0.9525 0
HOLE 411 -2.8576 0.9525 0
HOLE 417 -0.9525 0.9525 0
HOLE 418 0.9525 0.9525 0
HOLE 412 2.8576 0.9525 0
HOLE 417 -2.8576 2.8576 0
HOLE 414 -0.9525 2.8576 0
HOLE 414 0.9525 2.8576 0
HOLE 418 2.8576 2.8576 0
CUBOID 3 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE'
UNIT 426
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP RIGHT OPENING'
CUBOID 3 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
HOLE 413 0.9525 -2.8576 0
HOLE 416 2.8576 -2.8576 0
HOLE 411 -2.8576 -0.9525 0
HOLE 415 -0.9525 -0.9525 0
HOLE 416 0.9525 -0.9525 0
HOLE 412 2.8576 -0.9525 0
HOLE 411 -2.8576 0.9525 0
HOLE 417 -0.9525 0.9525 0
HOLE 418 0.9525 0.9525 0
HOLE 412 2.8576 0.9525 0
HOLE 417 -2.8576 2.8576 0
HOLE 414 -0.9525 2.8576 0
HOLE 414 0.9525 2.8576 0
HOLE 418 2.8576 2.8576 0
CUBOID 3 1 4P4.1529 43.48 -33.04
'
UNIT 430
COM='FUEL INSEPT IN, CENTER OPENING'
CUBOID 3 1 4P4.2672 43.48 -33.04
UNIT 431
COM='FUEL INSERT IN, BOTTOM OPENING'
CUBOID 3 1 4P4.2672 43.48 -33.04
HOLE 421 0.0 -0.1143 0.0
UNIT 432
COM='FUEL INSERT IN, TOP OPENING'
CUBOID 3 1 4P4.2672 43.48 -33.04
HOLE 422 0.0 0.1143 0.0
UNIT 433
COM='FUEL INSERT IN, BOTTOM LEFT OPENING'
CUBOID 3 1 4P4.2672 43.48 -33.04
HOLE 423 -0.1143 -0.1143 0.0
UNIT 434
COM='FUEL INSERT IN, TOP LEFT OPENING'
CUBOID 3 1 4P4.2672 43.48 -33.04
HOLE 424 -0.1143 0.1143 0.0
UNIT 435
COM='FUEL INSERT IN, BOTOM RIGHT OPENING'
CUBOID 3 1 4P4.2672 43.48 -33.04
HOLE 425 0.1143 -0.1143 0.0
UNIT 436
COM='FUEL INSEPT IN, TOP RIGHT OPENING'
CUBOID 3 1 4P4.2672 43.48 -33.04
HOLE 426 0.1143 0.1143 0.0
'
UNIT 440
COM='CENTER COLUMN OF THREE OPENINGS'
ARRAY 41 -4.2672 -13.5128 -33.04
REPLICATE 5 1 4R0.7112 2R0.0 1
UNIT 441
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 42 -4.2672 -8.8392 -33.04
REPLICATE 5 1 0.0 0.3408 2R0.3408 2R0.0 1
UNIT 442
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 43 -4.2672 -8.8392 -33.04
REPLICATE 5 1 0.3408 0.0 2R0.3408 2R0.0 1
UNIT 450
COM='96 TRIGA FUEL ELEMENTS IN EACH LWT BASKET'
CYLINDER 3 1 17.1560 43.485 -33.045
HOLE 440 0.0 0.0 0.0
HOLE 441 -9.2457 0.0 0.0
HOLE 442 +9.2457 0.0 0.0
CYLINDER 5 1 18.9193 43.485 -33.045
CYLINDER 7 1 33.4645 43.485 -33.045
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CYLINDER 5 1 36.5188 43.485 -33.045
CYLINDER 8 1 49.2227 43.485 -33.045
CYLINDER 5 1 49.8221 43.485 -33.045
CUBOID 9 1 4P49.8221 43.485 -33.045
' .....
UNIT 80
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 5 1 36.5188 2P14.1351
CYLINDER 9 1 49.8221 2P14.1351
CUBOID 9 1 4P49.8221 2P14.1351
UNIT 81
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 7 1 26.3525 2P3.81
CYLINDER 5 1 36.6188 +13.97 -12.7
CYLINDER 9 1 49.8221 +13.97 -12.7
CUBOID 9 1 4P49.8221 13.97 -12.7
GLOBAL UNIT 82
COM='STACK OF 5 BASKETS IN CASK'
ARRAY 20 -49.8221 -49.8221 -221.3
END GEOM
READ ARRAY
ARA=1 NUX=1 NUY=5 NUZ=1 FILL 10 5 16 5 11 END FILL
ARA=2 NUX=1 NUY=3 NUZ=1 FILL 13 6 12 END FILL
ARA=3 NUX=1 NUY=3 NUZ=1 FILL 15 6 14 END FILL
ARA=41 NUX=1 NUY=5 NUZ=1 FILL 432 45 430 45 431 END FILL
ARA=42 NUX=1 NUY=3 NUZ=1 FILL 436 46 435 END FILL
ARA=43 NUX=1 NUY=3 NUZ=1 FILL 434 46 433 END FILL
ARA=20 NUX=1 NUY=1 NUZ=7 FILL 81 30 3R450 30 80 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
READ START XSM=-17 XSP=17 YSM=-17 YSP=17 ZSM=-200 ZSP=200 END START
READ PLOT
TTL='X-Y PLOT OF CASK (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-50.0 YUL=50.0 ZUL=149.352
XLR=50.0 YLR=-50.0 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=149.352
XLR=17.2 YLR=-17.2 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CAVITY MID PLANE)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=0.0
XLR=17.2 YLR=-17.2 ZLR=0.0 END
TTL='X-Y PLOT OF CENTER OPENING (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=7.0 ZUL=149.352
XLR=7.0 YLR=-7.0 ZLR=149.352 END
TTL='X-Y PLOT OF PERIPHERAL OPENING (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=16.0 ZUL=149.352
XLR=7.0 YLR=4.0 ZLR=149.352 END
TTL='Y-Z PLOT OF BASKET (CENTER OF FUEL ELEMENTS,CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-14.0 ZUL=186.69
XLR=2.12 YLR=-4.5 ZLR=112.014 END
TTL='Y-Z PLOT OF BASKET (CASK)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-51 ZUL=220.0
XLR=2.12 YLR=+51 ZLR=-220.0
END PLOT
END DATA
```

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

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LIB 27GROUPNDF4 LIBRARY
MXX 12 MIXTURES
MSC 29 COMPOSITION SPECIFICATIONS
IZM 5 MATERIAL ZONES
GE MULTIREGION GEOMETRY
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLN 0 FUEL SOLUTIONS
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\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

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SC U-235 STANDARD COMPOSITION
MX 1 MIXTURE NO.
DEH 1.7323E-03 ATOMIC DENSITY
ROTH 1.0000 THEORETICAL DENSITY
NEL 1 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
92235 1.00 ATOM/MOLECULE
END
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SC U-238 STANDARD COMPOSITION
MX 1 MIXTURE NO.
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DEN 6.8418E-03 ATOMIC DENSITY  
ROTH 1.0000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
92238 1.00 ATOM/MOLECULE  
END

SC ZR STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
DEN 2.9039E-02 ATOMIC DENSITY  
ROTH 6.4900 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
40000 1.00 ATOM/MOLECULE  
END

SC H STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
DEN 4.9367E-02 ATOMIC DENSITY  
ROTH 1.0000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
1001 1.00 ATOM/MOLECULE

\*CLAD INCOLOY  
END

SC NI STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 2.8516E-02 ATOMIC DENSITY  
ROTH 8.9000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
28000 1.00 ATOM/MOLECULE  
END

SC FE STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 3.3820E-02 ATOMIC DENSITY  
ROTH 7.8600 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
26000 1.00 ATOM/MOLECULE  
END

SC CR STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 2.1151E-02 ATOMIC DENSITY  
ROTH 7.2000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
24000 1.00 ATOM/MOLECULE  
END

SC C STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 3.9900E-04 ATOMIC DENSITY  
ROTH 2.1000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
6012 1.00 ATOM/MOLECULE  
END

SC MN STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 1.3060E-03 ATOMIC DENSITY  
ROTH 7.2000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
25055 1.00 ATOM/MOLECULE  
END

SC S STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 2.2000E-05 ATOMIC DENSITY  
ROTH 2.0700 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
16000 1.00 ATOM/MOLECULE  
END

SC SI STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 1.7030E-03 ATOMIC DENSITY  
ROTH 2.3300 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
14000 1.00 ATOM/MOLECULE  
END

SC CU STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 5.6000E-04 ATOMIC DENSITY  
ROTH 8.9200 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS

```

ICP      1 0/1 MIXTURE/COMPOUND
          29000      1.00 ATOM/MOLECULE
END

SC AL      STANDARD COMPOSITION
MX      2 MIXTURE NO.
DEN      2.6600E-04 ATOMIC DENSITY
ROTH     2.7020 THEORETICAL DENSITY
NEL      1 NO. ELEMENTS
ICP      1 0/1 MIXTURE/COMPOUND
          13027      1.00 ATOM/MOLECULE
END

SC TI      STANDARD COMPOSITION
MX      2 MIXTURE NO.
DEN      1.5000E-04 ATOMIC DENSITY
ROTH     4.5000 THEORETICAL DENSITY
NEL      1 NO. ELEMENTS
ICP      1 0/1 MIXTURE/COMPOUND
          22000      1.00 ATOM/MOLECULE

'CASK INTERIOR MODERATOR MATERIAL
END

SC H2O     STANDARD COMPOSITION
MX      3 MIXTURE NO.
VF      0.0000 VOLUME FRACTION
ROTH     0.9982 THEORETICAL DENSITY
NEL      2 NO. ELEMENTS
ICP      1 0/1 MIXTURE/COMPOUND
TEMP     293.0 DEG KELVIN
          1001      2.00 ATOMS/MOLECULE
          8016      1.00 ATOM/MOLECULE

'END FITTING FOR FUEL ELEMENT
END

SC SS304   STANDARD COMPOSITION
MX      4 MIXTURE NO.
VF      0.4968 VOLUME FRACTION
ROTH     7.9200 THEORETICAL DENSITY
NEL      4 NO. ELEMENTS
ICP      0 0/1 MIXTURE/COMPOUND
TEMP     293.0 DEG KELVIN
          24304     19.000 WT%
          25055     2.000 WT%
          26304     69.500 WT%
          28304     9.500 WT%
END

SC H2O     STANDARD COMPOSITION
MX      4 MIXTURE NO.
VF      0.0000 VOLUME FRACTION
ROTH     0.9982 THEORETICAL DENSITY
NEL      2 NO. ELEMENTS
ICP      1 0/1 MIXTURE/COMPOUND
TEMP     293.0 DEG KELVIN
          1001      2.00 ATOMS/MOLECULE
          8016      1.00 ATOM/MOLECULE

'BASKET, AND CASK
END

SC SS304   STANDARD COMPOSITION
MX      5 MIXTURE NO.
VF      1.0000 VOLUME FRACTION
ROTH     7.9200 THEORETICAL DENSITY
NEL      4 NO. ELEMENTS
ICP      0 0/1 MIXTURE/COMPOUND
TEMP     293.0 DEG KELVIN
          24304     19.000 WT%
          25055     2.000 WT%
          26304     69.500 WT%
          28304     9.500 WT%

'AL FUEL HOLDER
END

SC AL      STANDARD COMPOSITION
MX      6 MIXTURE NO.
VF      1.0000 VOLUME FRACTION
ROTH     2.7020 THEORETICAL DENSITY
NEL      1 NO. ELEMENTS
ICP      1 0/1 MIXTURE/COMPOUND
TEMP     293.0 DEG KELVIN
          13027      1.00 ATOM/MOLECULE

'LEAD SHIELD
END

SC PB      STANDARD COMPOSITION
MX      7 MIXTURE NO.
VF      1.0000 VOLUME FRACTION
ROTH     11.3440 THEORETICAL DENSITY
NEL      1 NO. ELEMENTS

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ICP          1 0/1 MIXTURE/COMPOUND
TEMP         293.0 DEG KELVIN
            82000      1.00 ATOM/MOLECULE

'NEUTRON SHIELD
END

SC H2O          STANDARD COMPOSITION
MX            8 MIXTURE NO.
VF           0.0000 VOLUME FRACTION
ROTH         0.9992 THEORETICAL DENSITY
NEL          2 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP         293.0 DEG KELVIN
            1001      2.00 ATOMS/MOLECULE
            8016      1.00 ATOM/MOLECULE

'CASK EXTERNAL MATERIAL
END

SC H2O          STANDARD COMPOSITION
MX            9 MIXTURE NO.
VF           0.0000 VOLUME FRACTION
ROTH         0.9982 THEORETICAL DENSITY
NEL          2 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP         293.0 DEG KELVIN
            1001      2.00 ATOMS/MOLECULE
            8016      1.00 ATOM/MOLECULE

'MIXTURE (FUEL) FOR CANISTER
END

SC U-235        STANDARD COMPOSITION
MX            10 MIXTURE NO.
DEN          2.8119E-04 ATOMIC DENSITY
ROTH         1.0000 THEORETICAL DENSITY
NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
            92235      1.00 ATOM/MOLECULE
END

SC U-238        STANDARD COMPOSITION
MX            10 MIXTURE NO.
DEN          1.1105E-03 ATOMIC DENSITY
ROTH         1.0000 THEORETICAL DENSITY
NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
            92238      1.00 ATOM/MOLECULE
END

SC ZR           STANDARD COMPOSITION
MX            10 MIXTURE NO.
DEN          4.7136E-03 ATOMIC DENSITY
ROTH         6.4900 THEORETICAL DENSITY
NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
            40000      1.00 ATOM/MOLECULE
END

SC H            STANDARD COMPOSITION
MX            10 MIXTURE NO.
DEN          8.0131E-03 ATOMIC DENSITY
ROTH         1.0000 THEORETICAL DENSITY
NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
            1001      1.00 ATOM/MOLECULE
END

SC H2O          STANDARD COMPOSITION
MX            10 MIXTURE NO.
VF           1.0000 VOLUME FRACTION
ROTH         0.8362 SPECIFIED DENSITY
NEL          2 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP         300.0 DEG KELVIN
            1001      2.00 ATOMS/MOLECULE
            8016      1.00 ATOM/MOLECULE

'CANISTER INTERNAL MODERATOR
END

SC H2O          STANDARD COMPOSITION
MX            11 MIXTURE NO.
VF           1.0000 VOLUME FRACTION
ROTH         0.9982 SPECIFIED DENSITY
NEL          2 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP         293.0 DEG KELVIN
            1001      2.00 ATOMS/MOLECULE
            8016      1.00 ATOM/MOLECULE

'SECONDARY CASK CAVITY MATERIAL FOR MULTICELL CARD
END

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***                               TRIGA - PREF. FLOOD CANISTER                               ***
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***                               ***** NUMERIC PARAMETERS *****                               ***
***
***      TME      MAXIMUM PROBLEM TIME (MIN)                                170.00      ***
***
***      TBA      TIME PER GENERATION (MIN)                                2.00        ***
***
***      GEN      NUMBER OF GENERATIONS                                    403          ***
***
***      NPG      NUMBER PER GENERATION                                    1000         ***
***
***      NSK      NUMBER OF GENERATIONS TO BE SKIPPED                       3            ***
***
***      BEG      BEGINNING GENERATION NUMBER                               1            ***
***
***      RES      GENERATIONS BETWEEN CHECKPOINTS                           0            ***
***
***      X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS                        1            ***
***
***      NBK      NEUTRON BANK SIZE                                         1025         ***
***
***      XNB      EXTRA POSITIONS IN NEUTRON BANK                           0            ***
***
***      NFB      FISSION BANK SIZE                                         1000         ***
***
***      YFB      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                                    BB&27100001  ***
***
***      NBS      NUMBER OF D.A. BLOCKS ON UNIT 8                            200          ***
***
***      NLS      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           ***
***
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***                               TRIGA - PREF. FLOOD CANISTER                               ***
***                               ***** 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  YES ***
***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO          FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO        FMA PRINT FISSION 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            GAS PRINT FAR BY GROUP                     NO ***
***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS         NO            PAX PRINT XSEC-ALBEDO CORRELATION TABLES   NO ***
***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO            PWT PRINT WEIGHT AVERAGE ARRAY           NO ***
***
*** PKI PRINT FISSION SPECTRUM              NO            PGM PRINT INPUT GEOMETRY                 NO ***
***
*** P1D PRINT EXTRA 1-D CROSS SECTIONS       NO            BUG PRINT DEBUG INFORMATION              NO ***
***
***                                           TRK PRINT TRACKING INFORMATION           NO ***
***
.....
PARAMETER INPUT COMPLETED

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TRIGA - PREF. FLOOD CANISTER

MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD =3.0E-05

MIXTURE =	1	DENSITY(G/CC) =	7.8619						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE	TITLE			
08/12/94 1001001	4.93670E-02	1.05068E-02	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002			UPDATED
08/12/94 1040000	2.90390E-02	5.59490E-01	40000	91.2196	ZIRCONIUM	ENDF/B-IV MAT 7141			UPDATED
08/12/94 1092235	1.73230E-03	8.59993E-02	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261			UPDATED
08/12/94 1092238	6.84180E-03	3.44004E-01	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262			UPDATED
08/12/94									
MIXTURE =	2	DENSITY(G/CC) =	8.0325						
08/12/94 2006012	3.99000E-04	3.89820E-04	6000	12.0001	CARBON-12	ENDF/B-IV MAT 1274/THRM1065			UPDATED
08/12/94 2013027	2.66000E-04	1.48372E-03	13027	26.9818	AL-27 1193 218 GP	040375(5)			UPDATED
08/12/94 2014000	1.70300E-03	9.88763E-03	14000	28.0853	SILICON	ENDF/B-IV MAT 1194			UPDATED
06/12/94 2016000	2.20000E-05	1.45825E-04	16000	32.0634	SULFUR	LENDL MAT 7020			UPDATED
08/12/94 2022000	1.50000E-04	1.48470E-03	22000	47.8793	TITANIUM	ENDF/B-IV MAT 1286			UPDATED
08/12/94 2024000	2.11510E-02	2.27351E-01	24000	51.9957	CR 1191 218NGP WT 1/E P-3 293K	SIGP=5+4 RE(042375)			UPDATED
08/12/94 2025055	1.30600E-03	1.48325E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197			UPDATED
08/12/94 2026000	3.38200E-02	3.90441E-01	26000	55.8447	IRON	ENDF/B-IV MAT 1192			UPDATED
08/12/94 2028000	2.85160E-02	3.45964E-01	28000	58.6872	NI 1190 218NGP WT 1/E P-3 293K	SIGP=5+4 RE(042375)			UPDATED
08/12/94 2029000	5.60000E-04	7.42031E-03	29000	64.0966	COPPER	ENDF/B-IV MAT 1295			UPDATED
08/12/94									
MIXTURE =	3	DENSITY(G/CC) =	0.99817E-20						
08/12/94 3001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002			UPDATED

3008016 08/12/94	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE = NUCLIDE	4 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 3.9347 ZA	AWT	NUCLIDE TITLE		
4001001 08/12/94	6.67692E-22	2.83943E-22	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
4008016 08/12/94	3.33846E-22	2.25293E-21	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
4024304 08/12/94	8.65852E-03	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED
4025055 08/12/94	8.62609E-04	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED
4026304 08/12/94	2.94890E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED
4028304 08/12/94	3.83564E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED
MIXTURE = NUCLIDE	5 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 7.9200 ZA	AWT	NUCLIDE TITLE		
5024304 08/12/94	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED
5025055 08/12/94	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED
5026304 08/12/94	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED
5028304 08/12/94	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED
MIXTURE = NUCLIDE	6 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 2.7020 ZA	AWT	NUCLIDE TITLE		
6013027 08/12/94	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)		UPDATED
MIXTURE = NUCLIDE	7 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 11.344 ZA	AWT	NUCLIDE TITLE		
7082000 08/12/94	3.29690E-02	1.00000E+00	82000	207.2100	PB 1288 218RGP 042375 P-3 293K		UPDATED
MIXTURE = NUCLIDE	8 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 0.99817E-20 ZA	AWT	NUCLIDE TITLE		
8001001 08/12/94	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
8008016 08/12/94	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE = NUCLIDE	9 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 0.99817E-20 ZA	AWT	NUCLIDE TITLE		
9001001 08/12/94	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
9008016 08/12/94	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE = NUCLIDE	10 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 2.1123 ZA	AWT	NUCLIDE TITLE		
10001001 08/12/94	6.39462E-02	5.06550E-02	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
10008016 08/12/94	2.79665E-02	3.51554E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
10040000 08/12/94	4.71360E-03	3.38015E-01	40000	91.2196	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED
10092235 08/12/94	2.81190E-04	5.19571E-02	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED
10092238 08/12/94	1.11050E-03	2.07818E-01	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED
MIXTURE = NUCLIDE	11 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 0.99817 ZA	AWT	NUCLIDE TITLE		
11001001 08/12/94	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
11008016 08/12/94	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
MIXTURE = NUCLIDE	12 ATOM-DENS.	DENSITY(G/CC) WGT. FRAC.	= 0.99817E-20 ZA	AWT	NUCLIDE TITLE		
12001001 08/12/94	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
12008016 08/12/94	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
			1001001		HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
			3001001		HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 09/12/94
			4001001		HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 03/12/94
			8001001		HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
			9001001		HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
			10001001		HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
			11001001		HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
			12001001		HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
			2006012		CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94
			3008016		OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
			4008016		OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
			8008016		OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
			9008016		OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94

10098016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
11008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
12008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
2013027	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94
6013027	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94
2014000	SILICON	ENDF/B-IV MAT 1194	UPDATED 08/12/94
2016000	SULFUR LENDL MAT 7020		UPDATED 08/12/94
2022000	TITANIUM	ENDF/B-IV MAT 1286	UPDATED 08/12/94
2024000	CR 1191 218NGP WT 1/E P-3 293K SIGP=5+4 RE(042375)		UPDATED 08/12/94
4024304	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
5024304	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
2025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
4025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
5025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
2026000	IRON	ENDF/B-IV MAT 1192	UPDATED 08/12/94
4026304	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
5026304	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
2028000	NI 1190 218NGP WT 1/E P-3 293K SIGP=5+4 RE(042375)		UPDATED 08/12/94
4028304	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
5028304	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
2029000	COPPER	ENDF/B-IV MAT 1295	UPDATED 08/12/94
1040000	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94
10040000	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94
7082000	PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94
1092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
10092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
1092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94
10092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94

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***
***          TRIGA - PREF. FLOOD CANISTER
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***
***          ***** ADDITIONAL INFORMATION *****
***
*** NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          YES ***
***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1      GLOBAL ARRAY NUMBER          20 ***
***
*** NO. OF SCATTERING ANGLES IN XSECS   2      NUMBER OF UNITS IN THE GLOBAL X DIR.  1 ***
***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 26      NUMBER OF UNITS IN THE GLOBAL Y DIR.  1 ***
***
*** ENTRIES/NEUTRON IN THE FISSION BANK 19      NUMBER OF UNITS IN THE GLOBAL Z DIR.  7 ***
***
*** NUMBER OF MIXTURES USED             11      USE A GLOBAL REFLECTOR          YES ***
***
*** NUMBER OF BIAS ID'S USED            1      USE NESTED HOLES                YES ***
***
*** NUMBER OF DIFFERENTIAL ALBEDOS USED  0      NUMBER OF HOLES                 140 ***
***
*** TOTAL INPUT GEOMETRY REGIONS        91      MAXIMUM HOLE NESTING LEVEL       4 ***
***
*** NUMBER OF GEOMETRY REGIONS USED     87      USE NESTED ARRAYS                YES ***
***
*** LARGEST GEOMETRY UNIT NUMBER        450     NUMBER OF ARRAYS USED           7 ***
***
*** LARGEST ARRAY NUMBER                43      MAXIMUM ARRAY NESTING LEVEL      2 ***
***
***
*** +X BOUNDARY CONDITION                MIR     -X BOUNDARY CONDITION            MIR ***
***
*** +Y BOUNDARY CONDITION                MIR     -Y BOUNDARY CONDITION            MIR ***
***
*** +Z BOUNDARY CONDITION                MIR     -Z BOUNDARY CONDITION            MIR ***
***
.....

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.....  
**  
** APPAY      UNITS IN   UNITS IN   UNITS IN   HEATING  
** NUMBER     X DIR.     Y DIR.     Z DIR.     LEVEL   **  
**  
** 1          1          5          1          2      **  
**  
** 2          1          3          1          2      **  
**  
** 3          1          3          1          2      **  
**  
** 20 GLOBAL  1          1          7          1      **  
**  
** 41         1          5          1          2      **  
**  
** 42         1          3          1          2      **  
**  
** 43         1          3          1          2      **  
**  
.....
```

..... 0 IO'S WERE USED LOADING THE DATA .....

TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 1 -----								
TRIGA FUEL (SMEARED)								
1	CYLINDER	10 1	RADIUS = 3.9623	+Z = 60.959	-Z = 1.00000E-03	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
----- UNIT 5 -----								
3.38 IN WIDTH / 0.28 IN THICKNESS DIVIDER CENTER STACK (SEALED)								
1	CUBOID	5 1	+X = 4.2672	-X = -4.2672	+Y = 0.71120	-Y = 0.00000	+Z = 74.290	-Z = -8.2550
----- UNIT 6 -----								
3.38 IN WIDTH / 0.24 IN THICKNESS DIVIDER OUTSIDE STACK (SEALED)								
1	CUBOID	5 1	+X = 4.2672	-X = -4.2672	+Y = 0.60960	-Y = 0.00000	+Z = 74.290	-Z = -8.2550
----- UNIT 7 -----								
SEALED CANISTER								
1	CYLINDER	11 1	RADIUS = 3.9624	+Z = 60.960	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
	HOLE NUMBER	1	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1	
2	CYLINDER	5 1	RADIUS = 4.1275	+Z = 63.500	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3	CYLINDER	3 1	RADIUS = 4.1275	+Z = 74.290	-Z = -8.2550	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
----- UNIT 10 -----								
TRIGA ELEMENTS IN TOP OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1	CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
	HOLE NUMBER	2	AT X = 0.00000	Y = 0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 11 -----								
TRIGA ELEMENTS IN BOTTOM OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1	CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
	HOLE NUMBER	3	AT X = 0.00000	Y = -0.13970	Z = 0.00000	IS UNIT NUMBER	7	



TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 12 -----							
TRIGA ELEMENTS IN BOTTOM RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)							
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	4	AT X = 0.13970	Y = -0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 13 -----							
TRIGA ELEMENTS IN TOP RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)							
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	5	AT X = 0.13970	Y = 0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 14 -----							
TRIGA ELEMENTS IN BOTTOM LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)							
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	6	AT X = -0.13970	Y = -0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 15 -----							
TRIGA ELEMENTS IN TOP LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)							
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
HOLE NUMBER	7	AT X = -0.13970	Y = 0.13970	Z = 0.00000	IS UNIT NUMBER	7	
----- UNIT 16 -----							
TRIGA BASKET 3.38 IN X 3.38 IN CENTER OPENING (SEALED)							
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550
----- UNIT 20 EXTERNAL TO LATTICE 1 -----							
CENTER COLUMN OF THREE OPENINGS W/ 0.28 IN PLATE (SEALED)							
1 ARRAY NUMBER	1	+X = 4.2672	-X = -4.2672	+Y = 13.513	-Y = -13.513	+Z = 74.290	-Z = -8.2550
2 CUBOID	5 1	+X = 4.9784	-X = -4.9784	+Y = 14.224	-Y = -14.224	+Z = 74.290	-Z = -8.2550

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 21 EXTERNAL TO LATTICE 2 -----

LEFT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)

1 ARRAY NUMBER	2	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 74.290	-Z = -8.2550
2 CUBOID	5 1	+X = 4.2672	-X = -4.5720	+Y = 9.1440	-Y = -9.1440	+Z = 74.290	-Z = -8.2550

----- UNIT 22 EXTERNAL TO LATTICE 3 -----

RIGHT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)

1 ARRAY NUMBER	3	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 74.290	-Z = -8.2550
2 CUBOID	5 1	+X = 4.5720	-X = -4.2672	+Y = 9.1440	-Y = -9.1440	+Z = 74.290	-Z = -8.2550

----- UNIT 30 -----

NAC-LWT TRIGA BASKET (SEALED)

1 CYLINDER	3 1	RADIUS = 17.100	+Z = 74.290	-Z = -8.2550	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	8	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	20
HOLE NUMBER	9	AT X = -9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	21
HOLE NUMBER	10	AT X = 9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	22
2 CYLINDER	5 1	RADIUS = 18.910	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	7 1	RADIUS = 33.465	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4 CYLINDER	5 1	RADIUS = 36.519	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5 CYLINDER	8 1	RADIUS = 49.223	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000
6 CYLINDER	5 1	RADIUS = 49.822	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000
7 CUBOID	9 1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 74.930 -Z = -8.8900

----- UNIT 41 -----

TRIGA FUEL ELEMENT

1 CYLINDER	1 1	RADIUS = 0.67310	+Z = 28.575	-Z = -28.575	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2 CYLINDER	2 1	RADIUS = 0.71120	+Z = 28.575	-Z = -28.575	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	4 1	RADIUS = 0.71120	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 45 -----								
DIVIDER CENTER STACK								
1 CUBOID	5	1	+X = 4.2672	-X = -4.2672	+Y = 0.71120	-Y = 0.00000	+Z = 43.480	-Z = -33.040
----- UNIT 46 -----								
DIVIDER OUTSIDE STACK								
1 CUBOID	5	1	+X = 4.2672	-X = -4.2672	+Y = 0.60960	-Y = 0.00000	+Z = 43.480	-Z = -33.040
----- UNIT 80 -----								
SIMPLIFIED LID STRUCTURE NAC-LWT								
1 CYLINDER	5	1	RADIUS = 36.519	+Z = 14.135	-Z = -14.135	CENTERLINE IS AT X = 0.00000		Y = 0.00000
2 CYLINDER	9	1	RADIUS = 49.822	+Z = 14.135	-Z = -14.135	CENTERLINE IS AT X = 0.00000		Y = 0.00000
3 CUBOID	9	1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 14.135	-Z = -14.135
----- UNIT 81 -----								
SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT								
1 CYLINDER	7	1	RADIUS = 26.353	+Z = 3.8100	-Z = -3.8100	CENTERLINE IS AT X = 0.00000		Y = 0.00000
2 CYLINDER	5	1	RADIUS = 36.619	+Z = 13.970	-Z = -13.970	CENTERLINE IS AT X = 0.00000		Y = 0.00000
3 CYLINDER	9	1	RADIUS = 49.822	+Z = 13.970	-Z = -13.970	CENTERLINE IS AT X = 0.00000		Y = 0.00000
4 CUBOID	9	1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 13.970	-Z = -13.970
***** GLOBAL ***** ----- UNIT 82 EXTERNAL TO LATTICE 20 -----								
STACK OF 5 BASKETS IN CASK								
1 ARRAY NUMBER	20		+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 230.87	-Z = -221.30
----- UNIT 411 -----								
TRIGA FUEL ELEMENTS IN AL TUBE, RIGHT								
1 CYLINDER	3	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000		Y = 0.00000
HOLE NUMBER	12		AT X = 9.38000E-02	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 41		
2 CYLINDER	6	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000		Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 412 -----

TRIGA FUEL ELEMENTS IN AL TUBE, LEFT

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	13	AT X = -9.38000E-02	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 413 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	14	AT X = 0.00000	Y = 9.38000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 414 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	15	AT X = 0.00000	Y = -9.38000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 415 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP RIGHT

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	16	AT X = 6.62000E-02	Y = 6.62000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 416 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP LEFT

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	17	AT X = -6.62000E-02	Y = 6.62000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 417 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM RIGHT

1 CYLINDER	3	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	18		AT X = 6.62000E-02	Y = -6.62000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 418 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM LEFT

1 CYLINDER	3	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	19		AT X = -6.62000E-02	Y = -6.62000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 421 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	36		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	37		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	38		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	39		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	40		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	41		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	42		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	43		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	44		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	45		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	46		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	47		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	48		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	49		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	50		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	51		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	413	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 422 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	52		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	53		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	54		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	55		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	56		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	57		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	58		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	59		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	60		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	61		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	62		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	63		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	64		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	65		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	66		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	67		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 423 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM LEFT OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	68		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	69		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	70		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	71		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	72		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	73		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	74		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	75		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	76		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	77		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	78		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	79		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	80		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	81		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	82		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	83		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040



TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 424 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP LEFT OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	84		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	85		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	86		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	87		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	88		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	89		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	90		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	91		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	92		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	93		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	94		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	95		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	96		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	97		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	98		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	99		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 425 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM RIGHT OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	100		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	101		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBEP	102		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	103		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	104		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	105		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	106		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	107		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	108		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBEP	109		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	110		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	111		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBEP	112		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	113		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	114		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	115		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 426 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP RIGHT OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	116		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	117		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	118		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	119		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	120		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	121		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	122		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	123		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	124		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	125		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	126		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	127		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	128		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	129		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	130		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	131		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

----- UNIT 430 -----

FUEL INSERT IN, CENTER OPENING

1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
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----- UNIT 431 -----

FUEL INSERT IN, BOTTOM OPENING

1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	132		AT X = 0.00000	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	421	

TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 432 -----								
FUEL INSERT IN, TOP OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	133		AT X = 0.00000	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	422	
----- UNIT 433 -----								
FUEL INSERT IN, BOTTOM LEFT OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	134		AT X = -0.11430	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	423	
----- UNIT 434 -----								
FUEL INSERT IN, TOP LEFT OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	135		AT X = -0.11430	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	424	
----- UNIT 435 -----								
FUEL INSERT IN, BOTTOM RIGHT OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	136		AT X = 0.11430	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	425	
----- UNIT 436 -----								
FUEL INSERT IN, TOP RIGHT OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	137		AT X = 0.11430	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	426	
----- UNIT 440 EXTERNAL TO LATTICE 41 -----								
CENTER COLUMN OF THREE OPENINGS								
1 ARRAY NUMBER	41		+X = 4.2672	-X = -4.2672	+Y = 13.513	-Y = -13.513	+Z = 43.480	-Z = -33.040
2 CUBOID	5	1	+X = 4.9784	-X = -4.9784	+Y = 14.224	-Y = -14.224	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 441 EXTERNAL TO LATTICE 42 -----							
LEFT OUTSIDE COLUMN OF TWO OPENINGS							
1	ARRAY NUMBER 42	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 43.480	-Z = -33.040
2	CUBOID 5 1	+X = 4.2672	-X = -4.6080	+Y = 9.1800	-Y = -9.1800	+Z = 43.480	-Z = -33.040
----- UNIT 442 EXTERNAL TO LATTICE 43 -----							
RIGHT OUTSIDE COLUMN OF TWO OPENINGS							
1	ARRAY NUMBER 43	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 43.480	-Z = -33.040
2	CUBOID 5 1	+X = 4.6080	-X = -4.2672	+Y = 9.1800	-Y = -9.1800	+Z = 43.480	-Z = -33.040
----- UNIT 450 -----							
96 TRIGA FUEL ELEMENTS IN EACH LWT BASKET							
1	CYLINDER 3 1	RADIUS = 17.150	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
	HOLE NUMBER 138	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 440		
	HOLE NUMBER 139	AT X = -9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 441		
	HOLE NUMBER 140	AT X = 9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 442		
2	CYLINDER 5 1	RADIUS = 18.910	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3	CYLINDER 7 1	RADIUS = 33.465	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4	CYLINDER 5 1	RADIUS = 36.519	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
5	CYLINDER 8 1	RADIUS = 49.223	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
6	CYLINDER 5 1	RADIUS = 49.822	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
7	CUBOID 9 1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 43.485	-Z = -33.045

TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

11

5

16

5

10

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 2 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

12

6

13

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 3 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

14

6

15

TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 20 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

81

Z LAYER 2, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

30

Z LAYER 3, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450

Z LAYER 4, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450

Z LAYER 5, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450

Z LAYER 6, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

30

Z LAYER 7, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

80

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 41 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

431

45

430

45

432

TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 42 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

435

46

436

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 43 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

433

46

434





TRIGA - PREF. FLOOD CANISTER

GENERATION	ELAPSED TIME	AVERAGE	AVG K-EFF	MATRIX	MATRIX K-EFF
GENERATION K-EFFECTIVE	MINUTES	K-EFFECTIVE	DEVIATION	K-EFFECTIVE	DEVIATION
KENO MESSAGE NUMBER K5-132 1 8.07235E-01	WARNING... ONLY 1.38333E-02	908 INDEPENDENT 1.00000E+00	FISSION POINTS WERE 0.00000E+00	GENERATED 0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 2 8.67507E-01	WARNING... ONLY 1.83333E-02	937 INDEPENDENT 1.00000E+00	FISSION POINTS WERE 0.00000E+00	GENERATED 0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132 3 8.39890E-01	WARNING... ONLY 2.30000E-02	914 INDEPENDENT 8.39890E-01	FISSION POINTS WERE 0.00000E+00	GENERATED 0.00000E+00	0.00000E+00
4 8.46735E-01	2.75000E-02	8.43313E-01	3.42226E-03	0.00000E+00	0.00000E+00
5 8.51662E-01	3.21667E-02	8.46096E-01	3.41309E-03	0.00000E+00	0.00000E+00
6 8.38646E-01	3.66667E-02	8.44233E-01	3.04850E-03	0.00000E+00	0.00000E+00
7 8.34027E-01	4.13333E-02	8.42192E-01	3.12132E-03	0.00000E+00	0.00000E+00
8 8.40856E-01	4.58333E-02	8.41969E-01	2.55825E-03	0.00000E+00	0.00000E+00
9 8.61142E-01	5.03333E-02	8.44708E-01	3.48951E-03	0.00000E+00	0.00000E+00
10 8.85011E-01	5.50000E-02	8.49746E-01	5.87468E-03	0.00000E+00	0.00000E+00
11 8.82924E-01	5.86667E-02	8.53433E-01	6.35866E-03	0.00000E+00	0.00000E+00
12 8.41548E-01	6.31667E-02	8.52244E-01	5.81020E-03	0.00000E+00	0.00000E+00
13 8.04080E-01	6.86667E-02	8.47866E-01	6.84048E-03	0.00000E+00	0.00000E+00
14 8.09894E-01	7.33333E-02	8.44701E-01	7.00043E-03	0.00000E+00	0.00000E+00
15 8.95721E-01	7.78333E-02	8.48626E-01	7.54117E-03	0.00000E+00	0.00000E+00
16 8.65492E-01	8.15000E-02	8.49831E-01	7.08493E-03	0.00000E+00	0.00000E+00
17 8.45510E-01	8.70000E-02	8.49543E-01	6.60200E-03	0.00000E+00	0.00000E+00
18 8.28235E-01	9.16667E-02	8.48210E-01	6.31770E-03	0.00000E+00	0.00000E+00
19 8.75386E-01	9.61667E-02	8.49809E-01	6.14598E-03	0.00000E+00	0.00000E+00
20 8.53864E-01	1.00833E-01	8.50034E-01	5.79886E-03	0.00000E+00	0.00000E+00
21 8.80788E-01	1.05333E-01	8.51653E-01	5.71901E-03	0.00000E+00	0.00000E+00
22 8.32813E-01	1.09833E-01	8.50711E-01	5.50670E-03	0.00000E+00	0.00000E+00
23 8.76072E-01	1.14500E-01	8.51918E-01	5.37533E-03	0.00000E+00	0.00000E+00
24 8.22029E-01	1.19000E-01	8.50560E-01	5.30220E-03	0.00000E+00	0.00000E+00
25 8.58738E-01	1.23667E-01	8.50915E-01	5.07889E-03	0.00000E+00	0.00000E+00
26 8.24917E-01	1.28167E-01	8.49832E-01	4.98187E-03	0.00000E+00	0.00000E+00
27 8.16580E-01	1.32833E-01	8.48502E-01	4.96009E-03	0.00000E+00	0.00000E+00
28 8.62203E-01	1.37333E-01	8.49029E-01	4.79455E-03	0.00000E+00	0.00000E+00
29 8.42564E-01	1.42000E-01	8.48789E-01	4.61977E-03	0.00000E+00	0.00000E+00
30 8.65056E-01	1.46500E-01	8.49370E-01	4.48947E-03	0.00000E+00	0.00000E+00
31 8.34550E-01	1.51167E-01	8.48859E-01	4.36193E-03	0.00000E+00	0.00000E+00
32 8.32288E-01	1.55667E-01	8.48207E-01	4.25008E-03	0.00000E+00	0.00000E+00
33 8.36287E-01	1.60333E-01	8.47919E-01	4.12894E-03	0.00000E+00	0.00000E+00
34 8.39791E-01	1.64833E-01	8.47665E-01	4.00589E-03	0.00000E+00	0.00000E+00
35 8.46562E-01	1.69500E-01	8.47632E-01	3.88274E-03	0.00000E+00	0.00000E+00
36 8.51358E-01	1.74000E-01	8.47741E-01	3.76841E-03	0.00000E+00	0.00000E+00
37 8.26842E-01	1.78500E-01	8.47144E-01	3.70756E-03	0.00000E+00	0.00000E+00
38 8.42660E-01	1.83167E-01	8.47020E-01	3.60525E-03	0.00000E+00	0.00000E+00
39 8.48956E-01	1.87667E-01	8.47072E-01	3.50695E-03	0.00000E+00	0.00000E+00
40 8.30549E-01	1.92333E-01	8.46637E-01	3.44090E-03	0.00000E+00	0.00000E+00
41 8.23712E-01	1.96833E-01	8.46049E-01	3.40267E-03	0.00000E+00	0.00000E+00
42 8.43639E-01	2.01500E-01	8.45989E-01	3.31706E-03	0.00000E+00	0.00000E+00
43 8.15275E-01	2.06000E-01	8.45240E-01	3.32074E-03	0.00000E+00	0.00000E+00
44 8.30561E-01	2.11500E-01	8.44891E-01	3.25951E-03	0.00000E+00	0.00000E+00
45 8.43280E-01	2.16167E-01	8.44853E-01	3.18302E-03	0.00000E+00	0.00000E+00
46 8.88356E-01	2.20667E-01	8.45842E-01	3.26323E-03	0.00000E+00	0.00000E+00
47 8.75127E-01	2.25333E-01	8.46493E-01	3.25560E-03	0.00000E+00	0.00000E+00
48 8.70464E-01	2.29833E-01	8.47014E-01	3.22640E-03	0.00000E+00	0.00000E+00
49 9.04136E-01	2.34333E-01	8.48229E-01	3.38287E-03	0.00000E+00	0.00000E+00
50 8.22100E-01	2.39000E-01	8.47685E-01	3.35609E-03	0.00000E+00	0.00000E+00
51 8.68152E-01	2.43500E-01	8.48102E-01	3.31332E-03	0.00000E+00	0.00000E+00
52 8.91131E-01	2.47167E-01	8.48963E-01	3.35850E-03	0.00000E+00	0.00000E+00
53 8.33321E-01	2.52667E-01	8.48656E-01	3.30624E-03	0.00000E+00	0.00000E+00
54 8.40383E-01	2.57333E-01	8.48497E-01	3.24594E-03	0.00000E+00	0.00000E+00
55 8.83680E-01	2.61833E-01	8.49161E-01	3.25257E-03	0.00000E+00	0.00000E+00
56 8.48595E-01	2.66500E-01	8.49151E-01	3.19178E-03	0.00000E+00	0.00000E+00
57 8.57729E-01	2.71000E-01	8.49306E-01	3.13709E-03	0.00000E+00	0.00000E+00
58 8.16152E-01	2.75667E-01	8.48714E-01	3.13694E-03	0.00000E+00	0.00000E+00
59 8.44507E-01	2.79333E-01	8.48641E-01	3.08230E-03	0.00000E+00	0.00000E+00
60 8.69826E-01	2.84833E-01	8.49006E-01	3.05064E-03	0.00000E+00	0.00000E+00
347 8.53195E-01	1.61767E+00	8.48238E-01	1.16308E-03	0.00000E+00	0.00000E+00
348 8.41278E-01	1.62217E+00	8.48218E-01	1.15989E-03	0.00000E+00	0.00000E+00
349 8.61070E-01	1.62683E+00	8.48255E-01	1.15713E-03	0.00000E+00	0.00000E+00
350 8.56195E-01	1.63050E+00	8.48278E-01	1.15403E-03	0.00000E+00	0.00000E+00
351 8.52946E-01	1.63500E+00	8.48291E-01	1.15080E-03	0.00000E+00	0.00000E+00
352 8.67002E-01	1.63967E+00	8.48345E-01	1.14875E-03	0.00000E+00	0.00000E+00
353 8.44530E-01	1.64417E+00	8.48334E-01	1.14552E-03	0.00000E+00	0.00000E+00
354 8.46283E-01	1.64967E+00	8.48326E-01	1.14288E-03	0.00000E+00	0.00000E+00
355 8.43665E-01	1.65417E+00	8.48315E-01	1.13911E-03	0.00000E+00	0.00000E+00
356 8.65090E-01	1.65883E+00	8.48362E-01	1.13688E-03	0.00000E+00	0.00000E+00
357 8.67324E-01	1.66333E+00	8.48416E-01	1.13492E-03	0.00000E+00	0.00000E+00
358 8.26856E-01	1.66800E+00	8.48383E-01	1.13220E-03	0.00000E+00	0.00000E+00
359 8.55767E-01	1.67250E+00	8.48404E-01	1.12922E-03	0.00000E+00	0.00000E+00
360 8.15850E-01	1.67717E+00	8.48313E-01	1.12572E-03	0.00000E+00	0.00000E+00
361 8.28116E-01	1.68167E+00	8.48257E-01	1.12798E-03	0.00000E+00	0.00000E+00
362 8.36308E-01	1.68633E+00	8.48223E-01	1.12533E-03	0.00000E+00	0.00000E+00
363 8.40646E-01	1.69083E+00	8.48202E-01	1.12240E-03	0.00000E+00	0.00000E+00
364 8.13041E-01	1.69633E+00	8.48105E-01	1.12350E-03	0.00000E+00	0.00000E+00
365 8.12622E-01	1.70100E+00	8.48008E-01	1.12466E-03	0.00000E+00	0.00000E+00
366 8.81083E-01	1.70467E+00	8.48098E-01	1.12524E-03	0.00000E+00	0.00000E+00
367 8.86031E-01	1.70917E+00	8.48202E-01	1.12696E-03	0.00000E+00	0.00000E+00
368 8.97505E-01	1.71367E+00	8.48337E-01	1.13192E-03	0.00000E+00	0.00000E+00

369	8.26094E-01	1.71833E+00	8.48276E-01	1.13045E-03	0.00000E+00	0.00000E+00
370	8.32546E-01	1.72283E+00	8.48234E-01	1.12919E-03	0.00000E+00	0.00000E+00
371	8.54752E-01	1.72750E+00	8.48251E-01	1.12527E-03	0.00000E+00	0.00000E+00
372	8.49933E-01	1.73200E+00	8.48256E-01	1.12223E-03	0.00000E+00	0.00000E+00
373	8.72334E-01	1.73667E+00	8.48321E-01	1.12108E-03	0.00000E+00	0.00000E+00
374	8.29218E-01	1.74117E+00	8.48269E-01	1.11924E-03	0.00000E+00	0.00000E+00
375	8.03281E-01	1.74667E+00	8.48149E-01	1.12273E-03	0.00000E+00	0.00000E+00
376	8.34387E-01	1.75133E+00	8.48112E-01	1.12033E-03	0.00000E+00	0.00000E+00
377	8.40906E-01	1.75583E+00	8.48093E-01	1.11751E-03	0.00000E+00	0.00000E+00
378	8.40624E-01	1.76050E+00	8.48073E-01	1.11471E-03	0.00000E+00	0.00000E+00
379	8.40683E-01	1.76500E+00	8.48053E-01	1.11192E-03	0.00000E+00	0.00000E+00
380	8.59705E-01	1.76950E+00	8.48084E-01	1.10940E-03	0.00000E+00	0.00000E+00
381	8.66334E-01	1.77417E+00	8.48132E-01	1.10752E-03	0.00000E+00	0.00000E+00
382	8.64804E-01	1.77867E+00	8.48176E-01	1.10547E-03	0.00000E+00	0.00000E+00
383	8.34000E-01	1.78333E+00	8.48139E-01	1.10319E-03	0.00000E+00	0.00000E+00
384	8.87988E-01	1.78783E+00	8.48243E-01	1.10524E-03	0.00000E+00	0.00000E+00
385	8.51798E-01	1.79250E+00	8.48253E-01	1.10239E-03	0.00000E+00	0.00000E+00
386	8.85293E-01	1.79700E+00	8.48349E-01	1.10273E-03	0.00000E+00	0.00000E+00
387	8.45941E-01	1.80167E+00	8.48343E-01	1.10088E-03	0.00000E+00	0.00000E+00
388	8.67844E-01	1.80617E+00	8.48393E-01	1.09919E-03	0.00000E+00	0.00000E+00
389	8.40807E-01	1.81083E+00	8.48374E-01	1.09652E-03	0.00000E+00	0.00000E+00
390	8.51910E-01	1.81533E+00	8.48383E-01	1.09373E-03	0.00000E+00	0.00000E+00
391	8.57679E-01	1.82000E+00	8.48407E-01	1.09117E-03	0.00000E+00	0.00000E+00
392	8.56160E-01	1.82450E+00	8.48427E-01	1.08855E-03	0.00000E+00	0.00000E+00
393	8.90938E-01	1.82917E+00	8.48535E-01	1.09120E-03	0.00000E+00	0.00000E+00
394	7.97043E-01	1.83367E+00	8.48404E-01	1.09631E-03	0.00000E+00	0.00000E+00
395	8.77414E-01	1.83817E+00	8.48478E-01	1.09600E-03	0.00000E+00	0.00000E+00
396	8.73760E-01	1.84283E+00	8.48542E-01	1.09510E-03	0.00000E+00	0.00000E+00
397	8.81085E-01	1.84733E+00	8.48624E-01	1.09542E-03	0.00000E+00	0.00000E+00
398	8.69752E-01	1.85200E+00	8.48678E-01	1.09396E-03	0.00000E+00	0.00000E+00
399	8.74167E-01	1.85650E+00	8.48742E-01	1.09308E-03	0.00000E+00	0.00000E+00
400	8.40203E-01	1.86117E+00	8.48720E-01	1.09055E-03	0.00000E+00	0.00000E+00
401	8.12706E-01	1.86567E+00	8.48630E-01	1.09155E-03	0.00000E+00	0.00000E+00
402	8.68954E-01	1.87033E+00	8.48681E-01	1.09000E-03	0.00000E+00	0.00000E+00
403	8.54589E-01	1.87483E+00	8.48696E-01	1.08738E-03	0.00000E+00	0.00000E+00

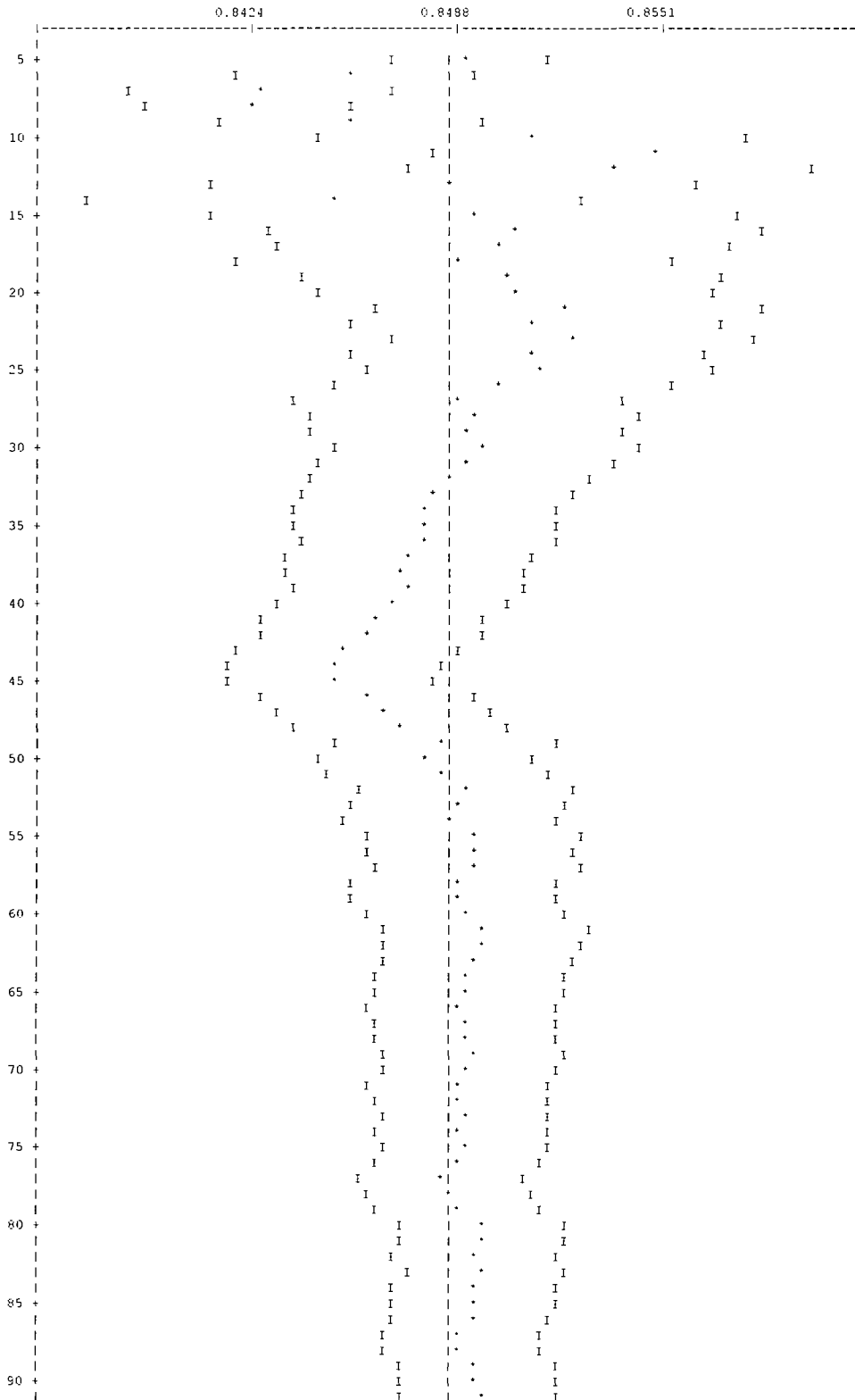
KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.



TRIGA - PREF. FLOOD CANISTER

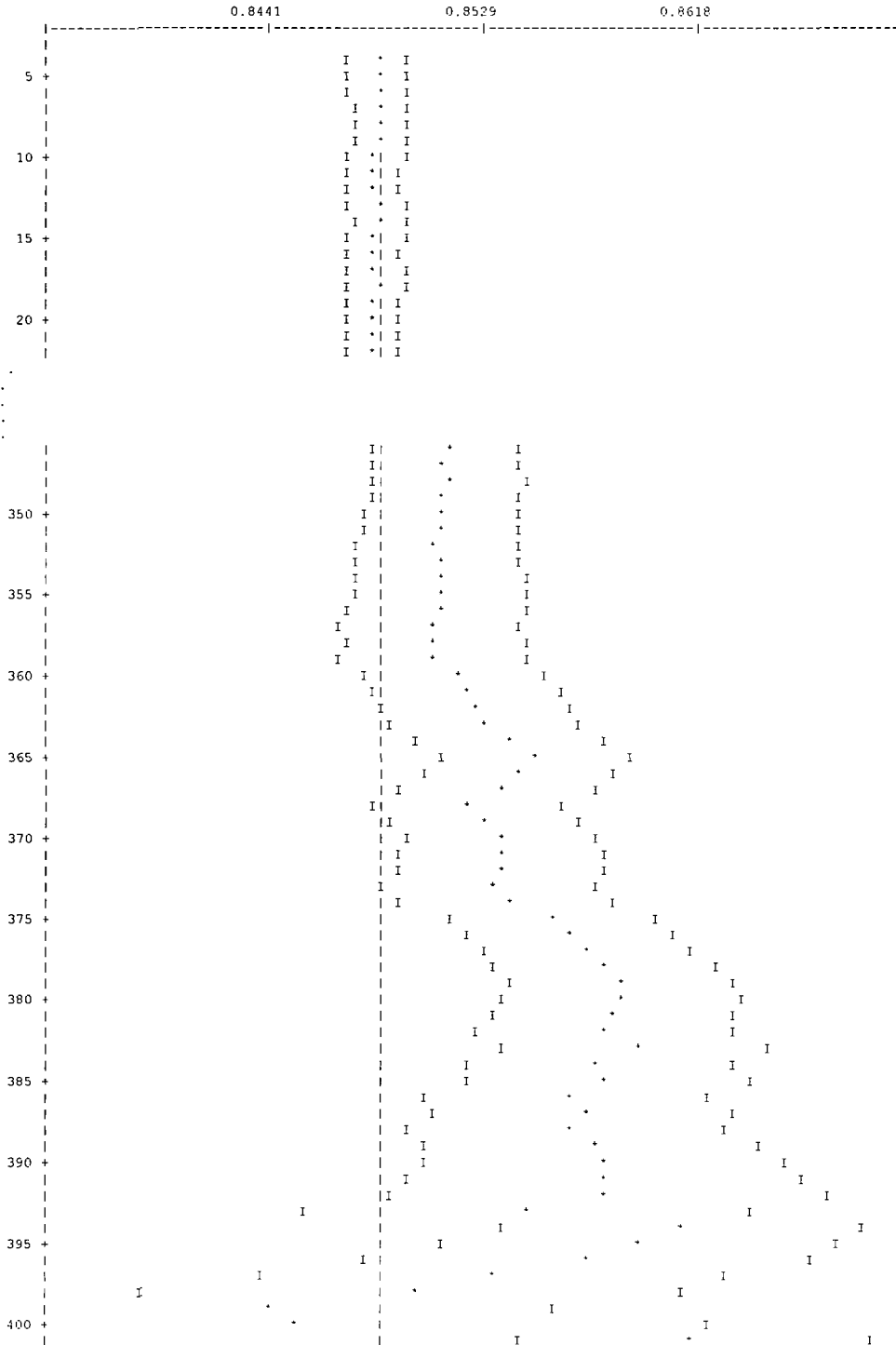
PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS  $K\text{-EFF} = 0.8487 \pm 0.0011$  WHICH OCCURS FOR 403 GENERATIONS RUN.





TRIGA - PREF. FLOOD CANISTER

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS  $K-EFF = 0.8487 \pm 0.0011$  WHICH OCCURS FOR 3 GENERATIONS SKIPPED.



TRIGA - PREF. FLOOD CANISTER									
GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	SKIPPING 3 GENERATIONS
									PERCENT DEVIATION
1	0.0011			9.11016E-04	2.0483	1.44722E-03	1.4308	0.00000E+00	0.0000
2	0.0049			4.13437E-03	0.6654	4.38445E-03	0.4784	0.00000E+00	0.0000
3	0.0060			5.10848E-03	0.5809	3.08989E-03	0.4698	0.00000E+00	0.0000
4	0.0031			2.59355E-03	0.6454	1.65717E-03	0.5041	0.00000E+00	0.0000
5	0.0027			2.27992E-03	0.5340	2.81194E-03	0.3798	0.00000E+00	0.0000
6	0.0041			3.45885E-03	0.4284	9.91625E-03	0.3262	0.00000E+00	0.0000
7	0.0055			4.70854E-03	0.3586	2.14216E-02	0.2862	0.00000E+00	0.0000
8	0.0057			4.82222E-03	0.3479	1.88953E-02	0.2953	0.00000E+00	0.0000
9	0.0075			6.38633E-03	0.3280	2.05390E-02	0.2566	0.00000E+00	0.0000
10	0.0162			1.37530E-02	0.3626	5.00036E-02	0.2732	0.00000E+00	0.0000
11	0.0324			2.75028E-02	0.3279	6.90049E-02	0.2278	0.00000E+00	0.0000
12	0.0397			3.36610E-02	0.3132	5.98571E-02	0.2109	0.00000E+00	0.0000
13	0.0340			2.88596E-02	0.2998	6.56003E-02	0.2109	0.00000E+00	0.0000
14	0.0256			2.16960E-02	0.2821	8.09273E-02	0.1985	0.00000E+00	0.0000
15	0.0053			4.46374E-03	0.3998	2.89047E-02	0.3705	0.00000E+00	0.0000
16	0.0035			2.94426E-03	0.4996	1.57641E-02	0.4189	0.00000E+00	0.0000
17	0.0052			4.40148E-03	0.7187	8.94175E-03	0.4698	0.00000E+00	0.0000
18	0.0068			5.74522E-03	0.6995	8.42296E-03	0.4837	0.00000E+00	0.0000
19	0.0082			6.98103E-03	0.5248	1.31466E-02	0.4587	0.00000E+00	0.0000
20	0.0323			2.73991E-02	0.3283	4.09554E-02	0.3806	0.00000E+00	0.0000
21	0.0164			1.39255E-02	0.4911	1.53079E-02	0.4510	0.00000E+00	0.0000
22	0.0366			3.10892E-02	0.3817	2.98264E-02	0.3818	0.00000E+00	0.0000
23	0.1058			8.97681E-02	0.2413	7.87515E-02	0.2410	0.00000E+00	0.0000
24	0.1783			1.51363E-01	0.2237	1.16485E-01	0.2203	0.00000E+00	0.0000
25	0.1479			1.25517E-01	0.2525	9.01161E-02	0.2404	0.00000E+00	0.0000
26	0.1886			1.60051E-01	0.2628	1.06558E-01	0.2549	0.00000E+00	0.0000
27	0.0768			6.51929E-02	0.3695	3.90816E-02	0.3829	0.00000E+00	0.0000
SYSTEM TOTAL =				8.48718E-01	0.1284	1.00182E+00	0.0457	0.00000E+00	0.0000
ELAPSED TIME 1.87483 MINUTES									
RANDOM NUMBER= 4CFD05CD34A0									



TRIGA - PREF. FLOOD CANISTER

```
FREQUENCY FOR GENERATIONS 4 TO 403
0.7929 TO 0.8010 ***
0.8010 TO 0.8091 *****
0.8091 TO 0.8172 *****
0.8172 TO 0.8253 *****
0.8253 TO 0.8334 *****
0.8334 TO 0.8415 *****
0.8415 TO 0.8496 *****
0.8496 TO 0.8577 *****
0.8577 TO 0.8658 *****
0.8658 TO 0.8739 *****
0.8739 TO 0.8820 *****
0.8820 TO 0.8901 *****
0.8901 TO 0.8982 *****
0.8982 TO 0.9063 *****
0.9063 TO 0.9144 *
```

```
FREQUENCY FOR GENERATIONS 104 TO 403
0.7929 TO 0.8010 ***
0.8010 TO 0.8091 *****
0.8091 TO 0.8172 *****
0.8172 TO 0.8253 *****
0.8253 TO 0.8334 *****
0.8334 TO 0.8415 *****
0.8415 TO 0.8496 *****
0.8496 TO 0.8577 *****
0.8577 TO 0.8658 *****
0.8658 TO 0.8739 *****
0.8739 TO 0.8820 *****
0.8820 TO 0.8901 *****
0.8901 TO 0.8982 *****
0.8982 TO 0.9063 *****
0.9063 TO 0.9144 **
```

```
FREQUENCY FOR GENERATIONS 204 TO 403
0.7929 TO 0.8010 ***
0.8010 TO 0.8091 *****
0.8091 TO 0.8172 *****
0.8172 TO 0.8253 *****
0.8253 TO 0.8334 *****
0.8334 TO 0.8415 *****
0.8415 TO 0.8496 *****
0.8496 TO 0.8577 *****
0.8577 TO 0.8658 *****
0.8658 TO 0.8739 *****
0.8739 TO 0.8820 *****
0.8820 TO 0.8901 *****
0.8901 TO 0.8982 *****
0.8982 TO 0.9063 *****
0.9063 TO 0.9144 **
```

TRIGA - PREF. FLOOD CANISTER

FREQUENCY FOR GENERATIONS 304 TO 403

0.7929 TO 0.8010     \*  
0.8010 TO 0.8091     \*\*  
0.8091 TO 0.8172     \*\*\*\*\*  
0.8172 TO 0.8253     \*\*\*  
0.8253 TO 0.8334     \*\*\*\*\*  
0.8334 TO 0.8415     \*\*\*\*\*  
0.8415 TO 0.8496     \*\*\*\*\*  
0.8496 TO 0.8577     \*\*\*\*\*  
0.8577 TO 0.8658     \*\*\*\*\*  
0.8658 TO 0.8739     \*\*\*\*\*  
0.8739 TO 0.8820     \*\*\*\*  
0.8820 TO 0.8901     \*\*\*\*  
0.8901 TO 0.8982     \*\*  
0.8982 TO 0.9063  
0.9063 TO 0.9144

Figure 6.6.6-4 TRIGA Fuel Cluster Rods – Maximum Reactivity HEU Case

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PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
TRIGA - PREF. FLOOD CANISTER
* ACCIDENT CONDITION CASK ARRAY - CASKS TOUCHING
* DAMGED FUEL PAYLOAD - CANISTER FLOODED AT 0.9982 G/CM^3
* ROD GEOMETRY - DRY CASK MOST REACTIVE CONFIGURATION
* CASK CAVITY MODERATOR DENSITY 1E-20 GM^3
* CASK EXTERIOR MODERATOR DENSITY 1E-20 GM^3
27GROUPNDF4 MULT
*UNCANISTERED FUEL
U-235 1 0.0 1.4646E-03 END
U-238 1 0.0 7.6111E-05 END
ZR 1 0.0 3.7145E-02 END
H 1 0.0 6.3147E-02 END
*CLAD INCOLOY
NI 2 0.0 0.028516 END
FE 2 0.0 0.033820 END
CR 2 0.0 0.021151 END
C 2 0.0 0.000399 END
MN 2 0.0 0.001306 END
S 2 0.0 0.000022 END
SI 2 0.0 0.001703 END
CU 2 0.0 0.000560 END
AL 2 0.0 0.000266 END
TI 2 0.0 0.000150 END
*CASK INTERIOR MODERATOR MATERIAL
H2O 3 1.0E-20 293.0 END
*END FITTING FOR FUEL ELEMENT
SS304 4 0.4968 293.0 END
H2O 4 1.0E-20 293.0 END
*BASKET, AND CASK
SS304 5 1.0 293.0 END
*AL FUEL HOLDER
AL 6 1.0 293.0 END
*LEAD SHIELD
PB 7 1.0 293.0 END
*NEUTRON SHIELD
H2O 8 1.0E-20 293.0 END
*CASK EXTERNAL MATERIAL
H2O 9 1.0E-20 293.0 END
*MIXTURE (FUEL) FOR CANISTER
U-235 10 0.0 2.3773E-04 END
U-238 10 0.0 1.2354E-05 END
ZR 10 0.0 6.0293E-03 END
H 10 0.0 1.0250E-02 END
H2O 10 DEN=0.8362 1.0 300.0 END
*CANISTER INTERNAL MODERATOR
H2O 11 DEN=0.9982 1.0 293.0 END
* SECONDARY CASK CAVITY MATERIAL FOR MULTICELL CARD
H2O 12 1.0E-20 293.0 END
END COMP
BUCKLEDCYL WHITE REFLECTED 0.0 57.15 END
1 0.6731 2 0.7112 3 0.80518 6 0.9525 12 1.0748 END ZONE
TRIGA - PREF. FLOOD CANISTER
READ PARAM TME=170.0 GEN=403 NPG=1000 RUN=YES PLT=NO
TBA=2.0 END PARAM
READ GEOM
UNIT 1
COM='TRIGA FUEL (SMEARED)'
CYLINDER 10 1 3.9623 60.959 0.001
UNIT 5
COM='3.38 in Width / 0.28 in Thickness DIVIDER CENTER STACK (SEALED)'
CUBOID 5 1 2P4.2672 0.7112 0.0 +74.29 -8.255
UNIT 6
COM='3.38 in Width / 0.24 in Thickness DIVIDER OUTSIDE STACK (SEALED)'
CUBOID 5 1 2P4.2672 0.6096 0.0 +74.29 -8.255
UNIT 7
COM='SEALED CANISTER'
CYLINDER 11 1 3.9624 +60.96 0.0
HOLE 1 0.0 0.0 0.0
CYLINDER 5 1 4.1275 +62.50 -1.27
CYLINDER 3 1 4.1275 +74.29 -8.255
UNIT 10
COM='TRIGA ELEMENTS IN Top of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 0.1397 0.0
UNIT 11
COM='TRIGA ELEMENTS IN Bottom of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 0.0 -0.1397 0.0
UNIT 12
COM='TRIGA ELEMENTS IN Bottom Right of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 +0.1397 -0.1397 0.0
UNIT 13
COM='TRIGA ELEMENTS IN Top Right of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 +0.1397 +0.1397 0.0
UNIT 14
COM='TRIGA ELEMENTS IN Bottom Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255

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HOLE 7 -0.1397 -0.1397 0.0
UNIT 15
COM='TRIGA ELEMENTS IN Top Left of 3.38 in x 3.38 in OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
HOLE 7 -0.1397 +0.1397 0.0
UNIT 16
COM='TRIGA BASKET 3.38 in x 3.38 in CENTER OPENING (SEALED)'
CUBOID 3 1 2P4.2672 2P4.2672 +74.29 -8.255
UNIT 20
COM='CENTER COLUMN OF THREE OPENINGS w/ 0.28 in plate (SEALED)'
ARRAY 1 -4.2672 -13.5128 -8.255
REPLICATE 5 1 4R0.7112 2R0.0 1
UNIT 21
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'
ARRAY 2 -4.2672 -8.8392 -8.255
REPLICATE 5 1 0.0 0.3048 2R0.3048 2R0.0 1
UNIT 22
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS w/ 0.12 in plate (SEALED)'
ARRAY 3 -4.2672 -8.8392 -8.255
REPLICATE 5 1 0.3048 0.0 2R0.3048 2R0.0 1
UNIT 30
COM='NAC-LWT TRIGA BASKET (SEALED)'
CYLINDER 3 1 17.1 +74.29 -8.255
HOLE 20 0.0 0.0 0.0
HOLE 21 -9.2457 0.0 0.0
HOLE 22 +9.2457 0.0 0.0
CYLINDER 5 1 18.9103 +74.93 -8.890
CYLINDER 7 1 33.4645 +74.93 -8.890
CYLINDER 5 1 36.5188 +74.93 -8.890
CYLINDER 8 1 49.2227 +74.93 -8.890
CYLINDER 5 1 49.8221 +74.93 -8.890
CUBOID 9 1 4P49.8221 +74.93 -8.890
' *****
UNIT 41
COM='TRIGA FUEL ELEMENT'
CYLINDER 1 1 0.6731 2P28.575
CYLINDER 2 1 0.7112 2P28.575
CYLINDER 4 1 0.7112 43.48 -33.04
UNIT 45
COM='DIVIDER CENTER STACK'
CUBOID 5 1 2P4.2672 0.7112 0.0 43.48 -33.04
UNIT 46
COM='DIVIDER OUTSIDE STACK'
CUBOID 5 1 2P4.2672 0.6096 0.0 43.48 -33.04
UNIT 410
COM='TRIGA FUEL ELEMENTS IN AL TUBE, CENTERED'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0 0.0 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 411
COM='TRIGA FUEL ELEMENTS IN AL TUBE, RIGHT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0938 0.0 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 412
COM='TRIGA FUEL ELEMENTS IN AL TUBE, LEFT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 -0.0938 0.0 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 413
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0 0.0938 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 414
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0 -0.0938 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 415
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP RIGHT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0662 0.0662 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 416
COM='TRIGA FUEL ELEMENTS IN AL TUBE, TOP LEFT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 -0.0662 0.0662 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 417
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM RIGHT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 0.0662 -0.0662 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
UNIT 418
COM='TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM LEFT'
CYLINDER 3 1 0.80518 43.48 -33.04
HOLE 41 -0.0662 -0.0662 0.0
CYLINDER 6 1 0.9525 43.48 -33.04
' *****
UNIT 420
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, CENTER OPENING'
CUBOID 3 1 4P4.1529 43.48 -33.04
HOLE 415 -2.8576 -2.8576 0
HOLE 413 -0.9525 -2.8576 0
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```
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
HOLE      414   -0.9525  2.8576    0
HOLE      414    0.9525  2.8576    0
HOLE      418    2.8576  2.8576    0
CUBOID    3 1 4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 421
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415   -2.8576 -2.8576    0
HOLE      413   -0.9525 -2.8576    0
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
HOLE      414   -0.9525  2.8576    0
HOLE      414    0.9525  2.8576    0
HOLE      418    2.8576  2.8576    0
CUBOID    3 1 4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 422
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415   -2.8576 -2.8576    0
HOLE      413   -0.9525 -2.8576    0
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
HOLE      414   -0.9525  2.8576    0
HOLE      414    0.9525  2.8576    0
HOLE      418    2.8576  2.8576    0
CUBOID    3 1 4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 423
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM LEFT OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415   -2.8576 -2.8576    0
HOLE      413   -0.9525 -2.8576    0
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
HOLE      414   -0.9525  2.8576    0
HOLE      414    0.9525  2.8576    0
HOLE      418    2.8576  2.8576    0
CUBOID    3 1 4P4.1529 43.48 -33.04
* CHECK 4.1 CM ABOVE*****
UNIT 424
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP LEFT OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415   -2.8576 -2.8576    0
HOLE      413   -0.9525 -2.8576    0
HOLE      413    0.9525 -2.8576    0
HOLE      416    2.8576 -2.8576    0
HOLE      411   -2.8576 -0.9525    0
HOLE      415   -0.9525 -0.9525    0
HOLE      416    0.9525 -0.9525    0
HOLE      412    2.8576 -0.9525    0
HOLE      411   -2.8576  0.9525    0
HOLE      417   -0.9525  0.9525    0
HOLE      418    0.9525  0.9525    0
HOLE      412    2.8576  0.9525    0
HOLE      417   -2.8576  2.8576    0
```

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HOLE      414  -0.9525  2.8576  0
HOLE      414   0.9525  2.8576  0
HOLE      418   2.8576  2.8576  0
CUBOID    3 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 425
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM RIGHT OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415  -2.8576 -2.8576  0
HOLE      413  -0.9525 -2.8576  0
HOLE      413   0.9525 -2.8576  0
HOLE      416   2.8576 -2.8576  0
HOLE      411  -2.8576 -0.9525  0
HOLE      415  -0.9525 -0.9525  0
HOLE      416   0.9525 -0.9525  0
HOLE      412   2.8576 -0.9525  0
HOLE      411  -2.8576  0.9525  0
HOLE      417  -0.9525  0.9525  0
HOLE      418   0.9525  0.9525  0
HOLE      412   2.8576  0.9525  0
HOLE      417  -2.8576  2.8576  0
HOLE      414  -0.9525  2.8576  0
HOLE      414   0.9525  2.8576  0
HOLE      418   2.8576  2.8576  0
CUBOID    3 1 4P4.1529 43.48 -33.04
' CHECK 4.1 CM ABOVE*****
UNIT 426
COM='AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP RIGHT OPENING'
CUBOID    3 1 4P4.1529 43.48 -33.04
HOLE      415  -2.8576 -2.8576  0
HOLE      413  -0.9525 -2.8576  0
HOLE      413   0.9525 -2.8576  0
HOLE      416   2.8576 -2.8576  0
HOLE      411  -2.8576 -0.9525  0
HOLE      415  -0.9525 -0.9525  0
HOLE      416   0.9525 -0.9525  0
HOLE      412   2.8576 -0.9525  0
HOLE      411  -2.8576  0.9525  0
HOLE      417  -0.9525  0.9525  0
HOLE      418   0.9525  0.9525  0
HOLE      412   2.8576  0.9525  0
HOLE      417  -2.8576  2.8576  0
HOLE      414  -0.9525  2.8576  0
HOLE      414   0.9525  2.8576  0
HOLE      418   2.8576  2.8576  0
CUBOID    3 1 4P4.1529 43.48 -33.04
' *****
UNIT 430
COM='FUEL INSERT IN, CENTER OPENING'
CUBOID    3 1 4P4.2672 43.48 -33.04
UNIT 431
COM='FUEL INSERT IN, BOTTOM OPENING'
CUBOID    3 1 4P4.2672 43.48 -33.04
HOLE 421  0.0 -0.1143 0.0
UNIT 432
COM='FUEL INSERT IN, TOP OPENING'
CUBOID    3 1 4P4.2672 43.48 -33.04
HOLE 422  0.0 0.1143 0.0
UNIT 433
COM='FUEL INSERT IN, BOTTOM LEFT OPENING'
CUBOID    3 1 4P4.2672 43.48 -33.04
HOLE 423 -0.1143 -0.1143 0.0
UNIT 434
COM='FUEL INSERT IN, TOP LEFT OPENING'
CUBOID    3 1 4P4.2672 43.48 -33.04
HOLE 424 -0.1143 0.1143 0.0
UNIT 435
COM='FUEL INSERT IN, BOTOM RIGHT OPENING'
CUBOID    3 1 4P4.2672 43.48 -33.04
HOLE 425  0.1143 -0.1143 0.0
UNIT 436
COM='FUEL INSERT IN, TOP RIGHT OPENING'
CUBOID    3 1 4P4.2672 43.48 -33.04
HOLE 426  0.1143 0.1143 0.0
' *****
UNIT 440
COM='CENTER COLUMN OF THREE OPENINGS'
ARRAY 41 -4.2672 -8.8392 -33.04
REPLICATE 5 1 4R0.7112 2R0.0 1
UNIT 441
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 42 -4.2672 -8.8392 -33.04
REPLICATE 5 1 0.0 0.3408 2R0.3408 2R0.0 1
UNIT 442
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 43 -4.2672 -8.8392 -33.04
REPLICATE 5 1 0.3408 0.0 2R0.3408 2R0.0 1
UNIT 450
COM='96 TRIGA FUEL ELEMENTS IN EACH LWT BASKET'
CYLINDER 3 1 17.1500 43.485 -33.045
HOLE 440  0.0 0.0 0.0
HOLE 441 -9.2457 0.0 0.0
HOLE 442  9.2457 0.0 0.0
CYLINDER 5 1 18.9103 43.485 -33.045
CYLINDER 7 1 33.4645 43.485 -33.045
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CYLINDER 5 1 36.5188 43.485 -33.045
CYLINDER 8 1 49.8227 43.485 -33.045
CYLINDER 5 1 49.8221 43.485 -33.045
CUBOID 9 1 4P49.8221 43.485 -33.045
.....
UNIT 80
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 5 1 36.5188 2P14.1351
CYLINDER 9 1 49.8221 2P14.1351
CUBOID 9 1 4P49.8221 2P14.1351
UNIT 81
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 7 1 26.3525 2P3.81
CYLINDER 5 1 36.6188 +13.97 -12.7
CYLINDER 9 1 49.8221 +13.97 -12.7
CUBOID 9 1 4P49.8221 13.97 -12.7
GLOBAL UNIT 82
COM='STACK OF 5 BASKETS IN CASK'
ARRAY 20 -49.8221 -49.8221 -221.3
END GEOM
READ ARRAY
ARA=1 NUX=1 NUY=5 NUZ=1 FILL 10 5 16 5 11 END FILL
ARA=2 NUX=1 NUY=3 NUZ=1 FILL 13 6 12 END FILL
ARA=3 NUX=1 NUY=3 NUZ=1 FILL 15 6 14 END FILL
ARA=41 NUX=1 NUY=5 NUZ=1 FILL 432 45 430 45 431 END FILL
ARA=42 NUX=1 NUY=3 NUZ=1 FILL 436 46 435 END FILL
ARA=43 NUX=1 NUY=3 NUZ=1 FILL 434 46 433 END FILL
ARA=20 NUX=1 NUY=1 NUZ=7 FILL 81 30 3R450 30 80 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
READ START XSM=-17 XSP=17 YSM=-17 YSP=17 ZSM=-200 ZSP=200 END START
READ PLOT
TTL='X-Y PLOT OF CASK (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-50.0 YUL=50.0 ZUL=149.352
XLR=50.0 YLR=-50.0 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=149.352
XLR=17.2 YLR=-17.2 ZLR=149.352 END
TTL='X-Y PLOT OF BASKET (CAVITY MID PLANE)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-17.2 YUL=17.2 ZUL=0.0
XLR=17.2 YLR=-17.2 ZLR=0.0 END
TTL='X-Y PLOT OF CENTER OPENING (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=7.0 ZUL=149.352
XLR=7.0 YLR=-7.0 ZLR=149.352 END
TTL='X-Y PLOT OF PERIPHERAL OPENING (CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=800
XUL=-7.0 YUL=16.0 ZUL=149.352
XLR=7.0 YLR=4.0 ZLR=149.352 END
TTL='Y-Z PLOT OF BASKET (CENTER OF FUEL ELEMENTS,CANISTER ELEVATION)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-14.0 ZUL=186.69
XLR=2.12 YLR=-4.5 ZLR=112.014 END
TTL='Y-Z PLOT OF BASKET (CASK)'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=800
XUL=2.12 YUL=-51 ZUL=220.0
XLR=2.12 YLR=+51 ZLR=-220.0
END PLOT
END DATA
```

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

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LIB 27GROUPPDF4 LIBRARY
MXX 12 MIXTURES
MSC 29 COMPOSITION SPECIFICATIONS
IZM 5 MATERIAL ZONES
GE MULTIREGION GEOMETRY
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLN 0 FUEL SOLUTIONS
```

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

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SC U-235 STANDARD COMPOSITION
MX 1 MIXTURE NO.
DEN 1.4646E-03 ATOMIC DENSITY
ROTH 1.0000 THEORETICAL DENSITY
NEL 1 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
92235 1.00 ATOM/MOLECULE
END
SC U-238 STANDARD COMPOSITION
```

MX 1 MIXTURE NO.  
DEN 7.6111E-05 ATOMIC DENSITY  
ROTH 1.0000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
92238 1.00 ATOM/MOLECULE  
END

SC ZR STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
DEN 3.7145E-02 ATOMIC DENSITY  
ROTH 6.4900 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
40000 1.00 ATOM/MOLECULE  
END

SC H STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
DEN 6.3147E-02 ATOMIC DENSITY  
ROTH 1.0000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
1001 1.00 ATOM/MOLECULE

'CLAD INCOLOY  
END

SC NI STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 2.8516E-02 ATOMIC DENSITY  
ROTH 8.9000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
28000 1.00 ATOM/MOLECULE  
END

SC FE STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 3.3820E-02 ATOMIC DENSITY  
ROTH 7.8600 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
26000 1.00 ATOM/MOLECULE  
END

SC CR STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 2.1151E-02 ATOMIC DENSITY  
ROTH 7.2000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
24000 1.00 ATOM/MOLECULE  
END

SC C STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 3.9900E-04 ATOMIC DENSITY  
ROTH 2.1000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
6012 1.00 ATOM/MOLECULE  
END

SC MN STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 1.3060E-03 ATOMIC DENSITY  
ROTH 7.2000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
25055 1.00 ATOM/MOLECULE  
END

SC S STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 2.2000E-05 ATOMIC DENSITY  
ROTH 2.0700 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
16000 1.00 ATOM/MOLECULE  
END

SC SI STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 1.7030E-03 ATOMIC DENSITY  
ROTH 2.3300 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
14000 1.00 ATOM/MOLECULE  
END

SC CU STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 5.6000E-04 ATOMIC DENSITY  
ROTH 8.9200 THEORETICAL DENSITY



NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
29000 1.00 ATOM/MOLECULE  
END

SC AL STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 2.6600E-04 ATOMIC DENSITY  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
13027 1.00 ATOM/MOLECULE  
END

SC TI STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
DEN 1.5000E-04 ATOMIC DENSITY  
ROTH 4.5000 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
22000 1.00 ATOM/MOLECULE

'CASK INTERIOR MODERATOR MATERIAL  
END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

'END FITTING FOR FUEL ELEMENT  
END

SC SS304 STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 0.4968 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%  
END

SC H2O STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

'BASKET, AND CASK  
END

SC SS304 STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

'AL FUEL HOLDER  
END

SC AL STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

'LEAD SHIELD  
END

SC PB STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY

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NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
           82000          1.00 ATOM/MOLECULE

'NEUTRON SHIELD
END

SC H2O          STANDARD COMPOSITION
MX            8 MIXTURE NO.
VF          0.0000 VOLUME FRACTION
ROTH        0.9982 THEORETICAL DENSITY
NEL          2 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
           1001          2.00 ATOMS/MOLECULE
           8016          1.00 ATOM/MOLECULE

'CASK EXTERNAL MATERIAL
END

SC H2O          STANDARD COMPOSITION
MX            9 MIXTURE NO.
VF          0.0000 VOLUME FRACTION
ROTH        0.9982 THEORETICAL DENSITY
NEL          2 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
           1001          2.00 ATOMS/MOLECULE
           8016          1.00 ATOM/MOLECULE

'MIXTURE (FUEL) FOR CANISTER
END

SC U-235        STANDARD COMPOSITION
MX            10 MIXTURE NO.
DEN         2.3773E-04 ATOMIC DENSITY
ROTH        1.0000 THEORETICAL DENSITY
NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
           92235          1.00 ATOM/MOLECULE
END

SC U-238        STANDARD COMPOSITION
MX            10 MIXTURE NO.
DEN         1.2354E-05 ATOMIC DENSITY
ROTH        1.0000 THEORETICAL DENSITY
NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
           92238          1.00 ATOM/MOLECULE
END

SC ZR           STANDARD COMPOSITION
MX            10 MIXTURE NO.
DEN         6.0293E-03 ATOMIC DENSITY
ROTH        6.4900 THEORETICAL DENSITY
NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
           40000          1.00 ATOM/MOLECULE
END

SC H            STANDARD COMPOSITION
MX            10 MIXTURE NO.
DEN         1.0250E-02 ATOMIC DENSITY
ROTH        1.0000 THEORETICAL DENSITY
NEL          1 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
           1001          1.00 ATOM/MOLECULE
END

SC H2O          STANDARD COMPOSITION
MX            10 MIXTURE NO.
VF          1.0000 VOLUME FRACTION
ROTH        0.8362 SPECIFIED DENSITY
NEL          2 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP        300.0 DEG KELVIN
           1001          2.00 ATOMS/MOLECULE
           8016          1.00 ATOM/MOLECULE

'CANISTER INTERNAL MODERATOR
END

SC H2O          STANDARD COMPOSITION
MX            11 MIXTURE NO.
VF          1.0000 VOLUME FRACTION
ROTH        0.9982 SPECIFIED DENSITY
NEL          2 NO. ELEMENTS
ICP          1 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
           1001          2.00 ATOMS/MOLECULE
           8016          1.00 ATOM/MOLECULE

' SECONDARY CASK CAVITY MATERIAL FOR MULTICELL CARD
END
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***                               TRIGA - PREF. FLOOD CANISTER                               ***
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***                               ***** NUMERIC PARAMETERS *****                               ***
***
***      TME      MAXIMUM PROBLEM TIME (MIN)                               170.00      ***
***
***      TBA      TIME PER GENERATION (MIN)                               2.00      ***
***
***      GEN      NUMBER OF GENERATIONS                               403      ***
***
***      NPG      NUMBER PER GENERATION                               1000      ***
***
***      NSK      NUMBER OF GENERATIONS TO BE SKIPPED                               3      ***
***
***      BEG      BEGINNING GENERATION NUMBER                               1      ***
***
***      RES      GENERATIONS BETWEEN CHECKPOINTS                               0      ***
***
***      X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS                               1      ***
***
***      NEK      NEUTRON BANK SIZE                               1025      ***
***
***      XNB      EXTRA POSITIONS IN NEUTRON BANK                               0      ***
***
***      NFB      FISSION BANK SIZE                               1000      ***
***
***      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                               BB827100001      ***
***
***      NBS      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      ***
.....

```

```

.....
***
*** TRIGA - PREF. FLOOD CANISTER
***
***** LOGICAL PARAMETERS *****
***
*** RUH EXECUTE PROBLEM AFTER CHECKING DATA YES PLT PLOT PICTUPE 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 YES ***
***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO ***
***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***
***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO PWT PRINT WEIGHT AVERAGE ARRAY NO ***
***
*** PKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO ***
***
*** P1D PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO ***
***
*** TRK PRINT TRACKING INFORMATION NO ***
***
.....
PARAMETER INPUT COMPLETED

```

..... 0 10'S WERE USED READING THE PARAMETER DATA .....

TRIGA - PREF. FLOOD CANISTER

MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD = 3.0E-05

MIXTURE =	1	DENSITY (G/CC) = 6.3339				NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
08/12/94 1001001	6.31470E-02	1.66819E-02	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002 UPDATED	
08/12/94 1040000	3.71450E-02	8.88318E-01	40000	91.2196	ZIRCONIUM	ENDF/B-IV MAT 7141 UPDATED	
08/12/94 1092235	1.46460E-03	9.02502E-02	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261 UPDATED	
08/12/94 1092238	7.61110E-05	4.75004E-03	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262 UPDATED	
08/12/94 2006012	3.99000E-04	9.89820E-04	6000	12.0001	CARBON-12	ENDF/B-IV MAT 1274/THRM1065 UPDATED	
08/12/94 2013027	2.66000E-04	1.48372E-03	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED	
08/12/94 2014000	1.70300E-03	9.98763E-03	14000	28.0853	SILICON	ENDF/B-IV MAT 1194 UPDATED	
08/12/94 2016000	2.20000E-05	1.45825E-04	16000	32.0634	SULFUR LENDL MAT 7020	UPDATED	
08/12/94 2022000	1.50000E-04	1.48470E-03	22000	47.8793	TITANIUM	ENDF/B-IV MAT 1286 UPDATED	
08/12/94 2024000	2.11510E-02	2.27351E-01	24000	51.9957	CR 1191 218NGP WT 1/E P-3 293K SIGP=5+4 RE(042375)	UPDATED	
08/12/94 2025055	1.30600E-03	1.48325E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197 UPDATED	
08/12/94 2026000	3.38200E-02	3.90441E-01	26000	55.8447	IRON	ENDF/B-IV MAT 1192 UPDATED	
08/12/94 2028000	2.85160E-02	3.45964E-01	28000	58.6872	NI 1190 218NGP WT 1/E P-3 293K SIGP=5+4 RE(042375)	UPDATED	
08/12/94 2029000	5.60000E-04	7.42031E-03	29000	64.0966	COPPER	ENDF/B-IV MAT 1295 UPDATED	
MIXTURE =	3	DENSITY (G/CC) = 0.99817E-20					

NAC-LWT Cask SAR  
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NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
3001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94						UPDATED
3008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94						UPDATED
MIXTURE = 4 DENSITY(G/CC) = 3.9347						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
4001001	6.67692E-22	2.83943E-22	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94						UPDATED
4008016	3.33846E-22	2.25293E-21	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94						UPDATED
4024304	8.65852E-03	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED
08/12/94						
4025055	8.62609E-04	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197
08/12/94						UPDATED
4026304	2.94890E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED
08/12/94						
4028304	3.83564E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED
08/12/94						
MIXTURE = 5 DENSITY(G/CC) = 7.9200						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
5024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED
08/12/94						
5025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197
08/12/94						UPDATED
5026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED
08/12/94						
5028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED
08/12/94						
MIXTURE = 6 DENSITY(G/CC) = 2.7020						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
6013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED
08/12/94						
MIXTURE = 7 DENSITY(G/CC) = 11.344						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
7082000	3.29690E-02	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K	UPDATED
08/12/94						
MIXTURE = 8 DENSITY(G/CC) = 0.99817E-20						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
8001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94						UPDATED
8008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94						UPDATED
MIXTURE = 9 DENSITY(G/CC) = 0.99817E-20						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
9001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94						UPDATED
9008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94						UPDATED
MIXTURE = 10 DENSITY(G/CC) = 1.8643						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
10001001	6.61831E-02	5.94016E-02	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94						UPDATED
10008016	2.79665E-02	3.98324E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94						UPDATED
10040000	6.02930E-03	4.59685E-01	40000	91.2196	ZIRCONIUM	ENDF/B-IV MAT 7141
08/12/94						UPDATED
10092235	2.37730E-04	4.97705E-02	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261
08/12/94						UPDATED
10092238	1.23540E-05	2.61949E-03	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262
08/12/94						UPDATED
MIXTURE = 11 DENSITY(G/CC) = 0.99817						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
11001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94						UPDATED
11008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94						UPDATED
MIXTURE = 12 DENSITY(G/CC) = 0.99817E-20						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	
12001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
08/12/94						UPDATED
12008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276
08/12/94						UPDATED
1001001					HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
3001001					HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
4001001					HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
8001001					HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
9001001					HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
10001001					HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
11001001					HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
12001001					HYDROGEN	ENDF/B-IV MAT 1269/THRM1002
2006012					CARBON-12	ENDF/B-IV MAT 1274/THRM1065
3008016					OXYGEN-16	ENDF/B-IV MAT 1276

4008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
8008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
9008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
10008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
11008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
12008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
2013027	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94
6013027	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94
2014000	SILICON	ENDF/B-IV MAT 1194	UPDATED 08/12/94
2016000	SULFUR	LENDL MAT 7020	UPDATED 08/12/94
2022000	TITANIUM	ENDF/B-IV MAT 1286	UPDATED 08/12/94
2024000	CR 1191 218NGP WT 1/E P-3 293K SIGP=5+4 RE(042375)		UPDATED 08/12/94
4024304	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
5024304	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
2025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
4025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
5025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
2026000	IRON	ENDF/B-IV MAT 1192	UPDATED 08/12/94
4026304	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
5026304	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
2028000	NI 1190 218NGP WT 1/E P-3 293K SIGP=5+4 RE(042375)		UPDATED 08/12/94
4028304	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
5028304	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94
2029000	COPPER	ENDF/B-IV MAT 1295	UPDATED 08/12/94
1040000	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94
10040000	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94
7082000	PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94
1092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
10092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
1092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94
10092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94

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.....  
***  
***          TRIGA - PREF. FLOOD CANISTER          ***  
***  
.....  
***  
***          ***** ADDITIONAL INFORMATION *****          ***  
***  
*** NUMBER OF ENERGY GROUPS          27          USE LATTICE GEOMETRY          YES ***  
***  
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1          GLOBAL ARRAY NUMBER          20 ***  
***  
*** NO. OF SCATTERING ANGLES IN XSECS  2          NUMBER OF UNITS IN THE GLOBAL X DIR.  1 ***  
***  
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 26          NUMBER OF UNITS IN THE GLOBAL Y DIR.  1 ***  
***  
*** ENTRIES/NEUTRON IN THE FISSION BANK 19          NUMBER OF UNITS IN THE GLOBAL Z DIR.  7 ***  
***  
*** NUMBER OF MIXTURES USED          11          USE A GLOBAL REFLECTOR          YES ***  
***  
*** NUMBER OF BIAS ID'S USED          1          USE NESTED HOLES          YES ***  
***  
*** NUMBER OF DIFFERENTIAL ALBEDOS USED 0          NUMBER OF HOLES          140 ***  
***  
*** TOTAL INPUT GEOMETRY REGIONS          91          MAXIMUM HOLE NESTING LEVEL          4 ***  
***  
*** NUMBER OF GEOMETRY REGIONS USED          87          USE NESTED ARRAYS          YES ***  
***  
*** LARGEST GEOMETRY UNIT NUMBER          450          NUMBER OF ARRAYS USED          7 ***  
***  
*** LARGEST ARRAY NUMBER          43          MAXIMUM ARRAY NESTING LEVEL          2 ***  
***  
***  
*** +X BOUNDARY CONDITION          MIR          -X BOUNDARY CONDITION          MIR ***  
***  
*** +Y BOUNDARY CONDITION          MIR          -Y BOUNDARY CONDITION          MIR ***  
***  
*** +Z BOUNDARY CONDITION          MIR          -Z BOUNDARY CONDITION          MIR ***  
***  
.....
```



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.....  
**  
** ARRAY      UNITS IN  UNITS IN  UNITS IN  NESTING  **  
** NUMBER     X DIR.    Y DIR.    Z DIR.    LEVEL    **  
** .....  
** 1          1          5          1          2        **  
** .....  
** 2          1          3          1          2        **  
** .....  
** 3          1          3          1          2        **  
** .....  
** 20 GLOBAL  1          1          7          1        **  
** .....  
** 41         1          5          1          2        **  
** .....  
** 42         1          3          1          2        **  
** .....  
** 43         1          3          1          2        **  
** .....  
.....
```

..... 0 IO'S WERE USED LOADING THE DATA .....

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 1 -----

TRIGA FUEL (SMEARED)

1 CYLINDER 10 1 RADIUS = 3.9623 +Z = 60.959 -Z = 1.00000E-03 CENTERLINE IS AT X = 0.00000 Y = 0.00000

----- UNIT 5 -----

3.38 IN WIDTH / 0.28 IN THICKNESS DIVIDER CENTER STACK (SEALED)

1 CUBOID 5 1 +X = 4.2672 -X = -4.2672 +Y = 0.71120 -Y = 0.00000 +Z = 74.290 -Z = -8.2550

----- UNIT 6 -----

3.38 IN WIDTH / 0.24 IN THICKNESS DIVIDER OUTSIDE STACK (SEALED)

1 CUBOID 5 1 +X = 4.2672 -X = -4.2672 +Y = 0.60960 -Y = 0.00000 +Z = 74.290 -Z = -8.2550

----- UNIT 7 -----

SEALED CANISTER

1 CYLINDER 11 1 RADIUS = 3.9624 +Z = 60.960 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

HOLE NUMBER 1 AT X = 0.00000 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 1

2 CYLINDER 5 1 RADIUS = 4.1275 +Z = 63.500 -Z = -1.2700 CENTERLINE IS AT X = 0.00000 Y = 0.00000

3 CYLINDER 3 1 RADIUS = 4.1275 +Z = 74.290 -Z = -8.2550 CENTERLINE IS AT X = 0.00000 Y = 0.00000

----- UNIT 10 -----

TRIGA ELEMENTS IN TOP OF 3.38 IN X 3.38 IN OPENING (SEALED)

1 CUBOID 3 1 +X = 4.2672 -X = -4.2672 +Y = 4.2672 -Y = -4.2672 +Z = 74.290 -Z = -8.2550

HOLE NUMBER 2 AT X = 0.00000 Y = 0.13970 Z = 0.00000 IS UNIT NUMBER 7

----- UNIT 11 -----

TRIGA ELEMENTS IN BOTTOM OF 3.38 IN X 3.38 IN OPENING (SEALED)

1 CUBOID 3 1 +X = 4.2672 -X = -4.2672 +Y = 4.2672 -Y = -4.2672 +Z = 74.290 -Z = -8.2550

HOLE NUMBER 3 AT X = 0.00000 Y = -0.13970 Z = 0.00000 IS UNIT NUMBER 7

TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
----- UNIT 12 -----								
TRIGA ELEMENTS IN BOTTOM RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER	4	AT X = 0.13970	Y = -0.13970	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 13 -----								
TRIGA ELEMENTS IN TOP RIGHT OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER	5	AT X = 0.13970	Y = 0.13970	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 14 -----								
TRIGA ELEMENTS IN BOTTOM LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER	6	AT X = -0.13970	Y = -0.13970	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 15 -----								
TRIGA ELEMENTS IN TOP LEFT OF 3.38 IN X 3.38 IN OPENING (SEALED)								
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
HOLE NUMBER	7	AT X = -0.13970	Y = 0.13970	Z = 0.00000	IS UNIT NUMBER	7		
----- UNIT 16 -----								
TRIGA BASKET 3.38 IN X 3.38 IN CENTER OPENING (SEALED)								
1 CUBOID	3 1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 74.290	-Z = -8.2550	
----- UNIT 20 EXTERNAL TO LATTICE 1 -----								
CENTER COLUMN OF THREE OPENINGS W/ 0.28 IN PLATE (SEALED)								
1 ARRAY NUMBER	1	+X = 4.2672	-X = -4.2672	+Y = 13.513	-Y = -13.513	+Z = 74.290	-Z = -8.2550	
2 CUBOID	5 1	+X = 4.9784	-X = -4.9784	+Y = 14.224	-Y = -14.224	+Z = 74.290	-Z = -8.2550	

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 21 EXTERNAL TO LATTICE 2 -----

LEFT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)

1 ARRAY NUMBER	2	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 74.290	-Z = -8.2550
2 CUBOID	5 1	+X = 4.2672	-X = -4.5720	+Y = 9.1440	-Y = -9.1440	+Z = 74.290	-Z = -8.2550

----- UNIT 22 EXTERNAL TO LATTICE 3 -----

RIGHT OUTSIDE COLUMN OF TWO OPENINGS W/ 0.12 IN PLATE (SEALED)

1 ARRAY NUMBER	3	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 74.290	-Z = -8.2550
2 CUBOID	5 1	+X = 4.5720	-X = -4.2672	+Y = 9.1440	-Y = -9.1440	+Z = 74.290	-Z = -8.2550

----- UNIT 30 -----

NAC-LWT TRIGA BASKET (SEALED)

1 CYLINDER	3 1	RADIUS = 17.100	+Z = 74.290	-Z = -8.2550	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	8	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	20	
HOLE NUMBER	9	AT X = -9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	21	
HOLE NUMBER	10	AT X = 9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	22	
2 CYLINDER	5 1	RADIUS = 18.910	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CYLINDER	7 1	RADIUS = 33.465	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4 CYLINDER	5 1	RADIUS = 36.519	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
5 CYLINDER	8 1	RADIUS = 49.223	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
6 CYLINDER	5 1	RADIUS = 49.822	+Z = 74.930	-Z = -8.8900	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
7 CUBOID	9 1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 74.930	-Z = -8.8900

----- UNIT 41 -----

TRIGA FUEL ELEMENT

1 CYLINDER	1 1	RADIUS = 0.67310	+Z = 28.575	-Z = -28.575	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2 CYLINDER	2 1	RADIUS = 0.71120	+Z = 28.575	-Z = -28.575	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	4 1	RADIUS = 0.71120	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 45 -----								
DIVIDER CENTER STACK								
1 CUBOID	5	1	+X = 4.2672	-X = -4.2672	+Y = 0.71120	-Y = 0.00000	+Z = 43.480	-Z = -33.040
----- UNIT 46 -----								
DIVIDER OUTSIDE STACK								
1 CUBOID	5	1	+X = 4.2672	-X = -4.2672	+Y = 0.60960	-Y = 0.00000	+Z = 43.480	-Z = -33.040
----- UNIT 80 -----								
SIMPLIFIED LID STRUCTURE NAC-LWT								
1 CYLINDER	5	1	RADIUS = 36.519	+Z = 14.135	-Z = -14.135	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
2 CYLINDER	9	1	RADIUS = 49.822	+Z = 14.135	-Z = -14.135	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CUBOID	9	1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 14.135	-Z = -14.135
----- UNIT 81 -----								
SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT								
1 CYLINDER	7	1	RADIUS = 26.353	+Z = 3.8100	-Z = -3.8100	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
2 CYLINDER	5	1	RADIUS = 36.619	+Z = 13.970	-Z = -12.700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CYLINDER	9	1	RADIUS = 49.822	+Z = 13.970	-Z = -12.700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4 CUBOID	9	1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 13.970	-Z = -12.700
----- UNIT 82 -----								
***** GLOBAL ***** EXTERNAL TO LATTICE 20 *****								
STACK OF 5 BASKETS IN CASK								
1 ARFAY NUMBER	20		+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 220.87	-Z = -221.30
----- UNIT 411 -----								
TRIGA FUEL ELEMENTS IN AL TUBE, RIGHT								
1 CYLINDER	3	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	12		AT X = 9.38000E-02	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	41	
2 CYLINDER	6	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000	

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
DUM ID

----- UNIT 412 -----

TRIGA FUEL ELEMENTS IN AL TUBE, LEFT

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	13	AT X = -9.38000E-02	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 413 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	14	AT X = 0.00000	Y = 9.38000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 414 -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	15	AT X = 0.00000	Y = -9.38000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 415 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP RIGHT

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	16	AT X = 6.62000E-02	Y = 6.62000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT 416 -----

TRIGA FUEL ELEMENTS IN AL TUBE, TOP LEFT

1 CYLINDER	3 1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	17	AT X = -6.62000E-02	Y = 6.62000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6 1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION            MEDIA BIAS            GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
                  NUM    ID

----- UNIT    417    -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM RIGHT

1 CYLINDER	3	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	18		AT X = 6.62000E-02	Y = -6.62000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

----- UNIT    418    -----

TRIGA FUEL ELEMENTS IN AL TUBE, BOTTOM LEFT

1 CYLINDER	3	1	RADIUS = 0.80518	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	19		AT X = -6.62000E-02	Y = -6.62000E-02	Z = 0.00000	IS UNIT NUMBER	41
2 CYLINDER	6	1	RADIUS = 0.95250	+Z = 43.480	-Z = -33.040	CENTERLINE IS AT X = 0.00000	Y = 0.00000

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 421 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	36		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	37		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	38		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	39		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	40		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	41		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	42		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	43		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	44		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	45		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	46		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	47		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	48		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	49		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	50		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	51		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040



TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 422 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	52		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	53		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	54		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	55		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	56		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	57		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	58		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	59		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	60		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	61		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	62		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	63		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	64		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	65		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	66		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	67		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 423 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM LEFT OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	68		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	69		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	70		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	71		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	72		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	73		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	74		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	75		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	76		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	77		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	78		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	79		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	80		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	81		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	82		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	83		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 424 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP LEFT OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	84		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	85		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	86		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	87		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	88		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	89		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	90		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	91		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	92		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	93		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	94		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	95		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	96		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	97		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	98		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	99		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 425 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, BOTTOM RIGHT OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	100		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	101		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	102		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	103		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	104		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	105		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	106		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	107		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	108		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	109		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	110		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	111		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	112		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	113		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	114		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	115		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 426 -----

AL TUBES WITH TRIGA FUEL, IN FUEL INSERT, TOP RIGHT OPENING

1 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040
HOLE NUMBER	116		AT X = -2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	117		AT X = -0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	118		AT X = 0.95250	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	413	
HOLE NUMBER	119		AT X = 2.8576	Y = -2.8576	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	120		AT X = -2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	121		AT X = -0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	415	
HOLE NUMBER	122		AT X = 0.95250	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	416	
HOLE NUMBER	123		AT X = 2.8576	Y = -0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	124		AT X = -2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	411	
HOLE NUMBER	125		AT X = -0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	126		AT X = 0.95250	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	418	
HOLE NUMBER	127		AT X = 2.8576	Y = 0.95250	Z = 0.00000	IS UNIT NUMBER	412	
HOLE NUMBER	128		AT X = -2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	417	
HOLE NUMBER	129		AT X = -0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	130		AT X = 0.95250	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	414	
HOLE NUMBER	131		AT X = 2.8576	Y = 2.8576	Z = 0.00000	IS UNIT NUMBER	418	
2 CUBOID	3	1	+X = 4.1529	-X = -4.1529	+Y = 4.1529	-Y = -4.1529	+Z = 43.480	-Z = -33.040

----- UNIT 430 -----

FUEL INSERT IN, CENTER OPENING

1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
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----- UNIT 431 -----

FUEL INSERT IN, BOTTOM OPENING

1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	132		AT X = 0.00000	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	421	

TRIGA - PREF. FLOOD CANISTER

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 432 -----								
FUEL INSERT IN, TOP OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	133		AT X = 0.00000	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	422	
----- UNIT 433 -----								
FUEL INSERT IN, BOTTOM LEFT OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	134		AT X = -0.11430	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	423	
----- UNIT 434 -----								
FUEL INSERT IN, TOP LEFT OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	135		AT X = -0.11430	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	424	
----- UNIT 435 -----								
FUEL INSERT IN, BOTOM FIGHT OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	136		AT X = 0.11430	Y = -0.11430	Z = 0.00000	IS UNIT NUMBER	425	
----- UNIT 436 -----								
FUEL INSERT IN, TOP RIGHT OPENING								
1 CUBOID	3	1	+X = 4.2672	-X = -4.2672	+Y = 4.2672	-Y = -4.2672	+Z = 43.480	-Z = -33.040
HOLE NUMBER	137		AT X = 0.11430	Y = 0.11430	Z = 0.00000	IS UNIT NUMBER	426	
----- UNIT 440 EXTERNAL TO LATTICE 41 -----								
CENTER COLUMN OF THREE OPENINGS								
1 ARRAY NUMBER	41		+X = 4.2672	-X = -4.2672	+Y = 13.513	-Y = -13.513	+Z = 43.480	-Z = -33.040
2 CUBOID	5	1	+X = 4.9784	-X = -4.9784	+Y = 14.224	-Y = -14.224	+Z = 43.480	-Z = -33.040

TRIGA - PREF. FLOOD CANISTER

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 441 EXTERNAL TO LATTICE 42 -----

LEFT OUTSIDE COLUMN OF TWO OPENINGS

1 ARRAY NUMBER	42	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 43.480	-Z = -33.040
2 CUBOID	5 1	+X = 4.2672	-X = -4.6080	+Y = 9.1800	-Y = -9.1800	+Z = 43.480	-Z = -33.040

----- UNIT 442 EXTERNAL TO LATTICE 43 -----

RIGHT OUTSIDE COLUMN OF TWO OPENINGS

1 ARRAY NUMBER	43	+X = 4.2672	-X = -4.2672	+Y = 8.8392	-Y = -8.8392	+Z = 43.480	-Z = -33.040
2 CUBOID	5 1	+X = 4.6080	-X = -4.2672	+Y = 9.1800	-Y = -9.1800	+Z = 43.480	-Z = -33.040

----- UNIT 450 -----

96 TRIGA FUEL ELEMENTS IN EACH LWT BASKET

1 CYLINDER	3 1	RADIUS = 17.150	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	138	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	440	
HOLE NUMBER	139	AT X = -9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	441	
HOLE NUMBER	140	AT X = 9.2457	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	442	
2 CYLINDER	5 1	RADIUS = 18.910	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CYLINDER	7 1	RADIUS = 33.465	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4 CYLINDER	5 1	RADIUS = 36.519	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
5 CYLINDER	8 1	RADIUS = 49.223	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
6 CYLINDER	5 1	RADIUS = 49.822	+Z = 43.485	-Z = -33.045	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
7 CUBOID	9 1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 43.485	-Z = -33.045

TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

11

5

16

5

10

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 2 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

12

6

13

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 3 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

14

6

15



TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 20 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

81

Z LAYER 2, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

30

Z LAYER 3, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450

Z LAYER 4, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450

Z LAYER 5, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

450

Z LAYER 6, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

30

Z LAYER 7, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP

80

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 41 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

431

45

430

45

432

TRIGA - PREF. FLOOD CANISTER

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 42 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

435  
46  
436

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 43 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

433  
46  
434

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS(G)
1	2.34271E+04 CM**3	1.48384E+05
2	2.72718E+03 CM**3	2.19061E+04
3	2.30497E+05 CM**3	2.30076E-15
4	8.86453E+03 CM**3	3.48789E+04
5	6.81739E+05 CM**3	5.39938E+06
6	1.79275E+04 CM**3	4.84400E+04
7	9.67892E+05 CM**3	1.09798E+07
8	1.35931E+06 CM**3	1.35683E-14
9	1.16111E+06 CM**3	1.15899E-14
10	3.60792E+04 CM**3	6.72616E+04
11	3.00293E+00 CM**3	2.99744E+00

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.....
***
***                               BIASING INFORMATION                               ***
***
***   A DEFAULT WEIGHT OF   0.500 WILL BE USED FOR ALL BIAS ID'S.   ***
***
.....

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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....

..... 0.01000 MINUTES WERE USED PROCESSING DATA. ....

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 1.32543E-02

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 1.70000E+01 -X=-1.70000E+01 +Y= 1.70000E+01 -Y=-1.70000E+01 +Z= 2.00000E+02 -Z=-2.00000E+02  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

0.04600 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.05333 MINUTES.

TRIGA - PREF. FLOOD CANISTER

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
KEHO MESSAGE NUMBER K5-132	WARNING... ONLY	958 INDEPENDENT	FISSION POINTS WERE GENERATED			
1	9.12272E-01	6.13333E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KEHO MESSAGE NUMBER K5-132	WARNING... ONLY	981 INDEPENDENT	FISSION POINTS WERE GENERATED			
2	8.97578E-01	6.58333E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KEHO MESSAGE NUMBER K5-132	WARNING... ONLY	965 INDEPENDENT	FISSION POINTS WERE GENERATED			
3	9.06507E-01	7.05000E-02	9.06507E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.60092E-01	7.50000E-02	9.33300E-01	2.67925E-02	0.00000E+00	0.00000E+00
5	9.13258E-01	7.96667E-02	9.26619E-01	1.68497E-02	0.00000E+00	0.00000E+00
6	9.41285E-01	8.41667E-02	9.30286E-01	1.24659E-02	0.00000E+00	0.00000E+00
7	9.20685E-01	8.36667E-02	9.28366E-01	9.84508E-03	0.00000E+00	0.00000E+00
8	9.75864E-01	9.41667E-02	9.19615E-01	1.18820E-02	0.00000E+00	0.00000E+00
9	9.12058E-01	9.96667E-02	9.19314E-01	1.00467E-02	0.00000E+00	0.00000E+00
10	9.05698E-01	1.04333E-01	9.17612E-01	8.86557E-03	0.00000E+00	0.00000E+00
11	9.05332E-01	1.09833E-01	9.16248E-01	7.93686E-03	0.00000E+00	0.00000E+00
12	9.08428E-01	1.14333E-01	9.15466E-01	7.14188E-03	0.00000E+00	0.00000E+00
13	9.33723E-01	1.19000E-01	9.17126E-01	6.66989E-03	0.00000E+00	0.00000E+00
14	9.37258E-01	1.23500E-01	9.18903E-01	6.31565E-03	0.00000E+00	0.00000E+00
15	9.35896E-01	1.29000E-01	9.20118E-01	5.95648E-03	0.00000E+00	0.00000E+00
16	8.78309E-01	1.33667E-01	9.17132E-01	6.27134E-03	0.00000E+00	0.00000E+00
17	8.82510E-01	1.38167E-01	9.14824E-01	6.27799E-03	0.00000E+00	0.00000E+00
18	9.14908E-01	1.42833E-01	9.14829E-01	5.87253E-03	0.00000E+00	0.00000E+00
19	8.74650E-01	1.48333E-01	9.12465E-01	6.00128E-03	0.00000E+00	0.00000E+00
20	8.92229E-01	1.52833E-01	9.11341E-01	5.76868E-03	0.00000E+00	0.00000E+00
21	9.05493E-01	1.58333E-01	9.11033E-01	5.46530E-03	0.00000E+00	0.00000E+00
22	9.22732E-01	1.62833E-01	9.11618E-01	5.21773E-03	0.00000E+00	0.00000E+00
23	9.33108E-01	1.67500E-01	9.12642E-01	5.06745E-03	0.00000E+00	0.00000E+00
24	9.48880E-01	1.72000E-01	9.14289E-01	5.10469E-03	0.00000E+00	0.00000E+00
25	9.28723E-01	1.76667E-01	9.14916E-01	4.91791E-03	0.00000E+00	0.00000E+00
26	9.06127E-01	1.82167E-01	9.14550E-01	4.72276E-03	0.00000E+00	0.00000E+00
27	9.03144E-01	1.86667E-01	9.14094E-01	4.55281E-03	0.00000E+00	0.00000E+00
28	9.06903E-01	1.91333E-01	9.13818E-01	4.38293E-03	0.00000E+00	0.00000E+00
29	9.31051E-01	1.95833E-01	9.14456E-01	4.26551E-03	0.00000E+00	0.00000E+00
30	8.78445E-01	2.01333E-01	9.13170E-01	4.30685E-03	0.00000E+00	0.00000E+00
31	8.91480E-01	2.06000E-01	9.12422E-01	4.22245E-03	0.00000E+00	0.00000E+00
32	9.22563E-01	2.10500E-01	9.12760E-01	4.09326E-03	0.00000E+00	0.00000E+00
33	9.18055E-01	2.16000E-01	9.12931E-01	3.96270E-03	0.00000E+00	0.00000E+00
34	9.29423E-01	2.20500E-01	9.13446E-01	3.87133E-03	0.00000E+00	0.00000E+00
35	9.16588E-01	2.25167E-01	9.13541E-01	3.75339E-03	0.00000E+00	0.00000E+00
36	9.31661E-01	2.29667E-01	9.14074E-01	3.68011E-03	0.00000E+00	0.00000E+00
37	8.97653E-01	2.35167E-01	9.13605E-01	3.60409E-03	0.00000E+00	0.00000E+00
38	9.13426E-01	2.39833E-01	9.13600E-01	3.50255E-03	0.00000E+00	0.00000E+00
39	9.51547E-01	2.44333E-01	9.14626E-01	3.55760E-03	0.00000E+00	0.00000E+00
40	9.05553E-01	2.49000E-01	9.14387E-01	3.47094E-03	0.00000E+00	0.00000E+00
41	8.94125E-01	2.53500E-01	9.13867E-01	3.42046E-03	0.00000E+00	0.00000E+00
42	9.15771E-01	2.59000E-01	9.13915E-01	3.33419E-03	0.00000E+00	0.00000E+00
43	8.88163E-01	2.63667E-01	9.13287E-01	3.31195E-03	0.00000E+00	0.00000E+00
44	8.99240E-01	2.69167E-01	9.12952E-01	3.24939E-03	0.00000E+00	0.00000E+00
45	9.11400E-01	2.73667E-01	9.12916E-01	3.17313E-03	0.00000E+00	0.00000E+00
46	8.77056E-01	2.78167E-01	9.12101E-01	3.20552E-03	0.00000E+00	0.00000E+00
47	9.37693E-01	2.82833E-01	9.12670E-01	3.18487E-03	0.00000E+00	0.00000E+00
48	8.88130E-01	2.88333E-01	9.12137E-01	3.16002E-03	0.00000E+00	0.00000E+00
49	9.43464E-01	2.92833E-01	9.12803E-01	3.16309E-03	0.00000E+00	0.00000E+00
50	9.02860E-01	2.97500E-01	9.12596E-01	3.10341E-03	0.00000E+00	0.00000E+00
51	9.24351E-01	3.03000E-01	9.12836E-01	3.04887E-03	0.00000E+00	0.00000E+00
52	9.30765E-01	3.07500E-01	9.13194E-01	3.00871E-03	0.00000E+00	0.00000E+00
53	8.90087E-01	3.12167E-01	9.12741E-01	2.98373E-03	0.00000E+00	0.00000E+00
54	8.95261E-01	3.16667E-01	9.12405E-01	2.94504E-03	0.00000E+00	0.00000E+00
55	9.11013E-01	3.22167E-01	9.12379E-01	2.88905E-02	0.00000E+00	0.00000E+00
56	9.27266E-01	3.26833E-01	9.12655E-01	2.84842E-03	0.00000E+00	0.00000E+00
57	9.14924E-01	3.31333E-01	9.12696E-01	2.79646E-03	0.00000E+00	0.00000E+00
58	9.05747E-01	3.36000E-01	9.12572E-01	2.74887E-03	0.00000E+00	0.00000E+00
59	9.70181E-01	3.40500E-01	9.13582E-01	2.88316E-03	0.00000E+00	0.00000E+00
60	9.13601E-01	3.46000E-01	9.13583E-01	2.93202E-03	0.00000E+00	0.00000E+00
347	9.32288E-01	1.73383E+00	9.10680E-01	1.26378E-03	0.00000E+00	0.00000E+00
348	9.39976E-01	1.73933E+00	9.10765E-01	1.26893E-03	0.00000E+00	0.00000E+00
349	9.26951E-01	1.74383E+00	9.10811E-01	1.26613E-03	0.00000E+00	0.00000E+00
350	9.36824E-01	1.74850E+00	9.10886E-01	1.26470E-03	0.00000E+00	0.00000E+00
351	9.31395E-01	1.75383E+00	9.10945E-01	1.26244E-03	0.00000E+00	0.00000E+00
352	9.09427E-01	1.75850E+00	9.10940E-01	1.25883E-03	0.00000E+00	0.00000E+00
353	8.91230E-01	1.76300E+00	9.10884E-01	1.25650E-03	0.00000E+00	0.00000E+00
354	8.82837E-01	1.76850E+00	9.10805E-01	1.25545E-03	0.00000E+00	0.00000E+00
355	8.94507E-01	1.77317E+00	9.10758E-01	1.25274E-03	0.00000E+00	0.00000E+00
356	9.20758E-01	1.77767E+00	9.10787E-01	1.24952E-03	0.00000E+00	0.00000E+00
357	9.21923E-01	1.78233E+00	9.10818E-01	1.24639E-03	0.00000E+00	0.00000E+00
358	8.95779E-01	1.78683E+00	9.10776E-01	1.24360E-03	0.00000E+00	0.00000E+00
359	8.92643E-01	1.79233E+00	9.10725E-01	1.24115E-03	0.00000E+00	0.00000E+00
360	8.92464E-01	1.79700E+00	9.10674E-01	1.23873E-03	0.00000E+00	0.00000E+00
361	9.36568E-01	1.80250E+00	9.10746E-01	1.23738E-03	0.00000E+00	0.00000E+00
362	9.16370E-01	1.80700E+00	9.10762E-01	1.23404E-03	0.00000E+00	0.00000E+00
363	9.19990E-01	1.81150E+00	9.10787E-01	1.23086E-03	0.00000E+00	0.00000E+00
364	8.68182E-01	1.81700E+00	9.10670E-01	1.23310E-03	0.00000E+00	0.00000E+00
365	9.09171E-01	1.82167E+00	9.10665E-01	1.22971E-03	0.00000E+00	0.00000E+00
366	9.13328E-01	1.82617E+00	9.10673E-01	1.22635E-03	0.00000E+00	0.00000E+00
367	9.26146E-01	1.83083E+00	9.10715E-01	1.22372E-03	0.00000E+00	0.00000E+00
368	9.18251E-01	1.83533E+00	9.10736E-01	1.22054E-03	0.00000E+00	0.00000E+00

369	9.27602E-01	1.84000E+00	9.10782E-01	1.21808E-03	0.00000E+00	0.00000E+00
370	9.05043E-01	1.84550E+00	9.10766E-01	1.21487E-03	0.00000E+00	0.00000E+00
371	9.10273E-01	1.85090E+00	9.10765E-01	1.21157E-03	0.00000E+00	0.00000E+00
372	8.65233E-01	1.85467E+00	9.10642E-01	1.21454E-03	0.00000E+00	0.00000E+00
373	9.29081E-01	1.85917E+00	9.10691E-01	1.21228E-03	0.00000E+00	0.00000E+00
374	9.41838E-01	1.86383E+00	9.10775E-01	1.21192E-03	0.00000E+00	0.00000E+00
375	9.13071E-01	1.86933E+00	9.10781E-01	1.20968E-03	0.00000E+00	0.00000E+00
376	8.91269E-01	1.87393E+00	9.10729E-01	1.20657E-03	0.00000E+00	0.00000E+00
377	9.11885E-01	1.87833E+00	9.10732E-01	1.20335E-03	0.00000E+00	0.00000E+00
378	9.41721E-01	1.88300E+00	9.10815E-01	1.20297E-03	0.00000E+00	0.00000E+00
379	9.08998E-01	1.88850E+00	9.10810E-01	1.19979E-03	0.00000E+00	0.00000E+00
380	9.16650E-01	1.89300E+00	9.10825E-01	1.19671E-03	0.00000E+00	0.00000E+00
381	9.38426E-01	1.89767E+00	9.10898E-01	1.19577E-03	0.00000E+00	0.00000E+00
382	8.84428E-01	1.90317E+00	9.10828E-01	1.19465E-03	0.00000E+00	0.00000E+00
383	9.13748E-01	1.90767E+00	9.10836E-01	1.19154E-03	0.00000E+00	0.00000E+00
384	9.27586E-01	1.91233E+00	9.10880E-01	1.18922E-03	0.00000E+00	0.00000E+00
385	9.32344E-01	1.91683E+00	9.10936E-01	1.18743E-03	0.00000E+00	0.00000E+00
386	9.01186E-01	1.92233E+00	9.10911E-01	1.18461E-03	0.00000E+00	0.00000E+00
387	8.94668E-01	1.92700E+00	9.10868E-01	1.18228E-03	0.00000E+00	0.00000E+00
388	9.39157E-01	1.93150E+00	9.10942E-01	1.18149E-03	0.00000E+00	0.00000E+00
389	9.35439E-01	1.93600E+00	9.11005E-01	1.18013E-03	0.00000E+00	0.00000E+00
390	9.16781E-01	1.94150E+00	9.11020E-01	1.17718E-03	0.00000E+00	0.00000E+00
391	8.54888E-01	1.94617E+00	9.10876E-01	1.18298E-03	0.00000E+00	0.00000E+00
392	9.32257E-01	1.95067E+00	9.10930E-01	1.18122E-03	0.00000E+00	0.00000E+00
393	9.15965E-01	1.95533E+00	9.10943E-01	1.17827E-03	0.00000E+00	0.00000E+00
394	9.44185E-01	1.96083E+00	9.11028E-01	1.17831E-03	0.00000E+00	0.00000E+00
395	9.41505E-01	1.96533E+00	9.11106E-01	1.17787E-03	0.00000E+00	0.00000E+00
396	9.05507E-01	1.97000E+00	9.11091E-01	1.17496E-03	0.00000E+00	0.00000E+00
397	9.23019E-01	1.97450E+00	9.11122E-01	1.17237E-03	0.00000E+00	0.00000E+00
398	8.99323E-01	1.97917E+00	9.11092E-01	1.16978E-03	0.00000E+00	0.00000E+00
399	9.50066E-01	1.98367E+00	9.11190E-01	1.17096E-03	0.00000E+00	0.00000E+00
400	9.31501E-01	1.98833E+00	9.11241E-01	1.16912E-03	0.00000E+00	0.00000E+00
401	9.40814E-01	1.99283E+00	9.11315E-01	1.16854E-03	0.00000E+00	0.00000E+00
402	8.74959E-01	1.99833E+00	9.11224E-01	1.16916E-03	0.00000E+00	0.00000E+00
403	8.91278E-01	2.00283E+00	9.11174E-01	1.16730E-03	0.00000E+00	0.00000E+00

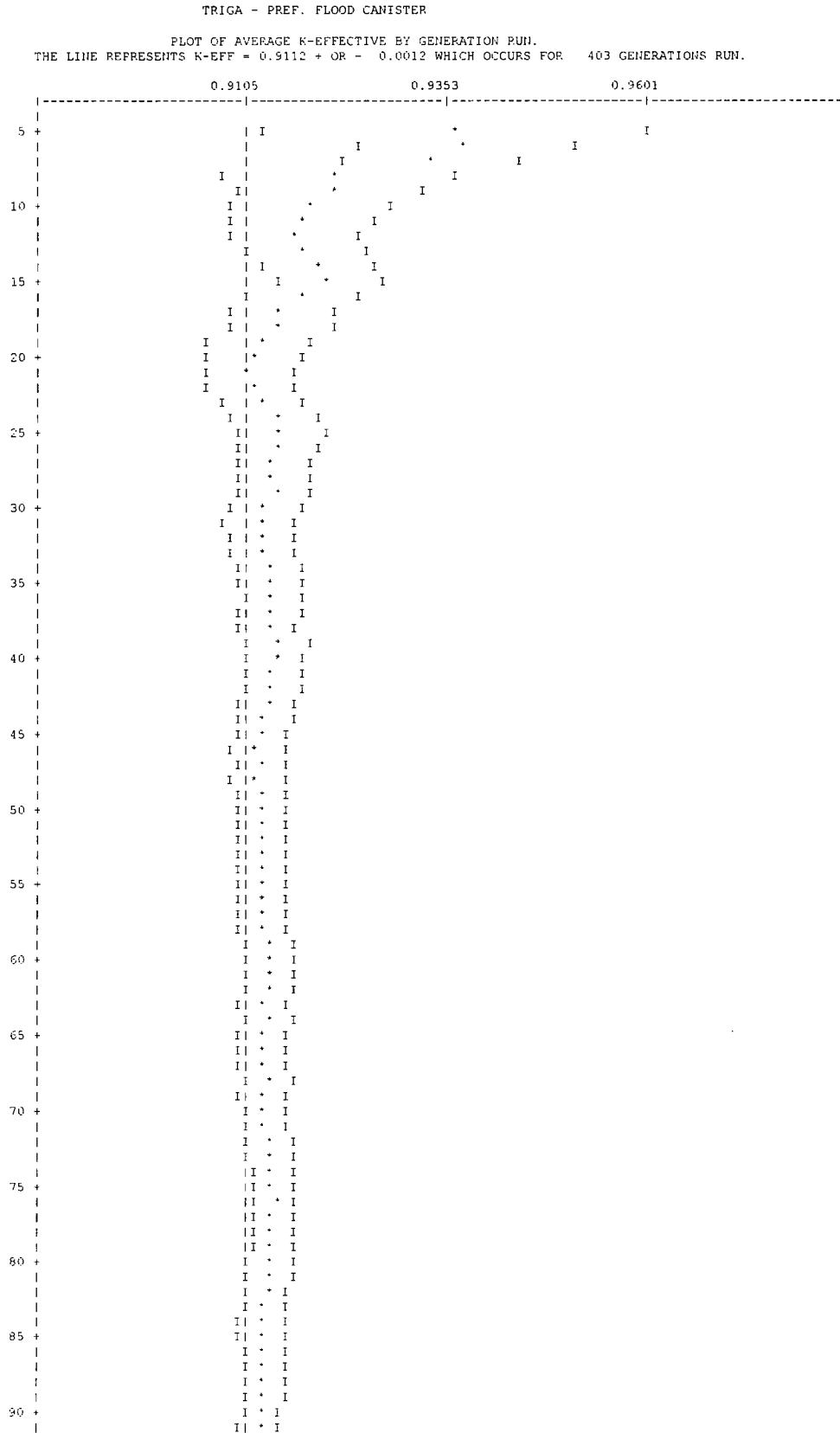
KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

TRIGA - PREF. FLOOD CANISTER

LIFETIME = 6.88467E-05 + OR - 1.54921E-07      GENERATION TIME = 2.92747E-05 + OR - 7.16936E-08  
 NU BAR = 2.42097E+00 + OR - 9.21427E-06      AVERAGE FISSION GROUP = 2.20445E+01 + OR - 6.79883E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 1.67845E-01 + OR - 7.91367E-04

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	0.91119	+ OR - 0.00117	0.91002 TO 0.91236	0.90885 TO 0.91353	0.90768 TO 0.91470	400000
4	0.91106	+ OR - 0.00117	0.90990 TO 0.91223	0.90873 TO 0.91340	0.90756 TO 0.91456	399000
5	0.91106	+ OR - 0.00117	0.90989 TO 0.91223	0.90872 TO 0.91340	0.90755 TO 0.91457	398000
6	0.91098	+ OR - 0.00117	0.90981 TO 0.91215	0.90864 TO 0.91332	0.90747 TO 0.91449	397000
7	0.91096	+ OR - 0.00117	0.90978 TO 0.91213	0.90861 TO 0.91330	0.90744 TO 0.91448	396000
8	0.91105	+ OR - 0.00117	0.90987 TO 0.91222	0.90870 TO 0.91339	0.90753 TO 0.91456	395000
9	0.91103	+ OR - 0.00118	0.90985 TO 0.91221	0.90868 TO 0.91338	0.90750 TO 0.91456	394000
10	0.91104	+ OR - 0.00118	0.90987 TO 0.91222	0.90869 TO 0.91340	0.90751 TO 0.91458	393000
11	0.91106	+ OR - 0.00118	0.90988 TO 0.91224	0.90870 TO 0.91342	0.90751 TO 0.91460	392000
12	0.91106	+ OR - 0.00118	0.90988 TO 0.91225	0.90870 TO 0.91343	0.90751 TO 0.91462	391000
17	0.91103	+ OR - 0.00119	0.90984 TO 0.91222	0.90865 TO 0.91341	0.90747 TO 0.91460	386000
22	0.91115	+ OR - 0.00120	0.90995 TO 0.91235	0.90875 TO 0.91355	0.90755 TO 0.91475	381000
27	0.91098	+ OR - 0.00121	0.90977 TO 0.91219	0.90856 TO 0.91340	0.90736 TO 0.91461	376000
32	0.91105	+ OR - 0.00122	0.90983 TO 0.91227	0.90861 TO 0.91348	0.90739 TO 0.91470	371000
37	0.91094	+ OR - 0.00123	0.90971 TO 0.91217	0.90848 TO 0.91341	0.90725 TO 0.91464	366000
42	0.91087	+ OR - 0.00124	0.90963 TO 0.91211	0.90838 TO 0.91336	0.90714 TO 0.91460	361000
47	0.91099	+ OR - 0.00125	0.90973 TO 0.91224	0.90848 TO 0.91349	0.90723 TO 0.91474	356000
...						
367	0.91583	+ OR - 0.00386	0.91197 TO 0.91969	0.90812 TO 0.92355	0.90426 TO 0.92740	36000
372	0.91753	+ OR - 0.00412	0.91341 TO 0.92166	0.90929 TO 0.92578	0.90517 TO 0.92990	31000
377	0.91755	+ OR - 0.00470	0.91286 TO 0.92225	0.90816 TO 0.92695	0.90346 TO 0.93164	26000
382	0.91744	+ OR - 0.00538	0.91206 TO 0.92281	0.90668 TO 0.92819	0.90130 TO 0.93357	21000
387	0.91854	+ OR - 0.00677	0.91177 TO 0.92531	0.90500 TO 0.93208	0.89823 TO 0.93885	16000
392	0.91983	+ OR - 0.00741	0.91242 TO 0.92724	0.90502 TO 0.93464	0.89761 TO 0.94205	11000
397	0.91466	+ OR - 0.01235	0.90230 TO 0.92701	0.88995 TO 0.93937	0.87759 TO 0.95172	6000









TRIGA - PREF. FLOOD CANISTER

SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0003			2.83496E-04	1.9031	1.29360E-03	1.4083	0.00000E+00	0.0000
2	0.0016			1.41686E-03	0.6296	3.41264E-03	0.4423	0.00000E+00	0.0000
3	0.0021			1.91174E-03	0.5343	1.85564E-03	0.3922	0.00000E+00	0.0000
4	0.0014			1.23455E-03	0.5902	1.05460E-03	0.4228	0.00000E+00	0.0000
5	0.0022			1.97527E-03	0.5128	2.47901E-03	0.3603	0.00000E+00	0.0000
6	0.0035			3.19311E-03	0.3708	9.28203E-03	0.3281	0.00000E+00	0.0000
7	0.0046			4.20300E-03	0.3053	2.01369E-02	0.3109	0.00000E+00	0.0000
8	0.0048			4.33301E-03	0.3190	1.69557E-02	0.3274	0.00000E+00	0.0000
9	0.0064			5.86971E-03	0.3129	1.80217E-02	0.2698	0.00000E+00	0.0000
10	0.0140			1.27575E-02	0.2781	4.46620E-02	0.2905	0.00000E+00	0.0000
11	0.0292			2.65849E-02	0.3108	5.97859E-02	0.2609	0.00000E+00	0.0000
12	0.0379			3.45597E-02	0.2912	4.79199E-02	0.2395	0.00000E+00	0.0000
13	0.0340			3.09422E-02	0.3038	5.62476E-02	0.2495	0.00000E+00	0.0000
14	0.0275			2.50167E-02	0.2791	6.45882E-02	0.2650	0.00000E+00	0.0000
15	0.0053			4.85847E-03	0.3936	3.04517E-02	0.3715	0.00000E+00	0.0000
16	0.0036			3.27596E-03	0.4464	1.68993E-02	0.4071	0.00000E+00	0.0000
17	0.0053			4.85898E-03	0.6615	9.66689E-03	0.4238	0.00000E+00	0.0000
18	0.0072			6.51798E-03	0.7127	9.24759E-03	0.4621	0.00000E+00	0.0000
19	0.0087			7.89008E-03	0.5201	1.45394E-02	0.4346	0.00000E+00	0.0000
20	0.0344			3.13456E-02	0.3415	4.58006E-02	0.3527	0.00000E+00	0.0000
21	0.0175			1.59595E-02	0.5092	1.73339E-02	0.4036	0.00000E+00	0.0000
22	0.0397			3.61509E-02	0.3631	3.41677E-02	0.3508	0.00000E+00	0.0000
23	0.1115			1.01637E-01	0.2349	8.94561E-02	0.2346	0.00000E+00	0.0000
24	0.1831			1.66854E-01	0.2104	1.29711E-01	0.2009	0.00000E+00	0.0000
25	0.1501			1.36737E-01	0.2458	9.95705E-02	0.2382	0.00000E+00	0.0000
26	0.1882			1.71487E-01	0.2681	1.16429E-01	0.2624	0.00000E+00	0.0000
27	0.0761			6.93315E-02	0.3792	4.18532E-02	0.3919	0.00000E+00	0.0000
SYSTEM TOTAL =				9.11186E-01	0.1284	1.00282E+00	0.0434	0.00000E+00	0.0000

ELAPSED TIME 2.00283 MINUTES

RANDOM NUMBER= 750E700F5DF1

TRIGA - PREF. FLOOD CAHISTER

```
FREQUENCY FOR GENERATIONS 4 TO 403
0.8423 TO 0.8540 ***
0.8540 TO 0.8656 *****
0.8656 TO 0.8773 *****
0.8773 TO 0.8889 *****
0.8889 TO 0.9006 *****
0.9006 TO 0.9123 *****
0.9123 TO 0.9239 *****
0.9239 TO 0.9356 *****
0.9356 TO 0.9472 *****
0.9472 TO 0.9589 *****
0.9589 TO 0.9705 *****
```

```
FREQUENCY FOR GENERATIONS 104 TO 403
0.8423 TO 0.8540 ***
0.8540 TO 0.8656 *****
0.8656 TO 0.8773 *****
0.8773 TO 0.8889 *****
0.8889 TO 0.9006 *****
0.9006 TO 0.9123 *****
0.9123 TO 0.9239 *****
0.9239 TO 0.9356 *****
0.9356 TO 0.9472 *****
0.9472 TO 0.9589 *****
0.9589 TO 0.9705 *****
```

```
FREQUENCY FOR GENERATIONS 204 TO 403
0.8423 TO 0.8540 **
0.8540 TO 0.8656 *****
0.8656 TO 0.8773 *****
0.8773 TO 0.8889 *****
0.8889 TO 0.9006 *****
0.9006 TO 0.9123 *****
0.9123 TO 0.9239 *****
0.9239 TO 0.9356 *****
0.9356 TO 0.9472 *****
0.9472 TO 0.9589 *****
0.9589 TO 0.9705 *
```

```
FREQUENCY FOR GENERATIONS 304 TO 403
0.8423 TO 0.8540 *
0.8540 TO 0.8656 *****
0.8656 TO 0.8773 *****
0.8773 TO 0.8889 *****
0.8889 TO 0.9006 *****
0.9006 TO 0.9123 *****
0.9123 TO 0.9239 *****
0.9239 TO 0.9356 *****
0.9356 TO 0.9472 *****
0.9472 TO 0.9589 *****
0.9589 TO 0.9705 *
```

**6.6.7 MTR Fuel Bounding Configuration**

An evaluation was performed to extend limits of enrichment for MTR fuel elements. This section provides the summarized input/output data for the MTR fuel finite cask model in the accident condition. This case represents HEU fuel at 94 wt % enrichment with 414 g  $^{235}\text{U}$  in 23 fuel plates. Also included is the bounding HEU case for the 460 g  $^{235}\text{U}$  with 23 plates of 20 g  $^{235}\text{U}$  per plate.

Figure 6.6.7-1 MTR Finite Cask Model

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT MTR INPUT FOR CASK MODEL - PLATES IN CLOSE & PLATES @ FULL PITCH
'MIN BASKET PLATE - COMMENT CARD REFERS TO NOMINAL PLATE SIZE
'23 PLATES - 18 GRAM 235U PER PLATE
'FUEL SHIFT AXIAL ALTERNATING
'56 CM ACTIVE FUEL HEIGHT
27GROUPNDF4 LATTICECELL
URANIUM 1 DEN=19.05 0.03626 293 92235 94. 92238 6. END
AL 1 DEN=2.702 0.25566 293 END
AL 2 1.0 293.0 END
H2O 3 1.0 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
FB 6 1.0 293.0 END
H2O 7 1.E-20 293.0 END
H2O 8 1.E-20 293.0 END
END COMP
SYMSLABCELL 0.3919 0.075 1 3 0.115 2 END

READ PARAM TBA=5 RUN=YES PLT=NO GEN=803 NPG=1000 END PARAM
READ GEOM
'
' FUEL PLATE CELL UNITS
'
UNIT 1
COM='MIDDLE FUEL PLATE CELL'
CUBOID 1 1 2P3.3000 2P0.0375 56.7 0.7
CUBOID 2 1 2P3.3000 2P0.0575 57.4 0.0
CUBOID 3 1 2P3.3000 2P0.1959 57.4 0.0
UNIT 2
COM='TOP FUEL PLATE CELL'
CUBOID 1 1 2P3.3000 2P0.0375 56.7 0.7
CUBOID 2 1 2P3.3000 2P0.0575 57.4 0.0
CUBOID 3 1 2P3.3000 0.0575 -0.1959 57.4 0.0
UNIT 3
COM='BOTTOM FUEL PLATE CELL'
CUBOID 1 1 2P3.3000 2P0.0375 56.7 0.7
CUBOID 2 1 2P3.3000 2P0.0575 57.4 0.0
CUBOID 3 1 2P3.3000 0.1959 -0.0575 57.4 0.0
'
UNIT 4
COM='SIDE PLATE'
CUBOID 2 1 2P0.2 2P3.75 57.4 0.0
'
' PLATES AT BOTTOM OF BASKET OPENING
'
' BASKET CENTER ROW ARRAY ELEMENTS
'
UNIT 10
COM='FUEL PATE ARRAY - PLATES IN 5/16 IN. WEB CENTER'
ARRAY 1 -3.3000 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 11
COM='FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 12
COM='FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
'
' BASKET TOP ROW ARRAY ELEMENTS
'
UNIT 20
COM='FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 21
COM='FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' BASKET BOTTOM ROW ARRAY ELEMENTS
```

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.
UNIT 30
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 31
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
.
' CONSTRUCTION BASKET ROWS
.
UNIT 40
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES'
ARRAY 2 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 2R0.0 1
UNIT 41
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 3 -14.1738 -4.3688 0.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 42
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES'
ARRAY 4 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
.
' BASKET UNIT
.
UNIT 50
COM='7 MTR ELEMENTS IN THE LWT'
CYLINDER 3 1 17.0500 73.152 0.0
HOLE 40 0.0 +9.4489 0.0
HOLE 41 0.0 0.0 0.0
HOLE 42 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 73.152 -1.27
CYLINDER 6 1 33.4963 73.152 -1.27
CYLINDER 5 1 36.5443 73.152 -1.27
CYLINDER 7 1 49.2443 73.152 -1.27
CYLINDER 5 1 49.8539 73.152 -1.27
CUBOID 8 1 4P49.8539 73.152 -1.27
.
' PLATES AT TOP OF BASKET OPENING
.
' BASKET CENTER ROW ARRAY ELEMENTS
.
UNIT 110
COM='FUEL PATE ARRAY - PLATES IN 5/16 IN. WEB CENTER'
ARRAY 1 -3.3000 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 15.752
HOLE 4 4.1687 0.0 15.752
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 111
COM='FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT'
ARRAY 1 -3.9686 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 15.752
HOLE 4 4.1687 0.0 15.752
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 112
COM='FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT'
ARRAY 1 -2.6314 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 15.752
HOLE 4 4.1687 0.0 15.752
REPLICATE 5 1 2R0.3556 4R0.0 1
.
' BASKET TOP ROW ARRAY ELEMENTS
.
UNIT 120
COM='FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK'
ARRAY 1 -2.6314 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 15.752
HOLE 4 4.1687 0.0 15.752
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 121
COM='FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK'
ARRAY 1 -3.9686 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 15.752
HOLE 4 4.1687 0.0 15.752
REPLICATE 5 1 0.0 0.3048 4R0.0 1
.
' BASKET BOTTOM ROW ARRAY ELEMENTS
.
UNIT 130
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
ARRAY 1 -2.6314 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
```

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HOLE 4 -4.1687 0.0 15.752
HOLE 4 4.1687 0.0 15.752
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 131
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 1 -3.3686 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 15.752
HOLE 4 4.1687 0.0 15.752
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' CONSTRUCTION BASKET ROWS
'
UNIT 140
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES'
ARRAY 12 -9.0428 -4.3688 0.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 141
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 13 -14.1738 -4.3688 0.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 142
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES'
ARRAY 14 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
'
' BASKET UNIT
'
UNIT 150
COM='7 MTR ELEMENTS IN THE LWT'
CYLINDER 3 1 17.0500 73.152 0.0
HOLE 140 0.0 +9.4489 0.0
HOLE 141 0.0 0.0 0.0
HOLE 142 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 73.152 -1.27
CYLINDER 6 1 33.4963 73.152 -1.27
CYLINDER 5 1 36.5443 73.152 -1.27
CYLINDER 7 1 49.2443 73.152 -1.27
CYLINDER 5 1 49.8539 73.152 -1.27
CUBOID 8 1 4P49.8539 73.152 -1.27
'
' CASK LID AND BOTTOM STRUCTURE
'
UNIT 60
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 5 1 36.5189 13.6775 -14.1351
CYLINDER 8 1 49.8539 13.6775 -14.1351
CUBOID 8 1 4P49.8539 13.6775 -14.1351
UNIT 61
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 6 1 26.3525 2P3.81
CYLINDER 5 1 36.6188 +13.36 -12.7
CYLINDER 8 1 49.8539 +13.36 -12.7
CUBOID 8 1 4P49.8539 +13.36 -12.7
UNIT 62
COM='THIN TOP AND BOTTOM SHELL OF NEUTRON SHIELD - SUBTRACTED FROM LID MODEL'
CYLINDER 5 1 49.8539 0.61 0.0
CUBOID 8 1 4P49.8539 0.61 0.0
'
' STACK OF BASKETS WITH CASK LID AND BOTTOM
'
GLOBAL UNIT 70
COM='STACK OF 6 BASKETS IN CASK WITH LID AND BOTTOM'
ARRAY 10 -49.8539 -49.8539 0.0
END GEOM
READ ARRAY
'
' FUEL ELEMENT PLATE ARRAY
'
ARA=1 NUX=1 NUY=23 NUZ=1 FILL 3 21R1 2 END FILL
'
' ARRAYS OF BASKET OPENINGS (TOP, MIDDLE, BOTTOM)
' PLATES AT BOTTOM OF OPENING
'
ARA=2 NUX=2 NUY=1 NUZ=1 FILL 20 21 END FILL
ARA=3 NUX=3 NUY=1 NUZ=1 FILL 12 10 11 END FILL
ARA=4 NUX=2 NUY=1 NUZ=1 FILL 30 31 END FILL
'
' ARRAYS OF BASKET OPENINGS (TOP, MIDDLE, BOTTOM)
' PLATES AT TOP OF OPENING
'
ARA=12 NUX=2 NUY=1 NUZ=1 FILL 120 121 END FILL
ARA=13 NUX=3 NUY=1 NUZ=1 FILL 112 110 111 END FILL
ARA=14 NUX=2 NUY=1 NUZ=1 FILL 130 131 END FILL
'
' ARRAY OF BASKETS WITH LID AND BOTTOM
'
ARA=10 NUX=1 NUY=1 NUZ=10 FILL 61 62 150 50 150 50 150 50 62 60 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CENTER ELEMENT - FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 MAX=1500
XUL=-5.0 YUL=5.0 ZUL=50.0
```

```
XLR=5.0 YLR=-5.0 ZLR=50.0 END
TTL='X-Y PLOT OF BASKET - FUEL ELEVATION'
UAX=1.0 VDN=-1.0 MAX=1500
XUL=-17.0 YUL=17.0 ZUL=50.0
XLR=17.0 YLR=-17.0 ZLR=50.0 END
TTL='X-Y PLOT OF CASK - FUEL ELEVATION'
UAX=1.0 VDN=-1.0 MAX=1500
XUL=-65.0 YUL=65.0 ZUL=50.0
XLR=65.0 YLR=-65.0 ZLR=50.0 END
TTL='Y-Z (X=0) PLOT OF BOTTOM BASKET - CENTER SECTION'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=55.0
XLR=0.0 YLR=5.0 ZLR=50.0 END
TTL='Y-Z (X=0) PLOT OF BOTTOM BASKET - CENTER FUEL ELEMENT'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=101.1
XLR=0.0 YLR=5.0 ZLR=26.6 END
TTL='Y-Z (X=-2) PLOT OF BOTTOM BASKET'
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-15.0 ZUL=101.1
XLR=-2.0 YLR=15.0 ZLR=26.6 END
TTL='Y-Z (X=-2) PLOT OF CASK - R=17.0'
LPI=5 MAX=1000
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-17.0 ZUL=502.0
XLR=-2.0 YLR=17.0 ZLR=-1.0 END
TTL='Y-Z (X=-2) PLOT OF CASK - R=51.0'
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-51.0 ZUL=502.0
XLR=-2.0 YLR=51.0 ZLR=-1.0 END
END PLOT
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.

MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.61 (SECONDS).

SECONDARY MODULE 000002 HAS BEEN CALLED.

MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 4.83 (SECONDS).

SECONDARY MODULE 000009 HAS BEEN CALLED.

MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 742.04 (SECONDS).

MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 749.95 (SECONDS).
```

```

CCCCCCCCC      SSSSSSSSSS      AAAAAAAA      SSSSSSSSSS      2222222222      555555555555
CCCCCCCCCCCCC  SSSSSSSSSSSS  AAAAAAAAAA  SSSSSSSSSS  222222222222  555555555555
CC      CC      SS      SS      AA      AA      SS      SS      22      22      55
CC      SS      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SSSSSSSSSS  AAAAAAAAAA  SSSSSSSSSS      22      555555555555
CC      SSSSSSSSSS  AAAAAAAAAA  SSSSSSSSSS      22      555555555555
CC      SS      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      CC      SS      SS      AA      AA      SS      SS      22      55      55
CCCCCCCCCCCCC  SSSSSSSSSSSS  AA      AA      SSSSSSSSSS  222222222222  555555555555
CCCCCCCCC      SSSSSSSSSS      AA      AA      SSSSSSSSSS  222222222222  555555555555
    
```

```

SSSSSSSSSSS  CCCCCCCCCC      AAAAAAAA      LL      EEEEEEEEEEEE      PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSSS  CCCCCCCCCC      AAAAAAAA      LL      EEEEEEEEEEEE      PPPPPPPPPPP  CCCCCCCCCC
SS      SS      CC      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SSSSSSSSSSS  CC      AAAAAAAAAA      LL      EEEEEEEEE      -----  PPPPPPPPPPP  CC
SSSSSSSSSSS  CC      AAAAAAAAAA      LL      EEEEEEEEE      -----  PPPPPPPPPPP  CC
SS      SS      CC      AA      AA      LL      EE      PP      CC
SS      SS      CC      AA      AA      LL      EE      PP      CC
SS      SS      CC      CC      AA      AA      LL      EE      PP      CC      CC
SSSSSSSSSSS  CCCCCCCCCC      AA      AA      LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSSS  CCCCCCCCCC      AA      AA      LLLLLLLLLLLL  EEEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

11      0000000      //      11      2222222222      //      0000000      0000000
111     000000000      //      111     222222222222      //      000000000      000000000
1111    00      00      //      1111   22      22      //      00      00      00      00
11      00      00      //      11      22      22      //      00      00      00      00
11      00      00      //      11      22      //      00      00      00      00
11      00      00      //      11      22      //      00      00      00      00
11      00      00      //      11      22      //      00      00      00      00
11      00      00      //      11      22      //      00      00      00      00
11111111 000000000      //      11111111 222222222222      //      000000000      000000000
11111111 0000000      //      11111111 222222222222      //      0000000      0000000
    
```

```

11      44      11      777777777777      33333333333      22222222222
111     444      111     777777777777      3333333333333      2222222222222
1111    4444      1111    77      77      33      33      22      22
11      44      44      11      77      11      77      33      33      22
11      44      44      11      77      11      77      33      33      22
11      44      44      11      77      11      77      333     33      22
11      44      44      11      77      11      77      333     33      22
11      444444444444      11      77      11      77      33      33      22
11      44444444444444      11      77      11      77      33      33      22
11      44      11      77      11      77      33      33      22
11111111 44      11111111 77      11111111 77      3333333333333      2222222222222
11111111 44      11111111 77      11111111 77      3333333333333      2222222222222
    
```





'MIN BASKET PLATE - COMMENT CARD REFERS TO NOMINAL PLATE SIZE  
'23 PLATES - 18 GRAM 235U PER PLATE  
'FUEL SHIFT AXIAL ALTERNATING  
'56 CM ACTIVE FUEL HEIGHT  
'MIN BASKET PLATE - COMMENT CARD REFERS TO NOMINAL PLATE SIZE  
'23 PLATES - 18 GRAM 235U PER PLATE  
'FUEL SHIFT AXIAL ALTERNATING  
'56 CM ACTIVE FUEL HEIGHT  
LWT MTR INPUT FOR CASK MODEL - PLATES IN CLOSE & PLATES @ FULL PITCH

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
MXK 8 MIXTURES  
MSC 9 COMPOSITION SPECIFICATIONS  
IZM 3 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC URANIUM STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.0363 VOLUME FRACTION  
ROTH 19.0500 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 94.000 WT%  
92238 6.000 WT%

END

SC AL STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.2557 VOLUME FRACTION  
ROTH 2.7020 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC SS304 STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%

28304 9.500 WT%

END

SC PB STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

CTP SYMMSLABCELL CELL TYPE  
PITCH 0.3919 CM CENTER TO CENTER SPACING  
FUELOD 0.0750 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 3 MIXTURE NO. OF MODERATOR  
CLADOD 0.1150 CM CLAD OUTER DIAMETER  
MCLAD 2 MIXTURE NO. OF CLAD

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL  
ZONE 2 IS CLAD  
ZONE 3 IS MOD

```

.....
***
***          LWT MTR INPUT FOR CASK MODEL - PLATES IN CLOSE & PLATES @ FULL PITCH
***
.....
***
***          ***** DATA LIBRARY INFORMATION *****
***
***          UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION
***          NUMBER          DATA SET NAME          NAME          -----
***          -----
***          89          G:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***          82          G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***          11          D:\hjp\23p-18g-as-56h\FT11F001          SHORT CROSS SECTION LIBRARY
***          90          D:\hjp\23p-18g-as-56h\FT90F001          INPUT DATA DIRECT ACCESS
***
.....
***
***          STANDARD COMPOSITION LIBRARY DATA
***          -----
***
***          UNIT NUMBER : 89
***
***          DATASET NAME : G:\scale43\DATALIB\FT89F001
***
***          LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
***          637 STANDARD COMPOSITIONS, 490 NUCLIDES
***          90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***          CREATION DATE: 6/30/95
***
***
***          CROSS SECTION LIBRARY DATA
***          -----
***
***          UNIT NUMBER : 82
***
***          DATASET NAME : G:\scale43\DATALIB\FT82F001
***
***          LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***          BASED ON ENDF-B VERSION 4 DATA
***          COMPILED FOR NRC 1/27/89
***          LAST UPDATED
***          L.M.PETRIE - ORNL
***
***
***          08/12/94
***
.....

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```

BBBBBBBBBBB 0000000000 NN NN AAAAAAAA MM MM IIIIIIIIIII 2222222222
BBBBBBBBBBB 000000000000 NNN NN AAAAAAAA MM MM IIIIIIIIIII 2222222222
BB BB 00 00 NNNN NN AA AA MMM MMM III III 22 22
BB BB 00 00 NN NN AA AA MM MM MM MM II II 22
BB BB 00 00 NN NN NN ----- AAAAAAAA MM MM MM II 22
BBBBBBBBBBB 00 00 NN NN NN ----- AAAAAAAA MM M MM II 22
BBBBBBBBBBB 00 00 NN NN NN ----- AAAAAAAA MM MM MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BBBBBBBBBBB 0000000000 NN NNN AA AA MM MM IIIIIIIIIII 2222222222
BBBBBBBBBBB 0000000000 NN NN AA AA MM MM IIIIIIIIIII 2222222222
    
```

```

SSSSSSSSSS CCCCCCCCCC AAAAAAAA LL EEEEEEEEEEE PFFFFFFFFFFFF CCCCCCCCCC
SSSSSSSSSS CCCCCCCCCC AAAAAAAA LL EEEEEEEEEEE PFFFFFFFFFFFF CCCCCCCCCC
SS SS CC CC AA AA LL EE EE PP CC PP CC CC
SS CC CC AA AA LL EE EE PP PP PP CC CC
SSSSSSSSSS CC AAAAAAAA LL EEEEEEE ----- PFFFFFFFFFFFF CC
SSSSSSSSSS CC AAAAAAAA LL EEEEEEE ----- PFFFFFFFFFFFF CC
SS SS CC AA AA LL EE EE PP CC CC CC
SS SS CC CC AA AA LL EE EE PP CC CC CC
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLLL EEEEEEEEEEE PP CCCCCCCCCC
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLLL EEEEEEEEEEE PP CCCCCCCCCC
    
```

```

11 000000 // 11 2222222222 // 000000 000000
111 00000000 // 111 2222222222 // 00000000 00000000
1111 00 00 // 1111 22 22 // 00 00 00 00
11 00 00 // 11 22 22 // 00 00 00 00
11 00 00 // 11 22 // 00 00 00 00
11 00 00 // 11 22 22 // 00 00 00 00
11 00 00 // 11 22 // 00 00 00 00
11 00 00 // 11 22 // 00 00 00 00
11111111 00000000 // 11111111 2222222222 // 00000000 00000000
11111111 0000000 // 11111111 2222222222 // 0000000 0000000
    
```

```

11 44 11 7777777777 3333333333 44
111 444 111 7777777777 3333333333 444
1111 4444 // 1111 77 77 // 33 33 4444
11 44 44 // 11 77 // 33 33 44 44
11 44 44 // 11 77 // 33 33 44 44
11 44 44 // 11 77 // 33 33 44 44
11 4444444444 // 11 77 // 33 33 4444444444
11 4444444444 // 11 77 // 33 33 4444444444
11 44 // 11 77 // 33 33 44
11111111 44 // 11111111 77 // 333333333333 44
11111111 44 // 11111111 77 // 3333333333 44
    
```



-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

PROBLEM DESCRIPTION

IGR--GEOMETRY (0/1/2/3--INF MED/SLAB/CYL/SPHERE) 1  
IZM--NUMBER OF ZONES OR MATERIAL REGIONS 8  
MS--MIXING TABLE LENGTH 16  
IBL--SHIELDED CROSS SECTION EDIT OPTION (0/1--NO/YES) 0  
IBR--BONDARENKO FACTOR EDIT OPTION (0/1--NO/YES) 0  
ISSOPT--DANC OFF FACTOR OPTION 0  
CONVERGENCE CRITERION 1.00000E-03  
GEOMETRY CORRECTION FACTOR FOR WIGNER RATIONAL APPROXIMATION 1.000E+00

3Q ARRAY HAS 16 ENTRIES.  
4Q ARRAY HAS 16 ENTRIES.  
5Q ARRAY HAS 16 ENTRIES.  
6Q ARRAY HAS 8 ENTRIES.  
7Q ARRAY HAS 8 ENTRIES.  
8Q ARRAY HAS 8 ENTRIES.  
9Q ARRAY HAS 8 ENTRIES.  
10Q ARRAY HAS 16 ENTRIES.  
11Q ARRAY HAS 8 ENTRIES.

MIXING TABLE

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	1.66361E-03	1092235
2	1	92238	1.04847E-04	1092238
3	1	13027	1.54180E-02	1013027
4	2	13027	6.03066E-02	2013027
5	4	13027	6.03066E-02	4013027
6	3	1001	6.67692E-02	3001001
7	7	1001	6.67692E-22	7001001
8	8	1001	6.67692E-22	8001001
9	3	8016	3.33846E-02	3008016
10	7	8016	3.33846E-22	7008016
11	8	8016	3.33846E-22	8008016
12	5	24304	1.74286E-02	5024304
13	5	25055	1.73633E-03	5025055
14	5	26304	5.93579E-02	5026304
15	5	28304	7.72070E-03	5028304
16	6	82000	3.29690E-02	6082000

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	3.75000E-02	2.93000E+02	2.62093E+00	0
2	2	5.75000E-02	2.93000E+02	0.00000E+00	0
3	3	1.95950E-01	2.93000E+02	0.00000E+00	0
4	4	5.19595E+00	2.93000E+02	0.00000E+00	0
5	5	1.01959E+01	2.93000E+02	0.00000E+00	0
6	6	1.51959E+01	2.93000E+02	0.00000E+00	0
7	7	2.01959E+01	2.93000E+02	0.00000E+00	0
8	8	2.51959E+01	2.93000E+02	0.00000E+00	0

3609 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 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 8016 OXYGEN-16 FROM LOG 18 TO LOG 1 BONDARENKO TRIGGER 0  
 COPY 13027 AL-27 1193 218 G FROM LOG 11 TO LOG 18 BONDARENKO TRIGGER 0



---

COPY	13027	AL-27	1193	218	G	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	13027	AL-27	1193	218	G	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	13027	AL-27	1193	218	G	FROM LOG 18 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	82000	PB	1288	218	NGP	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 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89  
LAST UPDATED

08/12/94

L.M.PETRIE	-	ORNL			
TAPE ID		4321	NUMBER OF NUCLIDES		16
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 08/12/94	ID	3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID	7001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID	8001001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID	3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID	7008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID	8008016
AL-27 1193 218 GP 040375 (5)		UPDATED 08/12/94	ID	1013027
AL-27 1193 218 GP 040375 (5)		UPDATED 08/12/94	ID	2013027
AL-27 1193 218 GP 040375 (5)		UPDATED 08/12/94	ID	4013027
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID	5024304
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID	5025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID	5026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID	5028304
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID	6082000
URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID	1092235
URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	ID	1092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.17 SECONDS

```

KK      KK  EEEEEEEEEEE  NN      NN  0000000000      VV      VV
KK      KK  EEEEEEEEEEE  NNN     NN  0000000000000    VV      VV
KK      KK  EE           NNNN    NN  00           VV      VV
KK      KK  EE           NN NN   NN  00           VV      VV
KK      KK  EE           NN NN   NN  00           VV      VV
KK      KK  EE           NN NN   NN  00           VV      VV
KKKKKKK  EEEEEEEEE   NN  NN   NN  00           VV      VV
KKKKKKK  EEEEEEEEE   NN  NN   NN  00           VV      VV
KK      KK  EE           NN  NN   NN  00           VV      VV
KK      KK  EE           NN  NN   NN  00           VV      VV
KK      KK  EE           NN  NN   NN  00           VV      VV
KK      KK  EE           NN  NN   NN  00           VV      VV
KK      KK  EEEEEEEEEEE  NN      NN  0000000000000  VV      VV
KK      KK  EEEEEEEEEEE  NN      NN  00000000000    VV

```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      CC  CC      AA      AA  LL      EE           PP      PP  CC      CC
SS      CC  CC      AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE  PPPPPPPPPPP  CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL      EEEEEEEEE  PPPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL      EE           PP      PP  CC      CC
SS      CC  CC      AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC

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11      0000000  //      11      2222222222  //      0000000  0000000
111     00000000 //      111     22222222222  //      00000000  00000000
1111    00      00 //      1111   22      22  //      00      00  00      00
11      00      00 //      11      22      22  //      00      00  00      00
11      00      00 //      11      22      22  //      00      00  00      00
11      00      00 //      11      22      22  //      00      00  00      00
11      00      00 //      11      22      22  //      00      00  00      00
11      00      00 //      11      22      22  //      00      00  00      00
1111111  000000000 //      1111111  22222222222  //      000000000  000000000
1111111  0000000  //      1111111  22222222222  //      0000000  0000000

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11      44      11      7777777777  44      0000000
111     444     111     7777777777  444     000000000
1111    4444    1111   77      77  4444  00      00
11      44 44   11      77      77  44 44  00      00
11      44 44   11      77      77  44 44  00      00
11      44 44   11      77      77  44 44  00      00
11      44 44   11      77      77  44 44  00      00
11      4444444444  111  77      77  44444444444  00      00
11      4444444444  111  77      77  44444444444  00      00
11      44      11      77      77  44      00      00
1111111  44      1111111  77      77  44      000000000
1111111  44      1111111  77      77  44      0000000

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MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD =3.0E-05

MIXTURE =	1	DENSITY (G/CC) =	1.3815				
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE		
1013027	1.54180E-02	5.00014E-01	13027	26.9818	AL-27 1193 218 GP 040375(5)		UPDATED
08/12/94							
1092235	1.66361E-03	4.69986E-01	92235	235.0441	URANIUM-235 ENDF/B-IV MAT 1261		UPDATED
08/12/94							
1092238	1.04847E-04	2.99991E-02	92238	238.0510	URANIUM-238 ENDF/B-IV MAT 1262		UPDATED
08/12/94							
MIXTURE =	2	DENSITY (G/CC) =	2.7020				
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE		
2013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)		UPDATED
08/12/94							
MIXTURE =	3	DENSITY (G/CC) =	0.99817				
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE		
3001001	6.67692E-02	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED
08/12/94							
3008016	3.33846E-02	8.88074E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED
08/12/94							
MIXTURE =	4	DENSITY (G/CC) =	2.7020				
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE		
4013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)		UPDATED
08/12/94							
MIXTURE =	5	DENSITY (G/CC) =	7.9200				
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE		
5024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED
08/12/94							
5025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED
08/12/94							
5026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED
08/12/94							
5028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED
08/12/94							
MIXTURE =	6	DENSITY (G/CC) =	11.344				
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE		
6082000	3.29690E-02	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K		UPDATED
08/12/94							
MIXTURE =	7	DENSITY (G/CC) =	0.99817E-20				
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE		
7001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED
08/12/94							
7008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED
08/12/94							
MIXTURE =	8	DENSITY (G/CC) =	0.99817E-20				
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE		
8001001	6.67692E-22	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED
08/12/94							
8008016	3.33846E-22	8.88073E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED
08/12/94							

KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 3 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 7 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 8 WERE CORRECTED FOR BAD MOMENTS.

..... 0 IO'S WERE USED MIXING CROSS-SECTIONS .....

1-D CROSS SECTION ARRAY ID NUMBERS  
 1 2002 1452 27 16 1018

..... 0 IO'S WERE USED PREPARING THE CROSS SECTIONS .....



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***** ADDITIONAL INFORMATION *****
*****
*** NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          YES ***
*** NO. OF FISSION SPECTRUM SOURCE GROUP 1      GLOBAL ARRAY NUMBER          10 ***
*** NO. OF SCATTERING ANGLES IN XSECS   2      NUMBER OF UNITS IN THE GLOBAL X DIR.  1 ***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK 28      NUMBER OF UNITS IN THE GLOBAL Y DIR.  1 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK 21      NUMBER OF UNITS IN THE GLOBAL Z DIR.  10 ***
*** NUMBER OF MIXTURES USED              7      USE A GLOBAL REFLECTOR        YES ***
*** NUMBER OF BIAS ID'S USED             1      USE NESTED HOLES              YES ***
*** NUMBER OF DIFFERENTIAL ALBEDOS USED  0      NUMBER OF HOLES                34 ***
*** TOTAL INPUT GEOMETRY REGIONS         88      MAXIMUM HOLE NESTING LEVEL      2 ***
*** NUMBER OF GEOMETRY REGIONS USED      88      USE NESTED ARRAYS              YES ***
*** LARGEST GEOMETRY UNIT NUMBER         150     NUMBER OF ARRAYS USED           8 ***
*** LARGEST ARRAY NUMBER                  14      MAXIMUM ARRAY NESTING LEVEL      3 ***
***
*** +X BOUNDARY CONDITION                 MIR     -X BOUNDARY CONDITION          MIR ***
*** +Y BOUNDARY CONDITION                 MIR     -Y BOUNDARY CONDITION          MIR ***
*** +Z BOUNDARY CONDITION                 MIR     -Z BOUNDARY CONDITION          MIR ***
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REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			----- UNIT 1 -----					
MIDDLE FUEL PLATE CELL								
1 CUBOID	1	1	+X = 3.3000	-X = -3.3000	+Y = 3.75000E-02	-Y = -3.75000E-02	+Z = 56.700	-Z = 0.70000
2 CUBOID	2	1	+X = 3.3000	-X = -3.3000	+Y = 5.75000E-02	-Y = -5.75000E-02	+Z = 57.400	-Z = 0.00000
3 CUBOID	3	1	+X = 3.3000	-X = -3.3000	+Y = 0.19590	-Y = -0.19590	+Z = 57.400	-Z = 0.00000
			----- UNIT 2 -----					
TOP FUEL PLATE CELL								
1 CUBOID	1	1	+X = 3.3000	-X = -3.3000	+Y = 3.75000E-02	-Y = -3.75000E-02	+Z = 56.700	-Z = 0.70000
2 CUBOID	2	1	+X = 3.3000	-X = -3.3000	+Y = 5.75000E-02	-Y = -5.75000E-02	+Z = 57.400	-Z = 0.00000
3 CUBOID	3	1	+X = 3.3000	-X = -3.3000	+Y = 5.75000E-02	-Y = -0.19590	+Z = 57.400	-Z = 0.00000
			----- UNIT 3 -----					
BOTTOM FUEL PLATE CELL								
1 CUBOID	1	1	+X = 3.3000	-X = -3.3000	+Y = 3.75000E-02	-Y = -3.75000E-02	+Z = 56.700	-Z = 0.70000
2 CUBOID	2	1	+X = 3.3000	-X = -3.3000	+Y = 5.75000E-02	-Y = -5.75000E-02	+Z = 57.400	-Z = 0.00000
3 CUBOID	3	1	+X = 3.3000	-X = -3.3000	+Y = 0.19590	-Y = -5.75000E-02	+Z = 57.400	-Z = 0.00000
			----- UNIT 4 -----					
SIDE PLATE								
1 CUBOID	2	1	+X = 0.20000	-X = -0.20000	+Y = 3.7500	-Y = -3.7500	+Z = 57.400	-Z = 0.00000
			----- UNIT 10 EXTERNAL TO LATTICE 1 -----					
FUEL PATE ARRAY - PLATES IN 5/16 IN. WEB CENTER								
1 ARRAY NUMBER	1		+X = 3.3000	-X = -3.3000	+Y = 4.3658	-Y = -4.3688	+Z = 57.400	-Z = 0.00000
2 CUBOID	3	1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
HOLE NUMBER	1		AT X = -4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
HOLE NUMBER	2		AT X = 4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
3 CUBOID	5	1	+X = 4.7244	-X = -4.7244	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			-----	UNIT	11	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT								
1	ARRAY NUMBER	1	+X = 2.6314	-X = -3.9686	+Y = 4.3658	-Y = -4.3688	+Z = 57.400	-Z = 0.00000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	3	AT X = -4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	4	AT X = 4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.7244	-X = -4.7244	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	12	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT								
1	ARRAY NUMBER	1	+X = 3.9686	-X = -2.6314	+Y = 4.3658	-Y = -4.3688	+Z = 57.400	-Z = 0.00000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	5	AT X = -4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	6	AT X = 4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.7244	-X = -4.7244	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	20	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOF STACK								
1	ARRAY NUMBER	1	+X = 3.9686	-X = -2.6314	+Y = 4.3658	-Y = -4.3688	+Z = 57.400	-Z = 0.00000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	7	AT X = -4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	8	AT X = 4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.6736	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			-----	UNIT	21	EXTERNAL TO LATTICE	1	-----
FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK								
1	ARRAY NUMBER	1	+X = 2.6314	-X = -3.9686	+Y = 4.3658	-Y = -4.3688	+Z = 57.400	-Z = 0.00000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	9	AT X = -4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	10	AT X = 4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.3688	-X = -4.6736	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	30	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK								
1	ARRAY NUMBER	1	+X = 3.9686	-X = -2.6314	+Y = 4.3658	-Y = -4.3688	+Z = 57.400	-Z = 0.00000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	11	AT X = -4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	12	AT X = 4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.6736	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	31	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK								
1	ARRAY NUMBER	1	+X = 2.6314	-X = -3.9686	+Y = 4.3658	-Y = -4.3688	+Z = 57.400	-Z = 0.00000
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	13	AT X = -4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	14	AT X = 4.1687	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.3688	-X = -4.6736	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	40	EXTERNAL TO LATTICE	2	-----
2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES								
1	ARRAY NUMBER	2	+X = 9.0420	-X = -9.0428	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
2	CUBOID	5 1	+X = 9.3468	-X = -9.3476	+Y = 4.6736	-Y = -4.3688	+Z = 73.152	-Z = 0.00000

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
----- UNIT 41 EXTERNAL TO LATTICE 3 -----								
3 UNIT ARRAY WITH REST OF 5/16 WEB								
1 ARRAY NUMBER	3	+X = 14.173	-X = -14.174	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000	
2 CUBOID	5 1	+X = 14.528	-X = -14.529	+Y = 5.0800	-Y = -5.0800	+Z = 73.152	-Z = 0.00000	
----- UNIT 42 EXTERNAL TO LATTICE 4 -----								
2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES								
1 ARRAY NUMBER	4	+X = 9.0420	-X = -9.0428	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000	
2 CUBOID	5 1	+X = 9.3468	-X = -9.3476	+Y = 4.3688	-Y = -4.6736	+Z = 73.152	-Z = 0.00000	
----- UNIT 50 -----								
7 MTR ELEMENTS IN THE LWT								
1 CYLINDER	3 1	RADIUS = 17.050	+Z = 73.152	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
HOLE NUMBER	15	AT X = 0.00000	Y = 9.4489	Z = 0.00000	IS UNIT NUMBER	40		
HOLE NUMBER	16	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	41		
HOLE NUMBER	17	AT X = 0.00000	Y = -9.4489	Z = 0.00000	IS UNIT NUMBER	42		
2 CYLINDER	5 1	RADIUS = 18.891	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
3 CYLINDER	6 1	RADIUS = 33.496	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
4 CYLINDER	5 1	RADIUS = 36.544	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
5 CYLINDER	7 1	RADIUS = 49.244	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
6 CYLINDER	5 1	RADIUS = 49.854	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
7 CUBOID	8 1	+X = 49.854	-X = -49.854	+Y = 49.854	-Y = -49.854	+Z = 73.152	-Z = -1.2700	
----- UNIT 60 -----								
SIMPLIFIED LID STRUCTURE NAC-LWT								
1 CYLINDER	5 1	RADIUS = 36.519	+Z = 13.677	-Z = -14.135	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
2 CYLINDER	8 1	RADIUS = 49.854	+Z = 13.677	-Z = -14.135	CENTERLINE IS AT X = 0.00000	Y = 0.00000		
3 CUBOID	8 1	+X = 49.854	-X = -49.854	+Y = 49.854	-Y = -49.854	+Z = 13.677	-Z = -14.135	

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REGION          MEDIA BIAS          GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM
                NUM    ID

                ----- UNIT    61 -----

SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT

  1 CYLINDER      6  1  RADIUS = 26.353  +Z = 3.8100  -Z = -3.8100  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  2 CYLINDER      5  1  RADIUS = 36.619  +Z = 13.360  -Z = -12.700  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  3 CYLINDER      8  1  RADIUS = 49.854  +Z = 13.360  -Z = -12.700  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  4 CUBOID        8  1  +X = 49.854  -X = -49.854  +Y = 49.854  -Y = -49.854  +Z = 13.360  -Z = -12.700

                ----- UNIT    62 -----

THIN TOP AND BOTTOM SHELL OF NEUTRON SHIELD - SUBTRACTED FROM LID MODEL

  1 CYLINDER      5  1  RADIUS = 49.854  +Z = 0.61000  -Z = 0.00000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  2 CUBOID        8  1  +X = 49.854  -X = -49.854  +Y = 49.854  -Y = -49.854  +Z = 0.61000  -Z = 0.00000

                ***** GLOBAL *****
                ----- UNIT    70  EXTERNAL TO LATTICE 10 -----

STACK OF 6 BASKETS IN CASK WITH LID AND BOTTOM

  1 ARRAY NUMBER  10      +X = 49.854  -X = -49.854  +Y = 49.854  -Y = -49.854  +Z = 501.62  -Z = 0.00000

                ----- UNIT    110  EXTERNAL TO LATTICE 1 -----

FUEL PATE ARRAY - PLATES IN 5/16 IN. WEB CENTER

  1 ARRAY NUMBER  1      +X = 3.3000  -X = -3.3000  +Y = 4.3658  -Y = -4.3688  +Z = 73.152  -Z = 15.752
  2 CUBOID        3  1  +X = 4.3688  -X = -4.3688  +Y = 4.3688  -Y = -4.3688  +Z = 73.152  -Z = 0.00000
  HOLE NUMBER    18      AT X = -4.1687  Y = 0.00000  Z = 15.752  IS UNIT NUMBER  4
  HOLE NUMBER    19      AT X = 4.1697  Y = 0.00000  Z = 15.752  IS UNIT NUMBER  4
  3 CUBOID        5  1  +X = 4.7244  -X = -4.7244  +Y = 4.3688  -Y = -4.3688  +Z = 73.152  -Z = 0.00000

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REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			-----	UNIT	111	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT								
1	ARRAY NUMBER	1	+X = 2.6314	-X = -3.9686	+Y = 4.3658	-Y = -4.3688	+Z = 73.152	-Z = 15.752
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	20	AT X = -4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
	HOLE NUMBER	21	AT X = 4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.7244	-X = -4.7244	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	112	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT								
1	ARRAY NUMBER	1	+X = 3.9686	-X = -2.6314	+Y = 4.3658	-Y = -4.3688	+Z = 73.152	-Z = 15.752
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	22	AT X = -4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
	HOLE NUMBER	23	AT X = 4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.7244	-X = -4.7244	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	120	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK								
1	ARRAY NUMBER	1	+X = 3.9686	-X = -2.6314	+Y = 4.3658	-Y = -4.3688	+Z = 73.152	-Z = 15.752
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	24	AT X = -4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
	HOLE NUMBER	25	AT X = 4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.6736	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			-----	UNIT	121	EXTERNAL TO LATTICE	1	-----
FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK								
1	ARRAY NUMBER	1	+X = 2.6314	-X = -3.9686	+Y = 4.3658	-Y = -4.3688	+Z = 73.152	-Z = 15.752
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	26	AT X = -4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
	HOLE NUMBER	27	AT X = 4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.3688	-X = -4.6736	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	130	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK								
1	ARRAY NUMBER	1	+X = 3.9686	-X = -2.6314	+Y = 4.3658	-Y = -4.3688	+Z = 73.152	-Z = 15.752
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	28	AT X = -4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
	HOLE NUMBER	29	AT X = 4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.6736	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	131	EXTERNAL TO LATTICE	1	-----
FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK								
1	ARRAY NUMBER	1	+X = 2.6314	-X = -3.9686	+Y = 4.3658	-Y = -4.3688	+Z = 73.152	-Z = 15.752
2	CUBOID	3 1	+X = 4.3688	-X = -4.3688	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
	HOLE NUMBER	30	AT X = -4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
	HOLE NUMBER	31	AT X = 4.1687	Y = 0.00000	Z = 15.752	IS UNIT NUMBER	4	
3	CUBOID	5 1	+X = 4.3688	-X = -4.6736	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
			-----	UNIT	140	EXTERNAL TO LATTICE	12	-----
2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES								
1	ARRAY NUMBER	12	+X = 9.0420	-X = -9.0428	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
2	CUBOID	5 1	+X = 9.3468	-X = -9.3476	+Y = 4.6736	-Y = -4.3688	+Z = 73.152	-Z = 0.00000



REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
 NUM ID

----- UNIT 141 EXTERNAL TO LATTICE 13 -----

3 UNIT ARRAY WITH REST OF 5/16 WEB

1 ARRAY NUMBER	13	+X = 14.173	-X = -14.174	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
2 CUBOID	5 1	+X = 14.528	-X = -14.529	+Y = 5.0800	-Y = -5.0800	+Z = 73.152	-Z = 0.00000

----- UNIT 142 EXTERNAL TO LATTICE 14 -----

2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES

1 ARRAY NUMBER	14	+X = 9.0420	-X = -9.0428	+Y = 4.3688	-Y = -4.3688	+Z = 73.152	-Z = 0.00000
2 CUBOID	5 1	+X = 9.3468	-X = -9.3476	+Y = 4.3688	-Y = -4.6736	+Z = 73.152	-Z = 0.00000

----- UNIT 150 -----

7 MTR ELEMENTS IN THE LWT

1 CYLINDER	3 1	RADIUS = 17.050	+Z = 73.152	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	32	AT X = 0.00000	Y = 9.4489	Z = 0.00000	IS UNIT NUMBER	140	
HOLE NUMBER	33	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	141	
HOLE NUMBER	34	AT X = 0.00000	Y = -9.4489	Z = 0.00000	IS UNIT NUMBER	142	
2 CYLINDER	5 1	RADIUS = 18.891	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CYLINDER	6 1	RADIUS = 33.496	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4 CYLINDER	5 1	RADIUS = 36.544	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
5 CYLINDER	7 1	RADIUS = 49.244	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
6 CYLINDER	5 1	RADIUS = 49.854	+Z = 73.152	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
7 CUBOID	8 1	+X = 49.854	-X = -49.854	+Y = 49.854	-Y = -49.854	+Z = 73.152	-Z = -1.2700



----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 3 -----  
Z LAYER 1, X COLUMN 1 TO 3 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
12 10 11

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 4 -----  
Z LAYER 1, X COLUMN 1 TO 2 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
30 31

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 10 -----

Z LAYER	1, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
61						
Z LAYER	2, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
62						
Z LAYER	3, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
150						
Z LAYER	4, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
50						
Z LAYER	5, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
150						
Z LAYER	6, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
50						
Z LAYER	7, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
150						
Z LAYER	8, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
50						
Z LAYER	9, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
62						
Z LAYER	10, X COLUMN	1 TO	1 LEFT TO RIGHT	Y ROW	1 TO	1 BOTTOM TO TOP
60						

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 12 -----  
Z LAYER 1, X COLUMN 1 TO 2 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
120 121

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 13 -----  
Z LAYER 1, X COLUMN 1 TO 3 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
112 110 111

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 14 -----  
Z LAYER 1, X COLUMN 1 TO 2 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
130 131

VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	2.77200E+01 CM**3	2.77200E+01 CM**3
	2	2	1.58466E+01 CM**3	4.35666E+01 CM**3
	3	3	1.04863E+02 CM**3	1.48430E+02 CM**3
2	1	4	2.77200E+01 CM**3	2.77200E+01 CM**3
	2	5	1.58466E+01 CM**3	4.35666E+01 CM**3
	3	6	5.24315E+01 CM**3	9.59981E+01 CM**3
3	1	7	2.77200E+01 CM**3	2.77200E+01 CM**3
	2	8	1.58466E+01 CM**3	4.35666E+01 CM**3
	3	9	5.24315E+01 CM**3	9.59981E+01 CM**3
4	1	10	1.72200E+02 CM**3	1.72200E+02 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 11 IS AN ARRAY PLACEMENT BOUNDARY REGION				
10	1	11	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	12	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	13	4.54580E+02 CM**3	6.03942E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 14 IS AN ARRAY PLACEMENT BOUNDARY REGION				
11	1	14	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	15	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	16	4.54580E+02 CM**3	6.03942E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 17 IS AN ARRAY PLACEMENT BOUNDARY REGION				
12	1	17	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	18	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	19	4.54580E+02 CM**3	6.03942E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 20 IS AN ARRAY PLACEMENT BOUNDARY REGION				
20	1	20	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	21	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	22	1.94820E+02 CM**3	5.77966E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 23 IS AN ARRAY PLACEMENT BOUNDARY REGION				
21	1	23	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	24	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	25	1.94820E+02 CM**3	5.77966E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 26 IS AN ARRAY PLACEMENT BOUNDARY REGION				
30	1	26	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	27	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	28	1.94820E+02 CM**3	5.77966E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 29 IS AN ARRAY PLACEMENT BOUNDARY REGION				
31	1	29	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	30	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	31	1.94820E+02 CM**3	5.77966E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 32 IS AN ARRAY PLACEMENT BOUNDARY REGION				
40	1	32	1.15593E+04 CM**3	1.15593E+04 CM**3
	2	33	8.06464E+02 CM**3	1.23658E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 34 IS AN ARRAY PLACEMENT BOUNDARY REGION				
41	1	34	1.81183E+04 CM**3	1.81183E+04 CM**3
	2	35	3.47806E+03 CM**3	2.15963E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 36 IS AN ARRAY PLACEMENT BOUNDARY REGION				
42	1	36	1.15593E+04 CM**3	1.15593E+04 CM**3
	2	37	8.06464E+02 CM**3	1.23658E+04 CM**3
50	1	38	2.04796E+04 CM**3	6.68074E+04 CM**3
	2	39	1.66327E+04 CM**3	8.34401E+04 CM**3
	3	40	1.78888E+05 CM**3	2.62328E+05 CM**3
	4	41	4.99123E+04 CM**3	3.12241E+05 CM**3
	5	42	2.54733E+05 CM**3	5.66974E+05 CM**3
	6	43	1.41241E+04 CM**3	5.81098E+05 CM**3
	7	44	1.58779E+05 CM**3	7.39877E+05 CM**3
60	1	79	1.16526E+05 CM**3	1.16526E+05 CM**3
	2	80	1.00639E+05 CM**3	2.17165E+05 CM**3
	3	81	5.93381E+04 CM**3	2.76503E+05 CM**3
61	1	82	1.66245E+04 CM**3	1.66245E+04 CM**3
	2	83	9.31579E+04 CM**3	1.09782E+05 CM**3
	3	84	9.36980E+04 CM**3	2.03480E+05 CM**3
	4	85	5.55989E+04 CM**3	2.59079E+05 CM**3
62	1	96	4.76297E+03 CM**3	4.76297E+03 CM**3

	2	87	1.30143E+03 CM**3	6.06440E+03 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 88 IS AN ARRAY PLACEMENT BOUNDARY REGION			
70	1	88	4.98697E+06 CM**3	4.98697E+06 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 45 IS AN ARRAY PLACEMENT BOUNDARY REGION			
110	1	45	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	46	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	47	4.54580E+02 CM**3	6.03942E+03 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 48 IS AN ARRAY PLACEMENT BOUNDARY REGION			
111	1	48	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	49	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	50	4.54580E+02 CM**3	6.03942E+03 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 51 IS AN ARRAY PLACEMENT BOUNDARY REGION			
112	1	51	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	52	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	53	4.54580E+02 CM**3	6.03942E+03 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 54 IS AN ARRAY PLACEMENT BOUNDARY REGION			
120	1	54	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	55	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	56	1.94820E+02 CM**3	5.77966E+03 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 57 IS AN ARRAY PLACEMENT BOUNDARY REGION			
121	1	57	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	58	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	59	1.94820E+02 CM**3	5.77966E+03 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 60 IS AN ARRAY PLACEMENT BOUNDARY REGION			
130	1	60	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	61	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	62	1.94820E+02 CM**3	5.77966E+03 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 63 IS AN ARRAY PLACEMENT BOUNDARY REGION			
131	1	63	3.30902E+03 CM**3	3.30902E+03 CM**3
	2	64	1.93142E+03 CM**3	5.58484E+03 CM**3
	3	65	1.94820E+02 CM**3	5.77966E+03 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 66 IS AN ARRAY PLACEMENT BOUNDARY REGION			
140	1	66	1.15593E+04 CM**3	1.15593E+04 CM**3
	2	67	8.06464E+02 CM**3	1.23658E+04 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 66 IS AN ARRAY PLACEMENT BOUNDARY REGION			
141	1	68	1.81183E+04 CM**3	1.81183E+04 CM**3
	2	69	3.47806E+03 CM**3	2.15963E+04 CM**3
SURROUNDING	GEOMETRY VOLUMES - GEOMETRY REGION 70 IS AN ARRAY PLACEMENT BOUNDARY REGION			
142	1	70	1.15593E+04 CM**3	1.15593E+04 CM**3
	2	71	8.06464E+02 CM**3	1.23658E+04 CM**3
150	1	72	2.04796E+04 CM**3	6.68074E+04 CM**3
	2	73	1.66327E+04 CM**3	8.34401E+04 CM**3
	3	74	1.78888E+05 CM**3	2.62328E+05 CM**3
	4	75	4.99133E+04 CM**3	3.12241E+05 CM**3
	5	76	2.54733E+05 CM**3	5.66974E+05 CM**3
	6	77	1.41241E+04 CM**3	5.81098E+05 CM**3
	7	78	1.58779E+05 CM**3	7.39877E+05 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	882	1	1	2.44490E+04 CM**3
		2	2	1.39767E+04 CM**3
		3	3	9.24891E+04 CM**3
2	42	1	1	1.16424E+03 CM**3
		2	2	6.65557E+02 CM**3
		3	3	2.20212E+03 CM**3
3	42	1	1	1.16424E+03 CM**3
		2	2	6.65557E+02 CM**3
		3	3	2.20212E+03 CM**3
4	84	1	2	1.44648E+04 CM**3
10	3	1	1	9.92705E+03 CM**3
		2	3	5.79427E+03 CM**3
		3	5	1.36374E+03 CM**3
11	3	1	1	9.92705E+03 CM**3
		2	3	5.79427E+03 CM**3

			3	5	1.36374E+03 CM**3
12	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		1.36374E+03 CM**3
20	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		5.84459E+02 CM**3
21	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		5.84459E+02 CM**3
30	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		5.84459E+02 CM**3
31	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		5.84459E+02 CM**3
40	3	1			3.46779E+04 CM**3
		2	5		2.41939E+03 CM**3
41	3	1			5.43548E+04 CM**3
		2	5		1.04342E+04 CM**3
42	3	1			3.46779E+04 CM**3
		2	5		2.41939E+03 CM**3
50	3	1	3		6.14387E+04 CM**3
		2	5		4.98980E+04 CM**3
		3	6		5.36664E+05 CM**3
		4	5		1.49740E+05 CM**3
		5	7		7.64198E+05 CM**3
		6	5		4.23722E+04 CM**3
		7	8		4.76337E+05 CM**3
60	1	1	5		1.16526E+05 CM**3
		2	8		1.00639E+05 CM**3
		3	8		5.93381E+04 CM**3
61	1	1	6		1.66245E+04 CM**3
		2	5		9.31579E+04 CM**3
		3	8		9.36980E+04 CM**3
		4	8		5.55989E+04 CM**3
62	2	1	5		9.52594E+03 CM**3
		2	8		2.60286E+03 CM**3
70	1	1			4.98697E+06 CM**3
110	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		1.36374E+03 CM**3
111	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		1.36374E+03 CM**3
112	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		1.36374E+03 CM**3
120	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		5.84459E+02 CM**3
121	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		5.84459E+02 CM**3
130	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		5.84459E+02 CM**3
131	3	1			9.92705E+03 CM**3
		2	3		5.79427E+03 CM**3
		3	5		5.84459E+02 CM**3
140	3	1			3.46779E+04 CM**3
		2	5		2.41939E+03 CM**3
141	3	1			5.43548E+04 CM**3
		2	5		1.04342E+04 CM**3
142	3	1			3.46779E+04 CM**3
		2	5		2.41939E+03 CM**3
150	3	1	3		6.14387E+04 CM**3
		2	5		4.98980E+04 CM**3
		3	6		5.36664E+05 CM**3
		4	5		1.49740E+05 CM**3
		5	7		7.64198E+05 CM**3



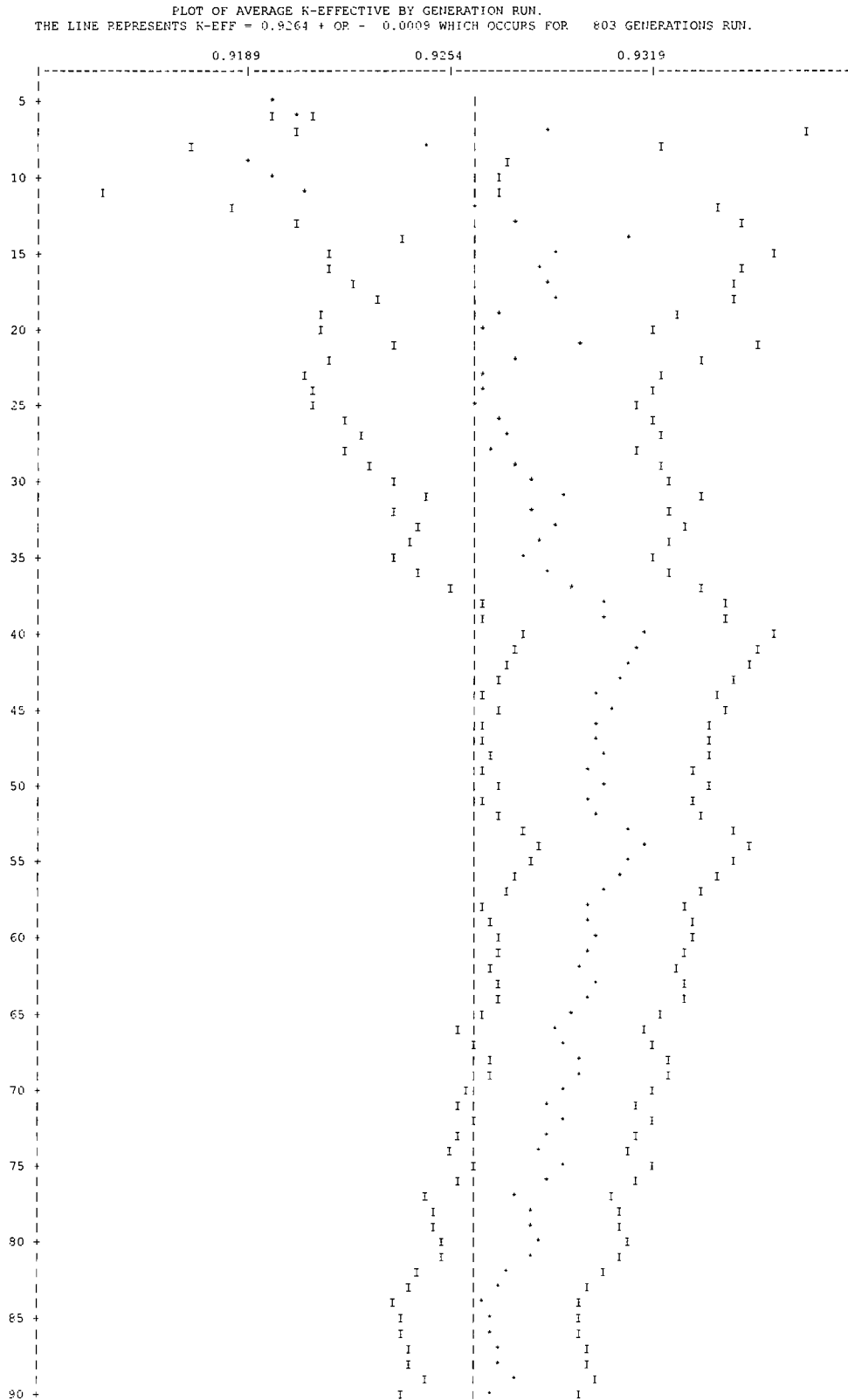


GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
KENO MESSAGE NUMBER K5-132	1	9.05782E-01	4.51683E+00	1.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	2	9.10251E-01	4.52683E+00	1.00000E+00	0.00000E+00	0.00000E+00
	3	8.90695E-01	4.53683E+00	8.90695E-01	0.00000E+00	0.00000E+00
	4	9.19914E-01	4.54700E+00	9.05304E-01	1.46094E-02	0.00000E+00
	5	9.19734E-01	4.55700E+00	9.10114E-01	9.70976E-03	0.00000E+00
	6	9.21886E-01	4.56617E+00	9.13057E-01	7.47003E-03	0.00000E+00
	7	9.53605E-01	4.57633E+00	9.21167E-01	9.96223E-03	0.00000E+00
	8	9.08830E-01	4.58550E+00	9.19111E-01	8.38999E-03	0.00000E+00
	9	8.89421E-01	4.59633E+00	9.14869E-01	8.26250E-03	0.00000E+00
	10	9.25939E-01	4.60550E+00	9.16253E-01	7.28810E-03	0.00000E+00
	11	9.27039E-01	4.61567E+00	9.17451E-01	6.53828E-03	0.00000E+00
	12	9.70198E-01	4.62483E+00	9.22726E-01	7.87535E-03	0.00000E+00
	13	9.40410E-01	4.63483E+00	9.24334E-01	7.30267E-03	0.00000E+00
	14	9.66821E-01	4.64400E+00	9.27874E-01	7.54829E-03	0.00000E+00
	15	9.03005E-01	4.65400E+00	9.25961E-01	7.20213E-03	0.00000E+00
	16	9.21764E-01	4.66417E+00	9.25662E-01	6.67462E-03	0.00000E+00
	17	9.31197E-01	4.67417E+00	9.26031E-01	6.22468E-03	0.00000E+00
	18	9.35219E-01	4.68333E+00	9.26605E-01	5.85090E-03	0.00000E+00
	19	8.98210E-01	4.69350E+00	9.24935E-01	5.74417E-03	0.00000E+00
	20	9.19709E-01	4.70350E+00	9.24644E-01	5.42344E-03	0.00000E+00
	21	9.81539E-01	4.71267E+00	9.27639E-01	5.94005E-03	0.00000E+00
	22	8.89901E-01	4.72267E+00	9.25752E-01	5.94273E-03	0.00000E+00
	23	9.08486E-01	4.73283E+00	9.24930E-01	5.71215E-03	0.00000E+00
	24	9.24379E-01	4.74283E+00	9.24905E-01	5.44638E-03	0.00000E+00
	25	9.22234E-01	4.75200E+00	9.24788E-01	5.20549E-03	0.00000E+00
	26	9.44589E-01	4.76117E+00	9.25613E-01	5.05170E-03	0.00000E+00
	27	9.35349E-01	4.77133E+00	9.26003E-01	4.86105E-03	0.00000E+00
	28	9.10675E-01	4.78133E+00	9.25413E-01	4.70740E-03	0.00000E+00
	29	9.48476E-01	4.79133E+00	9.26268E-01	4.60954E-03	0.00000E+00
	30	9.44440E-01	4.80050E+00	9.26917E-01	4.48903E-03	0.00000E+00
	31	9.54902E-01	4.81067E+00	9.27882E-01	4.43766E-03	0.00000E+00
	32	8.96797E-01	4.82067E+00	9.26845E-01	4.41062E-03	0.00000E+00
	33	9.50450E-01	4.82983E+00	9.27607E-01	4.33340E-03	0.00000E+00
	34	9.13527E-01	4.83983E+00	9.27167E-01	4.21880E-03	0.00000E+00
	35	9.14272E-01	4.85000E+00	9.26776E-01	4.10759E-03	0.00000E+00
	36	9.52428E-01	4.85917E+00	9.27531E-01	4.05573E-03	0.00000E+00
761	9.21736E-01	1.19400E+01	9.26718E-01	9.64740E-04	0.00000E+00	0.00000E+00
762	9.02916E-01	1.19500E+01	9.26687E-01	9.63979E-04	0.00000E+00	0.00000E+00
763	9.20364E-01	1.19600E+01	9.26679E-01	9.62747E-04	0.00000E+00	0.00000E+00
764	9.33754E-01	1.19692E+01	9.26688E-01	9.61528E-04	0.00000E+00	0.00000E+00
765	9.07859E-01	1.19793E+01	9.26663E-01	9.60584E-04	0.00000E+00	0.00000E+00
766	9.41903E-01	1.19893E+01	9.26683E-01	9.59533E-04	0.00000E+00	0.00000E+00
767	9.23249E-01	1.19995E+01	9.26679E-01	9.58289E-04	0.00000E+00	0.00000E+00
768	8.95873E-01	1.20095E+01	9.26638E-01	9.57881E-04	0.00000E+00	0.00000E+00
769	9.44687E-01	1.20197E+01	9.26662E-01	9.56921E-04	0.00000E+00	0.00000E+00
770	8.95803E-01	1.20287E+01	9.26622E-01	9.56519E-04	0.00000E+00	0.00000E+00
771	9.40899E-01	1.20388E+01	9.26640E-01	9.55454E-04	0.00000E+00	0.00000E+00
772	9.03765E-01	1.20480E+01	9.26611E-01	9.54675E-04	0.00000E+00	0.00000E+00
773	8.97725E-01	1.20580E+01	9.26573E-01	9.54172E-04	0.00000E+00	0.00000E+00
774	9.07220E-01	1.20672E+01	9.26548E-01	9.53265E-04	0.00000E+00	0.00000E+00
775	9.50358E-01	1.20773E+01	9.26575E-01	9.52529E-04	0.00000E+00	0.00000E+00
776	9.05261E-01	1.20873E+01	9.26551E-01	9.51696E-04	0.00000E+00	0.00000E+00
777	9.27807E-01	1.20965E+01	9.26553E-01	9.50469E-04	0.00000E+00	0.00000E+00
778	9.42900E-01	1.21065E+01	9.26574E-01	9.49477E-04	0.00000E+00	0.00000E+00
779	9.41042E-01	1.21167E+01	9.26593E-01	9.48437E-04	0.00000E+00	0.00000E+00
780	9.23276E-01	1.21267E+01	9.26588E-01	9.47227E-04	0.00000E+00	0.00000E+00
781	8.90843E-01	1.21368E+01	9.26543E-01	9.47122E-04	0.00000E+00	0.00000E+00
782	9.24456E-01	1.21458E+01	9.26540E-01	9.45911E-04	0.00000E+00	0.00000E+00
783	9.37806E-01	1.21560E+01	9.26554E-01	9.44809E-04	0.00000E+00	0.00000E+00
784	9.00231E-01	1.21660E+01	9.26521E-01	9.44200E-04	0.00000E+00	0.00000E+00
785	9.60546E-01	1.21762E+01	9.26564E-01	9.43994E-04	0.00000E+00	0.00000E+00
786	9.24507E-01	1.21853E+01	9.26561E-01	9.42793E-04	0.00000E+00	0.00000E+00
787	9.09256E-01	1.21953E+01	9.26539E-01	9.41849E-04	0.00000E+00	0.00000E+00
788	9.19815E-01	1.22053E+01	9.26531E-01	9.40689E-04	0.00000E+00	0.00000E+00
789	9.16692E-01	1.22155E+01	9.26518E-01	9.39576E-04	0.00000E+00	0.00000E+00
790	9.34050E-01	1.22255E+01	9.26528E-01	9.38432E-04	0.00000E+00	0.00000E+00
791	9.28294E-01	1.22347E+01	9.26530E-01	9.37244E-04	0.00000E+00	0.00000E+00
792	9.51657E-01	1.22448E+01	9.26562E-01	9.36597E-04	0.00000E+00	0.00000E+00
793	9.43198E-01	1.22548E+01	9.26583E-01	9.35649E-04	0.00000E+00	0.00000E+00
794	9.30817E-01	1.22640E+01	9.26588E-01	9.34482E-04	0.00000E+00	0.00000E+00
795	8.90619E-01	1.22740E+01	9.26542E-01	9.34045E-04	0.00000E+00	0.00000E+00
796	9.10460E-01	1.22832E+01	9.26523E-01	9.33447E-04	0.00000E+00	0.00000E+00
797	8.97591E-01	1.22933E+01	9.26486E-01	9.32982E-04	0.00000E+00	0.00000E+00
798	9.08117E-01	1.23033E+01	9.26463E-01	9.32095E-04	0.00000E+00	0.00000E+00
799	9.07942E-01	1.23135E+01	9.26440E-01	9.31215E-04	0.00000E+00	0.00000E+00
800	9.21666E-01	1.23227E+01	9.26434E-01	9.30066E-04	0.00000E+00	0.00000E+00
801	9.31197E-01	1.23327E+01	9.26440E-01	9.28921E-04	0.00000E+00	0.00000E+00
802	9.30922E-01	1.23427E+01	9.26446E-01	9.27776E-04	0.00000E+00	0.00000E+00
803	8.88743E-01	1.23528E+01	9.26399E-01	9.27811E-04	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123 EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

LIFETIME = 7.96468E-05 + OR - 1.28891E-07      GENERATION TIME = 3.85994E-05 + OR - 6.32864E-08  
 NU BAR = 2.42036E+00 + OR - 1.14075E-05      AVERAGE FISSION GROUP = 2.34826E+01 + OR - 4.40629E-03  
 ENERGY(EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 6.75831E-02 + OR - 2.21596E-04

NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	55 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
3	0.92644	+ OR - 0.00093	0.92552 TO 0.92737	0.92459 TO 0.92830	0.92366 TO 0.92923	800000
4	0.92645	+ OR - 0.00093	0.92552 TO 0.92738	0.92459 TO 0.92831	0.92366 TO 0.92924	799000
5	0.92646	+ OR - 0.00093	0.92553 TO 0.92739	0.92460 TO 0.92832	0.92367 TO 0.92925	798000
6	0.92647	+ OR - 0.00093	0.92553 TO 0.92740	0.92460 TO 0.92833	0.92367 TO 0.92926	797000
7	0.92643	+ OR - 0.00093	0.92550 TO 0.92736	0.92457 TO 0.92830	0.92364 TO 0.92923	796000
8	0.92645	+ OR - 0.00093	0.92552 TO 0.92739	0.92459 TO 0.92832	0.92366 TO 0.92925	795000
9	0.92650	+ OR - 0.00093	0.92557 TO 0.92743	0.92463 TO 0.92837	0.92370 TO 0.92930	794000
10	0.92650	+ OR - 0.00093	0.92557 TO 0.92743	0.92463 TO 0.92837	0.92370 TO 0.92930	793000
11	0.92650	+ OR - 0.00094	0.92557 TO 0.92744	0.92463 TO 0.92837	0.92369 TO 0.92931	792000
12	0.92644	+ OR - 0.00093	0.92551 TO 0.92738	0.92458 TO 0.92831	0.92364 TO 0.92925	791000
17	0.92641	+ OR - 0.00094	0.92547 TO 0.92734	0.92453 TO 0.92828	0.92359 TO 0.92922	786000
22	0.92642	+ OR - 0.00094	0.92548 TO 0.92735	0.92454 TO 0.92829	0.92360 TO 0.92923	781000
27	0.92641	+ OR - 0.00095	0.92547 TO 0.92736	0.92452 TO 0.92830	0.92358 TO 0.92925	776000
32	0.92638	+ OR - 0.00095	0.92543 TO 0.92733	0.92448 TO 0.92828	0.92353 TO 0.92923	771000
37	0.92631	+ OR - 0.00095	0.92535 TO 0.92726	0.92440 TO 0.92821	0.92345 TO 0.92916	766000
42	0.92620	+ OR - 0.00095	0.92524 TO 0.92715	0.92429 TO 0.92811	0.92333 TO 0.92906	761000
702	0.92470	+ OR - 0.00219	0.92251 TO 0.92689	0.92032 TO 0.92908	0.91813 TO 0.93127	101000
707	0.92432	+ OR - 0.00223	0.92209 TO 0.92655	0.91987 TO 0.92877	0.91764 TO 0.93100	96000
712	0.92431	+ OR - 0.00229	0.92202 TO 0.92660	0.91973 TO 0.92889	0.91744 TO 0.93118	91000
717	0.92428	+ OR - 0.00233	0.92195 TO 0.92661	0.91962 TO 0.92894	0.91729 TO 0.93127	86000
722	0.92525	+ OR - 0.00238	0.92288 TO 0.92763	0.92050 TO 0.93001	0.91812 TO 0.93239	81000
727	0.92385	+ OR - 0.00240	0.92145 TO 0.92625	0.91905 TO 0.92865	0.91665 TO 0.93105	76000
732	0.92456	+ OR - 0.00252	0.92204 TO 0.92708	0.91952 TO 0.92960	0.91700 TO 0.93212	71000
737	0.92459	+ OR - 0.00268	0.92191 TO 0.92727	0.91924 TO 0.92995	0.91656 TO 0.93263	66000
742	0.92491	+ OR - 0.00280	0.92211 TO 0.92772	0.91930 TO 0.93052	0.91650 TO 0.93332	61000
747	0.92537	+ OR - 0.00300	0.92237 TO 0.92837	0.91936 TO 0.93138	0.91636 TO 0.93438	56000
752	0.92380	+ OR - 0.00316	0.92064 TO 0.92657	0.91747 TO 0.93013	0.91431 TO 0.93329	51000
757	0.92301	+ OR - 0.00305	0.91996 TO 0.92605	0.91691 TO 0.92910	0.91387 TO 0.93214	46000
762	0.92105	+ OR - 0.00296	0.91809 TO 0.92401	0.91514 TO 0.92697	0.91218 TO 0.92993	41000
767	0.92045	+ OR - 0.00328	0.91716 TO 0.92373	0.91388 TO 0.92701	0.91060 TO 0.93029	36000
772	0.92113	+ OR - 0.00345	0.91768 TO 0.92458	0.91423 TO 0.92803	0.91079 TO 0.93147	31000
777	0.92179	+ OR - 0.00375	0.91804 TO 0.92555	0.91429 TO 0.92930	0.91054 TO 0.93305	26000
782	0.92115	+ OR - 0.00419	0.91696 TO 0.92534	0.91278 TO 0.92952	0.90859 TO 0.93371	21000
787	0.91949	+ OR - 0.00452	0.91497 TO 0.92400	0.91045 TO 0.92852	0.90593 TO 0.93304	16000
792	0.91466	+ OR - 0.00548	0.90918 TO 0.92015	0.90369 TO 0.92563	0.89821 TO 0.93112	11000
797	0.91476	+ OR - 0.00670	0.90806 TO 0.92146	0.90137 TO 0.92816	0.89467 TO 0.93486	6000



740 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
745 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
750 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
755 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
760 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
765 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
770 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
775 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
780 +	I		*	I
	I		*	I
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785 +	I		*	I
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790 +	I		*	I
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795 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I
800 +	I		*	I
	I		*	I
	I		*	I
	I		*	I
	I		*	I

SKIPPING 3 GENERATIONS									
GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0003			2.76261E-04	3.3995	1.43894E-03	0.9898	0.00000E+00	0.0000
2	0.0014			1.33374E-03	1.0362	3.28433E-03	0.3305	0.00000E+00	0.0000
3	0.0018			1.64813E-03	0.8673	1.11443E-03	0.5432	0.00000E+00	0.0000
4	0.0010			9.43052E-04	1.1806	5.85020E-04	0.8038	0.00000E+00	0.0000
5	0.0014			1.30958E-03	0.9350	1.06813E-03	0.5493	0.00000E+00	0.0000
6	0.0019			1.76704E-03	0.6925	2.84069E-03	0.3908	0.00000E+00	0.0000
7	0.0019			1.78654E-03	0.7230	4.80578E-03	0.4113	0.00000E+00	0.0000
8	0.0020			1.85710E-03	1.0723	4.17631E-03	0.4801	0.00000E+00	0.0000
9	0.0028			2.60413E-03	1.1712	4.65358E-03	0.4959	0.00000E+00	0.0000
10	0.0059			5.50223E-03	1.1171	1.10633E-02	0.4949	0.00000E+00	0.0000
11	0.0131			1.21635E-02	0.9260	1.68813E-02	0.4983	0.00000E+00	0.0000
12	0.0178			1.65352E-02	0.8811	1.73134E-02	0.5908	0.00000E+00	0.0000
13	0.0170			1.57646E-02	0.8717	2.10273E-02	0.5340	0.00000E+00	0.0000
14	0.0146			1.35151E-02	0.9027	2.44601E-02	0.4544	0.00000E+00	0.0000
15	0.0029			2.67349E-03	1.8035	1.08525E-02	0.5227	0.00000E+00	0.0000
16	0.0019			1.74669E-03	2.6311	6.41294E-03	0.6061	0.00000E+00	0.0000
17	0.0032			2.93053E-03	2.3384	4.27639E-03	0.9743	0.00000E+00	0.0000
18	0.0041			3.80840E-03	2.4299	4.25856E-03	1.1451	0.00000E+00	0.0000
19	0.0051			4.75188E-03	2.0026	6.74256E-03	0.7563	0.00000E+00	0.0000
20	0.0209			1.93777E-02	0.9376	2.47722E-02	0.4593	0.00000E+00	0.0000
21	0.0119			1.10034E-02	1.3987	1.10177E-02	0.7502	0.00000E+00	0.0000
22	0.0286			2.65082E-02	0.8958	2.53200E-02	0.5355	0.00000E+00	0.0000
23	0.1058			9.80401E-02	0.4254	1.01658E-01	0.2336	0.00000E+00	0.0000
24	0.2177			2.01695E-01	0.2852	2.10402E-01	0.1515	0.00000E+00	0.0000
25	0.1894			1.75473E-01	0.3129	1.80973E-01	0.1588	0.00000E+00	0.0000
26	0.2376			2.20153E-01	0.2780	2.23276E-01	0.1535	0.00000E+00	0.0000
27	0.0877			8.12749E-02	0.4616	7.72601E-02	0.2863	0.00000E+00	0.0000
SYSTEM TOTAL =				9.26443E-01	0.1002	1.00194E+00	0.0216	0.00000E+00	0.0000
ELAPSED TIME 12.35367 MINUTES									
RANDOM NUMBER= 653C16DB7132									

FREQUENCY FOR GENERATIONS 4 TO 803

0.8243 TO 0.8292	*
0.8292 TO 0.8341	*
0.8341 TO 0.8390	*
0.8390 TO 0.8439	*
0.8439 TO 0.8487	*
0.8487 TO 0.8536	*
0.8536 TO 0.8585	**
0.8585 TO 0.8634	***
0.8634 TO 0.8683	*
0.8683 TO 0.8732	****
0.8732 TO 0.8781	*****
0.8781 TO 0.8830	*****
0.8830 TO 0.8878	*****
0.8878 TO 0.8927	*****
0.8927 TO 0.8976	*****
0.8976 TO 0.9025	*****
0.9025 TO 0.9074	*****
0.9074 TO 0.9123	*****
0.9123 TO 0.9172	*****
0.9172 TO 0.9220	*****
0.9220 TO 0.9269	*****
0.9269 TO 0.9318	*****
0.9318 TO 0.9367	*****
0.9367 TO 0.9416	*****
0.9416 TO 0.9465	*****
0.9465 TO 0.9514	*****
0.9514 TO 0.9563	*****
0.9563 TO 0.9611	*****
0.9611 TO 0.9660	*****
0.9660 TO 0.9709	*****
0.9709 TO 0.9758	*****
0.9758 TO 0.9807	*****
0.9807 TO 0.9856	***
0.9856 TO 0.9905	****
0.9905 TO 0.9954	***
0.9954 TO 1.0002	*
1.0002 TO 1.0051	*
1.0051 TO 1.0100	*

```
FREQUENCY FOR GENERATIONS 204 TO 803  
0.8243 TO 0.8292 *  
0.8292 TO 0.8341 *  
0.8341 TO 0.8390 *  
0.8390 TO 0.8439 *  
0.8439 TO 0.8487 *  
0.8487 TO 0.8536 **  
0.8536 TO 0.8585 ***  
0.8585 TO 0.8634 *  
0.8634 TO 0.8683 ****  
0.8683 TO 0.8732 *****  
0.8732 TO 0.8781 *  
0.8781 TO 0.8830 *  
0.8830 TO 0.8878 *  
0.8878 TO 0.8927 *  
0.8927 TO 0.8976 *  
0.8976 TO 0.9025 *  
0.9025 TO 0.9074 *  
0.9074 TO 0.9123 *  
0.9123 TO 0.9172 *  
0.9172 TO 0.9220 *  
0.9220 TO 0.9269 *  
0.9269 TO 0.9318 *  
0.9318 TO 0.9367 *  
0.9367 TO 0.9416 *  
0.9416 TO 0.9465 *  
0.9465 TO 0.9514 *  
0.9514 TO 0.9563 *  
0.9563 TO 0.9611 *  
0.9611 TO 0.9660 *  
0.9660 TO 0.9709 *  
0.9709 TO 0.9758 *  
0.9758 TO 0.9807 *  
0.9807 TO 0.9856 *  
0.9856 TO 0.9905 *  
0.9905 TO 0.9954 *  
0.9954 TO 1.0002 *  
1.0002 TO 1.0051 *  
1.0051 TO 1.0100 *
```



FREQUENCY FOR GENERATIONS 404 TO 803

```
0.8243 TO 0.8292 *
0.8292 TO 0.8341 *
0.8341 TO 0.8390 *
0.8390 TO 0.8439 *
0.8439 TO 0.8487 *
0.8487 TO 0.8536 **
0.8536 TO 0.8585 *
0.8585 TO 0.8634 *
0.8634 TO 0.8683 ***
0.8683 TO 0.8732 ***
0.8732 TO 0.8781 *****
0.8781 TO 0.8830 *****
0.8830 TO 0.8878 *****
0.8878 TO 0.8927 *****
0.8927 TO 0.8976 *****
0.8976 TO 0.9025 *****
0.9025 TO 0.9074 *****
0.9074 TO 0.9123 *****
0.9123 TO 0.9172 *****
0.9172 TO 0.9220 *****
0.9220 TO 0.9269 *****
0.9269 TO 0.9318 *****
0.9318 TO 0.9367 *****
0.9367 TO 0.9416 *****
0.9416 TO 0.9465 *****
0.9465 TO 0.9514 *****
0.9514 TO 0.9563 *****
0.9563 TO 0.9611 *****
0.9611 TO 0.9660 *****
0.9660 TO 0.9709 *****
0.9709 TO 0.9758 *****
0.9758 TO 0.9807 *****
0.9807 TO 0.9856 *
0.9856 TO 0.9905 ***
0.9905 TO 0.9954 **
0.9954 TO 1.0002 *
1.0002 TO 1.0051 *
1.0051 TO 1.0100 *
```

FREQUENCY FOR GENERATIONS 604 TO 803

0.8243 TO 0.8292	*
0.8292 TO 0.8341	*
0.8341 TO 0.8390	*
0.8390 TO 0.8439	*
0.8439 TO 0.8487	*
0.8487 TO 0.8536	*
0.8536 TO 0.8585	*
0.8585 TO 0.8634	*
0.8634 TO 0.8683	*
0.8683 TO 0.8732	*
0.8732 TO 0.8781	*
0.8781 TO 0.8830	*****
0.8830 TO 0.8878	*****
0.8878 TO 0.8927	*****
0.8927 TO 0.8976	*****
0.8976 TO 0.9025	*****
0.9025 TO 0.9074	*****
0.9074 TO 0.9123	*****
0.9123 TO 0.9172	*****
0.9172 TO 0.9220	*****
0.9220 TO 0.9269	*****
0.9269 TO 0.9318	*****
0.9318 TO 0.9367	*****
0.9367 TO 0.9416	*****
0.9416 TO 0.9465	*****
0.9465 TO 0.9514	*****
0.9514 TO 0.9563	*****
0.9563 TO 0.9611	***
0.9611 TO 0.9660	*****
0.9660 TO 0.9709	*****
0.9709 TO 0.9758	*
0.9758 TO 0.9807	***
0.9807 TO 0.9856	*
0.9856 TO 0.9905	*
0.9905 TO 0.9954	*
0.9954 TO 1.0002	*
1.0002 TO 1.0051	*
1.0051 TO 1.0100	*

Figure 6.6.7-2 HEU MTR Finite Cask Model (460 g <sup>235</sup>U)

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT MTR INPUT FOR CASK MODEL - PLATES IN CLOSE & PLATES @ FULL PITCH
'MIN BASKET PLATE - COMMENT CARD REFERS TO NOMINAL PLATE SIZE
'23 PLATES - 20 GRAM 235U PER PLATE
'FUEL SHIFT AXIAL ALTERNATING
'56 CM ACTIVE FUEL HEIGHT
'MODIFIED TO 1.23 CM PLATE THICKNESS / 2 CM OFFSET
27GROUPNDF4 LATTICECELL
URANIUM 1 DEN=19.05 0.03650 293 92235 94. 92238 6. END
AL 1 DEN=2.702 0.25666 293 END
AL 2 1.0 293.0 END
H2O 3 1.0 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.E-20 293.0 END
H2O 8 1.E-20 293.0 END
END COMP
SYMMSLABCELL 0.3915 0.093 1 3 0.123 2 END

READ PARAM TBA=5 RUN=YES PLT=NO GEN=803 NPG=1000 END PARAM
READ GEOM
'
' FUEL PLATE CELL UNITS
'
UNIT 1
COM='MIDDLE FUEL PLATE CELL'
CUBOID 1 1 2P3.3000 2P0.0415 58.0 2.0
CUBOID 2 1 2P3.3000 2P0.0615 60.0 0.0
CUBOID 3 1 2P3.3000 2P0.1957 60.0 0.0
UNIT 2
COM='TOP FUEL PLATE CELL'
CUBOID 1 1 2P3.3000 2P0.0415 58.0 2.0
CUBOID 2 1 2P3.3000 2P0.0615 60.0 0.0
CUBOID 3 1 2P3.3000 0.0615 -0.1957 60.0 0.0
UNIT 3
COM='BOTTOM FUEL PLATE CELL'
CUBOID 1 1 2P3.3000 2P0.0415 58.0 2.0
CUBOID 2 1 2P3.3000 2P0.0615 60.0 0.0
CUBOID 3 1 2P3.3000 0.1957 -0.0615 60.0 0.0
'
UNIT 4
COM='SIDE PLATE'
CUBOID 2 1 2P0.2 2P3.75 60.0 0.0
'
' PLATES AT BOTTOM OF BASKET OPENING
'
' BASKET CENTER ROW ARRAY ELEMENTS
'
UNIT 10
COM='FUEL PATE ARRAY - PLATES IN 5/16 IN. WEB CENTER'
ARRAY 1 -3.3000 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 11
COM='FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 12
COM='FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
'
' BASKET TOP ROW ARRAY ELEMENTS
'
UNIT 20
COM='FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 21
COM='FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
```

```
'
' BASKET BOTTOM ROW ARRAY ELEMENTS
'
UNIT 30
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 31
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' CONSTRUCTION BASKET ROWS
'
UNIT 40
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES'
ARRAY 2 -9.0428 -4.3688 0.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 41
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 3 -14.1738 -4.3688 0.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 42
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES'
ARRAY 4 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
'
' BASKET UNIT
'
UNIT 50
COM='7 MTR ELEMENTS IN THE LWT'
CYLINDER 3 1 17.0500 73.152 0.0
HOLE 40 0.0 +9.4489 0.0
HOLE 41 0.0 0.0 0.0
HOLE 42 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 73.152 -1.27
CYLINDER 6 1 33.4963 73.152 -1.27
CYLINDER 5 1 36.5443 73.152 -1.27
CYLINDER 7 1 49.2443 73.152 -1.27
CYLINDER 5 1 49.8539 73.152 -1.27
CUBOID 8 1 4P49.8539 73.152 -1.27
'
' PLATES AT TOP OF BASKET OPENING
'
' BASKET CENTER ROW ARRAY ELEMENTS
'
UNIT 110
COM='FUEL FATE ARRAY - PLATES IN 5/16 IN. WEB CENTER'
ARRAY 1 -3.3000 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 111
COM='FUEL ARRAY 20 PLATES IN 5/16 IN. WEB RIGHT'
ARRAY 1 -3.9686 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 112
COM='FUEL ARRAY 20 PLATES IN 5/16 IN. WEB LEFT'
ARRAY 1 -2.6314 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 2R0.3556 4R0.0 1
'
' BASKET TOP ROW ARRAY ELEMENTS
'
UNIT 120
COM='FUEL ARRAY WITH HALF OF 1/4 PLATE ON RIGHT - TOP STACK'
ARRAY 1 -2.6314 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 121
COM='FUEL WITH HALF OF 1/4 IN. PLATE ON LEFT TOP STACK'
ARRAY 1 -3.9686 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' BASKET BOTTOM ROW ARRAY ELEMENTS
'
UNIT 130
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
```

```
APPAY 1 -2.6314 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 131
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
APPAY 1 -3.9686 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' CONSTRUCTION BASKET ROWS
'
UNIT 140
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES'
APPAY 12 -9.0428 -4.3688 0.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 141
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
APPAY 13 -14.1738 -4.3688 0.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 142
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES'
APPAY 14 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
'
' BASKET UNIT
'
UNIT 150
COM='7 MTR ELEMENTS IN THE LWT'
CYLINDER 3 1 17.0500 73.152 0.0
HOLE 140 0.0 +9.4489 0.0
HOLE 141 0.0 0.0 0.0
HOLE 142 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 73.152 -1.27
CYLINDER 6 1 33.4963 73.152 -1.27
CYLINDER 5 1 36.5443 73.152 -1.27
CYLINDER 7 1 49.2443 73.152 -1.27
CYLINDER 5 1 49.8539 73.152 -1.27
CUBOID 8 1 4P49.8539 73.152 -1.27
'
' CASK LID AND BOTTOM STRUCTURE
'
UNIT 60
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 5 1 36.5188 13.6775 -14.1351
CYLINDER 8 1 49.8539 13.6775 -14.1351
CUBOID 8 1 4P49.8539 13.6775 -14.1351
UNIT 61
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 6 1 26.3525 2P3.81
CYLINDER 5 1 36.6188 +13.36 -12.7
CYLINDER 8 1 49.8539 +13.36 -12.7
CUBOID 8 1 4P49.8539 +13.36 -12.7
UNIT 62
COM='THIN TOP AND BOTTOM SHELL OF NEUTRON SHIELD - SUBTRACTED FROM LID MODEL'
CYLINDER 5 1 49.8539 0.61 0.0
CUBOID 8 1 4P49.8539 0.61 0.0
'
' STACK OF BASKETS WITH CASK LID AND BOTTOM
'
GLOBAL UNIT 70
COM='STACK OF 6 BASKETS IN CASK WITH LID AND BOTTOM'
APPAY 10 -49.8539 -49.8539 0.0
END GEOM
READ APPAY
'
' FUEL ELEMENT PLATE ARRAY
'
ARA=1 NUX=1 NUY=23 NUZ=1 FILL 3 21R1 2 END FILL
'
' ARRAYS OF BASKET OPENINGS (TOP, MIDDLE, BOTTOM)
' PLATES AT BOTTOM OF OPENING
'
ARA=2 NUX=2 NUY=1 NUZ=1 FILL 20 21 END FILL
ARA=3 NUX=3 NUY=1 NUZ=1 FILL 10 10 11 END FILL
ARA=4 NUX=2 NUY=1 NUZ=1 FILL 30 31 END FILL
'
' ARRAYS OF BASKET OPENINGS (TOP, MIDDLE, BOTTOM)
' PLATES AT TOP OF OPENING
'
ARA=12 NUX=2 NUY=1 NUZ=1 FILL 120 121 END FILL
ARA=13 NUX=3 NUY=1 NUZ=1 FILL 112 110 111 END FILL
ARA=14 NUX=2 NUY=1 NUZ=1 FILL 130 131 END FILL
'
' ARRAY OF BASKETS WITH LID AND BOTTOM
'
ARA=10 NUX=1 NUY=1 NUZ=10 FILL 61 62 150 50 150 50 150 50 62 60 END FILL
END APPAY
READ BOUNDS ALL=MIR END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CENTER ELEMENT - FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
```

```
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-5.0 YUL=5.0 ZUL=50.0
XLR=5.0 YLR=-5.0 ZLR=50.0 END
TTL='X-Y PLOT OF BASKET - FUEL ELEVATION'
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-17.0 YUL=17.0 ZUL=50.0
XLR=17.0 YLR=-17.0 ZLR=50.0 END
TTL='X-Y PLOT OF CASK - FUEL ELEVATION'
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-65.0 YUL=65.0 ZUL=50.0
XLR=65.0 YLR=-65.0 ZLR=50.0 END
TTL='Y-Z (X=0) PLOT OF BOTTOM BASKET - CENTER SECTION'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=55.0
XLR=0.0 YLR=5.0 ZLR=50.0 END
TTL='Y-Z (X=0) PLOT OF BOTTOM BASKET - CENTER FUEL ELEMENT'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=101.1
XLR=0.0 YLR=5.0 ZLR=26.6 END
TTL='Y-Z (X=-2) PLOT OF BOTTOM BASKET'
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-15.0 ZUL=101.1
XLR=-2.0 YLR=15.0 ZLR=26.6 END
TTL='Y-Z (X=-2) PLOT OF CASK - R=17.0'
LPI=5 NAX=1000
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-17.0 ZUL=502.0
XLR=-2.0 YLR=17.0 ZLR=-1.0 END
TTL='Y-Z (X=-2) PLOT OF CASK - R=51.0'
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-51.0 ZUL=502.0
XLR=-2.0 YLR=51.0 ZLR=-1.0 END
END PLOT
END DATA
```

```
SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.55 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 3.29 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 745.01 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 751.44 (SECONDS).
```

```
CCCCCCCCC      SSSSSSSSS      AAAAAAAAA      SSSSSSSSS      222222222      5555555555555
CCCCCCCCCCCCC  SSSSSSSSSSSS  AAAAAAAAAAAA  SSSSSSSSSSSS  22222222222  5555555555555
CC      CC      SS      SS      AA      AA      SS      SS      22      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      SSSSSSSSSS  AAAAAAAAAAAA  SSSSSSSSSS      22      55555555555
CC      SSSSSSSSSS  AAAAAAAAAAAA  SSSSSSSSSS      22      55555555555
CC      SS      AA      AA      SS      SS      22      55
CC      SS      AA      AA      SS      SS      22      55
CC      CC      SS      SS      AA      AA      SS      SS      22      55      55
CCCCCCCCCCCCC  SSSSSSSSSSSS  AA      AA      SSSSSSSSSSSS  22222222222  5555555555555
CCCCCCCCCCCCC  SSSSSSSSSSSS  AA      AA      SSSSSSSSSSSS  22222222222  55555555555
```

```
SSSSSSSSSS      CCCCCCCCCC      AAAAAAAAA      LL      EEEEEEEEEEE      PPPPPPPPPPP      CCCCCCCCCC
SSSSSSSSSSSSS  CCCCCCCCCCCC  AAAAAAAAAAAA  LL      EEEEEEEEEEE      PPPPPPPPPPP  CCCCCCCCCCCC
SS      SS      CC      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC      CC
SSSSSSSSSS      CC      AAAAAAAAAAAA  LL      EEEEEEEEE     -----  PPPPPPPPPPP  CC
SSSSSSSSSS      CC      AAAAAAAAAAAA  LL      EEEEEEEEE     -----  PPPPPPPPPPP  CC
SS      SS      AA      AA      LL      EE      PP      CC      CC
SS      SS      CC      AA      LL      EE      PP      CC      CC
SS      SS      CC      AA      LL      EE      PP      CC      CC
SSSSSSSSSSSSS  CCCCCCCCCCCC  AA      AA      LLLLLLLLLLLL  EEEEEEEEEEE      PP      CCCCCCCCCC
SSSSSSSSSS      CCCCCCCCCC  AA      AA      LLLLLLLLLLLL  EEEEEEEEEEE      PP      CCCCCCCCCC
```

```
0000000      2222222222      //      2222222222      66666666666      //      0000000      11
000000000    22222222222    //      22222222222    66666666666    //      000000000    111
00      00      22      22      //      22      22      66      //      00      00      1111
00      00      22      22      //      22      22      66      //      00      00      11
00      00      22      22      //      22      22      66      //      00      00      11
00      00      22      22      //      22      22      66666666666 //      00      00      11
00      00      22      22      //      22      22      66666666666 //      00      00      11
00      00      22      22      //      22      22      66666666666 //      00      00      11
00      00      22      22      //      22      22      66666666666 //      00      00      11
000000000    22222222222    //      22222222222    66666666666    //      000000000    11111111
0000000      22222222222 //      22222222222    66666666666    //      0000000      11111111
```

```
0000000      9999999999      11      8888888888      44      44
000000000    99999999999      111      88888888888      444      444
00      00      99      99      :::      1111      88      88      :::      4444      4444
00      00      99      99      :::      11      88      88      :::      44      44
00      00      99      99      :::      11      88      88      :::      44      44
00      00      99999999999  11      88888888888  44      44
00      00      99999999999  11      88888888888  44      44
00      00      99      99      :::      11      88      88      :::      44444444444  44444444444
00      00      99      99      :::      11      88      88      :::      44444444444  44444444444
00      00      99      99      :::      11      88      88      :::      44      44
000000000    99999999999      11111111  88888888888      44      44
0000000      99999999999      11111111  88888888888      44      44
```





'MIN BASKET PLATE - COMMENT CARD REFERS TO NOMINAL PLATE SIZE  
'23 PLATES - 20 GRAM 235U PER PLATE  
'FUEL SHIFT AXIAL ALTERNATING  
'56 CM ACTIVE FUEL HEIGHT  
'MODIFIED TO 1.23 CM PLATE THICKNESS / 2 CM OFFSET  
'MIN BASKET PLATE - COMMENT CARD REFERS TO NOMINAL PLATE SIZE  
'23 PLATES - 20 GRAM 235U PER PLATE  
'FUEL SHIFT AXIAL ALTERNATING  
'56 CM ACTIVE FUEL HEIGHT  
'MODIFIED TO 1.23 CM PLATE THICKNESS / 2 CM OFFSET  
LWT MTR INPUT FOR CASK MODEL - PLATES IN CLOSE & PLATES @ FULL PITCH

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
MX 8 MIXTURES  
MSC 9 COMPOSITION SPECIFICATIONS  
IZM 3 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC URANIUM STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.0365 VOLUME FRACTION  
ROTH 19.0500 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 94.000 WT%  
92238 6.000 WT%

END

SC AL STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.2567 VOLUME FRACTION  
ROTH 2.7020 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
9016 1.00 ATOM/MOLECULE

END

SC AL STANDAPD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC SS304 STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND

TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%  
END

SC PB STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 0.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

CTP SYMMSLABCELL CELL TYPE  
PITCH 0.3915 CM CENTER TO CENTER SPACING  
FUELOD 0.0830 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 3 MIXTURE NO. OF MODERATOR  
CLADOD 0.1230 CM CLAD OUTER DIAMETER  
MCLAD 2 MIXTURE NO. OF CLAD

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL  
ZONE 2 IS CLAD  
ZONE 3 IS MOD

```
.....
***
***                               LWT MTR INPUT FOR CASK MODEL - PLATES IN CLOSE & PLATES @ FULL PITCH
***
.....
***                               ***** DATA LIBRARY INFORMATION *****
***
*** UNIT NUMBER          DATA SET NAME          VOLUME          UNIT FUNCTION
*** -----          -----          -----          -----
***      89      G:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***      82      G:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***      11      I:\PROJECTS\sts-proj\mtr\141000~1.2\HIGH-U-1          SHORT CROSS SECTION LIBRARY
***      90      I:\PROJECTS\sts-proj\mtr\141000~1.2\HIGH-U-1          INPUT DATA DIRECT ACCESS
***
.....
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
*** UNIT NUMBER      : 89
*** DATASET NAME    : G:\scale43\DATALIB\FT89F001
*** LIBRARY TITLE   : SCALE-4 STANDARD COMPOSITION LIBRARY
***                 : 637 STANDARD COMPOSITIONS, 490 NUCLIDES
***                 : 90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
*** CREATION DATE   : 6/30/95
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
*** UNIT NUMBER      : 82
*** DATASET NAME    : G:\scale43\DATALIB\FT82F001
*** LIBRARY TITLE   : SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***                 : BASED ON ENDF-B VERSION 4 DATA
***                 : COMPILED FOR NRC      1/27/89
***                 : LAST UPDATED
***                 : L.M.PETRIE - ORNL
***                 :                                08/12/94
***
.....

```

```
..... 0 IO'S WERE USED BEFORE READING KENO V DATA .....
..... 0 IO'S WERE USED READING THE KENO V PARAMETER DATA .....
```

CONTROL MODULE CSAS25 IS COMPLETE.

```

BBBBBBBBBBB 000000000 NN NN AAAAAAAA MM MM IIIIIIIIIII 2222222222
BBBBBBBBBBB 0000000000 NNN NN AAAAAAAAAA MMM MMM IIIIIIIIIII 222222222222
BB BB 00 00 NNNN NN AA AA MMMM MMMM II 22 22
BB BB 00 00 NN NN NN AA AA MM MM MM MM II 22 22
BB BB 00 00 NN NN NN AA AA MM MM MM MM II 22 22
BBBBBBBBBBB 00 00 NN NN NN ----- AAAAAAAAAAAAAA MM MMM MM II 22
BBBBBBBBBBB 00 00 NN NN NN ----- AAAAAAAAAAAAAA MM M MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BBBBBBBBBBB 0000000000 NN NNN AA AA MM MM IIIIIIIIIII 222222222222
BBBBBBBBBBB 0000000000 NN NN AA AA MM MM IIIIIIIIIII 222222222222

```

```

SSSSSSSSSS CCCCCCCCCC AAAAAAAA LL EEEEEEEEEEE PPPPPPPPPPP CCCCCCCCCC
SSSSSSSSSS CCCCCCCCCC AAAAAAAAAA LL EEEEEEEEEEE PPPPPPPPPPP CCCCCCCCCC
SS SS CC CC AA AA LL EE PP PP CC CC
SS CC CC AA AA LL EE PP PP CC CC
SS CC CC AA AA LL EE PP PP CC CC
SSSSSSSSSS CC AAAAAAAAAA LL EEEEEEEEE ----- PPPPPPPPPPP CC
SSSSSSSSSS CC AAAAAAAAAA LL EEEEEEEEE ----- PPPPPPPPPPP CC
SS SS CC AA AA LL EE PP PP CC CC
SS SS CC AA AA LL EE PP PP CC CC
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLL EEEEEEEEEEE P PP CCCCCCCCCC
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLL EEEEEEEEEEE P PP CCCCCCCCCC

```

```

0000000 2222222222 // 2222222222 6666666666 // 0000000 11
00000000 222222222222 // 222222222222 666666666666 // 000000000 111
00 00 22 22 // 22 22 66 66 // 00 00 1111
00 00 22 22 // 22 22 66 66 // 00 00 11
00 00 22 22 // 22 22 6666666666 // 00 00 11
00 00 22 22 // 22 22 666666666666 // 00 00 11
00 00 22 22 // 22 22 66 66 // 00 00 11
00 00 22 22 // 22 22 66 66 // 00 00 11
00000000 222222222222 // 222222222222 666666666666 // 000000000 1111111
0000000 222222222222 // 222222222222 666666666666 // 0000000 1111111

```

```

0000000 9999999999 11 8888888888 44 5555555555
00000000 999999999999 111 888888888888 444 555555555555
00 00 99 99 ::: 1111 88 88 ::: 4444 55
00 00 99 99 ::: 11 88 88 ::: 44 44 55
00 00 99 99 ::: 11 88 88 ::: 44 44 55
00 00 999999999999 11 8888888888 44 44 555555555555
00 00 999999999999 11 888888888888 44 44 555555555555
00 00 99 99 ::: 11 88 88 ::: 444444444444 55
00 00 99 99 ::: 11 88 88 ::: 44444444444444 55
00 00 99 99 ::: 11 88 88 ::: 44 44 55
00000000 999999999999 11111111 888888888888 44 555555555555
0000000 999999999999 11111111 888888888888 44 555555555555

```



-10 ARRAY HAS 1 ENTRIES.  
00 ARRAY HAS 4 ENTRIES.  
10 ARRAY HAS 6 ENTRIES.  
20 ARRAY HAS 2 ENTRIES.

LOGICAL ASSIGNMENTS

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

PROBLEM DESCRIPTION

IGR--GEOMETRY (0/1/2/3--INF MED/SLAB/CYL/SPHERE) 1  
IZM--NUMBER OF ZONES OR MATERIAL REGIONS 8  
MS--MIXING TABLE LENGTH 16  
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 16 ENTRIES.  
4Q ARRAY HAS 16 ENTRIES.  
5Q ARRAY HAS 16 ENTRIES.  
6Q ARRAY HAS 8 ENTRIES.  
7Q ARRAY HAS 8 ENTRIES.  
8Q ARRAY HAS 8 ENTRIES.  
9Q ARRAY HAS 8 ENTRIES.  
10Q ARRAY HAS 16 ENTRIES.  
11Q ARRAY HAS 8 ENTRIES.

MIXING TABLE

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	1.67462E-03	1092235
2	1	92238	1.05541E-04	1092238
3	1	13027	1.54783E-02	1013027
4	2	13027	6.03066E-02	2013027
5	4	13027	6.03066E-02	4013027
6	3	1001	6.67692E-02	3001001
7	7	1001	6.67692E-22	7001001
8	8	1001	6.67692E-22	8001001
9	3	8016	3.33846E-02	3008016
10	7	8016	3.33846E-22	7008016
11	8	8016	3.33846E-22	8008016
12	5	24304	1.74286E-02	5024304
13	5	25055	1.73633E-03	5025055
14	5	26304	5.93579E-02	5026304
15	5	28304	7.72070E-03	5028304
16	6	82000	3.29690E-02	6082000

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	4.15000E-02	2.93000E+02	2.35465E+00	0
2	2	6.15000E-02	2.93000E+02	0.00000E+00	0
3	3	1.95750E-01	2.93000E+02	0.00000E+00	0
4	4	5.19575E+00	2.93000E+02	0.00000E+00	0
5	5	1.01958E+01	2.93000E+02	0.00000E+00	0
6	6	1.51958E+01	2.93000E+02	0.00000E+00	0
7	7	2.01958E+01	2.93000E+02	0.00000E+00	0
8	8	2.51958E+01	2.93000E+02	0.00000E+00	0

3609 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 19 TO LOG 1 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 19 TO LOG 1 BONDARENKO TRIGGER 0  
COPY 8016 OXYGEN-16 FROM LOG 18 TO LOG 1 BONDARENKO TRIGGER 0  
COPY 13027 AL-27 1193 219 G FROM LOG 11 TO LOG 18 BONDARENKO TRIGGER 0

---

COPY	13027	AL-27	1193	218	G	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	13027	AL-27	1193	318	G	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	13027	AL-27	1193	218	G	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	24304	CR	1191	WT	SS-30	FROM LOG 11 TO LOG 1	BONDARENKO TRIGGER 0
COPY	25055	MANIGANESE-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	82000	PB	1288	218	NGP	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 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89  
LAST UPDATED

08/12/94

L.M.FETPIE - ORNL

TAPE ID	4321	NUMBER OF NUCLIDES	16
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 08/12/94	ID 3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 7001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 8001001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 7008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 8008016
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 1013027
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 2013027
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 4013027
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)*		UPDATED 08/12/94	ID 5024304
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID 5025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)*		UPDATED 08/12/94	ID 5026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)*		UPDATED 08/12/94	ID 5028304
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 6082000
URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID 1092235
URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	ID 1092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.11 SECONDS





```

-1Q ARRAY HAS      1 ENTRIES.
  0Q ARRAY HAS      9 ENTRIES.
  1Q ARRAY HAS     12 ENTRIES.
SELECT 16 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 RESONANCE CALCULATIONS HAVE BEEN REQUESTED
-1 OUTPUT OPTION FOR AMPX FORMATTED CROSS SECTION DATA
2001 MAXIMUM NUMBER OF RESONANCE MESH INTERVALS
  2 ORDER OF RESONANCE LEVEL PROCESSING

THE STORAGE ALLOCATED FOR THIS CASE IS 100000 WORDS

  2Q ARRAY HAS     16 ENTRIES.
  3Q ARRAY HAS     45 ENTRIES.
  4Q ARRAY HAS     16 ENTRIES.

GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
TAPE IDENTIFICATION NUMBER      4321
NUMBER OF NUCLIDES ON TAPE      16
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 1680 WORDS
XSDRN TAPE 4321
SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89
LAST UPDATED
L.M.PETRIE - ORNL
08/12/94

NUCLIDES FROM XSDRN TAPE
  1 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 3001001
  2 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 7001001
  3 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 8001001
  4 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 3008016
  5 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 7008016
  6 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 8008016
  7 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 1013027
  8 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 2013027
  9 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 4013027
 10 CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 5024304
 11 MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 5025055
 12 FE 1192 WT SS-304(1/EST) P-3 293K SF=5+4(42375)' UPDATED 08/12/94 5026304
 13 NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 5028304
 14 PB 1288 218NGP 042375 P-3 293K UPDATED 08/12/94 6082000
 15 URANIUM-235 ENDF/B-IV MAT 1261 UPDATED 08/12/94 1092235
 16 URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 1092238

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 3001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 7001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 8001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 3008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 7008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 8008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 1013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 2013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 4013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 5024304 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 5025055 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A) = 54.466 TEMPERATURE (KELVIN) = 293.000

```

POTENTIAL SCATTER SIGMA = 2.590 LUMPED NUCLEAR DENSITY = 1.7363295E-03  
 SPIN FACTOR (G) = 14.448 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 = 55.845 SIGMA(PER ABSORBER ATOM)= 3.4663022E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 55.925 SIGMA(PER ABSORBER ATOM)= 1.2557598E+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
8	-5.518788E-04	0.000000E+00	-3.944190E-01
9	-2.797993E-03	0.000000E+00	-2.293471E+00
10	-3.291452E-01	0.000000E+00	-3.820862E+01
11	-2.680562E+00	0.000000E+00	-1.159996E+02

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 3.33719E+00  
 FISSION 0.00000E+00

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 5026304 TEMPERATURE= 293.00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 5028304 TEMPERATURE= 293.00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

PB 1288 218NGP 042375 P-3 293K UPDATED 08/12/94 6082000 TEMPERATURE= 293.00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261 UPDATED 08/12/94 1092235 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 233.025 TEMPERATURE (KELVIN) = 293.000  
 POTENTIAL SCATTER SIGMA = 11.500 LUMPED NUCLEAR DENSITY = 1.6746225E-03  
 SPIN FACTOR (G) = 15171.100 LUMP DIMENSION (A-BAR) = 8.2999997E-02  
 INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 5.1177365E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM)= 1.2445693E+01

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 238.051 SIGMA(PER ABSORBER ATOM)= 7.7685076E-01

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-3.991273E+00	-2.455652E+00	-1.020250E-01
13	-1.148550E+01	-5.609972E+00	-2.579727E-01
14	-8.385537E+00	-4.924647E+00	-6.251335E-02
15	-4.888190E-04	-3.721843E-04	4.008032E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.00383E+02  
 FISSION 1.20157E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 1092238 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 238.000 TEMPERATURE (KELVIN) = 293.000  
 POTENTIAL SCATTER SIGMA = 10.599 LUMPED NUCLEAR DENSITY = 1.0554063E-04  
 SPIN FACTOR (G) = 656.527 LUMP DIMENSION (A-BAR) = 8.2999997E-02  
 INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 5.1177365E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM)= 1.9747691E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 235.044 SIGMA(PER ABSORBER ATOM)= 1.8885785E+02

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-3.221209E-04	0.000000E+00	-3.615814E-03
10	-1.701700E-02	-9.645751E-08	-1.233430E-01
11	-7.790445E-01	0.000000E+00	-2.481573E+00
12	-7.111002E+00	0.000000E+00	-8.512491E+00
13	-8.282583E+00	0.000000E+00	-2.746092E+00
14	-1.524248E+01	0.000000E+00	-8.966302E-01
15	-5.454276E-09	0.000000E+00	6.277273E-09

EXCESS RESONANCE INTEGRALS

	RESOLVED
ABSORPTION	2.35741E+02
FISSION	5.33533E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

**NAC-LWT Cask SAR  
Revision 43**

January 2015

THIS XSDRN WORKING TAPE WAS CREATED 02/26/01 AT 09:18:46  
THE TITLE OF THE PARENT CASE IS AS FOLLOWS  
SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89

TAPE ID	4321	NUMBER OF NUCLIDES	16
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 08/12/94	ID 3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 7001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 8001001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 7008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 8008016
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 1013027
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 2013027
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 4013027
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 5024304
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID 5025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 5026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 5028304
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 6082000
URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID 1092235
URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	ID 1092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.11 SECONDS

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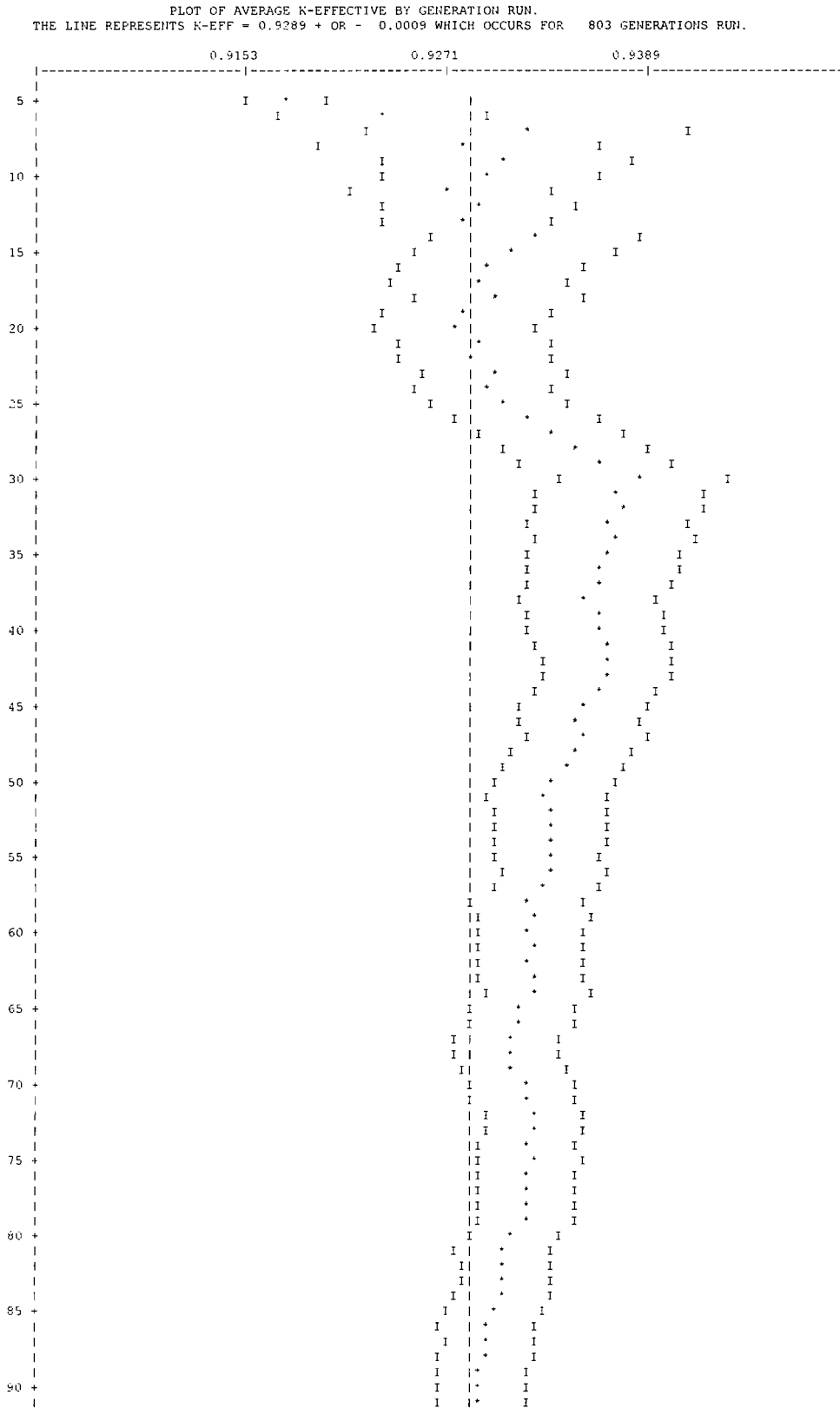
GENERATION KENO MESSAGE NUMBER	GENERATION K-EFFECTIVE NUMBER K5-132	ELAPSED TIME MINUTES WARNING... ONLY	AVERAGE K-EFFECTIVE 937 INDEPENDENT	AVG K-EFF DEVIATION FISSION POINTS WERE	MATRIX K-EFFECTIVE GENERATED	MATRIX K-EFF DEVIATION
1	8.55343E-01	4.51767E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.52762E-01	4.52683E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.43276E-01	4.53600E+00	9.43276E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.15340E-01	4.54600E+00	9.29308E-01	1.39679E-02	0.00000E+00	0.00000E+00
5	9.20312E-01	4.55517E+00	9.26310E-01	8.60381E-03	0.00000E+00	0.00000E+00
6	9.35103E-01	4.56533E+00	9.28508E-01	6.46878E-03	0.00000E+00	0.00000E+00
7	9.47650E-01	4.57533E+00	9.34336E-01	7.68620E-03	0.00000E+00	0.00000E+00
8	9.12494E-01	4.58450E+00	9.30696E-01	7.25517E-03	0.00000E+00	0.00000E+00
9	9.43531E-01	4.59450E+00	9.32529E-01	6.40001E-03	0.00000E+00	0.00000E+00
10	9.24840E-01	4.60467E+00	9.31568E-01	5.62531E-03	0.00000E+00	0.00000E+00
11	9.10585E-01	4.61383E+00	9.29237E-01	5.48160E-03	0.00000E+00	0.00000E+00
12	9.43642E-01	4.62383E+00	9.30677E-01	5.11014E-03	0.00000E+00	0.00000E+00
13	9.20175E-01	4.63383E+00	9.29722E-01	4.71987E-03	0.00000E+00	0.00000E+00
14	9.75696E-01	4.64400E+00	9.33554E-01	5.76559E-03	0.00000E+00	0.00000E+00
15	9.16658E-01	4.65317E+00	9.32254E-01	5.46050E-03	0.00000E+00	0.00000E+00
16	9.12942E-01	4.66417E+00	9.30875E-01	5.24025E-03	0.00000E+00	0.00000E+00
17	9.19028E-01	4.67417E+00	9.30085E-01	4.94192E-03	0.00000E+00	0.00000E+00
18	9.46357E-01	4.68333E+00	9.31102E-01	4.73330E-03	0.00000E+00	0.00000E+00
19	9.01398E-01	4.69333E+00	9.29354E-01	4.77717E-03	0.00000E+00	0.00000E+00
20	9.20218E-01	4.70250E+00	9.28847E-01	4.53247E-03	0.00000E+00	0.00000E+00
21	9.47900E-01	4.71267E+00	9.29850E-01	4.40301E-03	0.00000E+00	0.00000E+00
22	9.26415E-01	4.72267E+00	9.29678E-01	4.18059E-03	0.00000E+00	0.00000E+00
23	9.54758E-01	4.73283E+00	9.30972E-01	4.15200E-03	0.00000E+00	0.00000E+00
24	9.15572E-01	4.74200E+00	9.30177E-01	4.01940E-03	0.00000E+00	0.00000E+00
25	9.51173E-01	4.75200E+00	9.31090E-01	3.94767E-03	0.00000E+00	0.00000E+00
26	9.68620E-01	4.76200E+00	9.32653E-01	4.09033E-03	0.00000E+00	0.00000E+00
27	9.63570E-01	4.77117E+00	9.33890E-01	4.11359E-03	0.00000E+00	0.00000E+00
28	9.63525E-01	4.78133E+00	9.35030E-01	4.11329E-03	0.00000E+00	0.00000E+00
29	9.73742E-01	4.79133E+00	9.36464E-01	4.20971E-03	0.00000E+00	0.00000E+00
30	1.00936E+00	4.80050E+00	9.39067E-01	4.82014E-03	0.00000E+00	0.00000E+00
31	8.97393E-01	4.81067E+00	9.37630E-01	4.86791E-03	0.00000E+00	0.00000E+00
32	9.42504E-01	4.82067E+00	9.37793E-01	4.70565E-03	0.00000E+00	0.00000E+00
33	9.12839E-01	4.82983E+00	9.36988E-01	4.62196E-03	0.00000E+00	0.00000E+00
34	9.49503E-01	4.83983E+00	9.37379E-01	4.49225E-03	0.00000E+00	0.00000E+00
35	9.22407E-01	4.85000E+00	9.36825E-01	4.37757E-03	0.00000E+00	0.00000E+00
36	9.26712E-01	4.85917E+00	9.36625E-01	4.25747E-03	0.00000E+00	0.00000E+00
37	9.28231E-01	4.86917E+00	9.36385E-01	4.14099E-03	0.00000E+00	0.00000E+00
38	9.15251E-01	4.87833E+00	9.35798E-01	4.06691E-03	0.00000E+00	0.00000E+00
39	9.56362E-01	4.88833E+00	9.36354E-01	3.99433E-03	0.00000E+00	0.00000E+00
40	9.39974E-01	4.89750E+00	9.36449E-01	3.88896E-03	0.00000E+00	0.00000E+00
41	9.49166E-01	4.90767E+00	9.36775E-01	3.80194E-03	0.00000E+00	0.00000E+00
42	9.50192E-01	4.91767E+00	9.37110E-01	3.72082E-03	0.00000E+00	0.00000E+00
43	9.28187E-01	4.92767E+00	9.36893E-01	3.63546E-03	0.00000E+00	0.00000E+00
44	9.10787E-01	4.93783E+00	9.36271E-01	3.60188E-03	0.00000E+00	0.00000E+00
45	9.02307E-01	4.94783E+00	9.35481E-01	3.60472E-03	0.00000E+00	0.00000E+00
46	9.24200E-01	4.95800E+00	9.35225E-01	3.53116E-03	0.00000E+00	0.00000E+00
47	9.56755E-01	4.96717E+00	9.35703E-01	3.48480E-03	0.00000E+00	0.00000E+00
48	8.98639E-01	4.97717E+00	9.34898E-01	3.50215E-03	0.00000E+00	0.00000E+00
49	9.12026E-01	4.98733E+00	9.34411E-01	3.46121E-03	0.00000E+00	0.00000E+00
50	9.09649E-01	4.99733E+00	9.33895E-01	3.42738E-03	0.00000E+00	0.00000E+00
784	8.94491E-01	1.22155E+01	9.28832E-01	9.01006E-04	0.00000E+00	0.00000E+00
785	9.09315E-01	1.22255E+01	9.28806E-01	9.00236E-04	0.00000E+00	0.00000E+00
786	8.88725E-01	1.22357E+01	9.28755E-01	9.00539E-04	0.00000E+00	0.00000E+00
787	9.49059E-01	1.22465E+01	9.28781E-01	8.99763E-04	0.00000E+00	0.00000E+00
788	9.75643E-01	1.22557E+01	9.28841E-01	9.00593E-04	0.00000E+00	0.00000E+00
789	9.74076E-01	1.22658E+01	9.28898E-01	9.01283E-04	0.00000E+00	0.00000E+00
790	8.89811E-01	1.22768E+01	9.28848E-01	9.01504E-04	0.00000E+00	0.00000E+00
791	9.17117E-01	1.22860E+01	9.28834E-01	9.00484E-04	0.00000E+00	0.00000E+00
792	9.30645E-01	1.22960E+01	9.28836E-01	8.99346E-04	0.00000E+00	0.00000E+00
793	9.19421E-01	1.23052E+01	9.28824E-01	8.98287E-04	0.00000E+00	0.00000E+00
794	9.41785E-01	1.23152E+01	9.28840E-01	8.97301E-04	0.00000E+00	0.00000E+00
795	9.60725E-01	1.23253E+01	9.28861E-01	8.97071E-04	0.00000E+00	0.00000E+00
796	9.98373E-01	1.23345E+01	9.28842E-01	8.96764E-04	0.00000E+00	0.00000E+00
797	9.13509E-01	1.23445E+01	9.28823E-01	8.95843E-04	0.00000E+00	0.00000E+00
798	8.86803E-01	1.23547E+01	9.28770E-01	8.96272E-04	0.00000E+00	0.00000E+00
799	9.61447E-01	1.23647E+01	9.28811E-01	8.96086E-04	0.00000E+00	0.00000E+00
800	9.72597E-01	1.23747E+01	9.28666E-01	8.96665E-04	0.00000E+00	0.00000E+00
801	9.47415E-01	1.23857E+01	9.28890E-01	8.95843E-04	0.00000E+00	0.00000E+00
802	9.51550E-01	1.23958E+01	9.28918E-01	8.95171E-04	0.00000E+00	0.00000E+00
803	9.57784E-01	1.24050E+01	9.28954E-01	8.94779E-04	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

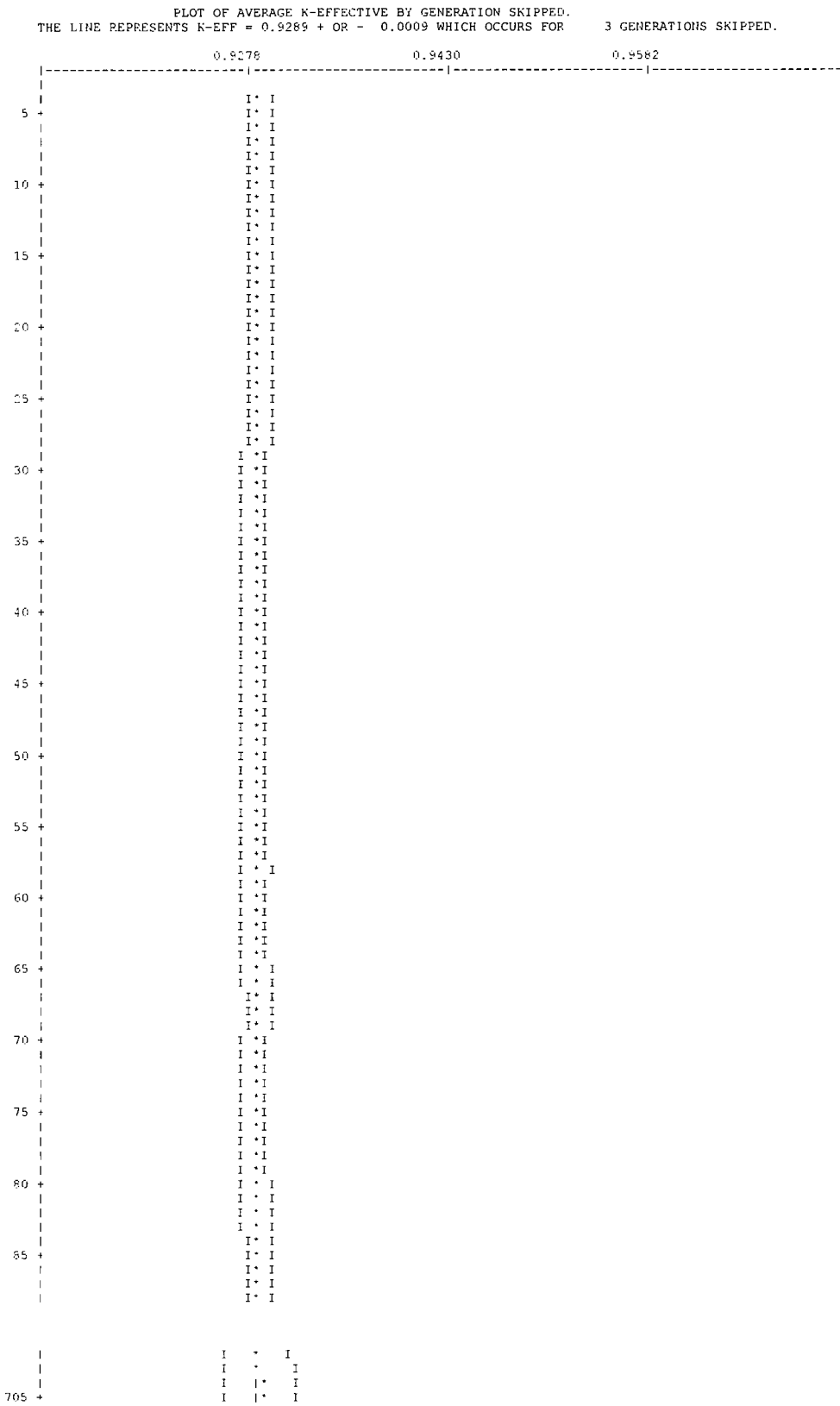
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LIFETIME = 7.89581E-05 + OR - 1.41168E-07      GENERATION TIME = 3.69606E-05 + OR - 6.24488E-08  
 NU BAR = 2.42056E+00 + OR - 1.23157E-05      AVERAGE FISSION GROUP = 2.33314E+01 + OR - 4.51865E-03  
 ENERGY(EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 7.56224E-02 + OR - 2.51308E-04

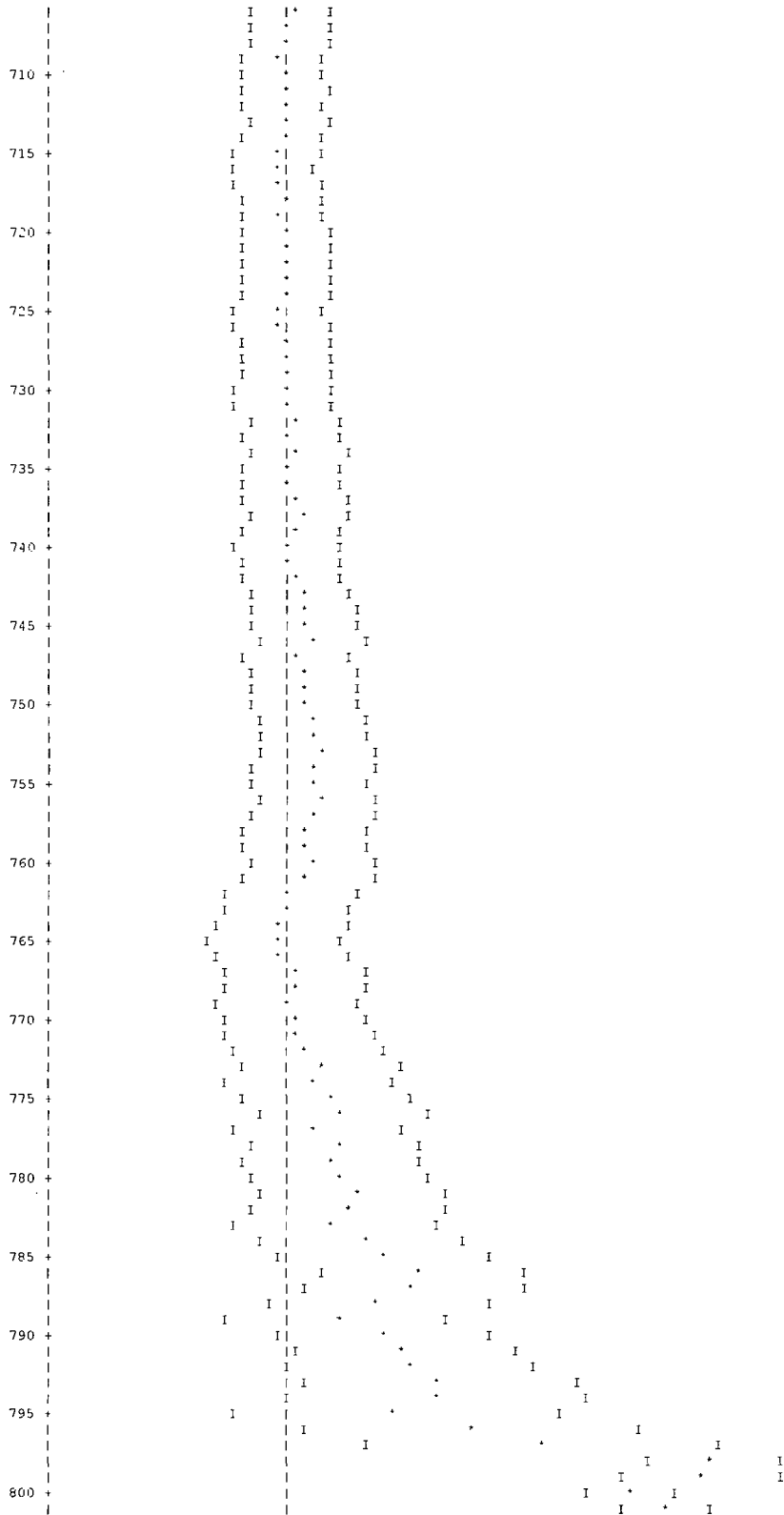
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
3	0.92894	+ OR - 0.00090	0.92804 TO 0.92983	0.92714 TO 0.93073	0.92625 TO 0.93162	800000
4	0.92895	+ OR - 0.00090	0.92806 TO 0.92985	0.92716 TO 0.93075	0.92626 TO 0.93164	799000
5	0.92896	+ OR - 0.00090	0.92807 TO 0.92986	0.92717 TO 0.93076	0.92627 TO 0.93166	798000
6	0.92896	+ OR - 0.00090	0.92806 TO 0.92985	0.92716 TO 0.93075	0.92626 TO 0.93165	797000
7	0.92892	+ OR - 0.00090	0.92802 TO 0.92982	0.92712 TO 0.93072	0.92622 TO 0.93162	796000
8	0.92894	+ OR - 0.00090	0.92804 TO 0.92984	0.92714 TO 0.93074	0.92624 TO 0.93164	795000
9	0.92892	+ OR - 0.00090	0.92802 TO 0.92982	0.92712 TO 0.93072	0.92622 TO 0.93163	794000
10	0.92893	+ OR - 0.00090	0.92803 TO 0.92983	0.92712 TO 0.93073	0.92622 TO 0.93163	793000
11	0.92895	+ OR - 0.00090	0.92805 TO 0.92985	0.92714 TO 0.93076	0.92624 TO 0.93166	792000
12	0.92893	+ OR - 0.00090	0.92803 TO 0.92984	0.92712 TO 0.93074	0.92622 TO 0.93164	791000
17	0.92893	+ OR - 0.00091	0.92803 TO 0.92984	0.92712 TO 0.93075	0.92621 TO 0.93165	786000
22	0.92894	+ OR - 0.00091	0.92802 TO 0.92985	0.92711 TO 0.93076	0.92620 TO 0.93167	781000
27	0.92879	+ OR - 0.00091	0.92788 TO 0.92971	0.92697 TO 0.93062	0.92605 TO 0.93154	776000
32	0.92861	+ OR - 0.00091	0.92770 TO 0.92952	0.92679 TO 0.93043	0.92588 TO 0.93134	771000
37	0.92861	+ OR - 0.00092	0.92770 TO 0.92953	0.92678 TO 0.93044	0.92587 TO 0.93136	766000
42	0.92853	+ OR - 0.00092	0.92761 TO 0.92944	0.92669 TO 0.93036	0.92577 TO 0.93128	761000
47	0.92855	+ OR - 0.00092	0.92763 TO 0.92948	0.92671 TO 0.93040	0.92578 TO 0.93132	756000
52	0.92864	+ OR - 0.00093	0.92771 TO 0.92957	0.92679 TO 0.93050	0.92586 TO 0.93142	751000
57	0.92862	+ OR - 0.00093	0.92769 TO 0.92956	0.92676 TO 0.93049	0.92583 TO 0.93142	746000
772	0.93019	+ OR - 0.00534	0.92485 TO 0.93552	0.91951 TO 0.94086	0.91417 TO 0.94620	31000
777	0.93071	+ OR - 0.00572	0.92499 TO 0.93643	0.91926 TO 0.94216	0.91354 TO 0.94788	26000
782	0.93322	+ OR - 0.00670	0.92652 TO 0.93993	0.91982 TO 0.94663	0.91311 TO 0.95334	21000
787	0.93744	+ OR - 0.00753	0.92990 TO 0.94497	0.92237 TO 0.95251	0.91483 TO 0.96004	16000
792	0.93743	+ OR - 0.00858	0.92885 TO 0.94601	0.92027 TO 0.95458	0.91169 TO 0.96316	11000
797	0.94632	+ OR - 0.01243	0.93388 TO 0.95875	0.92145 TO 0.97118	0.90902 TO 0.98362	6000











GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION	SKIPPING 3 GENERATIONS
1	0.0003			3.08599E-04	3.2806	1.45027E-03	1.0089	0.00000E+00	0.0000	
2	0.0016			1.46285E-03	1.0429	3.34241E-03	0.3409	0.00000E+00	0.0000	
3	0.0020			1.82688E-03	0.8427	1.18930E-03	0.5459	0.00000E+00	0.0000	
4	0.0011			1.05761E-03	1.1461	6.32283E-04	0.8050	0.00000E+00	0.0000	
5	0.0016			1.45380E-03	0.9568	1.13056E-03	0.5669	0.00000E+00	0.0000	
6	0.0021			1.94135E-03	0.7005	2.95458E-03	0.3781	0.00000E+00	0.0000	
7	0.0021			1.98165E-03	0.7377	5.02578E-03	0.3877	0.00000E+00	0.0000	
8	0.0023			2.10841E-03	0.9509	4.39348E-03	0.4452	0.00000E+00	0.0000	
9	0.0031			2.83491E-03	1.1509	4.85365E-03	0.5306	0.00000E+00	0.0000	
10	0.0067			6.19361E-03	1.0243	1.16847E-02	0.4715	0.00000E+00	0.0000	
11	0.0142			1.31987E-02	0.8508	1.77136E-02	0.4712	0.00000E+00	0.0000	
12	0.0190			1.76164E-02	0.8312	1.81847E-02	0.5562	0.00000E+00	0.0000	
13	0.0182			1.69247E-02	0.8974	2.19290E-02	0.5596	0.00000E+00	0.0000	
14	0.0157			1.45530E-02	0.8694	2.55460E-02	0.4510	0.00000E+00	0.0000	
15	0.0030			2.79913E-03	1.6979	1.10108E-02	0.5184	0.00000E+00	0.0000	
16	0.0021			1.94710E-03	2.2898	6.54953E-03	0.5876	0.00000E+00	0.0000	
17	0.0033			3.02592E-03	2.2997	4.35406E-03	0.9772	0.00000E+00	0.0000	
18	0.0046			4.28783E-03	2.1737	4.51204E-03	1.0749	0.00000E+00	0.0000	
19	0.0056			5.21682E-03	1.8496	7.03214E-03	0.7471	0.00000E+00	0.0000	
20	0.0234			2.17310E-02	0.9062	2.60732E-02	0.4375	0.00000E+00	0.0000	
21	0.0127			1.17969E-02	1.2310	1.13868E-02	0.6969	0.00000E+00	0.0000	
22	0.0307			2.85500E-02	0.8799	2.63312E-02	0.5384	0.00000E+00	0.0000	
23	0.1087			1.00964E-01	0.4455	1.02819E-01	0.2386	0.00000E+00	0.0000	
24	0.2182			2.02681E-01	0.2924	2.10037E-01	0.1542	0.00000E+00	0.0000	
25	0.1858			1.72586E-01	0.3061	1.78378E-01	0.1595	0.00000E+00	0.0000	
26	0.2292			2.12900E-01	0.2855	2.18767E-01	0.1605	0.00000E+00	0.0000	
27	0.0829			7.69878E-02	0.4909	7.46563E-02	0.2891	0.00000E+00	0.0000	
SYSTEM TOTAL =				9.28936E-01	0.0964	1.00194E+00	0.0244	0.00000E+00	0.0000	
ELAPSED TIME 12.40683 MINUTES										
RANDOM NUMBER= 1Bc744B1029D										

FREQUENCY FOR GENERATIONS 4 TO 803

0.8495 TO 0.8552	*
0.8552 TO 0.8609	***
0.8609 TO 0.8666	**
0.8666 TO 0.8723	**
0.8723 TO 0.8780	*****
0.8780 TO 0.8836	*****
0.8836 TO 0.8893	*****
0.8893 TO 0.8950	*****
0.8950 TO 0.9007	*****
0.9007 TO 0.9064	*****
0.9064 TO 0.9120	*****
0.9120 TO 0.9177	*****
0.9177 TO 0.9234	*****
0.9234 TO 0.9291	*****
0.9291 TO 0.9348	*****
0.9348 TO 0.9405	*****
0.9405 TO 0.9461	*****
0.9461 TO 0.9518	*****
0.9518 TO 0.9575	*****
0.9575 TO 0.9632	*****
0.9632 TO 0.9689	*****
0.9689 TO 0.9746	*****
0.9746 TO 0.9802	*****
0.9802 TO 0.9859	*****
0.9859 TO 0.9916	***
0.9916 TO 0.9973	***
0.9973 TO 1.0030	*
1.0030 TO 1.0086	*
1.0086 TO 1.0143	***

```
FREQUENCY FOR GENERATIONS 204 TO 803  
0.8495 TO 0.8552 *  
0.8552 TO 0.8609 **  
0.8609 TO 0.8666 **  
0.8666 TO 0.8723 *  
0.8723 TO 0.8780 *****  
0.8780 TO 0.8836 *****  
0.8836 TO 0.8893 *****  
0.8893 TO 0.8950 *****  
0.8950 TO 0.9007 *****  
0.9007 TO 0.9064 *****  
0.9064 TO 0.9120 *****  
0.9120 TO 0.9177 *****  
0.9177 TO 0.9234 *****  
0.9234 TO 0.9291 *****  
0.9291 TO 0.9348 *****  
0.9348 TO 0.9405 *****  
0.9405 TO 0.9461 *****  
0.9461 TO 0.9518 *****  
0.9518 TO 0.9575 *****  
0.9575 TO 0.9632 *****  
0.9632 TO 0.9689 *****  
0.9689 TO 0.9746 *****  
0.9746 TO 0.9802 *****  
0.9802 TO 0.9859 *****  
0.9859 TO 0.9916 *****  
0.9916 TO 0.9973 *****  
0.9973 TO 1.0030 *  
1.0030 TO 1.0086 *  
1.0086 TO 1.0143 **
```

FREQUENCY FOR GENERATIONS 404 TO 803

0.8495 TO 0.8552 \*  
0.8552 TO 0.8609 \*\*  
0.8609 TO 0.8666 \*  
0.8666 TO 0.8723 \*  
0.8723 TO 0.8780 \*\*\*  
0.8780 TO 0.8836 \*\*\*\*\*  
0.8836 TO 0.8893 \*\*\*\*\*  
0.8893 TO 0.8950 \*\*\*\*\*  
0.8950 TO 0.9007 \*\*\*\*\*  
0.9007 TO 0.9064 \*\*\*\*\*  
0.9064 TO 0.9120 \*\*\*\*\*  
0.9120 TO 0.9177 \*\*\*\*\*  
0.9177 TO 0.9234 \*\*\*\*\*  
0.9234 TO 0.9291 \*\*\*\*\*  
0.9291 TO 0.9348 \*\*\*\*\*  
0.9348 TO 0.9405 \*\*\*\*\*  
0.9405 TO 0.9461 \*\*\*\*\*  
0.9461 TO 0.9518 \*\*\*\*\*  
0.9518 TO 0.9575 \*\*\*\*\*  
0.9575 TO 0.9632 \*\*\*\*\*  
0.9632 TO 0.9689 \*\*\*\*\*  
0.9689 TO 0.9746 \*\*\*\*\*  
0.9746 TO 0.9802 \*\*\*\*\*  
0.9802 TO 0.9859 \*\*\*\*\*  
0.9859 TO 0.9916 \*\*\*\*\*  
0.9916 TO 0.9973 \*\*\*\*\*  
0.9973 TO 1.0030 \*  
1.0030 TO 1.0086 \*  
1.0086 TO 1.0143 \*

FREQUENCY FOR GENERATIONS 604 TO 603

0.8495 TO 0.8552	
0.8552 TO 0.8609	*
0.8609 TO 0.8666	
0.8666 TO 0.8723	
0.8723 TO 0.8780	***
0.8780 TO 0.8836	***
0.8836 TO 0.8893	*****
0.8893 TO 0.8950	*****
0.8950 TO 0.9007	*****
0.9007 TO 0.9064	*****
0.9064 TO 0.9120	*****
0.9120 TO 0.9177	*****
0.9177 TO 0.9234	*****
0.9234 TO 0.9291	*****
0.9291 TO 0.9348	*****
0.9348 TO 0.9405	*****
0.9405 TO 0.9461	*****
0.9461 TO 0.9518	*****
0.9518 TO 0.9575	*****
0.9575 TO 0.9632	*****
0.9632 TO 0.9689	****
0.9689 TO 0.9746	***
0.9746 TO 0.9802	*****
0.9802 TO 0.9859	*
0.9859 TO 0.9916	
0.9916 TO 0.9973	
0.9973 TO 1.0030	
1.0030 TO 1.0086	
1.0086 TO 1.0143	

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 12.40683 MINUTES  
.....  
\*

**6.6.8**      **DIDO Fuel Assemblies**

This section contains abbreviated output files from the most reactive normal condition and accident condition moderator density variation cases.

Figure 6.6.8-1 Maximum Reactivity DIDO Configuration – Eight Cask Array

```
.
NAC International
QSCALENT Banner Generation Utility v3.6 (20010221)
+-----+
I JOB INFORMATION I
+-----+
Output File Name:      eight-cask-void_ext.out
Start Date:           February 21, 2001
Start Time:           18:17:21
.
+-----+
I SOFTWARE INFORMATION I
+-----+
Program Name:         Scale 4.3 for Windows NT 4.0
Version:              4.3.1
Installation Date:    June 10, 1998
Code Verification Package #: EA913-1010-94, Rev. 0
Code Verification Date: June 10, 1998
Program Location:     G:\scale43\win_nt\exe
.
+-----+
I SYSTEM INFORMATION I
+-----+
Computer Type:        Dell Precision 410
Operating System:     Windows NT Version 4.0
Computer ID:          57NTY (MAC# 00C04F600F94)
Serial Number:        57NTY
Login ID:              zjx
System Verification Date: July 3, 2000
.
```



```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT with Loose DIDO HEU Fuel, Accident Condition, Radial Shift Pattern - Centere
'Fuel Tube Thick - Nominal Fuel Tube OD - Nominal Fuel Tube Height - Nominal
'Fuel Base Plate - Nominal Fuel Plate Diameter - Nominal Fuel Plate Thickness
'Fuel Plate Clad Thickness - Min Active Fuel Length - Min Fuel Element Height
'U235 Fuel Mass - Max Uranium Weight Fraction - Max Cylinder Pitch - Outer_Fix
27GROUPNDP4 LATTICECELL
'Material Description for LWT Analysis - DIDO HEU Fuel
URANIUM 1 DEN=0.5477 1.0 293.0 92235 94.0 92238 06.0 END
AL 1 DEN=1.7930 1.0 293.0 END
AL 2 1.00 293.0 END
H2O 3 DEN=0.9998 1.00 293.0 END
AREMGLC 0.9437 3 0 1 0
6012 2 1001 6 8016 2
4 0.5840 END
H2O 4 0.4160 293.0 END
PB 5 1.00 293.0 END
SS304 6 1.00 293.0 END
AL 7 1.00 293.0 END
SS304 8 1.00 293.0 END
H2O 9 DEN=0.0001 1.00 293.0 END
END COMP
SYMMSLABCELL 0.9800 0.0650 1 3 0.1300 2 END

READ PARAM TBA=5 TME=90 RUN=YES PLT=NO
GEN=1203 NPG=1000 END PARAM
READ START XSM=-16.85 XSP=16.85 YSM=16.85 YSP=-16.85
ZSM=26.67 ZSP=473.35 END START
READ GEOM
UNIT 1
COM='Fueled Annular Sections Tube 1 Loose '
'Fuel Annulus 1
CYLINDER 3 1 3.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.0625 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.1275 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
'Fuel Annulus 2
CYLINDER 3 1 3.5300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.5625 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.6275 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 58.7500 0.0000 ORIGIN 0.0000 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.0625 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 4.1275 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
'Fuel Annulus 4
CYLINDER 3 1 4.5300 58.7500 0.0000
CYLINDER 2 1 4.5625 58.7500 0.0000
CYLINDER 1 1 4.6275 58.7500 0.0000
CYLINDER 2 1 4.6599 58.7500 0.0000
UNIT 2
COM='Axial Clad Sections Tube 1 Loose '
'Clad Axial End Piece 1
CYLINDER 3 1 3.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.5300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 1.3750 0.0000 ORIGIN 0.0000 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
'Clad Axial End Piece 4
CYLINDER 3 1 4.5300 1.3750 0.0000
CYLINDER 2 1 4.6599 1.3750 0.0000
UNIT 3
COM='Fuel Element Tube 1'
CYLINDER 3 1 4.6600 61.5000 0.0000
HOLE 2 0.0000 0.0000 0.0000
HOLE 1 0.0000 0.0000 1.3750
HOLE 2 0.0000 0.0000 60.1250
UNIT 4
COM='Basket Fuel Tube - Fuel Down Radial Centered'
CYLINDER 3 1 5.0927 73.1773 0.0000
HOLE 3 0.0000 0.0000 0.0000
CYLINDER 2 1 5.3974 73.1773 0.0000
UNIT 5
COM='Basket Fuel Tube - Fuel Up Radial Centered'
CYLINDER 3 1 5.0927 73.1773 0.0000
HOLE 3 0.0000 0.0000 11.6772
CYLINDER 2 1 5.3974 73.1773 0.0000
UNIT 6
COM='Basket Bottom Plate Hole '
CYLINDER 3 1 1.27 1.2698 0.0000
UNIT 7
COM='Basket Bottom Plate '
CYLINDER 6 1 16.8466 1.2698 0.0000
HOLE 6 0.0000 0.0000 0.0000
HOLE 6 10.7950 0.0000 0.0000
HOLE 6 5.3975 9.3487 0.0000
HOLE 6 -5.3975 9.3487 0.0000
HOLE 6 -10.7950 0.0000 0.0000
HOLE 6 -5.3975 -9.3487 0.0000
HOLE 6 5.3975 -9.3487 0.0000
UNIT 8
COM='Heat Transfer Bar / Rod '
CYLINDER 7 1 0.3165 73.1773 0.0000
UNIT 9
COM='Basket Fuel Down'
CYLINDER 3 1 16.1926 73.1773 0.0000
HOLE 4 0.0000 0.0000 0.0000
HOLE 4 10.7950 0.0000 0.0000
HOLE 8 4.9493 2.8575 0.0000
HOLE 8 4.6024 3.3881 0.0000
HOLE 8 5.2354 2.2917 0.0000
HOLE 4 5.3975 9.3487 0.0000
HOLE 8 0.0000 5.7150 0.0000

```

```
HOLE 8 -0.6330 5.6798 0.0000
HOLE 8 0.6330 5.6798 0.0000
HOLE 4 -5.3975 9.3487 0.0000
HOLE 8 -4.9493 2.8575 0.0000
HOLE 8 -5.2354 2.2917 0.0000
HOLE 8 -4.6024 3.3881 0.0000
HOLE 4 -10.7950 0.0000 0.0000
HOLE 8 -4.9493 -2.8575 0.0000
HOLE 8 -4.6024 -3.3881 0.0000
HOLE 8 -5.2354 -2.2917 0.0000
HOLE 4 -5.3975 -9.3487 0.0000
HOLE 8 0.0000 -5.7150 0.0000
HOLE 8 0.6330 -5.6798 0.0000
HOLE 8 -0.6330 -5.6798 0.0000
HOLE 4 5.3975 -9.3487 0.0000
HOLE 8 4.9493 -2.8575 0.0000
HOLE 8 5.2354 -2.2917 0.0000
HOLE 8 4.6024 -3.3881 0.0000
CYLINDER 7 1 16.6688 73.1773 0.0000
CYLINDER 3 1 16.8466 73.1773 0.0000
UNIT 10
COM='Basket Fuel Up'
CYLINDER 3 1 16.1926 73.1773 0.0000
HOLE 5 0.0000 0.0000 0.0000
HOLE 5 10.7950 0.0000 0.0000
HOLE 8 4.9493 2.8575 0.0000
HOLE 8 4.6024 3.3881 0.0000
HOLE 8 5.2354 2.2917 0.0000
HOLE 5 5.3975 9.3487 0.0000
HOLE 8 0.0000 5.7150 0.0000
HOLE 8 -0.6330 5.6798 0.0000
HOLE 8 0.6330 5.6798 0.0000
HOLE 5 -5.3975 9.3487 0.0000
HOLE 8 -4.9493 2.8575 0.0000
HOLE 8 -5.2354 2.2917 0.0000
HOLE 8 -4.6024 3.3881 0.0000
HOLE 5 -10.7950 0.0000 0.0000
HOLE 8 -4.9493 -2.8575 0.0000
HOLE 8 -4.6024 -3.3881 0.0000
HOLE 8 -5.2354 -2.2917 0.0000
HOLE 5 -5.3975 -9.3487 0.0000
HOLE 8 0.0000 -5.7150 0.0000
HOLE 8 0.6330 -5.6798 0.0000
HOLE 8 -0.6330 -5.6798 0.0000
HOLE 5 5.3975 -9.3487 0.0000
HOLE 8 4.9493 -2.8575 0.0000
HOLE 8 5.2354 -2.2917 0.0000
HOLE 8 4.6024 -3.3881 0.0000
CYLINDER 7 1 16.6688 73.1773 0.0000
CYLINDER 3 1 16.8466 73.1773 0.0000
UNIT 11
COM='Cask Cavity '
CYLINDER 3 1 16.9863 446.6844 0.0000
HOLE 7 0.0000 0.0000 0.0001
HOLE 10 0.0000 0.0000 1.2700
HOLE 7 0.0000 0.0000 74.4475
HOLE 9 0.0000 0.0000 75.7174
HOLE 7 0.0000 0.0000 148.8949
HOLE 10 0.0000 0.0000 150.1648
HOLE 7 0.0000 0.0000 223.3423
HOLE 9 0.0000 0.0000 224.6122
HOLE 7 0.0000 0.0000 297.7897
HOLE 10 0.0000 0.0000 299.0596
HOLE 7 0.0000 0.0000 372.2371
HOLE 9 0.0000 0.0000 373.5070
UNIT 12
COM='Cask Shield Radial Configuration '
CYLINDER 3 1 16.9863 446.6844 0.0000
HOLE 11 0.0000 0.0000 0.0000
CYLINDER 8 1 18.9103 446.6844 0.0000
CYLINDER 5 1 33.4645 446.6844 0.0000
CYLINDER 8 1 36.5189 446.6844 0.0000
CYLINDER 9 1 49.2189 446.6844 0.0000
CYLINDER 8 1 49.8183 446.6844 0.0000
UNIT 13
COM='LWT Lid '
CYLINDER 8 1 36.5189 28.5750 0.5994
CYLINDER 9 1 49.8183 28.5750 0.5994
CYLINDER 8 1 49.8183 28.5750 0.0000
UNIT 14
COM='LWT Bottom Weldment '
CYLINDER 5 1 26.3525 16.5100 8.8900
CYLINDER 8 1 36.5189 26.0706 0.0000
CYLINDER 9 1 49.8183 26.0706 0.0000
CYLINDER 8 1 49.8183 26.6700 0.0000
UNIT 15
COM='LWT Cask '
CYLINDER 9 1 49.8183 501.9297 0.0000
HOLE 14 0.0000 0.0000 0.0000
HOLE 12 0.0000 0.0000 26.6701
HOLE 13 0.0000 0.0000 473.3546
Global UNIT 16
COM='Finite Cask Array 8 Casks'
CUBOID 3 1 199.2744 -149.4558 2P136.1066 501.9297 0.0000
HOLE 15 0.0000 0.0000 0.0000
HOLE 15 99.6368 0.0000 0.0000
HOLE 15 49.8184 86.2880 0.0000
HOLE 15 -49.8184 86.2880 0.0000
HOLE 15 -99.6368 0.0000 0.0000
HOLE 15 -49.8184 -86.2880 0.0000
HOLE 15 49.8184 -86.2880 0.0000
HOLE 15 149.4552 -86.2880 0.0000
END GEOM
READ BOUNDS ALL=H2O END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CASK ARRAY'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
```

XUL=-200 YUL=200 ZUL=57.4  
XLR=200 YLR=-200 ZLR=57.4 END  
END PLOT  
END DATA

SECONDARY MODULE 000008 HAS BEEN CALLED.  
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.77 (SECONDS).  
SECONDARY MODULE 000002 HAS BEEN CALLED.  
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 4.67 (SECONDS).  
SECONDARY MODULE 000009 HAS BEEN CALLED.  
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1727.35 (SECONDS).  
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1735.75 (SECONDS).

```

CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AAAAAAAAA  SSSSSSSSS  222222222  55555555555
CC          CC  SS      SS  AA      AA  SS      SS  22      22  55
CC          SS      SS  AA      AA  SS      SS  22      22  55
CC          SS      SS  AA      AA  SS      SS  22      22  55
CC          SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  22      22  55555555555
CC          SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  22      22  55555555555
CC          SS      SS  AA      AA  SS      SS  22      22  55
CC          SS      SS  AA      AA  SS      SS  22      22  55
CC          CC  SS      SS  AA      AA  SS      SS  22      22  55
CCCCCCCCC  SSSSSSSSS  AA          AA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AA          AA  SSSSSSSSS  222222222  55555555555
    
```

```

SSSSSSSSS  CCCCCCCCC  AAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SS          CC          AA          AA  LL          EE          PP          CC          CC
SS          CC          AA          AA  LL          EE          PP          CC          CC
SS          CC          AA          AA  LL          EE          PP          CC          CC
SSSSSSSSS  CC          AAAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CC
SSSSSSSSS  CC          AAAAAAAAAA  LL          EEEEEEEEE  PPPPPPPPP  CC
SS          SS      CC          AA          AA  LL          EE          PP          CC          CC
SS          SS      CC          AA          AA  LL          EE          PP          CC          CC
SSSSSSSSS  CCCCCCCCC  AA          AA  LLLLLLLLL  EEEEEEEEE  PP          CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AA          AA  LLLLLLLLL  EEEEEEEEE  PP          CCCCCCCCC
    
```

```

0000000  222222222  //  222222222  11  //  0000000  11
00000000  22222222222  //  22222222222  111  //  00000000  111
00 00 22 22 22 22 1111 11 00 00 1111 11
00 00 22 22 22 22 11 11 00 00 11 11
00 00 22 22 22 22 11 11 00 00 11 11
00 00 22 22 22 22 11 11 00 00 11 11
00 00 22 22 22 22 11 11 00 00 11 11
00 00 22 22 22 22 11 11 00 00 11 11
00 00 22 22 22 22 11 11 00 00 11 11
00000000  22222222222  //  22222222222  1111111  //  00000000  1111111
0000000  22222222222  //  22222222222  1111111  //  0000000  1111111
    
```

```

11 888888888 11 777777777 222222222 55555555555
111 88888888888 111 77777777777 22222222222 55555555555
1111 88 88 77 77 22 22 55
11 88 88 77 77 22 22 55
11 88 88 77 77 22 22 55
11 88888888888 11 77 77 22 22 55555555555
11 88888888888 11 77 77 22 22 55555555555
11 88 88 77 77 22 22 55
11 88 88 77 77 22 22 55
11 88 88 77 77 22 22 55
11111111 88888888888 11111111 77 77 22222222222 55555555555
11111111 88888888888 11111111 77 77 22222222222 55555555555
    
```



'Fuel Tube Thick - Nominal Fuel Tube OD - Nominal Fuel Tube Height - Nominal  
'Fuel Base Plate - Nominal Fuel Plate Diameter - Nominal Fuel Plate Thickness  
'Fuel Plate Clad Thickness - Min Active Fuel Length - Min Fuel Element Height  
'U235 Fuel Mass - Max Uranium Weight Fraction - Max Cylinder Pitch - Outer\_Fix  
'Material Description for LWT Analysis - DIDO HEU Fuel  
'Fuel Tube Thick - Nominal Fuel Tube OD - Nominal Fuel Tube Height - Nominal  
'Fuel Base Plate - Nominal Fuel Plate Diameter - Nominal Fuel Plate Thickness  
'Fuel Plate Clad Thickness - Min Active Fuel Length - Min Fuel Element Height  
'U235 Fuel Mass - Max Uranium Weight Fraction - Max Cylinder Pitch - Outer\_Fix  
'Material Description for LWT Analysis - DIDO HEU Fuel  
LWT WITH LOOSE DIDO HEU FUEL, ACCIDENT CONDITION, RADIAL SHIFT PATTERN - CENTERE

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
MX 9 MIXTURES  
MSC 11 COMPOSITION SPECIFICATIONS  
IZM 3 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC URANIUM STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.5477 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 94.000 WT%  
92238 6.000 WT%

END

SC AL STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 1.7930 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9998 SPECIFIED DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

SC ARBMGLC STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 0.5840 VOLUME FRACTION  
ROTH 0.9437 SPECIFIED DENSITY  
NEL 3 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
6012 2.00 ATOMS/MOLECULE  
1001 6.00 ATOMS/MOLECULE  
8016 2.00 ATOMS/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 0.4160 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

SC PB STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN

82000 1.00 ATOM/MOLECULE  
END  
SC SS304 STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

END  
SC AL STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END  
SC SS304 STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

END  
SC H2O STANDARD COMPOSITION  
MX 9 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.0001 SPECIFIED DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

CTP SYMMSLABCELL CELL TYPE  
PITCH 0.9800 CM CENTER TO CENTER SPACING  
FUELOD 0.0650 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 3 MIXTURE NO. OF MODERATOR  
CLADOD 0.1300 CM CLAD OUTER DIAMETER  
MCLAD 2 MIXTURE NO. OF CLAD

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY  
ZONE 1 IS FUEL  
ZONE 2 IS CLAD  
ZONE 3 IS MOD





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BBBBBBBBBBBB 0000000000 NN NN
BBBBBBBBBBBB 000000000000 NNN NN
BB BB 00 00 NNNN NN
BB BB 00 00 NN NN NN
BB BB 00 00 NN NN NN
BBBBBBBBBBBB 00 00 NN NN NN
BBBBBBBBBBBB 00 00 NN NN NN
BB BB 00 00 NN NN NN
BB BB 00 00 NN NN NN
BB BB 00 00 NN NN NN
BBBBBBBBBBBB 000000000000 NN NNN
BBBBBBBBBBBB 0000000000 NN NN

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SSSSSSSSSS CCCCCCCCCC AAAAAAAA LL
SSSSSSSSSS CCCCCCCCCC AAAAAAAA LL
SS SS CC CC AA AA LL
SS CC CC AA AA LL
SSSSSSSSSS CC AAAAAAAA LL
SSSSSSSSSS CC AAAAAAAA LL
SS SS CC AA AA LL
SS SS CC CC AA AA LL
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLL
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLL

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000000 2222222222
00000000 2222222222
00 00 22 22
00 00 22 22
00 00 22 22
00 00 22 22
00 00 22 22
00 00 22 22
00 00 22 22
00000000 2222222222
000000 2222222222

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11 8888888888
111 888888888888
1111 88 88
11 88 88
11 88 88
11 8888888888
11 8888888888
11 88 88
11 88 88
11 88 88
11111111 888888888888
11111111 888888888888

```



-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

PROBLEM DESCRIPTION

IGR--GEOMETRY (0/1/2/3--INF MED/SLAB/CYL/SPHERE) 1  
IZM--NUMBER OF ZONES OR MATERIAL REGIONS 9  
MS--MIXING TABLE LENGTH 21  
IEL--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 21 ENTRIES.  
4Q ARRAY HAS 21 ENTRIES.  
5Q ARRAY HAS 21 ENTRIES.  
6Q ARRAY HAS 9 ENTRIES.  
7Q ARRAY HAS 9 ENTRIES.  
8Q ARRAY HAS 9 ENTRIES.  
9Q ARRAY HAS 9 ENTRIES.  
10Q ARRAY HAS 21 ENTRIES.  
11Q ARRAY HAS 9 ENTRIES.

MIXING TABLE

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	1.31908E-03	1092235
2	1	92238	8.31332E-05	1092238
3	1	13027	4.00184E-02	1013027
4	2	13027	6.03066E-02	2013027
5	7	13027	6.03066E-02	7013027
6	3	1001	6.68762E-02	3001001
7	4	1001	5.98801E-02	4001001
8	9	1001	6.68896E-06	9001001
9	3	8016	3.34381E-02	3008016
10	4	8016	2.45894E-02	4008016
11	9	8016	3.34448E-06	9008016
12	4	6012	1.07014E-02	4006012
13	5	82000	3.29690E-02	5082000
14	6	24304	1.74286E-02	6024304
15	8	24304	1.74286E-02	8024304
16	6	25055	1.73633E-03	6025055
17	8	25055	1.73633E-03	8025055
18	6	26304	5.93579E-02	6026304
19	8	26304	5.93579E-02	8026304
20	6	28304	7.72070E-03	6028304
21	8	28304	7.72070E-03	8028304

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	3.25000E-02	2.93000E+02	4.53946E+00	0
2	2	6.50000E-02	2.93000E+02	0.00000E+00	0
3	3	4.90000E-01	2.93000E+02	0.00000E+00	0
4	4	5.49000E+00	2.93000E+02	0.00000E+00	0
5	5	1.04900E+01	2.93000E+02	0.00000E+00	0
6	6	1.54900E+01	2.93000E+02	0.00000E+00	0
7	7	2.04900E+01	2.93000E+02	0.00000E+00	0
8	8	2.54900E+01	2.93000E+02	0.00000E+00	0
9	9	3.04900E+01	2.93000E+02	0.00000E+00	0

4087 LOCATIONS OF 10000 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 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 13027 AL-27 1193 218 G FROM LOG 11 TO LOG 18 BONDARENKO TRIGGER 0  
COPY 13027 AL-27 1193 218 G FROM LOG 18 TO LOG 1 BONDARENKO TRIGGER 0  
COPY 13027 AL-27 1193 218 G FROM LOG 18 TO LOG 1 BONDARENKO TRIGGER 0

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COPY	13027	AL-27 1193 218 G	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	24304	CR 1191 WT SS-30	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	24304	CR 1191 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	24304	CR 1191 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	25055	MANGANESE-55	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	25055	MANGANESE-55	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	25055	MANGANESE-55	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	26304	FE 1192 WT SS-30	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	26304	FE 1192 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	26304	FE 1192 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	28304	NI 1190 WT SS-30	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	28304	NI 1190 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	28304	NI 1190 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	82000	PB 1288 218NGP	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 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89  
LAST UPDATED  
L.M.PETRIE - ORNL

08/12/94

TAPE ID	4321	NUMBER OF NUCLIDES	21
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 08/12/94	ID 3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 4001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 9001001
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94	ID 4006012
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 4008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 9008016
AL-27 1193 218	GP 040375(5)	UPDATED 08/12/94	ID 1013027
AL-27 1193 218	GP 040375(5)	UPDATED 08/12/94	ID 2013027
AL-27 1193 218	GP 040375(5)	UPDATED 08/12/94	ID 7013027
CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 6024304
CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8024304
MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	ID 6025055
MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	ID 8025055
FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 6026304
FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8026304
NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 6028304
NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8028304
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 5082000
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	ID 1092235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 1092238

TAPE COPY USED 0 1/0'S, AND TOOK 0.17 SECONDS







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-1Q ARRAY HAS      1 ENTRIES.
0Q ARRAY HAS      9 ENTRIES.
1Q ARRAY HAS     12 ENTRIES.

SELECT 21 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

4 RESONANCE CALCULATIONS HAVE BEEN REQUESTED
-1 OUTPUT OPTION FOR AMPX FORMATTED CROSS SECTION DATA
2001 MAXIMUM NUMBER OF RESONANCE MESH INTERVALS
2 ORDER OF RESONANCE LEVEL PROCESSING

THE STORAGE ALLOCATED FOR THIS CASE IS 100000 WORDS

2Q ARRAY HAS     21 ENTRIES.
3Q ARRAY HAS     60 ENTRIES.
4Q ARRAY HAS     21 ENTRIES.

GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
TAPE IDENTIFICATION NUMBER      4321
NUMBER OF NUCLIDES ON TAPE      21
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 1680 WORDS
XSDRN TAPE 4321
SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89
LAST UPDATED
L.M.PETRIE - ORNL
08/12/94

NUCLIDES FROM XSDRN TAPE
1 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 3001001
2 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 4001001
3 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 9001001
4 CARBON-12 ENDF/B-IV MAT 1274/THRM1065 UPDATED 08/12/94 4006012
5 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 3008016
6 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 4008016
7 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 9008016
8 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 1013027
9 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 2013027
10 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 7013027
11 CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 6024304
12 CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8024304
13 MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 6025055
14 MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 8025055
15 FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 6026304
16 FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8026304
17 NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 6028304
18 NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8028304
19 PB 1288 218NGP 042375 P-3 293K UPDATED 08/12/94 5082000
20 URANIUM-235 ENDF/B-IV MAT 1261 UPDATED 08/12/94 1092235
21 URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 1092238

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 3001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 4001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 9001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CARBON-12 ENDF/B-IV MAT 1274/THRM1065 UPDATED 08/12/94 4006012 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 3008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 4008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 9008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 1013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 2013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 7013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 6024304 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8024304 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 6025055 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A) = 54.466 TEMPERATURE (KELVIN) = 293.000
POTENTIAL SCATTER SIGMA = 2.590 LUMPED NUCLEAR DENSITY = 1.7363295E-03

```

SPIN FACTOR (G) = 14.448 LUMP DIMENSION (A-BAR) = 0.000000E+00  
INNER RADIUS = 0.000000E+00 DANCOFF CORRECTION (C) = 0.000000E+00

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 55.845 SIGMA(PER ABSORBER ATOM) = 3.4663022E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 55.925 SIGMA(PER ABSORBER ATOM) = 1.2557598E+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
8	-5.518788E-04	0.000000E+00	-3.944190E-01
9	-2.797993E-03	0.000000E+00	-2.293471E+00
10	-3.291452E-01	0.000000E+00	-3.820862E+01
11	-2.680562E+00	0.000000E+00	-1.159996E+02

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 3.33719E+00  
FISSION 0.00000E+00

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 8025055 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 54.466 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 2.590 LUMPED NUCLEAR DENSITY = 1.7363295E-03  
SPIN FACTOR (G) = 14.448 LUMP DIMENSION (A-BAR) = 0.000000E+00  
INNER RADIUS = 0.000000E+00 DANCOFF CORRECTION (C) = 0.000000E+00

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 55.845 SIGMA(PER ABSORBER ATOM) = 3.4663022E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 55.925 SIGMA(PER ABSORBER ATOM) = 1.2557598E+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
8	-5.518788E-04	0.000000E+00	-3.944190E-01
9	-2.797993E-03	0.000000E+00	-2.293471E+00
10	-3.291452E-01	0.000000E+00	-3.820862E+01
11	-2.680562E+00	0.000000E+00	-1.159996E+02

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 3.33719E+00  
FISSION 0.00000E+00

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375) ' UPDATED 08/12/94 6026304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375) ' UPDATED 08/12/94 8026304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375) ' UPDATED 08/12/94 6028304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375) ' UPDATED 08/12/94 8028304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

PB 1288 218NGP 042375 P-3 293K UPDATED 08/12/94 5082000 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261 UPDATED 08/12/94 1092235 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 233.025 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 11.500 LUMPED NUCLEAR DENSITY = 1.3190822E-03  
SPIN FACTOR (G) = 15171.100 LUMP DIMENSION (A-BAR) = 6.4999998E-02  
INNER RADIUS = 0.000000E+00 DANCOFF CORRECTION (C) = 1.5211706E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM) = 4.0850834E+01

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

NAC-LWT Cask SAR  
Revision 43

January 2015

MASS OF MODERATOR-2 = 238.051 SIGMA(PER ABSORBER ATOM) = 7.7685082E-01

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-1.712865E+00	-1.053512E+00	-4.421081E-02
13	-5.191924E+00	-2.544281E+00	-1.184106E-01
14	-3.743466E+00	-2.214335E+00	-2.824813E-02
15	-2.253279E-04	-1.715397E-04	1.537884E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.15925E+02  
FISSION 1.28649E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262

UPDATED 08/12/94 1092238 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A)	= 236.006	TEMPERATURE (KELVIN)	= 293.000
POTENTIAL SCATTER SIGMA	= 10.599	LUMPED NUCLEAR DENSITY	= 8.3133229E-05
SPIN FACTOR (G)	= 656.527	LUMP DIMENSION (A-BAR)	= 6.4999998E-02
INNER RADIUS	= 0.0000000E+00	DANCOFF CORRECTION (C)	= 1.5211706E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM) = 6.4818372E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 235.044 SIGMA(PER ABSORBER ATOM) = 1.8885785E+02

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-1.309125E-04	0.000000E+00	-1.475272E-03
10	-7.025824E-03	-3.903629E-08	-5.099698E-02
11	-3.303697E-01	0.000000E+00	-1.054719E+00
12	-3.107242E+00	0.000000E+00	-3.725560E+00
13	-3.585465E+00	0.000000E+00	-1.189779E+00
14	-6.584399E+00	0.000000E+00	-3.875874E-01
15	-4.155954E-09	0.000000E+00	3.752471E-09

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.57082E+02  
FISSION 5.33631E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

THIS XSDRN WORKING TAPE WAS CREATED 02/21/01 AT 18:17:27  
THE TITLE OF THE PARENT CASE IS AS FOLLOWS  
SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA

COMPILED FOR NRC	1/27/89				
TAPE ID		4321	NUMBER OF NUCLIDES		21
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 08/12/94	ID	3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	ID	4001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	ID	9001001
CARBON-12	ENDF/B-IV MAT 1274/THRM1065		UPDATED 08/12/94	ID	4006012
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	ID	3008016
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	ID	4008016
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	ID	9008016
AL-27 1193 218	GP 040375(5)		UPDATED 08/12/94	ID	1013027
AL-27 1193 218	GP 040375(5)		UPDATED 08/12/94	ID	2013027
AL-27 1193 218	GP 040375(5)		UPDATED 08/12/94	ID	7013027
CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	ID	6024304
CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	ID	8024304
MANGANESE-55	ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID	6025055
MANGANESE-55	ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID	8025055
FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	ID	6026304
FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	ID	8026304
NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	ID	6028304
NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	ID	8028304
PB 1288 218NGP 042375 P-3 293K			UPDATED 08/12/94	ID	5082000
URANIUM-235	ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID	1092235
URANIUM-238	ENDF/B-IV MAT 1262		UPDATED 08/12/94	ID	1092238
TAPE COPY USED	0 I/O'S, AND TOOK	0.16 SECONDS			





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***
***** NUMERIC PARAMETERS *****
***
***
TME      MAXIMUM PROBLEM TIME (MIN)          90.00
***
TBA      TIME PER GENERATION (MIN)           5.00
***
GEN      NUMBER OF GENERATIONS              1203
***
NPG      NUMBER PER GENERATION              1000
***
NSK      NUMBER OF GENERATIONS TO BE SKIPPED 3
***
BEG      BEGINNING GENERATION NUMBER         1
***
RES      GENERATIONS BETWEEN CHECKPOINTS     0
***
X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS 1
***
NBK      NEUTRON BANK SIZE                   1025
***
XNB      EXTRA POSITIONS IN NEUTRON BANK     0
***
NFB      FISSION BANK SIZE                   1000
***
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              BB82710001
***
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
***
.....
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MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD =3.0E-05

MIXTURE #	NUCLIDE	ATOM-DENS.	DENSITY (G/CC)	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	STATUS
1	1013027	4.00184E-02	2.3407	7.66010E-01	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED
	1092235	1.31908E-03	2.19951E-01	92235	235.0441		URANIUM-235 ENDF/B-IV MAT 1261	UPDATED
	1092238	8.31332E-05	1.40394E-02	92238	238.0510		URANIUM-238 ENDF/B-IV MAT 1262	UPDATED
2	2013027	6.03066E-02	2.7020	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED
	3001001	6.68762E-02	0.99977	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
	3008016	3.34381E-02	8.88074E-01	8016	15.9904		OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
3	4001001	5.98801E-02	0.96635	1.03684E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
	4006012	1.07014E-02	2.30668E-01	6000	12.0001		CARBON-12 ENDF/B-IV MAT 1274/THRM1065	UPDATED
	4008016	2.45894E-02	6.75649E-01	8016	15.9904		OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
4	5082000	3.29690E-02	11.344	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K	UPDATED
	6024304	1.74286E-02	7.9200	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'	UPDATED
	6025055	1.73633E-03	1.99999E-02	25055	54.9379		MANGANESE-55 ENDF/B-IV MAT 1197	UPDATED
5	6026304	5.93579E-02	6.95000E-01	26000	55.8447		FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'	UPDATED
	6028304	7.72070E-03	9.50001E-02	28000	58.6872		NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'	UPDATED
	7013027	6.03066E-02	2.7020	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED
6	8024304	1.74286E-02	7.9200	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'	UPDATED
	8025055	1.73633E-03	1.99999E-02	25055	54.9379		MANGANESE-55 ENDF/B-IV MAT 1197	UPDATED
	8026304	5.93579E-02	6.95000E-01	26000	55.8447		FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'	UPDATED
7	8028304	7.72070E-03	9.50001E-02	28000	58.6872		NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'	UPDATED
	9001001	6.68896E-06	0.99997E-04	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
	9008016	3.34448E-06	8.88074E-01	8016	15.9904		OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED

KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 3 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 4 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 9 WERE CORRECTED FOR BAD MOMENTS.  
 ..... 0 IO'S WERE USED MIXING CROSS-SECTIONS .....

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1-D CROSS SECTION ARRAY ID NUMBERS  
1 2002 1452 27 18 1018  
..... 0 IO'S WERE USED PREPARING THE CROSS SECTIONS .....

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***** 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 24    NUMBER OF UNITS IN THE GLOBAL Y DIR. 0 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK 17    NUMBER OF UNITS IN THE GLOBAL Z DIR. 0 ***
*** NUMBER OF MIXTURES USED              8    USE A GLOBAL REFLECTOR        YES ***
*** NUMBER OF BIAS ID'S USED             1    USE NESTED HOLES              YES ***
*** NUMBER OF DIFFERENTIAL ALBEDOS USED  1    NUMBER OF HOLES                86 ***
*** TOTAL INPUT GEOMETRY REGIONS         54    MAXIMUM HOLE NESTING LEVEL     7 ***
*** NUMBER OF GEOMETRY REGIONS USED      54    USE NESTED ARRAYS              NO ***
*** LARGEST GEOMETRY UNIT NUMBER         16    NUMBER OF ARRAYS USED          0 ***
*** LARGEST ARRAY NUMBER                 1    MAXIMUM ARRAY NESTING LEVEL    0 ***
*** +X BOUNDARY CONDITION                 H20    -X BOUNDARY CONDITION          H20 ***
*** +Y BOUNDARY CONDITION                 H20    -Y BOUNDARY CONDITION          H20 ***
*** +Z BOUNDARY CONDITION                 H20    -Z BOUNDARY CONDITION          H20 ***
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***** SPACE AND SUPERGROUP INFORMATION *****
100000 WORDS IS THE TOTAL SPACE AVAILABLE.
46861 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
53139 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
99444 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
53078 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
1369 WORDS ARE NEEDED FOR THE LARGEST GROUP.
48473 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
60385 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
60576 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.

SUPERGROUP      STARTING      ENDING      XSEC      ALBEDO      TOTAL
                GROUP        GROUP      LENGTH    LENGTH      LENGTH
                1            1          27        2010        544        13595

..... 0 IO'S WERE USED IN SUPERGROUPING .....
..... 0 IO'S WERE USED LOADING THE DATA .....
```

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
					UNIT	1			
FUELED ANNULAR SECTIONS			TUBE	1	LOOSE				
1 CYLINDER	3	1	RADIUS =	3.0300	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2 CYLINDER	2	1	RADIUS =	3.0625	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	1	1	RADIUS =	3.1275	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4 CYLINDER	2	1	RADIUS =	3.1600	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5 CYLINDER	3	1	RADIUS =	3.5300	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
6 CYLINDER	2	1	RADIUS =	3.5625	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
7 CYLINDER	1	1	RADIUS =	3.6275	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
8 CYLINDER	2	1	RADIUS =	3.6600	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
9 CYLINDER	3	1	RADIUS =	4.0300	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
10 CYLINDER	2	1	RADIUS =	4.0625	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
11 CYLINDER	1	1	RADIUS =	4.1275	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
12 CYLINDER	2	1	RADIUS =	4.1600	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
13 CYLINDER	3	1	RADIUS =	4.5300	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
14 CYLINDER	2	1	RADIUS =	4.5625	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
15 CYLINDER	1	1	RADIUS =	4.6275	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
16 CYLINDER	2	1	RADIUS =	4.6599	+Z =	58.750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 2 -----								
AXIAL CLAD SECTIONS		TUBE 1	LOOSE					
1 CYLINDER	3	1	RADIUS = 3.0300	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
2 CYLINDER	2	1	RADIUS = 3.1600	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3 CYLINDER	3	1	RADIUS = 3.5300	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4 CYLINDER	2	1	RADIUS = 3.6600	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
5 CYLINDER	3	1	RADIUS = 4.0300	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
6 CYLINDER	2	1	RADIUS = 4.1600	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
7 CYLINDER	3	1	RADIUS = 4.5300	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
8 CYLINDER	2	1	RADIUS = 4.6599	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
----- UNIT 3 -----								
FUEL ELEMENT		TUBE 1						
1 CYLINDER	3	1	RADIUS = 4.6600	+Z = 61.500	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	1		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	2	
HOLE NUMBER	2		AT X = 0.00000	Y = 0.00000	Z = 1.3750	IS UNIT NUMBER	1	
HOLE NUMBER	3		AT X = 0.00000	Y = 0.00000	Z = 60.125	IS UNIT NUMBER	2	
----- UNIT 4 -----								
BASKET FUEL TUBE - FUEL DOWN			RADIAL CENTERED					
1 CYLINDER	3	1	RADIUS = 5.0927	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	4		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	3	
2 CYLINDER	2	1	RADIUS = 5.3974	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
----- UNIT 5 -----								
BASKET FUEL TUBE - FUEL UP			RADIAL CENTERED					
1 CYLINDER	3	1	RADIUS = 5.0927	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
HOLE NUMBER	5		AT X = 0.00000	Y = 0.00000	Z = 11.677	IS UNIT NUMBER	3	
2 CYLINDER	2	1	RADIUS = 5.3974	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000	

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM						
				-----	UNIT	6	-----	
BASKET BOTTOM PLATE HOLE								
1	CYLINDER	3 1	RADIUS = 1.2700	+Z = 1.2698	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
				-----	UNIT	7	-----	
BASKET BOTTOM PLATE								
1	CYLINDER	6 1	RADIUS = 16.847	+Z = 1.2698	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
	HOLE NUMBER	6	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	6	
	HOLE NUMBER	7	AT X = 10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	6	
	HOLE NUMBER	8	AT X = 5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	6	
	HOLE NUMBER	9	AT X = -5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	6	
	HOLE NUMBER	10	AT X = -10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	6	
	HOLE NUMBER	11	AT X = -5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	6	
	HOLE NUMBER	12	AT X = 5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	6	
				-----	UNIT	8	-----	
HEAT TRANSFER BAR / ROD								
1	CYLINDER	7 1	RADIUS = 0.31650	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000



REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
			----- UNIT 9 -----				
BASKET FUEL DOWN							
1	CYLINDER	3 1	RADIUS = 16.193	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	13	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4
	HOLE NUMBER	14	AT X = 10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4
	HOLE NUMBER	15	AT X = 4.9493	Y = 2.8575	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	16	AT X = 4.6024	Y = 3.3881	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	17	AT X = 5.2354	Y = 2.2917	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	18	AT X = 5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	4
	HOLE NUMBER	19	AT X = 0.00000	Y = 5.7150	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	20	AT X = -0.63300	Y = 5.6798	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	21	AT X = 0.63300	Y = 5.6798	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	22	AT X = -5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	4
	HOLE NUMBER	23	AT X = -4.9493	Y = 2.8575	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	24	AT X = -5.2354	Y = 2.2917	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	25	AT X = -4.6024	Y = 3.3881	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	26	AT X = -10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4
	HOLE NUMBER	27	AT X = -4.9493	Y = -2.8575	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	28	AT X = -4.6024	Y = -3.3881	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	29	AT X = -5.2354	Y = -2.2917	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	30	AT X = -5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	4
	HOLE NUMBER	31	AT X = 0.00000	Y = -5.7150	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	32	AT X = 0.63300	Y = -5.6798	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	33	AT X = -0.63300	Y = -5.6798	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	34	AT X = 5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	4
	HOLE NUMBER	35	AT X = 4.9493	Y = -2.8575	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	36	AT X = 5.2354	Y = -2.2917	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	37	AT X = 4.6024	Y = -3.3881	Z = 0.00000	IS UNIT NUMBER	8
2	CYLINDER	7 1	RADIUS = 16.669	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3	CYLINDER	3 1	RADIUS = 16.847	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000

REGION	MEDIA BIAS NUM ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
				UNIT 10			
BASKET FUEL UP							
1	CYLINDER	3 1	RADIUS = 16.193	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000
	HOLE NUMBER	38	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	39	AT X = 10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	40	AT X = 4.9493	Y = 2.8575	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	41	AT X = 4.6024	Y = 3.3881	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	42	AT X = 5.2354	Y = 2.2917	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	43	AT X = 5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	44	AT X = 0.00000	Y = 5.7150	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	45	AT X = -0.63300	Y = 5.6798	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	46	AT X = 0.63300	Y = 5.6798	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	47	AT X = -5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	48	AT X = -4.9493	Y = 2.8575	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	49	AT X = -5.2354	Y = 2.2917	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	50	AT X = -4.6024	Y = 3.3881	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	51	AT X = -10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	52	AT X = -4.9493	Y = -2.8575	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	53	AT X = -4.6024	Y = -3.3881	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	54	AT X = -5.2354	Y = -2.2917	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	55	AT X = -5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	56	AT X = 0.00000	Y = -5.7150	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	57	AT X = 0.63300	Y = -5.6798	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	58	AT X = -0.63300	Y = -5.6798	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	59	AT X = 5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	5
	HOLE NUMBER	60	AT X = 4.9493	Y = -2.8575	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	61	AT X = 5.2354	Y = -2.2917	Z = 0.00000	IS UNIT NUMBER	8
	HOLE NUMBER	62	AT X = 4.6024	Y = -3.3881	Z = 0.00000	IS UNIT NUMBER	8
2	CYLINDER	7 1	RADIUS = 16.669	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000
3	CYLINDER	3 1	RADIUS = 16.847	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
 NUM ID

----- UNIT 11 -----

CASK CAVITY

1 CYLINDER	3	1	RADIUS = 16.986	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
HOLE NUMBER	63		AT X = 0.00000	Y = 0.00000	Z = 1.00000E-04	IS UNIT NUMBER	7	
HOLE NUMBER	64		AT X = 0.00000	Y = 0.00000	Z = 1.2700	IS UNIT NUMBER	10	
HOLE NUMBER	65		AT X = 0.00000	Y = 0.00000	Z = 74.448	IS UNIT NUMBER	7	
HOLE NUMBER	66		AT X = 0.00000	Y = 0.00000	Z = 75.717	IS UNIT NUMBER	9	
HOLE NUMBER	67		AT X = 0.00000	Y = 0.00000	Z = 148.89	IS UNIT NUMBER	7	
HOLE NUMBER	68		AT X = 0.00000	Y = 0.00000	Z = 150.16	IS UNIT NUMBER	10	
HOLE NUMBER	69		AT X = 0.00000	Y = 0.00000	Z = 223.34	IS UNIT NUMBER	7	
HOLE NUMBER	70		AT X = 0.00000	Y = 0.00000	Z = 224.61	IS UNIT NUMBER	9	
HOLE NUMBER	71		AT X = 0.00000	Y = 0.00000	Z = 297.79	IS UNIT NUMBER	7	
HOLE NUMBER	72		AT X = 0.00000	Y = 0.00000	Z = 299.06	IS UNIT NUMBER	10	
HOLE NUMBER	73		AT X = 0.00000	Y = 0.00000	Z = 372.24	IS UNIT NUMBER	7	
HOLE NUMBER	74		AT X = 0.00000	Y = 0.00000	Z = 373.51	IS UNIT NUMBER	9	

----- UNIT 12 -----

CASK SHIELD RADIAL CONFIGURATION

1 CYLINDER	3	1	RADIUS = 16.986	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
HOLE NUMBER	75		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	11	
2 CYLINDER	8	1	RADIUS = 18.910	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3 CYLINDER	5	1	RADIUS = 33.465	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
4 CYLINDER	8	1	RADIUS = 36.519	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
5 CYLINDER	9	1	RADIUS = 49.219	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
6 CYLINDER	8	1	RADIUS = 49.818	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
----- UNIT 13 -----							
LWT LID							
1 CYLINDER	8	1	RADIUS = 36.519	+Z = 28.575	-Z = 0.59940	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2 CYLINDER	9	1	RADIUS = 49.818	+Z = 28.575	-Z = 0.59940	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3 CYLINDER	8	1	RADIUS = 49.818	+Z = 28.575	-Z = 0.00000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
----- UNIT 14 -----							
LWT BOTTOM WELDMENT							
1 CYLINDER	5	1	RADIUS = 26.353	+Z = 16.510	-Z = 8.8900	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2 CYLINDER	8	1	RADIUS = 36.519	+Z = 26.071	-Z = 0.00000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3 CYLINDER	9	1	RADIUS = 49.818	+Z = 26.071	-Z = 0.00000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4 CYLINDER	8	1	RADIUS = 49.818	+Z = 26.670	-Z = 0.00000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
----- UNIT 15 -----							
LWT CASK							
1 CYLINDER	9	1	RADIUS = 49.818	+Z = 501.93	-Z = 0.00000	CENTERLINE IS AT X = 0.00000 Y = 0.00000	
HOLE NUMBER	76		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 14	
HOLE NUMBER	77		AT X = 0.00000	Y = 0.00000	Z = 26.670	IS UNIT NUMBER 12	
HOLE NUMBER	78		AT X = 0.00000	Y = 0.00000	Z = 473.35	IS UNIT NUMBER 13	



VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	1.69451E+03 CM**3	1.69451E+03 CM**3
		2	3.65458E+01 CM**3	1.73105E+03 CM**3
		3	7.42612E+01 CM**3	1.80531E+03 CM**3
		4	3.77155E+01 CM**3	1.84303E+03 CM**3
		5	4.56862E+02 CM**3	2.29989E+03 CM**3
		6	4.25442E+01 CM**3	2.34243E+03 CM**3
		7	8.62583E+01 CM**3	2.42869E+03 CM**3
		8	4.37139E+01 CM**3	2.47241E+03 CM**3
		9	5.25153E+02 CM**3	2.99756E+03 CM**3
		10	4.85422E+01 CM**3	3.04610E+03 CM**3
		11	9.82551E+01 CM**3	3.14436E+03 CM**3
		12	4.97122E+01 CM**3	3.19407E+03 CM**3
		13	5.93444E+02 CM**3	3.78751E+03 CM**3
		14	5.45405E+01 CM**3	3.84205E+03 CM**3
		15	1.10252E+02 CM**3	3.95231E+03 CM**3
		16	5.55391E+01 CM**3	4.00785E+03 CM**3
2	1	17	3.96586E+01 CM**3	3.96586E+01 CM**3
		18	3.47606E+00 CM**3	4.31347E+01 CM**3
		19	1.06925E+01 CM**3	5.38272E+01 CM**3
		20	4.03762E+00 CM**3	5.78648E+01 CM**3
		21	1.22908E+01 CM**3	7.01557E+01 CM**3
		22	4.59916E+00 CM**3	7.47548E+01 CM**3
		23	1.38891E+01 CM**3	8.86439E+01 CM**3
		24	5.15671E+00 CM**3	9.38006E+01 CM**3
3	1	25	1.79337E-01 CM**3	4.19563E+03 CM**3
4	1	26	1.76679E+03 CM**3	5.96242E+03 CM**3
		27	7.34815E+02 CM**3	6.69723E+03 CM**3
5	1	28	1.76679E+03 CM**3	5.96242E+03 CM**3
		29	7.34815E+02 CM**3	6.69723E+03 CM**3
6	1	30	6.43417E+00 CM**3	6.43417E+00 CM**3
7	1	31	1.08713E+03 CM**3	1.13216E+03 CM**3
8	1	32	2.30289E+01 CM**3	2.30289E+01 CM**3
9	1	33	1.29829E+04 CM**3	6.02781E+04 CM**3
		34	3.59751E+03 CM**3	6.38756E+04 CM**3
		35	1.36994E+03 CM**3	6.52455E+04 CM**3
10	1	36	1.29829E+04 CM**3	6.02781E+04 CM**3
		37	3.59751E+03 CM**3	6.38756E+04 CM**3
		38	1.36994E+03 CM**3	6.52455E+04 CM**3
11	1	39	6.63421E+03 CM**3	4.04900E+05 CM**3
12	1	40	0.00000E+00 CM**3	4.04900E+05 CM**3
		41	9.69190E+04 CM**3	5.01819E+05 CM**3
		42	1.06970E+06 CM**3	1.57152E+06 CM**3
		43	2.99966E+05 CM**3	1.87148E+06 CM**3
		44	1.52801E+06 CM**3	3.39950E+06 CM**3
		45	8.33038E+04 CM**3	3.48280E+06 CM**3
13	1	46	1.17210E+05 CM**3	1.17210E+05 CM**3
		47	1.00916E+05 CM**3	2.18126E+05 CM**3
		48	4.67352E+03 CM**3	2.22799E+05 CM**3
14	1	49	1.66245E+04 CM**3	1.66245E+04 CM**3
		50	9.26041E+04 CM**3	1.09229E+05 CM**3
		51	9.40439E+04 CM**3	2.03273E+05 CM**3
		52	4.67353E+03 CM**3	2.07946E+05 CM**3
15	1	53	2.42188E+00 CM**3	3.91355E+06 CM**3
16	1	54	1.63393E+07 CM**3	4.76477E+07 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	336	1	3	5.69354E+05 CM**3
		2	2	1.22794E+04 CM**3
		3	1	2.49518E+04 CM**3
		4	2	1.26724E+04 CM**3
		5	3	1.53506E+05 CM**3
		6	2	1.42948E+04 CM**3
		7	1	2.89828E+04 CM**3
		8	2	1.46879E+04 CM**3
		9	3	1.76452E+05 CM**3
		10	2	1.63102E+04 CM**3
		11	1	3.30137E+04 CM**3
		12	2	1.67033E+04 CM**3
		13	3	1.99397E+05 CM**3
		14	2	1.83256E+04 CM**3
		15	1	3.70448E+04 CM**3
		16	2	1.86611E+04 CM**3
2	672	1	3	2.66506E+04 CM**3
		2	2	2.33591E+03 CM**3
		3	3	7.18536E+03 CM**3
		4	2	2.71328E+03 CM**3
		5	3	8.25943E+03 CM**3
		6	2	3.09064E+03 CM**3
		7	3	9.33348E+03 CM**3
		8	2	3.46531E+03 CM**3
3	336	1	3	6.02571E+01 CM**3

4	168	1	3	2.96821E+05 CM**3
		2	2	1.23449E+05 CM**3
5	168	1	3	2.96821E+05 CM**3
		2	2	1.23449E+05 CM**3
6	336	1	3	2.16188E+03 CM**3
7	48	1	6	5.21820E+04 CM**3
8	864	1	7	1.98970E+04 CM**3
9	24	1	3	3.11591E+05 CM**3
		2	7	8.63402E+04 CM**3
		3	3	3.28785E+04 CM**3
10	24	1	3	3.11591E+05 CM**3
		2	7	8.63402E+04 CM**3
		3	3	3.28785E+04 CM**3
11	8	1	3	5.30737E+04 CM**3
12	8	1	3	0.00000E+00 CM**3
		2	8	7.75352E+05 CM**3
		3	5	8.55759E+06 CM**3
		4	8	2.39973E+06 CM**3
		5	9	1.22241E+07 CM**3
		6	8	6.66430E+05 CM**3
13	8	1	8	9.37680E+05 CM**3
		2	9	8.07326E+05 CM**3
		3	8	3.73881E+04 CM**3
14	8	1	5	1.32996E+05 CM**3
		2	8	7.40833E+05 CM**3
		3	9	7.52351E+05 CM**3
		4	8	3.73883E+04 CM**3
15	8	1	9	1.93750E+01 CM**3
16	1	1	3	1.63393E+07 CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	1.23993E+05 CM**3	2.90231E+05
2	3.82438E+05 CM**3	1.03335E+06
3	1.88273E+07 CM**3	1.88230E+07
5	8.69059E+06 CM**3	9.85860E+07
6	5.21820E+04 CM**3	4.13282E+05
7	1.92577E+05 CM**3	5.20344E+05
8	5.59480E+06 CM**3	4.43108E+07
9	1.37838E+07 CM**3	1.37834E+03

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***
***          BIASING INFORMATION          ***
***
***  A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S.  ***
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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....
..... 0.01267 MINUTES WERE USED PROCESSING DATA. ....

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VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 2.60229E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 1.68500E+01 -X=-1.68500E+01 +Y=-1.68500E+01 -Y= 1.68500E+01 +Z= 4.73350E+02 -Z= 2.66700E+01  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

0.11100 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.11733 MINUTES.

GENERATION KENO MESSAGE NUMBER	GENERATION K-EFFECTIVE NUMBER K5-132	ELAPSED TIME MINUTES WARNING . . . ONLY	AVERAGE K-EFFECTIVE 961 INDEPENDENT	AVG K-EFF DEVIATION FISSION POINTS WERE	MATRIX K-EFFECTIVE GENERATED	MATRIX K-EFF DEVIATION
1	8.58773E-01	1.46333E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.33771E-01	1.68333E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	8.63486E-01	1.93000E-01	8.63486E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	8.78581E-01	2.16000E-01	8.71034E-01	7.54768E-03	0.00000E+00	0.00000E+00
5	9.04679E-01	2.39833E-01	8.82249E-01	1.20320E-02	0.00000E+00	0.00000E+00
6	9.24609E-01	2.62667E-01	8.92839E-01	1.35843E-02	0.00000E+00	0.00000E+00
7	9.17145E-01	2.84667E-01	8.97700E-01	1.15910E-02	0.00000E+00	0.00000E+00
8	9.05527E-01	3.08500E-01	8.99005E-01	9.55350E-03	0.00000E+00	0.00000E+00
9	9.23056E-01	3.32167E-01	9.02441E-01	8.77483E-03	0.00000E+00	0.00000E+00
10	9.21692E-01	3.56000E-01	9.04847E-01	7.97116E-03	0.00000E+00	0.00000E+00
11	9.00007E-01	3.79833E-01	9.04309E-01	7.05044E-03	0.00000E+00	0.00000E+00
12	8.57565E-01	4.04500E-01	8.99635E-01	7.84969E-03	0.00000E+00	0.00000E+00
13	8.57721E-01	4.28333E-01	8.95824E-01	8.05812E-03	0.00000E+00	0.00000E+00
14	9.43923E-01	4.51167E-01	8.99833E-01	8.37718E-03	0.00000E+00	0.00000E+00
15	9.09837E-01	4.74167E-01	9.00602E-01	7.74422E-03	0.00000E+00	0.00000E+00
16	9.19908E-01	4.97000E-01	9.01981E-01	7.30116E-03	0.00000E+00	0.00000E+00
17	9.33907E-01	5.21667E-01	9.04110E-01	7.12246E-03	0.00000E+00	0.00000E+00
18	8.70579E-01	5.44667E-01	9.02014E-01	6.98426E-03	0.00000E+00	0.00000E+00
19	9.15282E-01	5.68333E-01	9.02794E-01	6.60683E-03	0.00000E+00	0.00000E+00
20	8.77615E-01	5.93167E-01	9.01407E-01	6.38169E-03	0.00000E+00	0.00000E+00
21	9.26908E-01	6.16000E-01	9.02749E-01	6.18389E-03	0.00000E+00	0.00000E+00
22	8.79347E-01	6.41667E-01	9.01579E-01	5.98210E-03	0.00000E+00	0.00000E+00
23	9.13359E-01	6.65500E-01	9.02140E-01	5.71770E-03	0.00000E+00	0.00000E+00
24	8.82892E-01	6.89167E-01	9.01265E-01	5.52137E-03	0.00000E+00	0.00000E+00
25	9.10070E-01	7.13000E-01	9.01648E-01	5.28972E-03	0.00000E+00	0.00000E+00
26	8.56690E-01	7.37833E-01	8.99774E-01	5.39986E-03	0.00000E+00	0.00000E+00
27	8.64557E-01	7.62500E-01	8.98366E-01	5.36752E-03	0.00000E+00	0.00000E+00
28	9.22162E-01	7.85333E-01	8.99281E-01	5.23753E-03	0.00000E+00	0.00000E+00
29	8.95370E-01	8.08167E-01	8.99136E-01	5.04190E-03	0.00000E+00	0.00000E+00
30	8.96834E-01	8.33833E-01	8.99054E-01	4.85919E-03	0.00000E+00	0.00000E+00
31	8.81740E-01	8.57667E-01	8.98457E-01	4.72650E-03	0.00000E+00	0.00000E+00
32	8.88292E-01	8.81500E-01	8.98118E-01	4.57879E-03	0.00000E+00	0.00000E+00
33	8.98466E-01	9.06167E-01	8.98129E-01	4.42863E-03	0.00000E+00	0.00000E+00
34	9.31577E-01	9.29000E-01	8.99175E-01	4.41356E-03	0.00000E+00	0.00000E+00
35	8.80767E-01	9.52833E-01	8.98617E-01	4.31394E-03	0.00000E+00	0.00000E+00
36	9.21118E-01	9.76667E-01	8.99278E-01	4.23714E-03	0.00000E+00	0.00000E+00
37	8.52259E-01	1.00050E+00	8.97935E-01	4.32807E-03	0.00000E+00	0.00000E+00
38	8.69525E-01	1.02433E+00	8.97146E-01	4.27953E-03	0.00000E+00	0.00000E+00
39	9.03040E-01	1.04817E+00	8.97305E-01	4.16530E-03	0.00000E+00	0.00000E+00
40	8.81602E-01	1.07183E+00	8.96892E-01	4.07522E-03	0.00000E+00	0.00000E+00
41	8.62374E-01	1.09667E+00	8.96007E-01	4.06682E-03	0.00000E+00	0.00000E+00
42	9.02090E-01	1.12133E+00	8.96159E-01	3.96677E-03	0.00000E+00	0.00000E+00
43	8.94155E-01	1.14517E+00	8.96110E-01	3.86911E-03	0.00000E+00	0.00000E+00
44	9.02857E-01	1.16900E+00	8.96271E-01	3.77929E-03	0.00000E+00	0.00000E+00
45	9.40155E-01	1.19083E+00	8.97291E-01	3.82829E-03	0.00000E+00	0.00000E+00
46	8.79557E-01	1.21467E+00	8.96888E-01	3.76249E-03	0.00000E+00	0.00000E+00
47	9.17170E-01	1.23850E+00	8.97339E-01	3.70544E-03	0.00000E+00	0.00000E+00
48	9.17262E-01	1.26233E+00	8.97772E-01	3.64978E-03	0.00000E+00	0.00000E+00
49	9.12876E-01	1.28617E+00	8.98093E-01	3.58571E-03	0.00000E+00	0.00000E+00
50	8.99770E-01	1.31083E+00	8.98128E-01	3.51039E-03	0.00000E+00	0.00000E+00
51	8.66263E-01	1.33467E+00	8.97478E-01	3.49896E-03	0.00000E+00	0.00000E+00
52	8.75319E-01	1.35933E+00	8.97035E-01	3.45680E-03	0.00000E+00	0.00000E+00
53	8.80759E-01	1.38317E+00	8.96716E-01	3.40333E-03	0.00000E+00	0.00000E+00
54	8.67570E-01	1.40783E+00	8.96155E-01	3.38398E-03	0.00000E+00	0.00000E+00
55	9.51958E-01	1.43250E+00	8.97208E-01	3.48250E-03	0.00000E+00	0.00000E+00
56	9.09210E-01	1.45550E+00	8.97430E-01	3.42462E-03	0.00000E+00	0.00000E+00
57	9.07998E-01	1.47933E+00	8.97623E-01	3.36726E-03	0.00000E+00	0.00000E+00
58	8.73204E-01	1.50400E+00	8.97186E-01	3.33521E-03	0.00000E+00	0.00000E+00
59	9.10378E-01	1.52783E+00	8.97418E-01	3.28434E-03	0.00000E+00	0.00000E+00
60	8.92000E-01	1.55150E+00	8.97325E-01	3.22857E-03	0.00000E+00	0.00000E+00
61	8.89776E-01	1.57633E+00	8.97197E-01	3.17596E-03	0.00000E+00	0.00000E+00
62	8.55916E-01	1.60100E+00	8.96509E-01	3.19747E-03	0.00000E+00	0.00000E+00
63	9.32555E-01	1.62300E+00	8.97099E-01	3.19966E-03	0.00000E+00	0.00000E+00
64	9.25066E-01	1.64583E+00	8.97551E-01	3.17978E-03	0.00000E+00	0.00000E+00
65	8.77079E-01	1.67050E+00	8.97226E-01	3.14573E-03	0.00000E+00	0.00000E+00
66	9.09881E-01	1.69433E+00	8.97423E-01	3.10250E-03	0.00000E+00	0.00000E+00
67	8.76992E-01	1.71817E+00	8.97109E-01	3.07052E-03	0.00000E+00	0.00000E+00
68	9.21783E-01	1.74100E+00	8.97483E-01	3.04667E-03	0.00000E+00	0.00000E+00
69	9.05453E-01	1.76483E+00	8.97602E-01	3.00321E-03	0.00000E+00	0.00000E+00
70	9.24480E-01	1.78783E+00	8.97997E-01	2.98500E-03	0.00000E+00	0.00000E+00
71	8.63590E-01	1.81250E+00	8.97498E-01	2.98339E-03	0.00000E+00	0.00000E+00
72	9.37983E-01	1.83533E+00	8.98077E-01	2.99680E-03	0.00000E+00	0.00000E+00
73	8.79989E-01	1.85917E+00	8.97822E-01	2.96525E-03	0.00000E+00	0.00000E+00
74	8.83123E-01	1.88300E+00	8.97618E-01	2.93090E-03	0.00000E+00	0.00000E+00
75	9.15389E-01	1.90683E+00	8.97861E-01	2.90070E-03	0.00000E+00	0.00000E+00
76	8.74826E-01	1.93233E+00	8.97550E-01	2.87812E-03	0.00000E+00	0.00000E+00
77	8.80442E-01	1.95533E+00	8.97322E-01	2.84863E-03	0.00000E+00	0.00000E+00
78	8.80627E-01	1.97817E+00	8.97102E-01	2.81947E-03	0.00000E+00	0.00000E+00
79	9.12211E-01	2.00200E+00	8.97298E-01	2.78952E-03	0.00000E+00	0.00000E+00
80	8.44802E-01	2.02667E+00	8.96625E-01	2.83459E-03	0.00000E+00	0.00000E+00
81	8.98826E-01	2.05050E+00	8.96653E-01	2.79862E-03	0.00000E+00	0.00000E+00
82	8.72723E-01	2.07433E+00	8.96354E-01	2.77955E-03	0.00000E+00	0.00000E+00
83	8.83782E-01	2.09717E+00	8.96199E-01	2.74941E-03	0.00000E+00	0.00000E+00
84	8.99513E-01	2.12183E+00	8.96239E-01	2.71597E-03	0.00000E+00	0.00000E+00
85	9.24791E-01	2.14567E+00	8.96583E-01	2.70501E-03	0.00000E+00	0.00000E+00
86	8.74108E-01	2.16850E+00	8.96316E-01	2.68598E-03	0.00000E+00	0.00000E+00
87	9.23002E-01	2.19233E+00	8.96630E-01	2.67269E-03	0.00000E+00	0.00000E+00
88	9.00543E-01	2.21717E+00	8.96675E-01	2.64182E-03	0.00000E+00	0.00000E+00
89	8.82276E-01	2.24083E+00	8.96510E-01	2.61652E-03	0.00000E+00	0.00000E+00
90	8.56795E-01	2.26467E+00	8.96058E-01	2.62569E-03	0.00000E+00	0.00000E+00
91	8.99466E-01	2.28850E+00	8.96097E-01	2.59631E-03	0.00000E+00	0.00000E+00
92	8.66877E-01	2.31317E+00	8.95772E-01	2.58774E-03	0.00000E+00	0.00000E+00
93	8.74085E-01	2.33700E+00	8.95534E-01	2.57022E-03	0.00000E+00	0.00000E+00
94	9.21830E-01	2.36083E+00	8.95820E-01	2.55815E-03	0.00000E+00	0.00000E+00
95	9.10253E-01	2.38367E+00	8.95975E-01	2.53525E-03	0.00000E+00	0.00000E+00
96	9.00694E-01	2.40750E+00	8.96025E-01	2.50863E-03	0.00000E+00	0.00000E+00
97	9.26241E-01	2.43133E+00	8.96349E-01	2.50238E-03	0.00000E+00	0.00000E+00
98	8.66651E-01	2.45517E+00	8.96212E-01	2.47824E-03	0.00000E+00	0.00000E+00
99	9.99097E-01	2.47883E+00	8.96272E-01	2.45273E-03	0.00000E+00	0.00000E+00
100	8.44858E-01	2.50183E+00	8.96767E-01	2.47768E-03	0.00000E+00	0.00000E+00
101	8.97823E-01	2.52550E+00	8.96778E-01	2.45255E-03	0.00000E+00	0.00000E+00
102	9.16019E-01	2.54850E+00	8.96970E-01	2.43551E-03	0.00000E+00	0.00000E+00



103	9.08980E-01	2.57233E+00	8.97089E-01	2.41421E-03	0.00000E+00	0.00000E+00
104	8.86222E-01	2.59600E+00	8.96983E-01	2.39280E-03	0.00000E+00	0.00000E+00
105	9.21146E-01	2.61983E+00	8.97217E-01	2.38104E-03	0.00000E+00	0.00000E+00
106	8.86269E-01	2.64283E+00	8.97112E-01	2.36038E-03	0.00000E+00	0.00000E+00
107	9.49570E-01	2.66650E+00	8.97612E-01	2.39058E-03	0.00000E+00	0.00000E+00
108	8.80222E-01	2.69033E+00	8.97448E-01	2.37155E-03	0.00000E+00	0.00000E+00
109	8.78681E-01	2.71317E+00	8.97282E-01	2.35716E-03	0.00000E+00	0.00000E+00
110	8.90503E-01	2.73617E+00	8.97219E-01	2.33608E-03	0.00000E+00	0.00000E+00
111	9.24128E-01	2.76000E+00	8.97466E-01	2.32768E-03	0.00000E+00	0.00000E+00
112	9.04722E-01	2.78367E+00	8.97532E-01	2.30736E-03	0.00000E+00	0.00000E+00
113	8.95747E-01	2.80850E+00	8.97516E-01	2.28654E-03	0.00000E+00	0.00000E+00
114	8.68503E-01	2.83233E+00	8.97257E-01	2.28079E-03	0.00000E+00	0.00000E+00
115	9.27085E-01	2.85600E+00	8.97521E-01	2.27587E-03	0.00000E+00	0.00000E+00
116	8.80557E-01	2.87900E+00	8.97372E-01	2.26072E-03	0.00000E+00	0.00000E+00
117	8.99169E-01	2.90267E+00	8.97387E-01	2.24103E-03	0.00000E+00	0.00000E+00
118	9.34573E-01	2.92567E+00	8.97708E-01	2.24464E-03	0.00000E+00	0.00000E+00
119	9.18461E-01	2.94850E+00	8.97885E-01	2.23243E-03	0.00000E+00	0.00000E+00
120	8.64606E-01	2.97233E+00	8.97603E-01	2.23132E-03	0.00000E+00	0.00000E+00
121	9.13743E-01	2.99617E+00	8.97739E-01	2.21665E-03	0.00000E+00	0.00000E+00
122	9.13687E-01	3.01983E+00	8.97872E-01	2.20211E-03	0.00000E+00	0.00000E+00
123	8.71706E-01	3.04283E+00	8.97656E-01	2.19452E-03	0.00000E+00	0.00000E+00
124	8.73371E-01	3.06750E+00	8.97457E-01	2.18554E-03	0.00000E+00	0.00000E+00
125	8.61744E-01	3.09133E+00	8.97166E-01	2.18705E-03	0.00000E+00	0.00000E+00
126	8.87808E-01	3.11417E+00	8.97091E-01	2.17066E-03	0.00000E+00	0.00000E+00
127	8.46442E-01	3.13900E+00	8.96686E-01	2.19101E-03	0.00000E+00	0.00000E+00
128	8.63348E-01	3.16367E+00	8.96421E-01	2.18960E-03	0.00000E+00	0.00000E+00
129	8.53674E-01	3.18833E+00	8.96084E-01	2.19821E-03	0.00000E+00	0.00000E+00
130	9.09836E-01	3.21217E+00	8.96192E-01	2.18362E-03	0.00000E+00	0.00000E+00
131	8.96024E-01	3.23600E+00	8.96190E-01	2.16662E-03	0.00000E+00	0.00000E+00
132	8.98081E-01	3.25983E+00	8.96205E-01	2.14994E-03	0.00000E+00	0.00000E+00
133	8.88058E-01	3.28350E+00	8.96143E-01	2.13437E-03	0.00000E+00	0.00000E+00
134	9.16562E-01	3.30833E+00	8.96298E-01	2.12378E-03	0.00000E+00	0.00000E+00
135	8.81358E-01	3.33200E+00	8.96185E-01	2.11075E-03	0.00000E+00	0.00000E+00
136	8.88469E-01	3.35583E+00	8.96128E-01	2.09573E-03	0.00000E+00	0.00000E+00
137	8.84176E-01	3.37967E+00	8.96039E-01	2.08203E-03	0.00000E+00	0.00000E+00
138	9.08892E-01	3.40350E+00	8.96134E-01	2.06882E-03	0.00000E+00	0.00000E+00
139	9.07285E-01	3.42817E+00	8.96215E-01	2.05528E-03	0.00000E+00	0.00000E+00
140	8.79684E-01	3.45200E+00	8.96095E-01	2.04384E-03	0.00000E+00	0.00000E+00
141	8.87105E-01	3.47583E+00	8.96031E-01	2.03012E-03	0.00000E+00	0.00000E+00
142	8.94803E-01	3.49867E+00	8.96022E-01	2.01558E-03	0.00000E+00	0.00000E+00
143	9.08305E-01	3.52150E+00	8.96109E-01	2.00313E-03	0.00000E+00	0.00000E+00
144	8.55544E-01	3.54533E+00	8.95823E-01	2.00939E-03	0.00000E+00	0.00000E+00
145	8.85286E-01	3.56833E+00	8.95749E-01	1.99664E-03	0.00000E+00	0.00000E+00
146	8.92547E-01	3.59200E+00	8.95727E-01	1.98285E-03	0.00000E+00	0.00000E+00
147	8.52651E-01	3.61683E+00	8.95430E-01	1.99142E-03	0.00000E+00	0.00000E+00
148	9.24393E-01	3.64050E+00	8.95629E-01	1.98765E-03	0.00000E+00	0.00000E+00
149	9.03056E-01	3.66533E+00	8.95679E-01	1.97473E-03	0.00000E+00	0.00000E+00
150	9.16130E-01	3.68817E+00	8.95817E-01	1.96621E-03	0.00000E+00	0.00000E+00
151	9.09824E-01	3.71200E+00	8.95911E-01	1.95523E-03	0.00000E+00	0.00000E+00
152	8.96596E-01	3.73483E+00	8.95916E-01	1.94215E-03	0.00000E+00	0.00000E+00
153	8.98241E-01	3.75767E+00	8.95931E-01	1.92931E-03	0.00000E+00	0.00000E+00
154	9.12544E-01	3.78150E+00	8.96041E-01	1.91969E-03	0.00000E+00	0.00000E+00
155	9.37176E-01	3.80450E+00	8.96309E-01	1.92596E-03	0.00000E+00	0.00000E+00
156	9.42169E-01	3.82817E+00	8.96607E-01	1.93645E-03	0.00000E+00	0.00000E+00
157	8.91191E-01	3.85300E+00	8.96572E-01	1.92423E-03	0.00000E+00	0.00000E+00
158	9.08956E-01	3.87583E+00	8.96652E-01	1.91350E-03	0.00000E+00	0.00000E+00
159	8.95884E-01	3.89967E+00	8.96647E-01	1.90128E-03	0.00000E+00	0.00000E+00
160	8.98953E-01	3.92350E+00	8.96663E-01	1.88927E-03	0.00000E+00	0.00000E+00
161	8.96101E-01	3.94717E+00	8.96658E-01	1.87735E-03	0.00000E+00	0.00000E+00
162	8.83021E-01	3.97100E+00	8.96573E-01	1.86753E-03	0.00000E+00	0.00000E+00
163	9.16210E-01	3.99583E+00	8.96695E-01	1.85989E-03	0.00000E+00	0.00000E+00
164	8.58566E-01	4.01950E+00	8.96459E-01	1.86330E-03	0.00000E+00	0.00000E+00
165	9.21076E-01	4.04333E+00	8.96610E-01	1.85798E-03	0.00000E+00	0.00000E+00
166	8.95743E-01	4.06717E+00	8.96605E-01	1.84663E-03	0.00000E+00	0.00000E+00
167	8.88705E-01	4.09000E+00	8.96557E-01	1.83602E-03	0.00000E+00	0.00000E+00
168	8.83226E-01	4.11383E+00	8.96477E-01	1.82670E-03	0.00000E+00	0.00000E+00
169	8.78492E-01	4.13767E+00	8.96369E-01	1.81892E-03	0.00000E+00	0.00000E+00
170	8.94948E-01	4.16150E+00	8.96361E-01	1.80808E-03	0.00000E+00	0.00000E+00
171	8.81945E-01	4.18517E+00	8.96275E-01	1.79937E-03	0.00000E+00	0.00000E+00
172	9.10233E-01	4.20817E+00	8.96357E-01	1.79064E-03	0.00000E+00	0.00000E+00
173	9.23181E-01	4.23283E+00	8.96514E-01	1.78703E-03	0.00000E+00	0.00000E+00
174	9.22740E-01	4.25483E+00	8.96667E-01	1.78314E-03	0.00000E+00	0.00000E+00
175	9.10878E-01	4.27950E+00	8.96749E-01	1.77471E-03	0.00000E+00	0.00000E+00
176	9.17149E-01	4.30333E+00	8.96866E-01	1.76837E-03	0.00000E+00	0.00000E+00
177	8.88689E-01	4.32617E+00	8.96819E-01	1.75886E-03	0.00000E+00	0.00000E+00
178	8.99471E-01	4.35100E+00	8.96834E-01	1.74890E-03	0.00000E+00	0.00000E+00
179	9.09166E-01	4.37383E+00	8.96904E-01	1.74039E-03	0.00000E+00	0.00000E+00
180	8.35989E-01	4.39850E+00	8.96562E-01	1.76409E-03	0.00000E+00	0.00000E+00
181	8.69753E-01	4.42233E+00	8.96412E-01	1.76059E-03	0.00000E+00	0.00000E+00
182	9.01969E-01	4.44700E+00	8.96443E-01	1.75106E-03	0.00000E+00	0.00000E+00
183	8.91836E-01	4.47083E+00	8.96418E-01	1.74154E-03	0.00000E+00	0.00000E+00
184	9.17951E-01	4.49550E+00	8.96536E-01	1.73598E-03	0.00000E+00	0.00000E+00
185	8.99231E-01	4.51933E+00	8.96551E-01	1.72653E-03	0.00000E+00	0.00000E+00
186	8.84331E-01	4.54233E+00	8.96484E-01	1.71841E-03	0.00000E+00	0.00000E+00
187	9.16742E-01	4.56700E+00	8.96594E-01	1.71260E-03	0.00000E+00	0.00000E+00
188	8.71679E-01	4.59167E+00	8.96460E-01	1.70862E-03	0.00000E+00	0.00000E+00
189	8.58782E-01	4.61550E+00	8.96258E-01	1.71136E-03	0.00000E+00	0.00000E+00
190	8.96294E-01	4.63933E+00	8.96258E-01	1.70224E-03	0.00000E+00	0.00000E+00
191	8.59250E-01	4.66217E+00	8.96063E-01	1.70449E-03	0.00000E+00	0.00000E+00
192	8.84561E-01	4.68500E+00	8.96002E-01	1.69658E-03	0.00000E+00	0.00000E+00
193	9.31881E-01	4.70883E+00	8.96190E-01	1.69809E-03	0.00000E+00	0.00000E+00
194	8.75438E-01	4.73450E+00	8.96082E-01	1.69268E-03	0.00000E+00	0.00000E+00
195	9.27611E-01	4.75733E+00	8.96245E-01	1.69179E-03	0.00000E+00	0.00000E+00
196	8.86960E-01	4.78117E+00	8.96197E-01	1.68373E-03	0.00000E+00	0.00000E+00
197	8.78513E-01	4.80500E+00	8.96107E-01	1.67753E-03	0.00000E+00	0.00000E+00
198	8.43970E-01	4.83150E+00	8.95841E-01	1.69001E-03	0.00000E+00	0.00000E+00
199	8.93770E-01	4.85633E+00	8.95830E-01	1.68145E-03	0.00000E+00	0.00000E+00
200	8.99111E-01	4.87917E+00	8.95847E-01	1.67301E-03	0.00000E+00	0.00000E+00
201	9.19939E-01	4.90200E+00	8.95968E-01	1.66898E-03	0.00000E+00	0.00000E+00
202	9.30312E-01	4.92483E+00	8.96140E-01	1.66947E-03	0.00000E+00	0.00000E+00
203	8.90682E-01	4.94967E+00	8.96112E-01	1.66137E-03	0.00000E+00	0.00000E+00
204	8.33278E-01	4.97333E+00	8.95801E-01	1.68213E-03	0.00000E+00	0.00000E+00
205	8.94063E-01	4.99900E+00	8.95793E-01	1.67385E-03	0.00000E+00	0.00000E+00
206	8.93316E-01	5.02200E+00	8.95781E-01	1.66567E-03	0.00000E+00	0.00000E+00
207	9.06016E-01	5.04667E+00	8.95831E-01	1.65827E-03	0.00000E+00	0.00000E+00
208	9.00892E-01	5.06950E+00	8.95855E-01	1.65039E-03	0.00000E+00	0.00000E+00
209	9.42164E-01	5.09250E+00	8.96079E-01	1.65756E-03	0.00000E+00	0.00000E+00
210	8.75255E-01	5.11800E+00	8.95979E-01	1.65261E-03	0.00000E+00	0.00000E+00

211	8.89688E-01	5.14183E+00	8.95949E-01	1.64496E-03	0.00000E+00	0.00000E+00
212	8.90783E-01	5.16483E+00	8.95924E-01	1.63729E-03	0.00000E+00	0.00000E+00
213	8.93693E-01	5.18850E+00	8.95913E-01	1.62955E-03	0.00000E+00	0.00000E+00
214	8.65067E-01	5.21333E+00	8.95768E-01	1.62836E-03	0.00000E+00	0.00000E+00
215	8.67362E-01	5.23617E+00	8.95635E-01	1.62617E-03	0.00000E+00	0.00000E+00
216	8.88983E-01	5.26000E+00	8.95603E-01	1.61885E-03	0.00000E+00	0.00000E+00
217	9.22045E-01	5.28383E+00	8.95726E-01	1.61599E-03	0.00000E+00	0.00000E+00
218	9.43618E-01	5.30750E+00	8.95948E-01	1.62370E-03	0.00000E+00	0.00000E+00
219	8.66742E-01	5.33133E+00	8.95814E-01	1.62180E-03	0.00000E+00	0.00000E+00
220	8.71369E-01	5.35517E+00	8.95701E-01	1.61823E-03	0.00000E+00	0.00000E+00
221	8.55960E-01	5.37983E+00	8.95520E-01	1.62101E-03	0.00000E+00	0.00000E+00
222	9.12158E-01	5.40283E+00	8.95596E-01	1.61540E-03	0.00000E+00	0.00000E+00
223	8.95254E-01	5.42650E+00	8.95594E-01	1.60807E-03	0.00000E+00	0.00000E+00
224	8.60585E-01	5.45033E+00	8.95436E-01	1.60856E-03	0.00000E+00	0.00000E+00
225	8.74524E-01	5.47417E+00	8.95343E-01	1.60408E-03	0.00000E+00	0.00000E+00
226	9.14818E-01	5.49700E+00	8.95430E-01	1.59926E-03	0.00000E+00	0.00000E+00
227	9.31760E-01	5.52083E+00	8.95591E-01	1.60031E-03	0.00000E+00	0.00000E+00
228	8.65724E-01	5.54550E+00	8.95459E-01	1.59868E-03	0.00000E+00	0.00000E+00
229	9.18458E-01	5.56850E+00	8.95560E-01	1.59485E-03	0.00000E+00	0.00000E+00
230	9.06092E-01	5.59317E+00	8.95606E-01	1.58851E-03	0.00000E+00	0.00000E+00
231	9.21820E-01	5.61600E+00	8.95721E-01	1.58569E-03	0.00000E+00	0.00000E+00
232	8.93586E-01	5.64167E+00	8.95712E-01	1.57881E-03	0.00000E+00	0.00000E+00
233	9.10950E-01	5.66450E+00	8.95778E-01	1.57335E-03	0.00000E+00	0.00000E+00
234	9.12836E-01	5.68833E+00	8.95851E-01	1.56828E-03	0.00000E+00	0.00000E+00
235	9.13126E-01	5.71033E+00	8.95925E-01	1.56329E-03	0.00000E+00	0.00000E+00
236	9.25522E-01	5.73417E+00	8.96052E-01	1.56173E-03	0.00000E+00	0.00000E+00
237	8.87379E-01	5.75883E+00	8.96015E-01	1.55551E-03	0.00000E+00	0.00000E+00
238	8.68187E-01	5.78350E+00	8.95897E-01	1.55338E-03	0.00000E+00	0.00000E+00
239	8.60217E-01	5.80917E+00	8.95746E-01	1.55412E-03	0.00000E+00	0.00000E+00
240	8.69248E-01	5.83217E+00	8.95635E-01	1.55158E-03	0.00000E+00	0.00000E+00
241	8.98512E-01	5.85583E+00	8.95647E-01	1.54512E-03	0.00000E+00	0.00000E+00
242	9.11914E-01	5.87883E+00	8.95715E-01	1.54016E-03	0.00000E+00	0.00000E+00
243	8.77626E-01	5.90167E+00	8.95640E-01	1.53559E-03	0.00000E+00	0.00000E+00
244	8.84961E-01	5.92550E+00	8.95596E-01	1.52987E-03	0.00000E+00	0.00000E+00
245	9.15886E-01	5.94933E+00	8.95679E-01	1.52585E-03	0.00000E+00	0.00000E+00
246	8.46228E-01	5.97400E+00	8.95477E-01	1.53304E-03	0.00000E+00	0.00000E+00
247	9.17179E-01	5.99783E+00	8.95655E-01	1.52934E-03	0.00000E+00	0.00000E+00
248	8.59401E-01	6.02167E+00	8.95418E-01	1.53018E-03	0.00000E+00	0.00000E+00
249	8.95811E-01	6.04533E+00	8.95420E-01	1.52398E-03	0.00000E+00	0.00000E+00
250	8.92145E-01	6.06917E+00	8.95407E-01	1.51788E-03	0.00000E+00	0.00000E+00
251	9.48130E-01	6.09200E+00	8.95618E-01	1.52653E-03	0.00000E+00	0.00000E+00
252	8.78052E-01	6.11583E+00	8.95548E-01	1.52203E-03	0.00000E+00	0.00000E+00
253	9.35664E-01	6.13967E+00	8.95708E-01	1.52436E-03	0.00000E+00	0.00000E+00
254	8.93427E-01	6.16333E+00	8.95699E-01	1.51832E-03	0.00000E+00	0.00000E+00
255	8.96659E-01	6.18817E+00	8.95703E-01	1.51231E-03	0.00000E+00	0.00000E+00
256	9.01249E-01	6.21200E+00	8.95724E-01	1.50651E-03	0.00000E+00	0.00000E+00
257	9.24391E-01	6.23483E+00	8.95837E-01	1.50479E-03	0.00000E+00	0.00000E+00
258	8.77010E-01	6.25783E+00	8.95763E-01	1.50070E-03	0.00000E+00	0.00000E+00
259	9.03217E-01	6.28067E+00	8.95792E-01	1.49513E-03	0.00000E+00	0.00000E+00
260	8.79833E-01	6.30333E+00	8.95730E-01	1.49061E-03	0.00000E+00	0.00000E+00
261	9.02200E-01	6.33017E+00	8.95755E-01	1.48506E-03	0.00000E+00	0.00000E+00
262	8.80712E-01	6.35383E+00	8.95698E-01	1.48046E-03	0.00000E+00	0.00000E+00
263	9.17152E-01	6.37683E+00	8.95780E-01	1.47707E-03	0.00000E+00	0.00000E+00
264	8.63141E-01	6.40150E+00	8.95655E-01	1.47669E-03	0.00000E+00	0.00000E+00
265	8.95414E-01	6.42533E+00	8.95654E-01	1.47106E-03	0.00000E+00	0.00000E+00
266	9.00271E-01	6.44817E+00	8.95672E-01	1.46558E-03	0.00000E+00	0.00000E+00
267	8.75733E-01	6.47383E+00	8.95597E-01	1.46197E-03	0.00000E+00	0.00000E+00
268	9.23365E-01	6.49767E+00	8.95701E-01	1.46020E-03	0.00000E+00	0.00000E+00
269	8.88812E-01	6.52317E+00	8.95675E-01	1.45495E-03	0.00000E+00	0.00000E+00
270	9.20117E-01	6.54617E+00	8.95766E-01	1.45238E-03	0.00000E+00	0.00000E+00
271	9.11885E-01	6.57000E+00	8.95826E-01	1.44821E-03	0.00000E+00	0.00000E+00
272	9.21993E-01	6.59367E+00	8.95923E-01	1.44609E-03	0.00000E+00	0.00000E+00
273	8.49401E-01	6.61850E+00	8.95752E-01	1.45093E-03	0.00000E+00	0.00000E+00
274	8.95063E-01	6.64217E+00	8.95749E-01	1.44559E-03	0.00000E+00	0.00000E+00
275	8.66475E-01	6.66700E+00	8.95642E-01	1.44427E-03	0.00000E+00	0.00000E+00
276	8.65963E-01	6.69267E+00	8.95533E-01	1.44306E-03	0.00000E+00	0.00000E+00
277	8.87114E-01	6.71550E+00	8.95503E-01	1.43813E-03	0.00000E+00	0.00000E+00
278	8.90469E-01	6.73933E+00	8.95485E-01	1.43303E-03	0.00000E+00	0.00000E+00
279	9.05177E-01	6.76317E+00	8.95520E-01	1.42827E-03	0.00000E+00	0.00000E+00
280	9.07149E-01	6.78783E+00	8.95561E-01	1.42374E-03	0.00000E+00	0.00000E+00
281	8.55320E-01	6.81167E+00	8.95417E-01	1.42594E-03	0.00000E+00	0.00000E+00
282	8.62157E-01	6.83450E+00	8.95298E-01	1.42580E-03	0.00000E+00	0.00000E+00
283	9.01137E-01	6.85917E+00	8.95319E-01	1.42087E-03	0.00000E+00	0.00000E+00
284	8.77530E-01	6.88300E+00	8.95256E-01	1.41722E-03	0.00000E+00	0.00000E+00
285	8.60813E-01	6.90683E+00	8.95134E-01	1.41744E-03	0.00000E+00	0.00000E+00
286	8.66350E-01	6.93150E+00	8.95033E-01	1.41607E-03	0.00000E+00	0.00000E+00
287	8.76397E-01	6.95533E+00	8.94968E-01	1.41261E-03	0.00000E+00	0.00000E+00
288	8.82161E-01	6.97817E+00	8.94923E-01	1.40838E-03	0.00000E+00	0.00000E+00
289	8.65790E-01	7.00200E+00	8.94821E-01	1.40713E-03	0.00000E+00	0.00000E+00
290	9.37929E-01	7.02483E+00	8.94971E-01	1.41020E-03	0.00000E+00	0.00000E+00
291	9.29246E-01	7.04867E+00	8.95090E-01	1.41031E-03	0.00000E+00	0.00000E+00
292	9.10414E-01	7.07150E+00	8.95143E-01	1.40643E-03	0.00000E+00	0.00000E+00
293	8.82829E-01	7.09533E+00	8.95100E-01	1.40222E-03	0.00000E+00	0.00000E+00
294	8.63260E-01	7.12100E+00	8.94991E-01	1.40166E-03	0.00000E+00	0.00000E+00
295	9.20586E-01	7.14383E+00	8.95079E-01	1.39960E-03	0.00000E+00	0.00000E+00
296	9.41261E-01	7.16683E+00	8.95236E-01	1.40365E-03	0.00000E+00	0.00000E+00
297	8.84594E-01	7.19150E+00	8.95200E-01	1.39935E-03	0.00000E+00	0.00000E+00
298	9.17430E-01	7.21533E+00	8.95275E-01	1.39663E-03	0.00000E+00	0.00000E+00
299	8.83992E-01	7.23917E+00	8.95237E-01	1.39244E-03	0.00000E+00	0.00000E+00
300	8.89306E-01	7.26200E+00	8.95217E-01	1.38790E-03	0.00000E+00	0.00000E+00
301	9.06865E-01	7.28667E+00	8.95256E-01	1.38380E-03	0.00000E+00	0.00000E+00
302	9.43762E-01	7.31050E+00	8.95417E-01	1.38862E-03	0.00000E+00	0.00000E+00
303	9.18035E-01	7.33433E+00	8.95493E-01	1.38604E-03	0.00000E+00	0.00000E+00
304	8.98479E-01	7.35717E+00	8.95502E-01	1.38148E-03	0.00000E+00	0.00000E+00
305	9.04385E-01	7.38000E+00	8.95532E-01	1.37723E-03	0.00000E+00	0.00000E+00
306	9.10615E-01	7.40383E+00	8.95581E-01	1.37358E-03	0.00000E+00	0.00000E+00
307	9.18945E-01	7.42767E+00	8.95658E-01	1.37121E-03	0.00000E+00	0.00000E+00
308	8.87790E-01	7.45150E+00	8.95632E-01	1.36697E-03	0.00000E+00	0.00000E+00
309	8.94523E-01	7.47433E+00	8.95629E-01	1.36251E-03	0.00000E+00	0.00000E+00
310	8.91631E-01	7.49917E+00	8.95616E-01	1.35814E-03	0.00000E+00	0.00000E+00
311	8.99515E-01	7.52283E+00	8.95628E-01	1.35380E-03	0.00000E+00	0.00000E+00
312	9.39045E-01	7.54483E+00	8.95768E-01	1.35667E-03	0.00000E+00	0.00000E+00
313	8.85895E-01	7.56867E+00	8.95737E-01	1.35268E-03	0.00000E+00	0.00000E+00
314	8.78723E-01	7.59250E+00	8.95682E-01	1.34944E-03	0.00000E+00	0.00000E+00
315	8.64668E-01	7.61717E+00	8.95583E-01	1.34876E-03	0.00000E+00	0.00000E+00
316	9.02749E-01	7.64100E+00	8.95606E-01	1.34466E-03	0.00000E+00	0.00000E+00
317	8.67690E-01	7.66667E+00	8.95517E-01	1.34331E-03	0.00000E+00	0.00000E+00
318	8.97839E-01	7.69033E+00	8.95524E-01	1.33907E-03	0.00000E+00	0.00000E+00

319	9.31740E-01	7.71417E+00	8.95639E-01	1.33972E-03	0.00000E+00	0.00000E+00
320	9.15333E-01	7.73800E+00	8.95701E-01	1.33693E-03	0.00000E+00	0.00000E+00
321	8.97757E-01	7.76267E+00	8.95707E-01	1.33275E-03	0.00000E+00	0.00000E+00
322	9.07318E-01	7.78650E+00	8.95743E-01	1.32908E-03	0.00000E+00	0.00000E+00
323	9.00348E-01	7.81033E+00	8.95758E-01	1.32501E-03	0.00000E+00	0.00000E+00
324	8.93546E-01	7.83317E+00	8.95751E-01	1.32090E-03	0.00000E+00	0.00000E+00
325	9.13417E-01	7.85700E+00	8.95806E-01	1.31794E-03	0.00000E+00	0.00000E+00
326	8.67137E-01	7.88167E+00	8.95717E-01	1.31684E-03	0.00000E+00	0.00000E+00
327	9.11058E-01	7.90733E+00	8.95764E-01	1.31363E-03	0.00000E+00	0.00000E+00
328	8.93442E-01	7.93117E+00	8.95757E-01	1.30962E-03	0.00000E+00	0.00000E+00
329	8.58242E-01	7.95400E+00	8.95643E-01	1.31064E-03	0.00000E+00	0.00000E+00
330	8.87510E-01	7.97883E+00	8.95618E-01	1.30687E-03	0.00000E+00	0.00000E+00
331	8.84861E-01	8.00167E+00	8.95585E-01	1.30330E-03	0.00000E+00	0.00000E+00
332	9.20879E-01	8.02550E+00	8.95662E-01	1.30161E-03	0.00000E+00	0.00000E+00
333	8.92014E-01	8.04933E+00	8.95651E-01	1.29771E-03	0.00000E+00	0.00000E+00
334	8.98793E-01	8.07483E+00	8.95660E-01	1.29383E-03	0.00000E+00	0.00000E+00
335	9.05699E-01	8.09867E+00	8.95690E-01	1.29029E-03	0.00000E+00	0.00000E+00
336	8.77431E-01	8.12250E+00	8.95636E-01	1.28759E-03	0.00000E+00	0.00000E+00
337	9.39878E-01	8.14533E+00	8.95768E-01	1.29051E-03	0.00000E+00	0.00000E+00
338	8.97092E-01	8.16917E+00	8.95772E-01	1.28667E-03	0.00000E+00	0.00000E+00
339	8.92360E-01	8.19117E+00	8.95762E-01	1.28289E-03	0.00000E+00	0.00000E+00
340	8.63111E-01	8.21583E+00	8.95665E-01	1.28273E-03	0.00000E+00	0.00000E+00
341	8.56991E-01	8.24050E+00	8.95551E-01	1.28402E-03	0.00000E+00	0.00000E+00
342	8.54876E-01	8.26433E+00	8.95431E-01	1.28581E-03	0.00000E+00	0.00000E+00
343	9.22585E-01	8.28817E+00	8.95511E-01	1.28451E-03	0.00000E+00	0.00000E+00
344	9.04882E-01	8.31100E+00	8.95538E-01	1.28104E-03	0.00000E+00	0.00000E+00
345	8.62203E-01	8.33483E+00	8.95441E-01	1.28099E-03	0.00000E+00	0.00000E+00
346	8.91068E-01	8.35867E+00	8.95428E-01	1.27733E-03	0.00000E+00	0.00000E+00
347	8.77276E-01	8.38333E+00	8.95376E-01	1.27470E-03	0.00000E+00	0.00000E+00
348	8.80922E-01	8.40717E+00	8.95334E-01	1.27170E-03	0.00000E+00	0.00000E+00
349	8.87942E-01	8.43000E+00	8.95313E-01	1.26821E-03	0.00000E+00	0.00000E+00
350	9.08687E-01	8.45483E+00	8.95318E-01	1.26514E-03	0.00000E+00	0.00000E+00
351	8.55023E-01	8.47950E+00	8.95236E-01	1.26680E-03	0.00000E+00	0.00000E+00
352	9.10473E-01	8.50333E+00	8.95279E-01	1.26392E-03	0.00000E+00	0.00000E+00
353	9.23391E-01	8.52617E+00	8.95359E-01	1.26286E-03	0.00000E+00	0.00000E+00
354	8.55000E-01	8.55000E+00	8.95352E-01	1.25929E-03	0.00000E+00	0.00000E+00
355	8.80755E-01	8.57283E+00	8.95311E-01	1.25639E-03	0.00000E+00	0.00000E+00
356	8.95925E-01	8.59767E+00	8.95312E-01	1.25284E-03	0.00000E+00	0.00000E+00
357	9.49281E-01	8.62050E+00	8.95464E-01	1.25852E-03	0.00000E+00	0.00000E+00
358	8.91730E-01	8.64433E+00	8.95454E-01	1.25503E-03	0.00000E+00	0.00000E+00
359	8.82525E-01	8.66817E+00	8.95418E-01	1.25203E-03	0.00000E+00	0.00000E+00
360	9.10724E-01	8.69183E+00	8.95460E-01	1.24926E-03	0.00000E+00	0.00000E+00
361	9.29336E-01	8.71383E+00	8.95555E-01	1.24934E-03	0.00000E+00	0.00000E+00
362	9.19163E-01	8.73667E+00	8.95620E-01	1.24759E-03	0.00000E+00	0.00000E+00
363	8.90057E-01	8.75967E+00	8.95605E-01	1.24423E-03	0.00000E+00	0.00000E+00
364	8.68297E-01	8.78350E+00	8.95529E-01	1.24308E-03	0.00000E+00	0.00000E+00
365	8.95902E-01	8.80817E+00	8.95530E-01	1.23965E-03	0.00000E+00	0.00000E+00
366	8.53996E-01	8.83283E+00	8.95416E-01	1.24149E-03	0.00000E+00	0.00000E+00
367	8.95485E-01	8.85750E+00	8.95417E-01	1.23809E-03	0.00000E+00	0.00000E+00
368	8.70299E-01	8.88233E+00	8.95348E-01	1.23660E-03	0.00000E+00	0.00000E+00
369	9.39315E-01	8.90517E+00	8.95468E-01	1.23904E-03	0.00000E+00	0.00000E+00
370	8.42743E-01	8.92983E+00	8.95324E-01	1.24394E-03	0.00000E+00	0.00000E+00
371	9.00029E-01	8.95367E+00	8.95337E-01	1.24063E-03	0.00000E+00	0.00000E+00
372	8.88064E-01	8.97650E+00	8.95318E-01	1.23743E-03	0.00000E+00	0.00000E+00
373	8.96316E-01	8.99950E+00	8.95320E-01	1.23409E-03	0.00000E+00	0.00000E+00
374	8.80433E-01	9.02333E+00	8.95280E-01	1.23142E-03	0.00000E+00	0.00000E+00
375	9.32961E-01	9.04617E+00	8.95381E-01	1.23226E-03	0.00000E+00	0.00000E+00
376	8.60609E-01	9.07083E+00	8.95288E-01	1.23248E-03	0.00000E+00	0.00000E+00
377	8.89423E-01	9.09567E+00	8.95273E-01	1.22929E-03	0.00000E+00	0.00000E+00
378	9.17431E-01	9.11750E+00	8.95332E-01	1.22743E-03	0.00000E+00	0.00000E+00
379	8.90763E-01	9.14133E+00	8.95319E-01	1.22423E-03	0.00000E+00	0.00000E+00
380	9.03933E-01	9.16517E+00	8.95352E-01	1.22126E-03	0.00000E+00	0.00000E+00
381	9.02580E-01	9.18983E+00	8.95364E-01	1.21818E-03	0.00000E+00	0.00000E+00
382	9.12075E-01	9.21367E+00	8.95408E-01	1.21577E-03	0.00000E+00	0.00000E+00
383	8.65641E-01	9.23750E+00	8.95330E-01	1.21509E-03	0.00000E+00	0.00000E+00
384	8.66290E-01	9.26217E+00	8.95254E-01	1.21428E-03	0.00000E+00	0.00000E+00
385	8.89759E-01	9.28683E+00	8.95240E-01	1.21119E-03	0.00000E+00	0.00000E+00
386	9.14192E-01	9.31067E+00	8.95289E-01	1.20904E-03	0.00000E+00	0.00000E+00
387	9.17638E-01	9.33367E+00	8.95347E-01	1.20729E-03	0.00000E+00	0.00000E+00
388	9.25979E-01	9.35733E+00	8.95427E-01	1.20677E-03	0.00000E+00	0.00000E+00
389	9.32704E-01	9.38033E+00	8.95523E-01	1.20750E-03	0.00000E+00	0.00000E+00
390	9.03165E-01	9.40417E+00	8.95543E-01	1.20455E-03	0.00000E+00	0.00000E+00
391	9.46238E-01	9.42783E+00	8.95673E-01	1.20849E-03	0.00000E+00	0.00000E+00
392	9.08953E-01	9.45267E+00	8.95707E-01	1.20587E-03	0.00000E+00	0.00000E+00
393	9.64028E-01	9.47550E+00	8.95882E-01	1.21541E-03	0.00000E+00	0.00000E+00
394	9.09928E-01	9.50017E+00	8.95918E-01	1.21283E-03	0.00000E+00	0.00000E+00
395	8.59672E-01	9.52500E+00	8.95825E-01	1.21325E-03	0.00000E+00	0.00000E+00
396	8.69255E-01	9.54867E+00	8.95758E-01	1.21205E-03	0.00000E+00	0.00000E+00
397	8.91838E-01	9.57250E+00	8.95748E-01	1.20902E-03	0.00000E+00	0.00000E+00
398	9.24188E-01	9.59533E+00	8.95820E-01	1.20810E-03	0.00000E+00	0.00000E+00
399	8.94896E-01	9.61917E+00	8.95817E-01	1.20505E-03	0.00000E+00	0.00000E+00
400	9.11581E-01	9.64400E+00	8.95857E-01	1.20267E-03	0.00000E+00	0.00000E+00
401	8.91078E-01	9.66767E+00	8.95845E-01	1.19971E-03	0.00000E+00	0.00000E+00
402	8.95141E-01	9.69150E+00	8.95843E-01	1.19671E-03	0.00000E+00	0.00000E+00
403	9.06940E-01	9.71533E+00	8.95871E-01	1.19405E-03	0.00000E+00	0.00000E+00
404	8.85631E-01	9.73917E+00	8.95846E-01	1.19134E-03	0.00000E+00	0.00000E+00
405	9.18539E-01	9.76300E+00	8.95902E-01	1.18972E-03	0.00000E+00	0.00000E+00
406	9.11942E-01	9.78683E+00	8.95942E-01	1.18743E-03	0.00000E+00	0.00000E+00
407	9.70086E-01	9.80967E+00	8.96125E-01	1.19866E-03	0.00000E+00	0.00000E+00
408	9.04730E-01	9.83350E+00	8.96146E-01	1.19579E-03	0.00000E+00	0.00000E+00
409	8.94946E-01	9.85717E+00	8.96143E-01	1.19286E-03	0.00000E+00	0.00000E+00
410	9.05643E-01	9.88200E+00	8.96166E-01	1.19016E-03	0.00000E+00	0.00000E+00
411	9.16808E-01	9.90567E+00	8.96217E-01	1.18831E-03	0.00000E+00	0.00000E+00
412	8.86415E-01	9.92950E+00	8.96193E-01	1.18655E-03	0.00000E+00	0.00000E+00
413	9.08300E-01	9.95333E+00	8.96222E-01	1.18313E-03	0.00000E+00	0.00000E+00
414	8.38968E-01	9.97717E+00	8.96083E-01	1.18841E-03	0.00000E+00	0.00000E+00
415	9.04074E-01	9.99917E+00	8.96103E-01	1.18569E-03	0.00000E+00	0.00000E+00
416	9.34861E-01	1.00220E+01	8.96196E-01	1.18652E-03	0.00000E+00	0.00000E+00
417	9.10037E-01	1.00458E+01	8.96230E-01	1.18413E-03	0.00000E+00	0.00000E+00
418	9.15567E-01	1.00697E+01	8.96276E-01	1.18219E-03	0.00000E+00	0.00000E+00
419	9.55204E-01	1.00925E+01	8.96417E-01	1.18779E-03	0.00000E+00	0.00000E+00
420	8.82081E-01	1.01163E+01	8.96383E-01	1.18544E-03	0.00000E+00	0.00000E+00
421	9.08086E-01	1.01402E+01	8.96411E-01	1.18294E-03	0.00000E+00	0.00000E+00
422	9.12650E-01	1.01648E+01	8.96450E-01	1.18075E-03	0.00000E+00	0.00000E+00
423	8.54102E-01	1.01895E+01	8.96349E-01	1.18223E-03	0.00000E+00	0.00000E+00
424	9.08926E-01	1.02123E+01	8.96379E-01	1.17980E-03	0.00000E+00	0.00000E+00
425	9.35580E-01	1.02343E+01	8.96472E-01	1.18065E-03	0.00000E+00	0.00000E+00
426	8.81976E-01	1.02582E+01	8.96437E-01	1.17836E-03	0.00000E+00	0.00000E+00

427	8.94689E-01	1.02820E+01	8.96433E-01	1.17559E-03	0.00000E+00	0.00000E+00
428	9.27000E-01	1.03058E+01	8.96505E-01	1.17502E-03	0.00000E+00	0.00000E+00
429	8.87504E-01	1.03295E+01	8.96484E-01	1.17246E-03	0.00000E+00	0.00000E+00
430	9.34985E-01	1.03525E+01	8.96574E-01	1.17317E-03	0.00000E+00	0.00000E+00
431	9.17721E-01	1.03753E+01	8.96623E-01	1.17147E-03	0.00000E+00	0.00000E+00
432	9.03182E-01	1.03992E+01	8.96638E-01	1.16884E-03	0.00000E+00	0.00000E+00
433	9.94514E-01	1.04212E+01	8.96865E-01	1.18803E-03	0.00000E+00	0.00000E+00
434	8.97109E-01	1.04450E+01	8.96866E-01	1.18528E-03	0.00000E+00	0.00000E+00
435	8.68383E-01	1.04697E+01	8.96800E-01	1.18436E-03	0.00000E+00	0.00000E+00
436	9.04481E-01	1.04935E+01	8.96818E-01	1.18176E-03	0.00000E+00	0.00000E+00
437	9.18522E-01	1.05153E+01	8.96868E-01	1.18010E-03	0.00000E+00	0.00000E+00
438	9.03273E-01	1.05392E+01	8.96883E-01	1.17748E-03	0.00000E+00	0.00000E+00
439	9.03496E-01	1.05622E+01	8.96898E-01	1.17488E-03	0.00000E+00	0.00000E+00
440	8.87313E-01	1.05868E+01	8.96876E-01	1.17240E-03	0.00000E+00	0.00000E+00
441	8.70212E-01	1.06115E+01	8.96815E-01	1.17130E-03	0.00000E+00	0.00000E+00
442	8.58089E-01	1.06353E+01	8.96727E-01	1.17195E-03	0.00000E+00	0.00000E+00
443	8.91367E-01	1.06582E+01	8.96715E-01	1.16935E-03	0.00000E+00	0.00000E+00
444	9.07255E-01	1.06820E+01	8.96739E-01	1.16694E-03	0.00000E+00	0.00000E+00
445	8.76624E-01	1.07058E+01	8.96693E-01	1.16519E-03	0.00000E+00	0.00000E+00
446	8.79254E-01	1.07297E+01	8.96654E-01	1.16323E-03	0.00000E+00	0.00000E+00
447	8.80421E-01	1.07535E+01	8.96618E-01	1.16118E-03	0.00000E+00	0.00000E+00
448	8.92619E-01	1.07772E+01	8.96609E-01	1.15861E-03	0.00000E+00	0.00000E+00
449	8.87123E-01	1.08010E+01	8.96587E-01	1.15621E-03	0.00000E+00	0.00000E+00
450	8.93978E-01	1.08238E+01	8.96582E-01	1.15364E-03	0.00000E+00	0.00000E+00
451	8.74146E-01	1.08477E+01	8.96532E-01	1.15216E-03	0.00000E+00	0.00000E+00
452	9.10700E-01	1.08707E+01	8.96563E-01	1.15002E-03	0.00000E+00	0.00000E+00
453	9.24132E-01	1.08935E+01	8.96524E-01	1.14910E-03	0.00000E+00	0.00000E+00
454	9.01100E-01	1.09173E+01	8.96534E-01	1.14660E-03	0.00000E+00	0.00000E+00
455	9.23492E-01	1.09402E+01	8.96693E-01	1.14560E-03	0.00000E+00	0.00000E+00
456	9.05902E-01	1.09640E+01	8.96714E-01	1.14325E-03	0.00000E+00	0.00000E+00
457	9.00037E-01	1.09878E+01	8.96721E-01	1.14076E-03	0.00000E+00	0.00000E+00
458	8.78071E-01	1.10125E+01	8.96680E-01	1.13899E-03	0.00000E+00	0.00000E+00
459	8.78601E-01	1.10363E+01	8.96641E-01	1.13718E-03	0.00000E+00	0.00000E+00
460	8.74789E-01	1.10602E+01	8.96593E-01	1.13570E-03	0.00000E+00	0.00000E+00
461	9.11807E-01	1.10838E+01	8.96626E-01	1.13371E-03	0.00000E+00	0.00000E+00
462	9.08229E-01	1.11077E+01	8.96651E-01	1.13152E-03	0.00000E+00	0.00000E+00
463	8.95114E-01	1.11315E+01	8.96648E-01	1.12907E-03	0.00000E+00	0.00000E+00
464	8.93458E-01	1.11562E+01	8.96641E-01	1.12664E-03	0.00000E+00	0.00000E+00
465	8.78004E-01	1.11800E+01	8.96601E-01	1.12493E-03	0.00000E+00	0.00000E+00
466	8.81664E-01	1.12028E+01	8.96569E-01	1.12296E-03	0.00000E+00	0.00000E+00
467	9.22024E-01	1.12267E+01	8.96623E-01	1.12188E-03	0.00000E+00	0.00000E+00
468	8.74849E-01	1.12505E+01	8.96577E-01	1.12044E-03	0.00000E+00	0.00000E+00
469	9.07953E-01	1.12743E+01	8.96601E-01	1.11831E-03	0.00000E+00	0.00000E+00
470	9.00350E-01	1.12990E+01	8.96609E-01	1.11595E-03	0.00000E+00	0.00000E+00
471	8.92630E-01	1.13237E+01	8.96600E-01	1.11360E-03	0.00000E+00	0.00000E+00
472	8.84763E-01	1.13475E+01	8.96575E-01	1.11151E-03	0.00000E+00	0.00000E+00
473	8.92004E-01	1.13713E+01	8.96566E-01	1.10919E-03	0.00000E+00	0.00000E+00
474	8.79063E-01	1.13960E+01	8.96528E-01	1.10746E-03	0.00000E+00	0.00000E+00
475	8.93526E-01	1.14198E+01	8.96522E-01	1.10513E-03	0.00000E+00	0.00000E+00
476	8.97703E-01	1.14437E+01	8.96525E-01	1.10280E-03	0.00000E+00	0.00000E+00
477	8.82148E-01	1.14665E+01	8.96494E-01	1.10089E-03	0.00000E+00	0.00000E+00
478	8.80307E-01	1.14895E+01	8.96460E-01	1.09910E-03	0.00000E+00	0.00000E+00
479	9.40191E-01	1.15123E+01	8.96522E-01	1.09922E-03	0.00000E+00	0.00000E+00
480	8.80948E-01	1.15370E+01	8.96490E-01	1.10005E-03	0.00000E+00	0.00000E+00
481	8.84586E-01	1.15598E+01	8.96465E-01	1.09803E-03	0.00000E+00	0.00000E+00
482	8.77404E-01	1.15837E+01	8.96426E-01	1.09646E-03	0.00000E+00	0.00000E+00
483	9.26403E-01	1.16075E+01	8.96488E-01	1.09595E-03	0.00000E+00	0.00000E+00
484	9.10083E-01	1.16313E+01	8.96516E-01	1.09404E-03	0.00000E+00	0.00000E+00
485	9.16693E-01	1.16542E+01	8.96558E-01	1.09257E-03	0.00000E+00	0.00000E+00
486	8.49247E-01	1.16788E+01	8.96460E-01	1.09469E-03	0.00000E+00	0.00000E+00
487	8.83473E-01	1.17027E+01	8.96433E-01	1.09275E-03	0.00000E+00	0.00000E+00
488	9.26183E-01	1.17265E+01	8.96495E-01	1.09222E-03	0.00000E+00	0.00000E+00
489	8.57221E-01	1.17512E+01	8.96414E-01	1.09295E-03	0.00000E+00	0.00000E+00
490	9.06872E-01	1.17750E+01	8.96435E-01	1.09092E-03	0.00000E+00	0.00000E+00
491	9.17416E-01	1.17988E+01	8.96478E-01	1.08935E-03	0.00000E+00	0.00000E+00
492	8.94006E-01	1.18227E+01	8.96473E-01	1.08732E-03	0.00000E+00	0.00000E+00
493	9.14281E-01	1.18465E+01	8.96510E-01	1.08571E-03	0.00000E+00	0.00000E+00
494	9.52789E-01	1.18693E+01	8.96624E-01	1.08952E-03	0.00000E+00	0.00000E+00
495	8.69660E-01	1.18940E+01	8.96569E-01	1.08868E-03	0.00000E+00	0.00000E+00
496	9.11134E-01	1.19170E+01	8.96599E-01	1.08688E-03	0.00000E+00	0.00000E+00
497	9.20718E-01	1.19398E+01	8.96648E-01	1.08577E-03	0.00000E+00	0.00000E+00
498	8.96202E-01	1.19645E+01	8.96647E-01	1.08358E-03	0.00000E+00	0.00000E+00
499	9.02916E-01	1.19873E+01	8.96659E-01	1.08147E-03	0.00000E+00	0.00000E+00
500	8.85633E-01	1.20122E+01	8.96637E-01	1.07953E-03	0.00000E+00	0.00000E+00
501	9.25873E-01	1.20360E+01	8.96696E-01	1.07895E-03	0.00000E+00	0.00000E+00
502	8.97125E-01	1.20597E+01	8.96697E-01	1.07679E-03	0.00000E+00	0.00000E+00
503	8.73163E-01	1.20835E+01	8.96650E-01	1.07567E-03	0.00000E+00	0.00000E+00
504	8.86625E-01	1.21083E+01	8.96630E-01	1.07371E-03	0.00000E+00	0.00000E+00
505	9.03667E-01	1.21320E+01	8.96644E-01	1.07166E-03	0.00000E+00	0.00000E+00
506	8.93322E-01	1.21568E+01	8.96637E-01	1.06956E-03	0.00000E+00	0.00000E+00
507	9.20239E-01	1.21805E+01	8.96684E-01	1.06846E-03	0.00000E+00	0.00000E+00
508	8.97849E-01	1.22035E+01	8.96686E-01	1.06635E-03	0.00000E+00	0.00000E+00
509	9.03579E-01	1.22273E+01	8.96700E-01	1.06433E-03	0.00000E+00	0.00000E+00
510	9.41743E-01	1.22510E+01	8.96788E-01	1.06593E-03	0.00000E+00	0.00000E+00
511	9.09846E-01	1.22748E+01	8.96814E-01	1.06414E-03	0.00000E+00	0.00000E+00
512	9.02922E-01	1.22977E+01	8.96826E-01	1.06212E-03	0.00000E+00	0.00000E+00
513	8.83000E-01	1.23215E+01	8.96799E-01	1.06038E-03	0.00000E+00	0.00000E+00
514	8.94430E-01	1.23453E+01	8.96794E-01	1.05832E-03	0.00000E+00	0.00000E+00
515	8.46309E-01	1.23710E+01	8.96696E-01	1.06083E-03	0.00000E+00	0.00000E+00
516	9.29154E-01	1.23930E+01	8.96759E-01	1.06065E-03	0.00000E+00	0.00000E+00
517	8.75636E-01	1.24177E+01	8.96718E-01	1.05938E-03	0.00000E+00	0.00000E+00
518	9.25388E-01	1.24415E+01	8.96774E-01	1.05878E-03	0.00000E+00	0.00000E+00
519	9.01574E-01	1.24643E+01	8.96783E-01	1.05677E-03	0.00000E+00	0.00000E+00
520	8.93721E-01	1.24872E+01	8.96777E-01	1.05475E-03	0.00000E+00	0.00000E+00
521	8.85690E-01	1.25110E+01	8.96756E-01	1.05293E-03	0.00000E+00	0.00000E+00
522	8.43889E-01	1.25358E+01	8.96654E-01	1.05581E-03	0.00000E+00	0.00000E+00
523	8.99307E-01	1.25595E+01	8.96659E-01	1.05379E-03	0.00000E+00	0.00000E+00
524	9.39461E-01	1.25833E+01	8.96741E-01	1.05496E-03	0.00000E+00	0.00000E+00
525	9.13382E-01	1.26080E+01	8.96773E-01	1.05343E-03	0.00000E+00	0.00000E+00
526	9.20663E-01	1.26310E+01	8.96818E-01	1.05240E-03	0.00000E+00	0.00000E+00
527	9.11607E-01	1.26548E+01	8.96847E-01	1.05077E-03	0.00000E+00	0.00000E+00
528	8.89681E-01	1.26785E+01	8.96833E-01	1.04886E-03	0.00000E+00	0.00000E+00
529	9.28580E-01	1.27015E+01	8.96893E-01	1.04860E-03	0.00000E+00	0.00000E+00
530	8.65511E-01	1.27262E+01	8.96834E-01	1.04830E-03	0.00000E+00	0.00000E+00
531	9.11819E-01	1.27508E+01	8.96862E-01	1.04670E-03	0.00000E+00	0.00000E+00
532	8.78168E-01	1.27747E+01	8.96827E-01	1.04532E-03	0.00000E+00	0.00000E+00
533	8.34391E-01	1.27985E+01	8.96709E-01	1.04995E-03	0.00000E+00	0.00000E+00
534	9.08869E-01	1.28223E+01	8.96732E-01	1.04823E-03	0.00000E+00	0.00000E+00

535	8.64387E-01	1.28460E+01	8.96671E-01	1.04802E-03	0.00000E+00	0.00000E+00
536	8.99302E-01	1.28698E+01	8.96676E-01	1.04606E-03	0.00000E+00	0.00000E+00
537	9.32684E-01	1.28937E+01	8.96744E-01	1.04627E-03	0.00000E+00	0.00000E+00
538	8.79891E-01	1.29183E+01	8.96712E-01	1.04479E-03	0.00000E+00	0.00000E+00
539	9.14136E-01	1.29413E+01	8.96745E-01	1.04335E-03	0.00000E+00	0.00000E+00
540	9.01656E-01	1.29642E+01	8.96754E-01	1.04145E-03	0.00000E+00	0.00000E+00
541	8.75015E-01	1.29898E+01	8.96713E-01	1.04030E-03	0.00000E+00	0.00000E+00
542	8.68825E-01	1.30127E+01	8.96662E-01	1.03965E-03	0.00000E+00	0.00000E+00
543	8.83360E-01	1.30373E+01	8.96635E-01	1.03807E-03	0.00000E+00	0.00000E+00
544	8.95750E-01	1.30622E+01	8.96633E-01	1.03616E-03	0.00000E+00	0.00000E+00
545	9.08330E-01	1.30842E+01	8.96655E-01	1.03447E-03	0.00000E+00	0.00000E+00
546	9.23595E-01	1.31078E+01	8.96704E-01	1.03376E-03	0.00000E+00	0.00000E+00
547	8.70013E-01	1.31327E+01	8.96655E-01	1.03302E-03	0.00000E+00	0.00000E+00
548	8.93271E-01	1.31563E+01	8.96649E-01	1.03114E-03	0.00000E+00	0.00000E+00
549	8.97267E-01	1.31802E+01	8.96650E-01	1.02926E-03	0.00000E+00	0.00000E+00
550	8.46308E-01	1.32040E+01	8.96558E-01	1.03148E-03	0.00000E+00	0.00000E+00
551	8.93473E-01	1.32278E+01	8.96553E-01	1.02961E-03	0.00000E+00	0.00000E+00
552	8.52139E-01	1.32525E+01	8.96472E-01	1.03091E-03	0.00000E+00	0.00000E+00
553	8.77510E-01	1.32772E+01	8.96438E-01	1.02961E-03	0.00000E+00	0.00000E+00
554	9.29491E-01	1.33002E+01	8.96498E-01	1.02948E-03	0.00000E+00	0.00000E+00
555	8.98625E-01	1.33240E+01	8.96501E-01	1.02763E-03	0.00000E+00	0.00000E+00
556	9.12137E-01	1.33477E+01	8.96530E-01	1.02616E-03	0.00000E+00	0.00000E+00
557	8.86835E-01	1.33707E+01	8.96512E-01	1.02446E-03	0.00000E+00	0.00000E+00
558	8.75002E-01	1.33935E+01	8.96473E-01	1.02335E-03	0.00000E+00	0.00000E+00
559	8.99338E-01	1.34163E+01	8.96479E-01	1.02152E-03	0.00000E+00	0.00000E+00
560	8.55454E-01	1.34412E+01	8.96405E-01	1.02233E-03	0.00000E+00	0.00000E+00
561	8.86954E-01	1.34648E+01	8.96388E-01	1.02064E-03	0.00000E+00	0.00000E+00
562	8.93705E-01	1.34887E+01	8.96383E-01	1.01883E-03	0.00000E+00	0.00000E+00
563	9.00043E-01	1.35125E+01	8.96390E-01	1.01703E-03	0.00000E+00	0.00000E+00
564	9.35165E-01	1.35363E+01	8.96459E-01	1.01756E-03	0.00000E+00	0.00000E+00
565	9.18707E-01	1.35602E+01	8.96498E-01	1.01652E-03	0.00000E+00	0.00000E+00
566	9.02933E-01	1.35838E+01	8.96510E-01	1.01478E-03	0.00000E+00	0.00000E+00
567	9.02138E-01	1.36077E+01	8.96520E-01	1.01304E-03	0.00000E+00	0.00000E+00
568	8.8465E-01	1.36315E+01	8.96495E-01	1.01146E-03	0.00000E+00	0.00000E+00
569	8.5252E-01	1.36552E+01	8.96444E-01	1.0118E-03	0.00000E+00	0.00000E+00
570	8.59762E-01	1.36800E+01	8.96379E-01	1.01146E-03	0.00000E+00	0.00000E+00
571	8.85772E-01	1.37038E+01	8.96360E-01	1.00986E-03	0.00000E+00	0.00000E+00
572	9.05816E-01	1.37276E+01	8.96377E-01	1.00822E-03	0.00000E+00	0.00000E+00
573	9.24165E-01	1.37505E+01	8.96426E-01	1.00763E-03	0.00000E+00	0.00000E+00
574	9.12854E-01	1.37733E+01	8.96454E-01	1.00627E-03	0.00000E+00	0.00000E+00
575	9.04969E-01	1.37972E+01	8.96469E-01	1.00463E-03	0.00000E+00	0.00000E+00
576	9.22231E-01	1.38202E+01	8.96514E-01	1.00388E-03	0.00000E+00	0.00000E+00
577	9.18564E-01	1.38430E+01	8.96552E-01	1.00286E-03	0.00000E+00	0.00000E+00
578	9.22708E-01	1.38668E+01	8.96598E-01	1.00215E-03	0.00000E+00	0.00000E+00
579	9.49538E-01	1.38915E+01	8.96690E-01	1.00461E-03	0.00000E+00	0.00000E+00
580	9.11573E-01	1.39135E+01	8.96715E-01	1.00320E-03	0.00000E+00	0.00000E+00
581	9.09612E-01	1.39373E+01	8.96738E-01	1.00172E-03	0.00000E+00	0.00000E+00
582	8.74688E-01	1.39610E+01	8.96700E-01	1.00071E-03	0.00000E+00	0.00000E+00
583	9.06132E-01	1.39848E+01	8.96716E-01	9.99118E-04	0.00000E+00	0.00000E+00
584	9.00629E-01	1.40078E+01	8.96723E-01	9.97422E-04	0.00000E+00	0.00000E+00
585	9.05499E-01	1.40315E+01	8.96738E-01	9.95824E-04	0.00000E+00	0.00000E+00
586	9.03479E-01	1.40545E+01	8.96749E-01	9.94184E-04	0.00000E+00	0.00000E+00
587	9.06552E-01	1.40782E+01	8.96766E-01	9.92624E-04	0.00000E+00	0.00000E+00
588	8.59516E-01	1.41012E+01	8.96702E-01	9.92966E-04	0.00000E+00	0.00000E+00
589	9.16276E-01	1.41240E+01	8.96736E-01	9.91834E-04	0.00000E+00	0.00000E+00
590	8.65798E-01	1.41487E+01	8.96683E-01	9.91542E-04	0.00000E+00	0.00000E+00
591	9.13283E-01	1.41717E+01	8.96711E-01	9.90259E-04	0.00000E+00	0.00000E+00
592	8.79095E-01	1.41963E+01	8.96681E-01	9.89030E-04	0.00000E+00	0.00000E+00
593	8.85133E-01	1.42202E+01	8.96662E-01	9.87548E-04	0.00000E+00	0.00000E+00
594	8.86839E-01	1.42440E+01	8.96635E-01	9.86241E-04	0.00000E+00	0.00000E+00
595	8.86666E-01	1.42677E+01	8.96618E-01	9.84702E-04	0.00000E+00	0.00000E+00
596	8.84925E-01	1.42933E+01	8.96599E-01	9.83258E-04	0.00000E+00	0.00000E+00
597	8.77997E-01	1.43182E+01	8.96567E-01	9.82101E-04	0.00000E+00	0.00000E+00
598	9.12672E-01	1.43428E+01	8.96594E-01	9.80824E-04	0.00000E+00	0.00000E+00
599	8.74607E-01	1.43667E+01	8.96558E-01	9.79873E-04	0.00000E+00	0.00000E+00
600	8.75190E-01	1.43913E+01	8.96522E-01	9.78885E-04	0.00000E+00	0.00000E+00
601	9.26165E-01	1.44142E+01	8.96571E-01	9.78502E-04	0.00000E+00	0.00000E+00
602	8.63866E-01	1.44390E+01	8.96517E-01	9.78389E-04	0.00000E+00	0.00000E+00
603	9.43383E-01	1.44627E+01	8.96595E-01	9.78688E-04	0.00000E+00	0.00000E+00
604	9.09885E-01	1.44857E+01	8.96617E-01	9.78488E-04	0.00000E+00	0.00000E+00
605	9.12432E-01	1.45103E+01	8.96643E-01	9.77216E-04	0.00000E+00	0.00000E+00
606	8.77274E-01	1.45342E+01	8.96611E-01	9.76123E-04	0.00000E+00	0.00000E+00
607	9.14951E-01	1.45570E+01	8.96641E-01	9.74980E-04	0.00000E+00	0.00000E+00
608	9.17347E-01	1.45808E+01	8.96676E-01	9.73969E-04	0.00000E+00	0.00000E+00
609	9.24481E-01	1.46037E+01	8.96721E-01	9.73442E-04	0.00000E+00	0.00000E+00
610	9.21725E-01	1.46267E+01	8.96762E-01	9.72709E-04	0.00000E+00	0.00000E+00
611	8.77816E-01	1.46503E+01	8.96731E-01	9.71609E-04	0.00000E+00	0.00000E+00
612	9.16235E-01	1.46752E+01	8.96763E-01	9.70541E-04	0.00000E+00	0.00000E+00
613	8.83370E-01	1.46988E+01	8.96741E-01	9.69199E-04	0.00000E+00	0.00000E+00
614	8.99418E-01	1.47227E+01	8.96746E-01	9.67624E-04	0.00000E+00	0.00000E+00
615	8.86865E-01	1.47465E+01	8.96730E-01	9.66179E-04	0.00000E+00	0.00000E+00
616	8.66860E-01	1.47693E+01	8.96681E-01	9.65830E-04	0.00000E+00	0.00000E+00
617	9.38340E-01	1.47932E+01	8.96749E-01	9.66635E-04	0.00000E+00	0.00000E+00
618	8.96360E-01	1.48170E+01	8.96748E-01	9.65065E-04	0.00000E+00	0.00000E+00
619	8.64843E-01	1.48408E+01	8.96696E-01	9.64886E-04	0.00000E+00	0.00000E+00
620	9.07567E-01	1.48647E+01	8.96714E-01	9.63484E-04	0.00000E+00	0.00000E+00
621	8.85979E-01	1.48875E+01	8.96697E-01	9.62082E-04	0.00000E+00	0.00000E+00
622	8.92642E-01	1.49113E+01	8.96690E-01	9.60552E-04	0.00000E+00	0.00000E+00
623	8.90951E-01	1.49342E+01	8.96681E-01	9.59048E-04	0.00000E+00	0.00000E+00
624	9.12984E-01	1.49570E+01	8.96707E-01	9.57864E-04	0.00000E+00	0.00000E+00
625	9.03836E-01	1.49808E+01	8.96719E-01	9.56393E-04	0.00000E+00	0.00000E+00
626	8.87053E-01	1.50047E+01	8.96703E-01	9.54985E-04	0.00000E+00	0.00000E+00
627	9.01798E-01	1.50275E+01	8.96711E-01	9.53491E-04	0.00000E+00	0.00000E+00
628	8.71258E-01	1.50513E+01	8.96671E-01	9.52834E-04	0.00000E+00	0.00000E+00
629	8.80493E-01	1.50742E+01	8.96645E-01	9.51663E-04	0.00000E+00	0.00000E+00
630	9.01947E-01	1.50980E+01	8.96653E-01	9.50184E-04	0.00000E+00	0.00000E+00
631	8.69068E-01	1.51227E+01	8.96609E-01	9.49685E-04	0.00000E+00	0.00000E+00
632	9.03954E-01	1.51465E+01	8.96621E-01	9.48248E-04	0.00000E+00	0.00000E+00
633	8.90630E-01	1.51703E+01	8.96612E-01	9.46792E-04	0.00000E+00	0.00000E+00
634	8.87538E-01	1.51950E+01	8.96597E-01	9.45402E-04	0.00000E+00	0.00000E+00
635	8.79876E-01	1.52188E+01	8.96571E-01	9.44277E-04	0.00000E+00	0.00000E+00
636	8.34785E-01	1.52435E+01	8.96473E-01	9.47809E-04	0.00000E+00	0.00000E+00
637	8.28974E-01	1.52683E+01	8.96367E-01	9.52267E-04	0.00000E+00	0.00000E+00
638	9.04197E-01	1.52922E+01	8.96379E-01	9.50848E-04	0.00000E+00	0.00000E+00
639	8.53858E-01	1.53158E+01	8.96313E-01	9.51699E-04	0.00000E+00	0.00000E+00
640	8.76145E-01	1.53407E+01	8.96281E-01	9.50731E-04	0.00000E+00	0.00000E+00
641	8.65992E-01	1.53645E+01	8.96234E-01	9.50425E-04	0.00000E+00	0.00000E+00
642	8.94271E-01	1.53892E+01	8.96230E-01	9.48944E-04	0.00000E+00	0.00000E+00

643	8.87355E-01	1.54130E+01	8.96217E-01	9.47563E-04	0.00000E+00	0.00000E+00
644	9.05501E-01	1.54367E+01	8.96231E-01	9.46197E-04	0.00000E+00	0.00000E+00
645	9.02579E-01	1.54605E+01	8.96241E-01	9.44776E-04	0.00000E+00	0.00000E+00
646	8.95672E-01	1.54843E+01	8.96240E-01	9.43308E-04	0.00000E+00	0.00000E+00
647	8.79846E-01	1.55072E+01	8.96215E-01	9.42187E-04	0.00000E+00	0.00000E+00
648	9.08793E-01	1.55302E+01	8.96234E-01	9.40929E-04	0.00000E+00	0.00000E+00
649	9.13886E-01	1.55538E+01	8.96261E-01	9.39870E-04	0.00000E+00	0.00000E+00
650	8.74276E-01	1.55777E+01	8.96227E-01	9.39031E-04	0.00000E+00	0.00000E+00
651	8.80085E-01	1.56015E+01	8.96203E-01	9.37913E-04	0.00000E+00	0.00000E+00
652	9.01869E-01	1.56243E+01	8.96211E-01	9.36510E-04	0.00000E+00	0.00000E+00
653	8.84645E-01	1.56482E+01	8.96194E-01	9.35239E-04	0.00000E+00	0.00000E+00
654	8.47322E-01	1.56728E+01	8.96119E-01	9.36807E-04	0.00000E+00	0.00000E+00
655	8.66875E-01	1.56967E+01	8.96074E-01	9.36443E-04	0.00000E+00	0.00000E+00
656	9.05990E-01	1.57197E+01	8.96089E-01	9.35132E-04	0.00000E+00	0.00000E+00
657	8.75003E-01	1.57433E+01	8.96057E-01	9.34259E-04	0.00000E+00	0.00000E+00
658	8.78428E-01	1.57672E+01	8.96030E-01	9.33220E-04	0.00000E+00	0.00000E+00
659	8.82439E-01	1.57920E+01	8.96009E-01	9.32028E-04	0.00000E+00	0.00000E+00
660	8.75620E-01	1.58157E+01	8.95978E-01	9.31127E-04	0.00000E+00	0.00000E+00
661	9.00068E-01	1.58405E+01	8.95984E-01	9.29733E-04	0.00000E+00	0.00000E+00
662	8.88360E-01	1.58642E+01	8.95973E-01	9.28395E-04	0.00000E+00	0.00000E+00
663	8.80138E-01	1.58890E+01	8.95949E-01	9.27299E-04	0.00000E+00	0.00000E+00
664	9.30244E-01	1.59118E+01	8.96001E-01	9.27346E-04	0.00000E+00	0.00000E+00
665	8.93375E-01	1.59347E+01	8.96004E-01	9.25953E-04	0.00000E+00	0.00000E+00
666	8.78347E-01	1.59585E+01	8.95978E-01	9.24940E-04	0.00000E+00	0.00000E+00
667	9.29099E-01	1.59813E+01	8.96028E-01	9.24890E-04	0.00000E+00	0.00000E+00
668	9.12020E-01	1.60052E+01	8.96052E-01	9.23812E-04	0.00000E+00	0.00000E+00
669	8.53710E-01	1.60300E+01	8.95988E-01	9.24608E-04	0.00000E+00	0.00000E+00
670	9.10854E-01	1.60537E+01	8.96010E-01	9.23491E-04	0.00000E+00	0.00000E+00
671	9.15832E-01	1.60775E+01	8.96040E-01	9.22585E-04	0.00000E+00	0.00000E+00
672	9.03861E-01	1.61013E+01	8.96052E-01	9.21281E-04	0.00000E+00	0.00000E+00
673	9.01234E-01	1.61260E+01	8.96059E-01	9.19940E-04	0.00000E+00	0.00000E+00
674	8.88334E-01	1.61498E+01	8.96048E-01	9.18642E-04	0.00000E+00	0.00000E+00
675	9.03907E-01	1.61745E+01	8.96060E-01	9.17350E-04	0.00000E+00	0.00000E+00
676	8.77962E-01	1.61983E+01	8.96033E-01	9.16381E-04	0.00000E+00	0.00000E+00
677	8.38561E-01	1.62240E+01	8.95948E-01	9.18975E-04	0.00000E+00	0.00000E+00
678	8.93554E-01	1.62478E+01	8.95944E-01	9.17622E-04	0.00000E+00	0.00000E+00
679	9.01517E-01	1.62707E+01	8.95952E-01	9.16302E-04	0.00000E+00	0.00000E+00
680	8.86653E-01	1.62953E+01	8.95939E-01	9.15053E-04	0.00000E+00	0.00000E+00
681	8.89348E-01	1.63192E+01	8.95929E-01	9.13756E-04	0.00000E+00	0.00000E+00
682	8.88747E-01	1.63430E+01	8.95918E-01	9.12472E-04	0.00000E+00	0.00000E+00
683	9.01776E-01	1.63668E+01	8.95927E-01	9.11172E-04	0.00000E+00	0.00000E+00
684	9.01454E-01	1.63907E+01	8.95935E-01	9.09871E-04	0.00000E+00	0.00000E+00
685	9.32153E-01	1.64143E+01	8.95988E-01	9.10084E-04	0.00000E+00	0.00000E+00
686	9.12537E-01	1.64373E+01	8.96012E-01	9.09074E-04	0.00000E+00	0.00000E+00
687	8.72577E-01	1.64620E+01	8.95978E-01	9.08391E-04	0.00000E+00	0.00000E+00
688	9.01912E-01	1.64848E+01	8.95987E-01	9.07107E-04	0.00000E+00	0.00000E+00
689	8.75728E-01	1.65097E+01	8.95957E-01	9.06265E-04	0.00000E+00	0.00000E+00
690	8.56792E-01	1.65343E+01	8.95900E-01	9.06736E-04	0.00000E+00	0.00000E+00
691	9.18720E-01	1.65582E+01	8.95933E-01	9.06024E-04	0.00000E+00	0.00000E+00
692	9.40426E-01	1.65810E+01	8.95998E-01	9.07005E-04	0.00000E+00	0.00000E+00
693	9.41321E-01	1.66038E+01	8.96035E-01	9.08064E-04	0.00000E+00	0.00000E+00
694	8.95081E-01	1.66287E+01	8.96023E-01	9.06752E-04	0.00000E+00	0.00000E+00
695	9.36425E-01	1.66515E+01	8.96120E-01	9.07314E-04	0.00000E+00	0.00000E+00
696	9.24387E-01	1.66743E+01	8.96161E-01	9.06921E-04	0.00000E+00	0.00000E+00
697	8.90040E-01	1.66973E+01	8.96152E-01	9.05657E-04	0.00000E+00	0.00000E+00
698	8.92430E-01	1.67210E+01	8.96147E-01	9.04371E-04	0.00000E+00	0.00000E+00
699	9.44390E-01	1.67430E+01	8.96216E-01	9.05721E-04	0.00000E+00	0.00000E+00
700	8.87635E-01	1.67678E+01	8.96204E-01	9.04506E-04	0.00000E+00	0.00000E+00
701	8.85004E-01	1.67915E+01	8.96188E-01	9.03354E-04	0.00000E+00	0.00000E+00
702	9.32628E-01	1.68145E+01	8.96240E-01	9.03563E-04	0.00000E+00	0.00000E+00
703	9.11362E-01	1.68365E+01	8.96261E-01	9.02531E-04	0.00000E+00	0.00000E+00
704	9.09693E-01	1.68602E+01	8.96280E-01	9.01447E-04	0.00000E+00	0.00000E+00
705	9.00177E-01	1.68832E+01	8.96286E-01	9.00181E-04	0.00000E+00	0.00000E+00
706	9.22326E-01	1.69068E+01	8.96323E-01	8.99662E-04	0.00000E+00	0.00000E+00
707	8.86457E-01	1.69317E+01	8.96309E-01	8.98494E-04	0.00000E+00	0.00000E+00
708	8.87745E-01	1.69555E+01	8.96297E-01	8.97303E-04	0.00000E+00	0.00000E+00
709	9.06482E-01	1.69792E+01	8.96311E-01	8.96148E-04	0.00000E+00	0.00000E+00
710	8.94310E-01	1.70030E+01	8.96308E-01	8.94886E-04	0.00000E+00	0.00000E+00
711	8.83311E-01	1.70277E+01	8.96290E-01	8.93811E-04	0.00000E+00	0.00000E+00
712	9.23554E-01	1.70525E+01	8.96329E-01	8.93376E-04	0.00000E+00	0.00000E+00
713	9.40958E-01	1.70753E+01	8.96391E-01	8.94325E-04	0.00000E+00	0.00000E+00
714	8.73210E-01	1.70992E+01	8.96359E-01	8.93661E-04	0.00000E+00	0.00000E+00
715	9.02008E-01	1.71230E+01	8.96367E-01	8.92442E-04	0.00000E+00	0.00000E+00
716	8.99512E-01	1.71458E+01	8.96357E-01	8.91243E-04	0.00000E+00	0.00000E+00
717	9.28365E-01	1.71697E+01	8.96402E-01	8.91118E-04	0.00000E+00	0.00000E+00
718	9.11495E-01	1.71935E+01	8.96423E-01	8.90305E-04	0.00000E+00	0.00000E+00
719	9.22444E-01	1.72172E+01	8.96459E-01	8.89620E-04	0.00000E+00	0.00000E+00
720	8.98003E-01	1.72410E+01	8.96461E-01	8.88383E-04	0.00000E+00	0.00000E+00
721	8.83291E-01	1.72648E+01	8.96443E-01	8.87336E-04	0.00000E+00	0.00000E+00
722	8.58316E-01	1.72895E+01	8.96390E-01	8.87683E-04	0.00000E+00	0.00000E+00
723	9.11684E-01	1.73143E+01	8.96411E-01	8.86705E-04	0.00000E+00	0.00000E+00
724	8.89329E-01	1.73380E+01	8.96401E-01	8.85530E-04	0.00000E+00	0.00000E+00
725	9.22633E-01	1.73618E+01	8.96437E-01	8.85028E-04	0.00000E+00	0.00000E+00
726	9.06097E-01	1.73867E+01	8.96451E-01	8.83905E-04	0.00000E+00	0.00000E+00
727	8.88787E-01	1.74095E+01	8.96440E-01	8.82749E-04	0.00000E+00	0.00000E+00
728	9.12740E-01	1.74333E+01	8.96462E-01	8.81818E-04	0.00000E+00	0.00000E+00
729	9.21494E-01	1.74570E+01	8.96497E-01	8.81277E-04	0.00000E+00	0.00000E+00
730	9.06084E-01	1.74818E+01	8.96510E-01	8.80164E-04	0.00000E+00	0.00000E+00
731	8.44856E-01	1.75075E+01	8.96439E-01	8.81807E-04	0.00000E+00	0.00000E+00
732	9.13042E-01	1.75312E+01	8.96462E-01	8.80892E-04	0.00000E+00	0.00000E+00
733	9.27032E-01	1.75550E+01	8.96504E-01	8.80680E-04	0.00000E+00	0.00000E+00
734	8.87729E-01	1.75788E+01	8.96492E-01	8.79557E-04	0.00000E+00	0.00000E+00
735	8.87608E-01	1.76027E+01	8.96480E-01	8.78440E-04	0.00000E+00	0.00000E+00
736	8.87589E-01	1.76265E+01	8.96468E-01	8.77326E-04	0.00000E+00	0.00000E+00
737	9.40468E-01	1.76502E+01	8.96527E-01	8.78175E-04	0.00000E+00	0.00000E+00
738	8.80430E-01	1.76750E+01	8.96506E-01	8.77253E-04	0.00000E+00	0.00000E+00
739	9.27698E-01	1.76988E+01	8.96548E-01	8.77084E-04	0.00000E+00	0.00000E+00
740	9.19151E-01	1.77217E+01	8.96578E-01	8.76430E-04	0.00000E+00	0.00000E+00
741	8.92995E-01	1.77455E+01	8.96574E-01	8.75257E-04	0.00000E+00	0.00000E+00
742	9.21454E-01	1.77692E+01	8.96607E-01	8.74719E-04	0.00000E+00	0.00000E+00
743	9.21646E-01	1.77930E+01	8.96641E-01	8.74192E-04	0.00000E+00	0.00000E+00
744	8.62474E-01	1.78178E+01	8.96595E-01	8.74226E-04	0.00000E+00	0.00000E+00
745	8.78658E-01	1.78415E+01	8.96571E-01	8.73382E-04	0.00000E+00	0.00000E+00
746	8.95708E-01	1.78653E+01	8.96570E-01	8.72208E-04	0.00000E+00	0.00000E+00
747	9.28713E-01	1.78892E+01	8.96613E-01	8.72105E-04	0.00000E+00	0.00000E+00
748	9.44537E-01	1.79130E+01	8.96677E-01	8.73301E-04	0.00000E+00	0.00000E+00
749	9.25454E-01	1.79368E+01	8.96716E-01	8.72982E-04	0.00000E+00	0.00000E+00
750	9.07206E-01	1.79597E+01	8.96730E-01	8.71927E-04	0.00000E+00	0.00000E+00

751	9.24168E-01	1.79835E+01	8.96766E-01	8.71532E-04	0.00000E+00	0.00000E+00
752	8.69112E-01	1.80082E+01	8.96729E-01	8.71150E-04	0.00000E+00	0.00000E+00
753	9.19546E-01	1.80310E+01	8.96760E-01	8.70519E-04	0.00000E+00	0.00000E+00
754	9.11653E-01	1.80548E+01	8.96780E-01	8.69587E-04	0.00000E+00	0.00000E+00
755	8.89243E-01	1.80795E+01	8.96770E-01	8.68489E-04	0.00000E+00	0.00000E+00
756	8.91823E-01	1.81025E+01	8.96763E-01	8.67361E-04	0.00000E+00	0.00000E+00
757	8.3349E-01	1.81272E+01	8.96688E-01	8.70210E-04	0.00000E+00	0.00000E+00
758	9.41370E-01	1.81500E+01	8.96739E-01	8.71067E-04	0.00000E+00	0.00000E+00
759	8.49148E-01	1.81738E+01	8.96676E-01	8.72184E-04	0.00000E+00	0.00000E+00
760	9.24990E-01	1.81977E+01	8.96713E-01	8.71833E-04	0.00000E+00	0.00000E+00
761	9.23285E-01	1.82205E+01	8.96748E-01	8.71387E-04	0.00000E+00	0.00000E+00
762	9.10927E-01	1.82443E+01	8.96767E-01	8.70440E-04	0.00000E+00	0.00000E+00
763	9.42739E-01	1.82672E+01	8.96827E-01	8.71392E-04	0.00000E+00	0.00000E+00
764	9.13939E-01	1.82902E+01	8.96850E-01	8.70537E-04	0.00000E+00	0.00000E+00
765	9.01541E-01	1.83148E+01	8.96856E-01	8.69417E-04	0.00000E+00	0.00000E+00
766	8.89058E-01	1.83377E+01	8.96846E-01	8.68338E-04	0.00000E+00	0.00000E+00
767	9.43874E-01	1.83615E+01	8.96907E-01	8.69379E-04	0.00000E+00	0.00000E+00
768	8.99420E-01	1.83853E+01	8.96911E-01	8.68249E-04	0.00000E+00	0.00000E+00
769	8.78321E-01	1.84092E+01	8.96886E-01	8.67455E-04	0.00000E+00	0.00000E+00
770	8.93033E-01	1.84320E+01	8.96881E-01	8.66340E-04	0.00000E+00	0.00000E+00
771	8.60661E-01	1.84577E+01	8.96834E-01	8.66493E-04	0.00000E+00	0.00000E+00
772	8.41810E-01	1.84823E+01	8.96763E-01	8.68313E-04	0.00000E+00	0.00000E+00
773	9.00824E-01	1.85052E+01	8.96768E-01	8.67202E-04	0.00000E+00	0.00000E+00
774	8.52743E-01	1.85300E+01	8.96711E-01	8.67953E-04	0.00000E+00	0.00000E+00
775	9.13975E-01	1.85547E+01	8.96733E-01	8.67117E-04	0.00000E+00	0.00000E+00
776	8.84565E-01	1.85793E+01	8.96718E-01	8.66139E-04	0.00000E+00	0.00000E+00
777	8.97693E-01	1.86042E+01	8.96719E-01	8.65022E-04	0.00000E+00	0.00000E+00
778	9.14455E-01	1.86278E+01	8.96742E-01	8.64208E-04	0.00000E+00	0.00000E+00
779	9.20641E-01	1.86508E+01	8.96772E-01	8.63643E-04	0.00000E+00	0.00000E+00
780	8.92296E-01	1.86737E+01	8.96767E-01	8.62552E-04	0.00000E+00	0.00000E+00
781	8.77353E-01	1.86963E+01	8.96742E-01	8.61804E-04	0.00000E+00	0.00000E+00
782	8.83905E-01	1.87232E+01	8.96725E-01	8.60855E-04	0.00000E+00	0.00000E+00
783	8.86227E-01	1.87468E+01	8.96712E-01	8.59857E-04	0.00000E+00	0.00000E+00
784	9.80030E-01	1.87717E+01	8.96714E-01	8.58757E-04	0.00000E+00	0.00000E+00
785	9.14458E-01	1.87945E+01	8.96736E-01	8.57960E-04	0.00000E+00	0.00000E+00
786	9.54414E-01	1.88183E+01	8.96810E-01	8.60017E-04	0.00000E+00	0.00000E+00
787	9.06428E-01	1.88422E+01	8.96822E-01	8.59009E-04	0.00000E+00	0.00000E+00
788	8.68680E-01	1.88660E+01	8.96786E-01	8.58662E-04	0.00000E+00	0.00000E+00
789	8.95655E-01	1.88897E+01	8.96785E-01	8.57571E-04	0.00000E+00	0.00000E+00
790	9.21673E-01	1.89127E+01	8.96816E-01	8.57064E-04	0.00000E+00	0.00000E+00
791	8.98787E-01	1.89373E+01	8.96819E-01	8.55981E-04	0.00000E+00	0.00000E+00
792	9.21291E-01	1.89612E+01	8.96850E-01	8.55458E-04	0.00000E+00	0.00000E+00
793	9.00681E-01	1.89850E+01	8.96855E-01	8.54390E-04	0.00000E+00	0.00000E+00
794	9.07533E-01	1.90087E+01	8.96868E-01	8.53417E-04	0.00000E+00	0.00000E+00
795	9.26335E-01	1.90325E+01	8.96905E-01	8.53149E-04	0.00000E+00	0.00000E+00
796	9.22731E-01	1.90553E+01	8.96938E-01	8.52695E-04	0.00000E+00	0.00000E+00
797	8.68620E-01	1.90802E+01	8.96902E-01	8.52366E-04	0.00000E+00	0.00000E+00
798	8.60341E-01	1.91040E+01	8.96856E-01	8.52533E-04	0.00000E+00	0.00000E+00
799	9.05900E-01	1.91268E+01	8.96868E-01	8.51538E-04	0.00000E+00	0.00000E+00
800	8.50813E-01	1.91507E+01	8.96810E-01	8.52426E-04	0.00000E+00	0.00000E+00
801	8.84755E-01	1.91743E+01	8.96795E-01	8.51492E-04	0.00000E+00	0.00000E+00
802	9.60932E-01	1.91973E+01	8.96875E-01	8.54198E-04	0.00000E+00	0.00000E+00
803	8.76828E-01	1.92212E+01	8.96850E-01	8.53498E-04	0.00000E+00	0.00000E+00
804	8.62301E-01	1.92458E+01	8.96807E-01	8.53521E-04	0.00000E+00	0.00000E+00
805	8.76213E-01	1.92705E+01	8.96781E-01	8.52843E-04	0.00000E+00	0.00000E+00
806	8.74276E-01	1.92943E+01	8.96753E-01	8.52241E-04	0.00000E+00	0.00000E+00
807	8.93648E-01	1.93182E+01	8.96749E-01	8.51191E-04	0.00000E+00	0.00000E+00
808	8.65924E-01	1.93420E+01	8.96711E-01	8.50949E-04	0.00000E+00	0.00000E+00
809	9.53415E-01	1.93648E+01	8.96780E-01	8.52737E-04	0.00000E+00	0.00000E+00
810	9.08650E-01	1.93895E+01	8.96795E-01	8.51808E-04	0.00000E+00	0.00000E+00
811	9.41810E-01	1.94115E+01	8.96851E-01	8.52572E-04	0.00000E+00	0.00000E+00
812	9.06418E-01	1.94343E+01	8.96862E-01	8.51601E-04	0.00000E+00	0.00000E+00
813	8.92819E-01	1.94582E+01	8.96857E-01	8.50564E-04	0.00000E+00	0.00000E+00
814	8.98339E-01	1.94820E+01	8.96859E-01	8.49518E-04	0.00000E+00	0.00000E+00
815	8.77347E-01	1.95058E+01	8.96835E-01	8.48812E-04	0.00000E+00	0.00000E+00
816	8.87159E-01	1.95297E+01	8.96823E-01	8.47852E-04	0.00000E+00	0.00000E+00
817	9.42640E-01	1.95525E+01	8.96880E-01	8.48675E-04	0.00000E+00	0.00000E+00
818	8.70783E-01	1.95782E+01	8.96848E-01	8.48237E-04	0.00000E+00	0.00000E+00
819	9.40829E-01	1.96010E+01	8.96901E-01	8.48907E-04	0.00000E+00	0.00000E+00
820	9.16201E-01	1.96238E+01	8.96925E-01	8.48197E-04	0.00000E+00	0.00000E+00
821	8.66118E-01	1.96487E+01	8.96887E-01	8.47995E-04	0.00000E+00	0.00000E+00
822	9.34448E-01	1.96723E+01	8.96933E-01	8.48198E-04	0.00000E+00	0.00000E+00
823	9.11216E-01	1.96962E+01	8.96951E-01	8.47343E-04	0.00000E+00	0.00000E+00
824	9.02826E-01	1.97192E+01	8.96958E-01	8.46342E-04	0.00000E+00	0.00000E+00
825	9.08861E-01	1.97420E+01	8.96972E-01	8.45437E-04	0.00000E+00	0.00000E+00
826	9.03117E-01	1.97667E+01	8.96980E-01	8.44443E-04	0.00000E+00	0.00000E+00
827	8.83126E-01	1.97905E+01	8.96963E-01	8.43586E-04	0.00000E+00	0.00000E+00
828	8.81592E-01	1.98143E+01	8.96944E-01	8.42769E-04	0.00000E+00	0.00000E+00
829	8.73749E-01	1.98363E+01	8.96916E-01	8.42217E-04	0.00000E+00	0.00000E+00
830	8.87441E-01	1.98610E+01	8.96905E-01	8.41277E-04	0.00000E+00	0.00000E+00
831	9.38631E-01	1.98848E+01	8.96955E-01	8.41768E-04	0.00000E+00	0.00000E+00
832	9.11097E-01	1.99095E+01	8.96972E-01	8.40926E-04	0.00000E+00	0.00000E+00
833	9.35022E-01	1.99323E+01	8.97018E-01	8.41160E-04	0.00000E+00	0.00000E+00
834	9.17385E-01	1.99552E+01	8.97042E-01	8.40505E-04	0.00000E+00	0.00000E+00
835	9.02165E-01	1.99790E+01	8.97049E-01	8.39518E-04	0.00000E+00	0.00000E+00
836	9.05111E-01	2.00028E+01	8.97058E-01	8.38567E-04	0.00000E+00	0.00000E+00
837	9.03150E-01	2.00277E+01	8.97066E-01	8.37593E-04	0.00000E+00	0.00000E+00
838	9.14907E-01	2.00505E+01	8.97087E-01	8.36863E-04	0.00000E+00	0.00000E+00
839	9.11821E-01	2.00733E+01	8.97104E-01	8.36048E-04	0.00000E+00	0.00000E+00
840	8.32084E-01	2.00980E+01	8.97027E-01	8.38647E-04	0.00000E+00	0.00000E+00
841	8.96703E-01	2.01228E+01	8.97026E-01	8.37647E-04	0.00000E+00	0.00000E+00
842	8.86132E-01	2.01467E+01	8.97014E-01	8.36749E-04	0.00000E+00	0.00000E+00
843	9.30081E-01	2.01703E+01	8.97053E-01	8.36678E-04	0.00000E+00	0.00000E+00
844	8.79857E-01	2.01942E+01	8.97032E-01	8.35933E-04	0.00000E+00	0.00000E+00
845	9.24139E-01	2.02180E+01	8.97065E-01	8.35560E-04	0.00000E+00	0.00000E+00
846	8.89679E-01	2.02418E+01	8.97056E-01	8.34615E-04	0.00000E+00	0.00000E+00
847	8.78686E-01	2.02657E+01	8.97034E-01	8.33911E-04	0.00000E+00	0.00000E+00
848	9.00913E-01	2.02885E+01	8.97039E-01	8.32937E-04	0.00000E+00	0.00000E+00
849	9.03616E-01	2.03123E+01	8.97046E-01	8.31989E-04	0.00000E+00	0.00000E+00
850	8.87309E-01	2.03362E+01	8.97035E-01	8.31087E-04	0.00000E+00	0.00000E+00
851	8.86621E-01	2.03608E+01	8.97023E-01	8.30198E-04	0.00000E+00	0.00000E+00
852	9.28976E-01	2.03855E+01	8.97060E-01	8.30072E-04	0.00000E+00	0.00000E+00
853	9.17824E-01	2.04093E+01	8.97085E-01	8.29455E-04	0.00000E+00	0.00000E+00
854	8.91841E-01	2.04332E+01	8.97079E-01	8.28504E-04	0.00000E+00	0.00000E+00
855	8.97408E-01	2.04570E+01	8.97079E-01	8.27532E-04	0.00000E+00	0.00000E+00
856	9.00859E-01	2.04825E+01	8.97083E-01	8.26575E-04	0.00000E+00	0.00000E+00
857	8.89706E-01	2.05055E+01	8.97075E-01	8.25652E-04	0.00000E+00	0.00000E+00
858	9.27852E-01	2.05302E+01	8.97111E-01	8.25471E-04	0.00000E+00	0.00000E+00

859	9.12221E-01	2.05540E+01	8.97128E-01	8.24695E-04	0.00000E+00	0.00000E+00
860	8.77890E-01	2.05787E+01	8.97106E-01	8.24039E-04	0.00000E+00	0.00000E+00
861	9.06913E-01	2.06025E+01	8.97117E-01	8.23158E-04	0.00000E+00	0.00000E+00
862	9.07860E-01	2.06263E+01	8.97130E-01	8.22295E-04	0.00000E+00	0.00000E+00
863	9.02653E-01	2.06500E+01	8.97136E-01	8.21365E-04	0.00000E+00	0.00000E+00
864	9.23429E-01	2.06730E+01	8.97167E-01	8.20978E-04	0.00000E+00	0.00000E+00
865	9.04582E-01	2.06958E+01	8.97175E-01	8.20071E-04	0.00000E+00	0.00000E+00
866	8.95726E-01	2.07205E+01	8.97174E-01	8.19123E-04	0.00000E+00	0.00000E+00
867	9.08764E-01	2.07443E+01	8.97187E-01	8.18285E-04	0.00000E+00	0.00000E+00
868	8.87258E-01	2.07682E+01	8.97176E-01	8.17420E-04	0.00000E+00	0.00000E+00
869	8.66767E-01	2.07920E+01	8.97140E-01	8.17230E-04	0.00000E+00	0.00000E+00
870	9.38072E-01	2.08140E+01	8.97188E-01	8.17649E-04	0.00000E+00	0.00000E+00
871	8.62568E-01	2.08377E+01	8.97148E-01	8.17679E-04	0.00000E+00	0.00000E+00
872	9.20281E-01	2.08615E+01	8.97174E-01	8.17171E-04	0.00000E+00	0.00000E+00
873	9.34936E-01	2.08853E+01	8.97218E-01	8.17383E-04	0.00000E+00	0.00000E+00
874	9.13250E-01	2.09092E+01	8.97236E-01	8.16652E-04	0.00000E+00	0.00000E+00
875	8.47220E-01	2.09338E+01	8.97179E-01	8.17725E-04	0.00000E+00	0.00000E+00
876	8.80179E-01	2.09585E+01	8.97159E-01	8.17021E-04	0.00000E+00	0.00000E+00
877	8.80312E-01	2.09833E+01	8.97140E-01	8.16313E-04	0.00000E+00	0.00000E+00
878	9.40622E-01	2.10062E+01	8.97190E-01	8.16891E-04	0.00000E+00	0.00000E+00
879	8.53698E-01	2.10308E+01	8.97140E-01	8.17464E-04	0.00000E+00	0.00000E+00
880	8.85290E-01	2.10557E+01	8.97127E-01	8.16644E-04	0.00000E+00	0.00000E+00
881	8.62659E-01	2.10803E+01	8.97087E-01	8.16657E-04	0.00000E+00	0.00000E+00
882	8.77399E-01	2.11050E+01	8.97065E-01	8.16035E-04	0.00000E+00	0.00000E+00
883	8.96399E-01	2.11298E+01	8.97064E-01	8.15108E-04	0.00000E+00	0.00000E+00
884	8.85206E-01	2.11545E+01	8.97051E-01	8.14295E-04	0.00000E+00	0.00000E+00
885	9.08646E-01	2.11783E+01	8.97064E-01	8.13478E-04	0.00000E+00	0.00000E+00
886	9.08222E-01	2.12012E+01	8.97077E-01	8.12655E-04	0.00000E+00	0.00000E+00
887	9.04370E-01	2.12258E+01	8.97085E-01	8.11778E-04	0.00000E+00	0.00000E+00
888	8.91415E-01	2.12507E+01	8.97078E-01	8.10887E-04	0.00000E+00	0.00000E+00
889	8.79315E-01	2.12753E+01	8.97058E-01	8.10220E-04	0.00000E+00	0.00000E+00
890	9.09294E-01	2.12992E+01	8.97072E-01	8.09424E-04	0.00000E+00	0.00000E+00
891	9.35346E-01	2.13220E+01	8.97115E-01	8.09658E-04	0.00000E+00	0.00000E+00
892	8.63768E-01	2.13467E+01	8.97078E-01	8.09616E-04	0.00000E+00	0.00000E+00
893	8.79302E-01	2.13715E+01	8.97058E-01	8.08952E-04	0.00000E+00	0.00000E+00
894	8.56139E-01	2.13952E+01	8.97012E-01	8.09346E-04	0.00000E+00	0.00000E+00
895	8.47750E-01	2.14200E+01	8.96957E-01	8.10319E-04	0.00000E+00	0.00000E+00
896	8.89862E-01	2.14438E+01	8.96949E-01	8.09451E-04	0.00000E+00	0.00000E+00
897	8.60465E-01	2.14685E+01	8.96908E-01	8.09573E-04	0.00000E+00	0.00000E+00
898	9.24712E-01	2.14923E+01	8.96939E-01	8.09264E-04	0.00000E+00	0.00000E+00
899	8.65832E-01	2.15160E+01	8.96904E-01	8.09105E-04	0.00000E+00	0.00000E+00
900	8.92025E-01	2.15398E+01	8.96899E-01	8.08222E-04	0.00000E+00	0.00000E+00
901	8.90804E-01	2.15647E+01	8.96892E-01	8.07351E-04	0.00000E+00	0.00000E+00
902	9.21082E-01	2.15875E+01	8.96919E-01	8.06901E-04	0.00000E+00	0.00000E+00
903	8.89179E-01	2.16113E+01	8.96911E-01	8.06051E-04	0.00000E+00	0.00000E+00
904	9.00549E-01	2.16360E+01	8.96915E-01	8.05167E-04	0.00000E+00	0.00000E+00
905	8.83174E-01	2.16598E+01	8.96899E-01	8.04419E-04	0.00000E+00	0.00000E+00
906	8.83253E-01	2.16837E+01	8.96884E-01	8.03670E-04	0.00000E+00	0.00000E+00
907	8.29947E-01	2.17083E+01	8.96810E-01	8.06182E-04	0.00000E+00	0.00000E+00
908	8.53567E-01	2.17322E+01	8.96763E-01	8.06705E-04	0.00000E+00	0.00000E+00
909	8.97252E-01	2.17558E+01	8.96803E-01	8.06844E-04	0.00000E+00	0.00000E+00
910	9.07859E-01	2.17797E+01	8.96816E-01	8.06047E-04	0.00000E+00	0.00000E+00
911	8.69146E-01	2.18045E+01	8.96785E-01	8.05735E-04	0.00000E+00	0.00000E+00
912	9.33907E-01	2.18282E+01	8.96826E-01	8.05883E-04	0.00000E+00	0.00000E+00
913	8.68292E-01	2.18512E+01	8.96795E-01	8.05607E-04	0.00000E+00	0.00000E+00
914	8.88328E-01	2.18758E+01	8.96785E-01	8.04776E-04	0.00000E+00	0.00000E+00
915	9.14710E-01	2.18997E+01	8.96805E-01	8.04134E-04	0.00000E+00	0.00000E+00
916	8.92708E-01	2.19225E+01	8.96800E-01	8.03266E-04	0.00000E+00	0.00000E+00
917	8.72728E-01	2.19472E+01	8.96774E-01	8.02819E-04	0.00000E+00	0.00000E+00
918	9.03811E-01	2.19702E+01	8.96782E-01	8.01979E-04	0.00000E+00	0.00000E+00
919	8.74917E-01	2.19948E+01	8.96758E-01	8.01459E-04	0.00000E+00	0.00000E+00
920	8.66324E-01	2.20195E+01	8.96725E-01	8.01271E-04	0.00000E+00	0.00000E+00
921	8.83617E-01	2.20443E+01	8.96711E-01	8.00526E-04	0.00000E+00	0.00000E+00
922	9.22406E-01	2.20672E+01	8.96738E-01	8.00143E-04	0.00000E+00	0.00000E+00
923	8.66842E-01	2.20918E+01	8.96706E-01	7.99933E-04	0.00000E+00	0.00000E+00
924	8.89395E-01	2.21157E+01	8.96698E-01	7.99104E-04	0.00000E+00	0.00000E+00
925	8.36655E-01	2.21395E+01	8.96633E-01	8.00884E-04	0.00000E+00	0.00000E+00
926	8.95882E-01	2.21652E+01	8.96632E-01	8.00017E-04	0.00000E+00	0.00000E+00
927	8.56521E-01	2.21898E+01	8.96589E-01	8.00327E-04	0.00000E+00	0.00000E+00
928	8.76121E-01	2.22145E+01	8.96567E-01	7.99768E-04	0.00000E+00	0.00000E+00
929	8.49620E-01	2.22383E+01	8.96516E-01	8.00509E-04	0.00000E+00	0.00000E+00
930	8.52140E-01	2.22630E+01	8.96468E-01	8.01074E-04	0.00000E+00	0.00000E+00
931	9.00874E-01	2.22878E+01	8.96473E-01	8.00225E-04	0.00000E+00	0.00000E+00
932	9.05055E-01	2.23115E+01	8.96482E-01	7.99418E-04	0.00000E+00	0.00000E+00
933	9.16334E-01	2.23353E+01	8.96504E-01	7.98843E-04	0.00000E+00	0.00000E+00
934	8.26662E-01	2.23602E+01	8.96429E-01	8.01496E-04	0.00000E+00	0.00000E+00
935	8.64593E-01	2.23848E+01	8.96395E-01	8.01364E-04	0.00000E+00	0.00000E+00
936	8.73175E-01	2.24095E+01	8.96370E-01	8.00891E-04	0.00000E+00	0.00000E+00
937	8.66541E-01	2.24342E+01	8.96338E-01	8.00670E-04	0.00000E+00	0.00000E+00
938	8.98576E-01	2.24572E+01	8.96340E-01	7.99818E-04	0.00000E+00	0.00000E+00
939	8.94220E-01	2.24810E+01	8.96338E-01	7.98967E-04	0.00000E+00	0.00000E+00
940	9.23132E-01	2.25047E+01	8.96366E-01	7.98626E-04	0.00000E+00	0.00000E+00
941	8.92493E-01	2.25285E+01	8.96362E-01	7.97785E-04	0.00000E+00	0.00000E+00
942	8.71159E-01	2.25523E+01	8.96335E-01	7.97387E-04	0.00000E+00	0.00000E+00
943	9.16876E-01	2.25762E+01	8.96357E-01	7.96838E-04	0.00000E+00	0.00000E+00
944	8.93818E-01	2.26000E+01	8.96355E-01	7.95996E-04	0.00000E+00	0.00000E+00
945	9.11905E-01	2.26237E+01	8.96371E-01	7.95323E-04	0.00000E+00	0.00000E+00
946	8.74771E-01	2.26485E+01	8.96348E-01	7.94809E-04	0.00000E+00	0.00000E+00
947	9.16302E-01	2.26713E+01	8.96369E-01	7.94249E-04	0.00000E+00	0.00000E+00
948	8.71349E-01	2.26952E+01	8.96343E-01	7.93849E-04	0.00000E+00	0.00000E+00
949	8.56971E-01	2.27180E+01	8.96301E-01	7.94100E-04	0.00000E+00	0.00000E+00
950	8.88669E-01	2.27418E+01	8.96293E-01	7.93302E-04	0.00000E+00	0.00000E+00
951	8.90950E-01	2.27657E+01	8.96288E-01	7.92486E-04	0.00000E+00	0.00000E+00
952	9.28767E-01	2.27895E+01	8.96322E-01	7.92389E-04	0.00000E+00	0.00000E+00
953	8.58953E-01	2.28132E+01	8.96283E-01	7.92530E-04	0.00000E+00	0.00000E+00
954	9.59375E-01	2.28370E+01	8.96349E-01	7.94466E-04	0.00000E+00	0.00000E+00
955	8.57345E-01	2.28608E+01	8.96308E-01	7.94687E-04	0.00000E+00	0.00000E+00
956	9.13339E-01	2.28837E+01	8.96326E-01	7.94054E-04	0.00000E+00	0.00000E+00
957	9.04645E-01	2.29075E+01	8.96334E-01	7.93270E-04	0.00000E+00	0.00000E+00
958	9.21641E-01	2.29313E+01	8.96361E-01	7.92882E-04	0.00000E+00	0.00000E+00
959	8.77621E-01	2.29552E+01	8.96341E-01	7.92295E-04	0.00000E+00	0.00000E+00
960	9.04417E-01	2.29798E+01	8.96350E-01	7.91512E-04	0.00000E+00	0.00000E+00
961	8.91568E-01	2.30045E+01	8.96345E-01	7.90702E-04	0.00000E+00	0.00000E+00
962	9.21566E-01	2.30283E+01	8.96371E-01	7.90315E-04	0.00000E+00	0.00000E+00
963	8.82102E-01	2.30530E+01	8.96356E-01	7.89632E-04	0.00000E+00	0.00000E+00
964	8.66841E-01	2.30778E+01	8.96326E-01	7.89407E-04	0.00000E+00	0.00000E+00
965	9.07051E-01	2.31025E+01	8.96337E-01	7.88666E-04	0.00000E+00	0.00000E+00
966	9.17604E-01	2.31272E+01	8.96359E-01	7.88156E-04	0.00000E+00	0.00000E+00



967	8.55027E-01	2.31520E+01	8.96316E-01	7.88503E-04	0.00000E+00	0.00000E+00
968	8.85794E-01	2.31757E+01	8.96305E-01	7.87761E-04	0.00000E+00	0.00000E+00
969	8.90583E-01	2.31995E+01	8.96299E-01	7.86969E-04	0.00000E+00	0.00000E+00
970	8.84951E-01	2.32225E+01	8.96287E-01	7.86243E-04	0.00000E+00	0.00000E+00
971	8.98120E-01	2.32462E+01	8.96289E-01	7.85433E-04	0.00000E+00	0.00000E+00
972	9.26559E-01	2.32692E+01	8.96320E-01	7.85243E-04	0.00000E+00	0.00000E+00
973	8.53054E-01	2.32928E+01	8.96276E-01	7.85639E-04	0.00000E+00	0.00000E+00
974	8.45272E-01	2.33185E+01	8.96223E-01	7.86647E-04	0.00000E+00	0.00000E+00
975	8.92275E-01	2.33423E+01	8.96219E-01	7.85848E-04	0.00000E+00	0.00000E+00
976	8.96983E-01	2.33652E+01	8.96220E-01	7.85041E-04	0.00000E+00	0.00000E+00
977	9.23888E-01	2.33900E+01	8.96248E-01	7.84749E-04	0.00000E+00	0.00000E+00
978	9.03130E-01	2.34128E+01	8.96256E-01	7.83976E-04	0.00000E+00	0.00000E+00
979	8.89610E-01	2.34367E+01	8.96249E-01	7.83203E-04	0.00000E+00	0.00000E+00
980	9.08651E-01	2.34605E+01	8.96261E-01	7.82505E-04	0.00000E+00	0.00000E+00
981	9.23001E-01	2.34852E+01	8.96289E-01	7.82182E-04	0.00000E+00	0.00000E+00
982	9.34685E-01	2.35090E+01	8.96328E-01	7.82365E-04	0.00000E+00	0.00000E+00
983	8.80812E-01	2.35328E+01	8.96312E-01	7.81727E-04	0.00000E+00	0.00000E+00
984	8.90980E-01	2.35577E+01	8.96307E-01	7.80950E-04	0.00000E+00	0.00000E+00
985	8.89848E-01	2.35803E+01	8.96300E-01	7.80182E-04	0.00000E+00	0.00000E+00
986	9.14138E-01	2.36032E+01	8.96318E-01	7.79600E-04	0.00000E+00	0.00000E+00
987	9.17277E-01	2.36280E+01	8.96339E-01	7.79099E-04	0.00000E+00	0.00000E+00
988	9.20812E-01	2.36508E+01	8.96364E-01	7.78704E-04	0.00000E+00	0.00000E+00
989	8.90277E-01	2.36755E+01	8.96358E-01	7.77939E-04	0.00000E+00	0.00000E+00
990	8.61549E-01	2.36993E+01	8.96323E-01	7.77949E-04	0.00000E+00	0.00000E+00
991	9.06464E-01	2.37222E+01	8.96333E-01	7.77230E-04	0.00000E+00	0.00000E+00
992	8.76428E-01	2.37460E+01	8.96313E-01	7.76705E-04	0.00000E+00	0.00000E+00
993	8.98159E-01	2.37708E+01	8.96315E-01	7.75923E-04	0.00000E+00	0.00000E+00
994	8.77262E-01	2.37937E+01	8.96296E-01	7.75378E-04	0.00000E+00	0.00000E+00
995	8.86444E-01	2.38193E+01	8.96286E-01	7.74660E-04	0.00000E+00	0.00000E+00
996	9.29766E-01	2.38422E+01	8.96319E-01	7.74613E-04	0.00000E+00	0.00000E+00
997	9.17535E-01	2.38642E+01	8.96341E-01	7.74128E-04	0.00000E+00	0.00000E+00
998	9.15832E-01	2.38870E+01	8.96360E-01	7.73598E-04	0.00000E+00	0.00000E+00
999	9.35707E-01	2.39108E+01	8.96400E-01	7.73029E-04	0.00000E+00	0.00000E+00
1000	8.61549E-01	2.39337E+01	8.96369E-01	7.72687E-04	0.00000E+00	0.00000E+00
1001	8.84044E-01	2.39567E+01	8.96356E-01	7.73010E-04	0.00000E+00	0.00000E+00
1002	8.68562E-01	2.39813E+01	8.96328E-01	7.72737E-04	0.00000E+00	0.00000E+00
1003	8.88865E-01	2.40052E+01	8.96321E-01	7.72001E-04	0.00000E+00	0.00000E+00
1004	8.80088E-01	2.40288E+01	8.96305E-01	7.71400E-04	0.00000E+00	0.00000E+00
1005	8.86939E-01	2.40527E+01	8.96295E-01	7.70687E-04	0.00000E+00	0.00000E+00
1006	9.02762E-01	2.40765E+01	8.96302E-01	7.69946E-04	0.00000E+00	0.00000E+00
1007	8.64564E-01	2.41012E+01	8.96270E-01	7.69827E-04	0.00000E+00	0.00000E+00
1008	9.00696E-01	2.41250E+01	8.96275E-01	7.69074E-04	0.00000E+00	0.00000E+00
1009	9.00350E-01	2.41497E+01	8.96279E-01	7.68321E-04	0.00000E+00	0.00000E+00
1010	9.00566E-01	2.41735E+01	8.96283E-01	7.67570E-04	0.00000E+00	0.00000E+00
1011	8.91664E-01	2.41973E+01	8.96278E-01	7.66823E-04	0.00000E+00	0.00000E+00
1012	8.97271E-01	2.42230E+01	8.96279E-01	7.66064E-04	0.00000E+00	0.00000E+00
1013	9.16475E-01	2.42458E+01	8.96299E-01	7.65566E-04	0.00000E+00	0.00000E+00
1014	8.97566E-01	2.42707E+01	8.96301E-01	7.64810E-04	0.00000E+00	0.00000E+00
1015	8.86673E-01	2.42943E+01	8.96291E-01	7.64114E-04	0.00000E+00	0.00000E+00
1016	8.87857E-01	2.43173E+01	8.96283E-01	7.63406E-04	0.00000E+00	0.00000E+00
1017	9.22095E-01	2.43410E+01	8.96308E-01	7.63077E-04	0.00000E+00	0.00000E+00
1018	9.01253E-01	2.43648E+01	8.96313E-01	7.62341E-04	0.00000E+00	0.00000E+00
1019	9.23257E-01	2.43897E+01	8.96340E-01	7.62052E-04	0.00000E+00	0.00000E+00
1020	8.96923E-01	2.44125E+01	8.96340E-01	7.61303E-04	0.00000E+00	0.00000E+00
1021	8.97407E-01	2.44363E+01	8.96341E-01	7.60556E-04	0.00000E+00	0.00000E+00
1022	9.07315E-01	2.44592E+01	8.96352E-01	7.59886E-04	0.00000E+00	0.00000E+00
1023	8.95572E-01	2.44838E+01	8.96351E-01	7.59142E-04	0.00000E+00	0.00000E+00
1024	9.07718E-01	2.45087E+01	8.96362E-01	7.58481E-04	0.00000E+00	0.00000E+00
1025	9.02544E-01	2.45332E+01	8.96362E-01	7.57763E-04	0.00000E+00	0.00000E+00
1026	8.94517E-01	2.45553E+01	8.96367E-01	7.57025E-04	0.00000E+00	0.00000E+00
1027	8.87744E-01	2.45800E+01	8.96358E-01	7.56332E-04	0.00000E+00	0.00000E+00
1028	8.91779E-01	2.46038E+01	8.96354E-01	7.55608E-04	0.00000E+00	0.00000E+00
1029	8.81953E-01	2.46277E+01	8.96340E-01	7.55002E-04	0.00000E+00	0.00000E+00
1030	8.91379E-01	2.46523E+01	8.96335E-01	7.54283E-04	0.00000E+00	0.00000E+00
1031	8.97679E-01	2.46762E+01	8.96336E-01	7.53551E-04	0.00000E+00	0.00000E+00
1032	8.77777E-01	2.47000E+01	8.96318E-01	7.53034E-04	0.00000E+00	0.00000E+00
1033	8.83846E-01	2.47247E+01	8.96306E-01	7.52401E-04	0.00000E+00	0.00000E+00
1034	8.79761E-01	2.47475E+01	8.96290E-01	7.51842E-04	0.00000E+00	0.00000E+00
1035	8.97991E-01	2.47713E+01	8.96292E-01	7.51116E-04	0.00000E+00	0.00000E+00
1036	8.89629E-01	2.47952E+01	8.96285E-01	7.50417E-04	0.00000E+00	0.00000E+00
1037	8.66763E-01	2.48180E+01	8.96257E-01	7.50234E-04	0.00000E+00	0.00000E+00
1038	8.84214E-01	2.48437E+01	8.96245E-01	7.49600E-04	0.00000E+00	0.00000E+00
1039	9.15908E-01	2.48683E+01	8.96264E-01	7.49116E-04	0.00000E+00	0.00000E+00
1040	9.21075E-01	2.48922E+01	8.96288E-01	7.48776E-04	0.00000E+00	0.00000E+00
1041	8.55317E-01	2.49168E+01	8.96248E-01	7.49094E-04	0.00000E+00	0.00000E+00
1042	8.96144E-01	2.49407E+01	8.96248E-01	7.48373E-04	0.00000E+00	0.00000E+00
1043	9.08740E-01	2.49645E+01	8.96260E-01	7.47750E-04	0.00000E+00	0.00000E+00
1044	8.51237E-01	2.49883E+01	8.96217E-01	7.48281E-04	0.00000E+00	0.00000E+00
1045	8.96748E-01	2.50130E+01	8.96218E-01	7.47563E-04	0.00000E+00	0.00000E+00
1046	8.54888E-01	2.50377E+01	8.96178E-01	7.47895E-04	0.00000E+00	0.00000E+00
1047	8.85638E-01	2.50625E+01	8.96168E-01	7.47247E-04	0.00000E+00	0.00000E+00
1048	8.88498E-01	2.50872E+01	8.96161E-01	7.46568E-04	0.00000E+00	0.00000E+00
1049	9.04067E-01	2.51118E+01	8.96168E-01	7.45893E-04	0.00000E+00	0.00000E+00
1050	8.65492E-01	2.51365E+01	8.96139E-01	7.45756E-04	0.00000E+00	0.00000E+00
1051	8.89499E-01	2.51595E+01	8.96133E-01	7.45071E-04	0.00000E+00	0.00000E+00
1052	8.95148E-01	2.51833E+01	8.96132E-01	7.44362E-04	0.00000E+00	0.00000E+00
1053	9.21011E-01	2.52070E+01	8.96155E-01	7.44030E-04	0.00000E+00	0.00000E+00
1054	8.79649E-01	2.52300E+01	8.96140E-01	7.43488E-04	0.00000E+00	0.00000E+00
1055	8.94670E-01	2.52538E+01	8.96138E-01	7.42783E-04	0.00000E+00	0.00000E+00
1056	9.09842E-01	2.52775E+01	8.96151E-01	7.42192E-04	0.00000E+00	0.00000E+00
1057	9.12909E-01	2.53023E+01	8.96167E-01	7.41658E-04	0.00000E+00	0.00000E+00
1058	9.31263E-01	2.53242E+01	8.96200E-01	7.41701E-04	0.00000E+00	0.00000E+00
1059	9.05228E-01	2.53480E+01	8.96209E-01	7.41048E-04	0.00000E+00	0.00000E+00
1060	9.40802E-01	2.53710E+01	8.96251E-01	7.41546E-04	0.00000E+00	0.00000E+00
1061	8.74881E-01	2.53947E+01	8.96231E-01	7.41120E-04	0.00000E+00	0.00000E+00
1062	9.05751E-01	2.54177E+01	8.96240E-01	7.40475E-04	0.00000E+00	0.00000E+00
1063	8.88956E-01	2.54413E+01	8.96233E-01	7.39809E-04	0.00000E+00	0.00000E+00
1064	9.42077E-01	2.54643E+01	8.96276E-01	7.40371E-04	0.00000E+00	0.00000E+00
1065	9.24862E-01	2.54882E+01	8.96303E-01	7.40163E-04	0.00000E+00	0.00000E+00
1066	8.55677E-01	2.55118E+01	8.96265E-01	7.40452E-04	0.00000E+00	0.00000E+00
1067	8.85195E-01	2.55357E+01	8.96254E-01	7.39830E-04	0.00000E+00	0.00000E+00
1068	8.49246E-01	2.55595E+01	8.96210E-01	7.40450E-04	0.00000E+00	0.00000E+00
1069	8.85453E-01	2.55842E+01	8.96200E-01	7.39824E-04	0.00000E+00	0.00000E+00
1070	8.44268E-01	2.56080E+01	8.96152E-01	7.40735E-04	0.00000E+00	0.00000E+00
1071	9.04609E-01	2.56327E+01	8.96159E-01	7.40084E-04	0.00000E+00	0.00000E+00
1072	8.84240E-01	2.56565E+01	8.96148E-01	7.39476E-04	0.00000E+00	0.00000E+00
1073	8.44388E-01	2.56803E+01	8.96100E-01	7.40364E-04	0.00000E+00	0.00000E+00
1074	8.84394E-01	2.57042E+01	8.96089E-01	7.39754E-04	0.00000E+00	0.00000E+00

1075	8.84275E-01	2.57280E+01	8.96078E-01	7.39146E-04	0.00000E+00	0.00000E+00
1076	8.82604E-01	2.57527E+01	8.96066E-01	7.38564E-04	0.00000E+00	0.00000E+00
1077	9.01255E-01	2.57755E+01	8.96070E-01	7.37892E-04	0.00000E+00	0.00000E+00
1078	9.15737E-01	2.57993E+01	8.96089E-01	7.37433E-04	0.00000E+00	0.00000E+00
1079	8.98836E-01	2.58232E+01	8.96091E-01	7.36752E-04	0.00000E+00	0.00000E+00
1080	8.66644E-01	2.58478E+01	8.96064E-01	7.36575E-04	0.00000E+00	0.00000E+00
1081	8.58190E-01	2.58725E+01	8.96029E-01	7.36729E-04	0.00000E+00	0.00000E+00
1082	8.92714E-01	2.58973E+01	8.96026E-01	7.36053E-04	0.00000E+00	0.00000E+00
1083	8.54882E-01	2.59212E+01	8.95988E-01	7.36356E-04	0.00000E+00	0.00000E+00
1084	9.02746E-01	2.59448E+01	8.95994E-01	7.35702E-04	0.00000E+00	0.00000E+00
1085	9.08642E-01	2.59678E+01	8.96006E-01	7.35115E-04	0.00000E+00	0.00000E+00
1086	8.88831E-01	2.59917E+01	8.95999E-01	7.34466E-04	0.00000E+00	0.00000E+00
1087	9.28360E-01	2.60145E+01	8.96029E-01	7.34395E-04	0.00000E+00	0.00000E+00
1088	8.89307E-01	2.60392E+01	8.96023E-01	7.33744E-04	0.00000E+00	0.00000E+00
1089	9.13454E-01	2.60630E+01	8.96039E-01	7.33244E-04	0.00000E+00	0.00000E+00
1090	9.16673E-01	2.60868E+01	8.96058E-01	7.32816E-04	0.00000E+00	0.00000E+00
1091	8.74491E-01	2.61097E+01	8.96038E-01	7.32410E-04	0.00000E+00	0.00000E+00
1092	9.01690E-01	2.61335E+01	8.96043E-01	7.31756E-04	0.00000E+00	0.00000E+00
1093	8.46123E-01	2.61582E+01	8.95997E-01	7.32516E-04	0.00000E+00	0.00000E+00
1094	9.08212E-01	2.61820E+01	8.96008E-01	7.31930E-04	0.00000E+00	0.00000E+00
1095	8.98488E-01	2.62058E+01	8.96011E-01	7.31264E-04	0.00000E+00	0.00000E+00
1096	9.09170E-01	2.62287E+01	8.96023E-01	7.30694E-04	0.00000E+00	0.00000E+00
1097	8.60699E-01	2.62533E+01	8.96018E-01	7.30042E-04	0.00000E+00	0.00000E+00
1098	8.31684E-01	2.62763E+01	8.96005E-01	7.29493E-04	0.00000E+00	0.00000E+00
1099	8.94330E-01	2.63010E+01	8.96003E-01	7.28830E-04	0.00000E+00	0.00000E+00
1100	8.61453E-01	2.63257E+01	8.95972E-01	7.28845E-04	0.00000E+00	0.00000E+00
1101	8.77511E-01	2.63495E+01	8.95955E-01	7.28375E-04	0.00000E+00	0.00000E+00
1102	8.96574E-01	2.63733E+01	8.95956E-01	7.27713E-04	0.00000E+00	0.00000E+00
1103	8.74184E-01	2.63980E+01	8.95936E-01	7.27321E-04	0.00000E+00	0.00000E+00
1104	8.78485E-01	2.64218E+01	8.95920E-01	7.26833E-04	0.00000E+00	0.00000E+00
1105	9.01330E-01	2.64465E+01	8.95925E-01	7.26190E-04	0.00000E+00	0.00000E+00
1106	9.34887E-01	2.64703E+01	8.95960E-01	7.26390E-04	0.00000E+00	0.00000E+00
1107	8.93618E-01	2.64942E+01	8.95958E-01	7.25735E-04	0.00000E+00	0.00000E+00
1108	9.02750E-01	2.65170E+01	8.95964E-01	7.25105E-04	0.00000E+00	0.00000E+00
1109	9.18999E-01	2.65408E+01	8.95985E-01	7.24748E-04	0.00000E+00	0.00000E+00
1110	8.98118E-01	2.65637E+01	8.95987E-01	7.24097E-04	0.00000E+00	0.00000E+00
1111	8.98897E-01	2.65875E+01	8.95989E-01	7.23448E-04	0.00000E+00	0.00000E+00
1112	9.08947E-01	2.66113E+01	8.96001E-01	7.22890E-04	0.00000E+00	0.00000E+00
1113	9.26974E-01	2.66352E+01	8.96029E-01	7.22777E-04	0.00000E+00	0.00000E+00
1114	8.71905E-01	2.66590E+01	8.96007E-01	7.22453E-04	0.00000E+00	0.00000E+00
1115	8.96963E-01	2.66827E+01	8.96008E-01	7.21804E-04	0.00000E+00	0.00000E+00
1116	8.71165E-01	2.67057E+01	8.95986E-01	7.21500E-04	0.00000E+00	0.00000E+00
1117	8.90311E-01	2.67295E+01	8.95981E-01	7.20871E-04	0.00000E+00	0.00000E+00
1118	8.99518E-01	2.67542E+01	8.95984E-01	7.20232E-04	0.00000E+00	0.00000E+00
1119	8.91354E-01	2.67780E+01	8.95980E-01	7.19599E-04	0.00000E+00	0.00000E+00
1120	9.17347E-01	2.68017E+01	8.95999E-01	7.19209E-04	0.00000E+00	0.00000E+00
1121	8.77721E-01	2.68255E+01	8.95983E-01	7.18751E-04	0.00000E+00	0.00000E+00
1122	9.00307E-01	2.68485E+01	8.95986E-01	7.18120E-04	0.00000E+00	0.00000E+00
1123	8.60885E-01	2.68713E+01	8.95962E-01	7.17880E-04	0.00000E+00	0.00000E+00
1124	8.69200E-01	2.68952E+01	8.95939E-01	7.17636E-04	0.00000E+00	0.00000E+00
1125	9.31893E-01	2.69180E+01	8.95971E-01	7.17711E-04	0.00000E+00	0.00000E+00
1126	9.03385E-01	2.69427E+01	8.95977E-01	7.17103E-04	0.00000E+00	0.00000E+00
1127	8.59036E-01	2.69665E+01	8.95944E-01	7.17217E-04	0.00000E+00	0.00000E+00
1128	9.04152E-01	2.69903E+01	8.95952E-01	7.16617E-04	0.00000E+00	0.00000E+00
1129	9.12474E-01	2.70132E+01	8.95966E-01	7.16131E-04	0.00000E+00	0.00000E+00
1130	8.60995E-01	2.70378E+01	8.95935E-01	7.16167E-04	0.00000E+00	0.00000E+00
1131	8.71672E-01	2.70627E+01	8.95914E-01	7.15855E-04	0.00000E+00	0.00000E+00
1132	9.26681E-01	2.70865E+01	8.95941E-01	7.15740E-04	0.00000E+00	0.00000E+00
1133	8.94016E-01	2.71102E+01	8.95939E-01	7.15109E-04	0.00000E+00	0.00000E+00
1134	8.93460E-01	2.71350E+01	8.95937E-01	7.14480E-04	0.00000E+00	0.00000E+00
1135	9.08239E-01	2.71578E+01	8.95948E-01	7.13932E-04	0.00000E+00	0.00000E+00
1136	8.62759E-01	2.71825E+01	8.95919E-01	7.13902E-04	0.00000E+00	0.00000E+00
1137	8.77150E-01	2.72063E+01	8.95902E-01	7.13464E-04	0.00000E+00	0.00000E+00
1138	9.16201E-01	2.72302E+01	8.95920E-01	7.13060E-04	0.00000E+00	0.00000E+00
1139	9.28077E-01	2.72522E+01	8.95948E-01	7.12994E-04	0.00000E+00	0.00000E+00
1140	9.15754E-01	2.72768E+01	8.95966E-01	7.12579E-04	0.00000E+00	0.00000E+00
1141	8.83411E-01	2.72997E+01	8.95955E-01	7.12039E-04	0.00000E+00	0.00000E+00
1142	8.69228E-01	2.73263E+01	8.95931E-01	7.11800E-04	0.00000E+00	0.00000E+00
1143	8.85366E-01	2.73492E+01	8.95922E-01	7.11236E-04	0.00000E+00	0.00000E+00
1144	8.86207E-01	2.73738E+01	8.95914E-01	7.10664E-04	0.00000E+00	0.00000E+00
1145	9.06083E-01	2.73968E+01	8.95922E-01	7.10098E-04	0.00000E+00	0.00000E+00
1146	8.85198E-01	2.74215E+01	8.95913E-01	7.09539E-04	0.00000E+00	0.00000E+00
1147	9.09287E-01	2.74443E+01	8.95925E-01	7.09015E-04	0.00000E+00	0.00000E+00
1148	9.23632E-01	2.74682E+01	8.95949E-01	7.08809E-04	0.00000E+00	0.00000E+00
1149	9.00286E-01	2.74920E+01	8.95953E-01	7.08200E-04	0.00000E+00	0.00000E+00
1150	8.69474E-01	2.75167E+01	8.95930E-01	7.07852E-04	0.00000E+00	0.00000E+00
1151	8.50941E-01	2.75395E+01	8.95891E-01	7.08426E-04	0.00000E+00	0.00000E+00
1152	8.59734E-01	2.75652E+01	8.95859E-01	7.08507E-04	0.00000E+00	0.00000E+00
1153	8.87615E-01	2.75890E+01	8.95852E-01	7.07928E-04	0.00000E+00	0.00000E+00
1154	8.40925E-01	2.76128E+01	8.95804E-01	7.08918E-04	0.00000E+00	0.00000E+00
1155	8.68554E-01	2.76367E+01	8.95781E-01	7.08697E-04	0.00000E+00	0.00000E+00
1156	9.28105E-01	2.76595E+01	8.95809E-01	7.08637E-04	0.00000E+00	0.00000E+00
1157	8.83594E-01	2.76833E+01	8.95798E-01	7.08102E-04	0.00000E+00	0.00000E+00
1158	9.12399E-01	2.77062E+01	8.95812E-01	7.07635E-04	0.00000E+00	0.00000E+00
1159	9.17283E-01	2.77290E+01	8.95831E-01	7.07266E-04	0.00000E+00	0.00000E+00
1160	8.97163E-01	2.77520E+01	8.95832E-01	7.06656E-04	0.00000E+00	0.00000E+00
1161	9.02969E-01	2.77757E+01	8.95838E-01	7.06073E-04	0.00000E+00	0.00000E+00
1162	8.64871E-01	2.77995E+01	8.95812E-01	7.05969E-04	0.00000E+00	0.00000E+00
1163	8.51225E-01	2.78243E+01	8.95773E-01	7.06405E-04	0.00000E+00	0.00000E+00
1164	9.14045E-01	2.78480E+01	8.95789E-01	7.05972E-04	0.00000E+00	0.00000E+00
1165	9.02196E-01	2.78710E+01	8.95794E-01	7.05386E-04	0.00000E+00	0.00000E+00
1166	8.64393E-01	2.78948E+01	8.95767E-01	7.05296E-04	0.00000E+00	0.00000E+00
1167	8.72484E-01	2.79185E+01	8.95747E-01	7.04974E-04	0.00000E+00	0.00000E+00
1168	9.08082E-01	2.79415E+01	8.95758E-01	7.04449E-04	0.00000E+00	0.00000E+00
1169	8.61882E-01	2.79662E+01	8.95729E-01	7.04443E-04	0.00000E+00	0.00000E+00
1170	8.85325E-01	2.79900E+01	8.95720E-01	7.03896E-04	0.00000E+00	0.00000E+00
1171	8.91575E-01	2.80128E+01	8.95717E-01	7.03303E-04	0.00000E+00	0.00000E+00
1172	8.73048E-01	2.80367E+01	8.95697E-01	7.02968E-04	0.00000E+00	0.00000E+00
1173	8.62656E-01	2.80595E+01	8.95669E-01	7.02934E-04	0.00000E+00	0.00000E+00
1174	8.58240E-01	2.80852E+01	8.95637E-01	7.03060E-04	0.00000E+00	0.00000E+00
1175	9.06722E-01	2.81090E+01	8.95646E-01	7.02524E-04	0.00000E+00	0.00000E+00
1176	9.05635E-01	2.81328E+01	8.95655E-01	7.01977E-04	0.00000E+00	0.00000E+00
1177	9.41449E-01	2.81557E+01	8.95694E-01	7.02463E-04	0.00000E+00	0.00000E+00
1178	8.96015E-01	2.81785E+01	8.95694E-01	7.01863E-04	0.00000E+00	0.00000E+00
1179	9.18680E-01	2.82033E+01	8.95714E-01	7.01539E-04	0.00000E+00	0.00000E+00
1180	9.09530E-01	2.82270E+01	8.95725E-01	7.01041E-04	0.00000E+00	0.00000E+00
1181	9.22157E-01	2.82518E+01	8.95748E-01	7.00805E-04	0.00000E+00	0.00000E+00
1182	9.17719E-01	2.82755E+01	8.95767E-01	7.00458E-04	0.00000E+00	0.00000E+00

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1183	8.68359E-01	2.82993E+01	8.95743E-01	7.00250E-04	0.00000E+00	0.00000E+00
1184	9.04160E-01	2.83232E+01	8.95750E-01	6.99693E-04	0.00000E+00	0.00000E+00
1185	9.23835E-01	2.83470E+01	8.95774E-01	6.99504E-04	0.00000E+00	0.00000E+00
1186	9.16994E-01	2.83708E+01	8.95792E-01	6.99143E-04	0.00000E+00	0.00000E+00
1187	9.20446E-01	2.83955E+01	8.95813E-01	6.98863E-04	0.00000E+00	0.00000E+00
1188	9.08031E-01	2.84183E+01	8.95823E-01	6.98349E-04	0.00000E+00	0.00000E+00
1189	9.27445E-01	2.84422E+01	8.95850E-01	6.98269E-04	0.00000E+00	0.00000E+00
1190	8.84641E-01	2.84668E+01	8.95840E-01	6.97745E-04	0.00000E+00	0.00000E+00
1191	9.12230E-01	2.84917E+01	8.95854E-01	6.97294E-04	0.00000E+00	0.00000E+00
1192	9.27426E-01	2.85145E+01	8.95881E-01	6.97213E-04	0.00000E+00	0.00000E+00
1193	8.89833E-01	2.85373E+01	8.95876E-01	6.96645E-04	0.00000E+00	0.00000E+00
1194	9.27713E-01	2.85603E+01	8.95902E-01	6.96573E-04	0.00000E+00	0.00000E+00
1195	9.52418E-01	2.85840E+01	8.95950E-01	6.97599E-04	0.00000E+00	0.00000E+00
1196	8.74577E-01	2.86078E+01	8.95932E-01	6.97245E-04	0.00000E+00	0.00000E+00
1197	8.51631E-01	2.86317E+01	8.95895E-01	6.97647E-04	0.00000E+00	0.00000E+00
1198	8.98460E-01	2.86555E+01	8.95897E-01	6.97066E-04	0.00000E+00	0.00000E+00
1199	8.77306E-01	2.86802E+01	8.95881E-01	6.96657E-04	0.00000E+00	0.00000E+00
1200	9.21877E-01	2.87040E+01	8.95903E-01	6.96413E-04	0.00000E+00	0.00000E+00
1201	8.84406E-01	2.87287E+01	8.95893E-01	6.95898E-04	0.00000E+00	0.00000E+00
1202	9.26636E-01	2.87517E+01	8.95919E-01	6.95790E-04	0.00000E+00	0.00000E+00
1203	9.09364E-01	2.87753E+01	8.95930E-01	6.95300E-04	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

LIFETIME = 1.45824E-04 + OR - 1.69663E-07      GENERATION TIME = 9.91010E-05 + OR - 1.05326E-07  
 NU BAR = 2.41915E+00 + OR - 3.80479E-06      AVERAGE FISSION GROUP = 2.45928E+01 + OR - 2.26697E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 3.06273E-02 + OR - 6.87042E-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	0.89596	+ OR - 0.00070	0.89526 TO 0.89665	0.89457 TO 0.89735	0.89387 TO 0.89804	1200000
4	0.89597	+ OR - 0.00070	0.89528 TO 0.89667	0.89458 TO 0.89736	0.89388 TO 0.89806	1199000
5	0.89596	+ OR - 0.00070	0.89527 TO 0.89666	0.89457 TO 0.89736	0.89388 TO 0.89805	1198000
6	0.89594	+ OR - 0.00070	0.89524 TO 0.89664	0.89455 TO 0.89733	0.89385 TO 0.89803	1197000
7	0.89592	+ OR - 0.00070	0.89523 TO 0.89662	0.89453 TO 0.89732	0.89383 TO 0.89801	1196000
8	0.89591	+ OR - 0.00070	0.89522 TO 0.89661	0.89452 TO 0.89731	0.89382 TO 0.89801	1195000
9	0.89589	+ OR - 0.00070	0.89519 TO 0.89659	0.89450 TO 0.89729	0.89380 TO 0.89798	1194000
10	0.89587	+ OR - 0.00070	0.89517 TO 0.89657	0.89447 TO 0.89727	0.89378 TO 0.89796	1193000
11	0.89587	+ OR - 0.00070	0.89517 TO 0.89657	0.89447 TO 0.89726	0.89377 TO 0.89796	1192000
12	0.89590	+ OR - 0.00070	0.89520 TO 0.89660	0.89450 TO 0.89730	0.89380 TO 0.89799	1191000
17	0.89583	+ OR - 0.00070	0.89513 TO 0.89653	0.89443 TO 0.89722	0.89373 TO 0.89792	1186000
22	0.89583	+ OR - 0.00070	0.89513 TO 0.89653	0.89443 TO 0.89723	0.89374 TO 0.89793	1181000
27	0.89588	+ OR - 0.00070	0.89518 TO 0.89658	0.89448 TO 0.89728	0.89378 TO 0.89798	1176000
32	0.89587	+ OR - 0.00070	0.89517 TO 0.89658	0.89447 TO 0.89728	0.89376 TO 0.89799	1171000
37	0.89587	+ OR - 0.00070	0.89517 TO 0.89657	0.89446 TO 0.89728	0.89376 TO 0.89798	1166000
42	0.89592	+ OR - 0.00071	0.89522 TO 0.89663	0.89451 TO 0.89734	0.89380 TO 0.89804	1161000
47	0.89588	+ OR - 0.00071	0.89517 TO 0.89658	0.89446 TO 0.89729	0.89375 TO 0.89800	1156000
52	0.89588	+ OR - 0.00071	0.89517 TO 0.89659	0.89446 TO 0.89730	0.89375 TO 0.89801	1151000
57	0.89585	+ OR - 0.00071	0.89514 TO 0.89656	0.89443 TO 0.89727	0.89372 TO 0.89798	1146000
62	0.89590	+ OR - 0.00071	0.89519 TO 0.89661	0.89447 TO 0.89733	0.89376 TO 0.89804	1141000
67	0.89586	+ OR - 0.00071	0.89515 TO 0.89658	0.89443 TO 0.89729	0.89372 TO 0.89801	1136000
72	0.89580	+ OR - 0.00071	0.89508 TO 0.89651	0.89437 TO 0.89723	0.89365 TO 0.89794	1131000
77	0.89584	+ OR - 0.00072	0.89512 TO 0.89655	0.89440 TO 0.89727	0.89369 TO 0.89799	1126000
82	0.89590	+ OR - 0.00072	0.89518 TO 0.89662	0.89446 TO 0.89734	0.89374 TO 0.89806	1121000
87	0.89588	+ OR - 0.00072	0.89516 TO 0.89660	0.89444 TO 0.89732	0.89372 TO 0.89804	1116000
92	0.89594	+ OR - 0.00072	0.89522 TO 0.89667	0.89450 TO 0.89739	0.89378 TO 0.89811	1111000

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	0.89589	+ OR - 0.00072	0.89517 TO 0.89662	0.89445 TO 0.89734	0.89372 TO 0.89807	1106000
102	0.89584	+ OR - 0.00073	0.89511 TO 0.89656	0.89438 TO 0.89729	0.89366 TO 0.89801	1101000
107	0.89577	+ OR - 0.00073	0.89504 TO 0.89650	0.89432 TO 0.89722	0.89359 TO 0.89795	1096000
112	0.89577	+ OR - 0.00073	0.89504 TO 0.89650	0.89431 TO 0.89723	0.89358 TO 0.89796	1091000
117	0.89578	+ OR - 0.00073	0.89504 TO 0.89651	0.89431 TO 0.89724	0.89358 TO 0.89797	1086000
122	0.89571	+ OR - 0.00073	0.89498 TO 0.89645	0.89425 TO 0.89718	0.89352 TO 0.89791	1081000
127	0.89584	+ OR - 0.00073	0.89511 TO 0.89658	0.89438 TO 0.89731	0.89364 TO 0.89804	1076000
132	0.89590	+ OR - 0.00074	0.89516 TO 0.89663	0.89443 TO 0.89737	0.89369 TO 0.89810	1071000
137	0.89592	+ OR - 0.00074	0.89518 TO 0.89665	0.89444 TO 0.89739	0.89370 TO 0.89813	1066000
142	0.89592	+ OR - 0.00074	0.89518 TO 0.89666	0.89444 TO 0.89740	0.89369 TO 0.89814	1061000
147	0.89600	+ OR - 0.00074	0.89526 TO 0.89674	0.89451 TO 0.89748	0.89377 TO 0.89823	1056000
152	0.89593	+ OR - 0.00074	0.89519 TO 0.89668	0.89444 TO 0.89742	0.89370 TO 0.89817	1051000
157	0.89584	+ OR - 0.00075	0.89509 TO 0.89658	0.89434 TO 0.89733	0.89360 TO 0.89807	1046000
162	0.89583	+ OR - 0.00075	0.89508 TO 0.89658	0.89433 TO 0.89733	0.89358 TO 0.89808	1041000
167	0.89583	+ OR - 0.00075	0.89508 TO 0.89658	0.89433 TO 0.89733	0.89358 TO 0.89808	1036000
172	0.89586	+ OR - 0.00075	0.89511 TO 0.89661	0.89435 TO 0.89737	0.89360 TO 0.89812	1031000
177	0.89578	+ OR - 0.00076	0.89502 TO 0.89654	0.89426 TO 0.89729	0.89351 TO 0.89805	1026000
182	0.89584	+ OR - 0.00076	0.89508 TO 0.89660	0.89432 TO 0.89736	0.89357 TO 0.89811	1021000
187	0.89581	+ OR - 0.00076	0.89505 TO 0.89657	0.89429 TO 0.89733	0.89353 TO 0.89809	1016000
192	0.89592	+ OR - 0.00076	0.89515 TO 0.89668	0.89439 TO 0.89744	0.89363 TO 0.89820	1011000
197	0.89590	+ OR - 0.00076	0.89513 TO 0.89666	0.89437 TO 0.89742	0.89360 TO 0.89819	1006000
202	0.89589	+ OR - 0.00076	0.89512 TO 0.89665	0.89436 TO 0.89742	0.89359 TO 0.89818	1001000
207	0.89595	+ OR - 0.00077	0.89518 TO 0.89672	0.89442 TO 0.89748	0.89365 TO 0.89825	996000
212	0.89593	+ OR - 0.00077	0.89516 TO 0.89670	0.89440 TO 0.89747	0.89363 TO 0.89824	991000
217	0.89597	+ OR - 0.00077	0.89520 TO 0.89675	0.89443 TO 0.89752	0.89366 TO 0.89829	986000
222	0.89601	+ OR - 0.00077	0.89523 TO 0.89678	0.89446 TO 0.89755	0.89369 TO 0.89832	981000
227	0.89601	+ OR - 0.00077	0.89524 TO 0.89678	0.89446 TO 0.89755	0.89369 TO 0.89833	976000

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
232	0.89598	+ OR - 0.00077	0.89521 TO 0.89676	0.89443 TO 0.89753	0.89366 TO 0.89831	971000
237	0.89591	+ OR - 0.00078	0.89513 TO 0.89669	0.89435 TO 0.89746	0.89358 TO 0.89824	966000
242	0.89598	+ OR - 0.00078	0.89520 TO 0.89676	0.89442 TO 0.89754	0.89365 TO 0.89832	961000
247	0.89602	+ OR - 0.00078	0.89524 TO 0.89680	0.89446 TO 0.89759	0.89368 TO 0.89837	956000
252	0.89603	+ OR - 0.00078	0.89525 TO 0.89681	0.89447 TO 0.89759	0.89368 TO 0.89838	951000
257	0.89596	+ OR - 0.00078	0.89517 TO 0.89674	0.89439 TO 0.89752	0.89360 TO 0.89831	946000
262	0.89599	+ OR - 0.00079	0.89521 TO 0.89678	0.89442 TO 0.89757	0.89363 TO 0.89836	941000
267	0.89602	+ OR - 0.00079	0.89523 TO 0.89682	0.89444 TO 0.89761	0.89365 TO 0.89840	936000
272	0.89593	+ OR - 0.00079	0.89514 TO 0.89673	0.89435 TO 0.89752	0.89355 TO 0.89831	931000
277	0.89606	+ OR - 0.00079	0.89526 TO 0.89685	0.89447 TO 0.89765	0.89367 TO 0.89844	926000
282	0.89612	+ OR - 0.00080	0.89533 TO 0.89692	0.89453 TO 0.89772	0.89373 TO 0.89851	921000
287	0.89623	+ OR - 0.00080	0.89543 TO 0.89703	0.89463 TO 0.89783	0.89383 TO 0.89863	916000
292	0.89618	+ OR - 0.00080	0.89538 TO 0.89698	0.89458 TO 0.89778	0.89378 TO 0.89858	911000
297	0.89617	+ OR - 0.00080	0.89537 TO 0.89697	0.89457 TO 0.89777	0.89376 TO 0.89857	906000
302	0.89610	+ OR - 0.00080	0.89530 TO 0.89690	0.89449 TO 0.89771	0.89369 TO 0.89851	901000
307	0.89602	+ OR - 0.00081	0.89522 TO 0.89683	0.89441 TO 0.89764	0.89360 TO 0.89844	896000
312	0.89599	+ OR - 0.00081	0.89518 TO 0.89680	0.89437 TO 0.89761	0.89356 TO 0.89842	891000
317	0.89608	+ OR - 0.00081	0.89526 TO 0.89689	0.89445 TO 0.89770	0.89364 TO 0.89852	886000
322	0.89600	+ OR - 0.00082	0.89518 TO 0.89681	0.89437 TO 0.89763	0.89355 TO 0.89845	881000
327	0.89599	+ OR - 0.00082	0.89517 TO 0.89681	0.89435 TO 0.89763	0.89353 TO 0.89845	876000
332	0.89603	+ OR - 0.00082	0.89521 TO 0.89685	0.89439 TO 0.89768	0.89356 TO 0.89850	871000
337	0.89599	+ OR - 0.00083	0.89517 TO 0.89682	0.89434 TO 0.89764	0.89352 TO 0.89847	866000
342	0.89613	+ OR - 0.00083	0.89530 TO 0.89695	0.89447 TO 0.89778	0.89365 TO 0.89861	861000
347	0.89615	+ OR - 0.00083	0.89532 TO 0.89698	0.89449 TO 0.89781	0.89366 TO 0.89864	856000
352	0.89620	+ OR - 0.00083	0.89537 TO 0.89703	0.89453 TO 0.89786	0.89370 TO 0.89870	851000
357	0.89613	+ OR - 0.00083	0.89529 TO 0.89696	0.89446 TO 0.89779	0.89362 TO 0.89863	846000
362	0.89606	+ OR - 0.00084	0.89523 TO 0.89690	0.89439 TO 0.89774	0.89355 TO 0.89858	841000

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
367	0.89615	+ OR - 0.00084	0.89531 TO 0.89699	0.89447 TO 0.89784	0.89363 TO 0.89868	836000
372	0.89620	+ OR - 0.00084	0.89536 TO 0.89704	0.89452 TO 0.89788	0.89368 TO 0.89873	831000
377	0.89623	+ OR - 0.00084	0.89539 TO 0.89707	0.89454 TO 0.89792	0.89370 TO 0.89876	826000
382	0.89617	+ OR - 0.00085	0.89532 TO 0.89702	0.89448 TO 0.89787	0.89363 TO 0.89871	821000
387	0.89621	+ OR - 0.00085	0.89535 TO 0.89706	0.89450 TO 0.89791	0.89365 TO 0.89876	816000
392	0.89604	+ OR - 0.00085	0.89519 TO 0.89689	0.89433 TO 0.89774	0.89348 TO 0.89859	811000
397	0.89602	+ OR - 0.00085	0.89517 TO 0.89687	0.89432 TO 0.89772	0.89347 TO 0.89857	806000
402	0.89597	+ OR - 0.00085	0.89512 TO 0.89683	0.89426 TO 0.89768	0.89341 TO 0.89854	801000
407	0.89583	+ OR - 0.00085	0.89498 TO 0.89669	0.89412 TO 0.89754	0.89327 TO 0.89839	796000
412	0.89579	+ OR - 0.00086	0.89494 TO 0.89665	0.89408 TO 0.89751	0.89322 TO 0.89837	791000
417	0.89577	+ OR - 0.00086	0.89491 TO 0.89663	0.89405 TO 0.89749	0.89319 TO 0.89835	786000
422	0.89565	+ OR - 0.00086	0.89479 TO 0.89651	0.89393 TO 0.89737	0.89307 TO 0.89823	781000
427	0.89565	+ OR - 0.00086	0.89479 TO 0.89652	0.89393 TO 0.89738	0.89307 TO 0.89824	776000
432	0.89554	+ OR - 0.00087	0.89467 TO 0.89640	0.89380 TO 0.89727	0.89294 TO 0.89813	771000
437	0.89540	+ OR - 0.00086	0.89454 TO 0.89626	0.89368 TO 0.89712	0.89282 TO 0.89798	766000
442	0.89547	+ OR - 0.00086	0.89461 TO 0.89633	0.89374 TO 0.89720	0.89288 TO 0.89806	761000
447	0.89553	+ OR - 0.00087	0.89466 TO 0.89639	0.89379 TO 0.89726	0.89292 TO 0.89813	756000
452	0.89555	+ OR - 0.00087	0.89468 TO 0.89642	0.89381 TO 0.89730	0.89293 TO 0.89817	751000
457	0.89545	+ OR - 0.00088	0.89457 TO 0.89632	0.89369 TO 0.89720	0.89282 TO 0.89808	746000
462	0.89548	+ OR - 0.00088	0.89460 TO 0.89636	0.89372 TO 0.89725	0.89284 TO 0.89813	741000
467	0.89549	+ OR - 0.00089	0.89461 TO 0.89638	0.89372 TO 0.89726	0.89283 TO 0.89815	736000
472	0.89552	+ OR - 0.00089	0.89462 TO 0.89641	0.89373 TO 0.89730	0.89284 TO 0.89819	731000
477	0.89556	+ OR - 0.00090	0.89466 TO 0.89646	0.89377 TO 0.89736	0.89287 TO 0.89825	726000
482	0.89560	+ OR - 0.00090	0.89470 TO 0.89650	0.89380 TO 0.89740	0.89290 TO 0.89830	721000
487	0.89559	+ OR - 0.00090	0.89469 TO 0.89649	0.89379 TO 0.89739	0.89288 TO 0.89829	716000
492	0.89556	+ OR - 0.00090	0.89465 TO 0.89646	0.89375 TO 0.89737	0.89284 TO 0.89827	711000
497	0.89543	+ OR - 0.00091	0.89452 TO 0.89633	0.89362 TO 0.89724	0.89271 TO 0.89814	706000

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
502	0.89538	+ OR - 0.00091	0.89447 TO 0.89629	0.89356 TO 0.89721	0.89265 TO 0.89812	701000
507	0.89538	+ OR - 0.00092	0.89447 TO 0.89630	0.89355 TO 0.89722	0.89264 TO 0.89813	696000
512	0.89527	+ OR - 0.00092	0.89435 TO 0.89619	0.89343 TO 0.89711	0.89251 TO 0.89803	691000
517	0.89534	+ OR - 0.00092	0.89442 TO 0.89626	0.89350 TO 0.89718	0.89257 TO 0.89810	686000
522	0.89538	+ OR - 0.00092	0.89445 TO 0.89630	0.89353 TO 0.89723	0.89261 TO 0.89815	681000
527	0.89522	+ OR - 0.00093	0.89429 TO 0.89615	0.89336 TO 0.89707	0.89244 TO 0.89800	676000
532	0.89522	+ OR - 0.00093	0.89429 TO 0.89615	0.89336 TO 0.89708	0.89243 TO 0.89801	671000
537	0.89528	+ OR - 0.00093	0.89435 TO 0.89621	0.89342 TO 0.89714	0.89249 TO 0.89807	666000
542	0.89533	+ OR - 0.00094	0.89440 TO 0.89627	0.89346 TO 0.89720	0.89253 TO 0.89814	661000
547	0.89533	+ OR - 0.00094	0.89439 TO 0.89627	0.89345 TO 0.89721	0.89251 TO 0.89815	656000
552	0.89547	+ OR - 0.00094	0.89453 TO 0.89641	0.89359 TO 0.89736	0.89265 TO 0.89830	651000
557	0.89543	+ OR - 0.00095	0.89448 TO 0.89638	0.89354 TO 0.89732	0.89259 TO 0.89827	646000
562	0.89553	+ OR - 0.00095	0.89458 TO 0.89649	0.89363 TO 0.89744	0.89268 TO 0.89839	641000
567	0.89541	+ OR - 0.00096	0.89445 TO 0.89636	0.89349 TO 0.89732	0.89254 TO 0.89828	636000
572	0.89553	+ OR - 0.00096	0.89457 TO 0.89649	0.89361 TO 0.89745	0.89264 TO 0.89841	631000
577	0.89536	+ OR - 0.00097	0.89439 TO 0.89632	0.89343 TO 0.89729	0.89246 TO 0.89825	626000
582	0.89521	+ OR - 0.00097	0.89425 TO 0.89618	0.89328 TO 0.89715	0.89231 TO 0.89811	621000
587	0.89514	+ OR - 0.00097	0.89416 TO 0.89611	0.89319 TO 0.89708	0.89221 TO 0.89806	616000
592	0.89520	+ OR - 0.00098	0.89423 TO 0.89618	0.89325 TO 0.89716	0.89227 TO 0.89814	611000
597	0.89530	+ OR - 0.00098	0.89432 TO 0.89629	0.89334 TO 0.89727	0.89235 TO 0.89826	606000
602	0.89534	+ OR - 0.00099	0.89436 TO 0.89633	0.89337 TO 0.89732	0.89238 TO 0.89831	601000
607	0.89521	+ OR - 0.00099	0.89422 TO 0.89620	0.89323 TO 0.89719	0.89223 TO 0.89818	596000
612	0.89507	+ OR - 0.00100	0.89407 TO 0.89607	0.89308 TO 0.89706	0.89208 TO 0.89806	591000
617	0.89507	+ OR - 0.00100	0.89407 TO 0.89607	0.89307 TO 0.89707	0.89207 TO 0.89807	586000
622	0.89512	+ OR - 0.00101	0.89411 TO 0.89613	0.89310 TO 0.89713	0.89210 TO 0.89814	581000
627	0.89508	+ OR - 0.00102	0.89407 TO 0.89610	0.89305 TO 0.89711	0.89204 TO 0.89813	576000
632	0.89517	+ OR - 0.00102	0.89415 TO 0.89619	0.89312 TO 0.89721	0.89210 TO 0.89823	571000



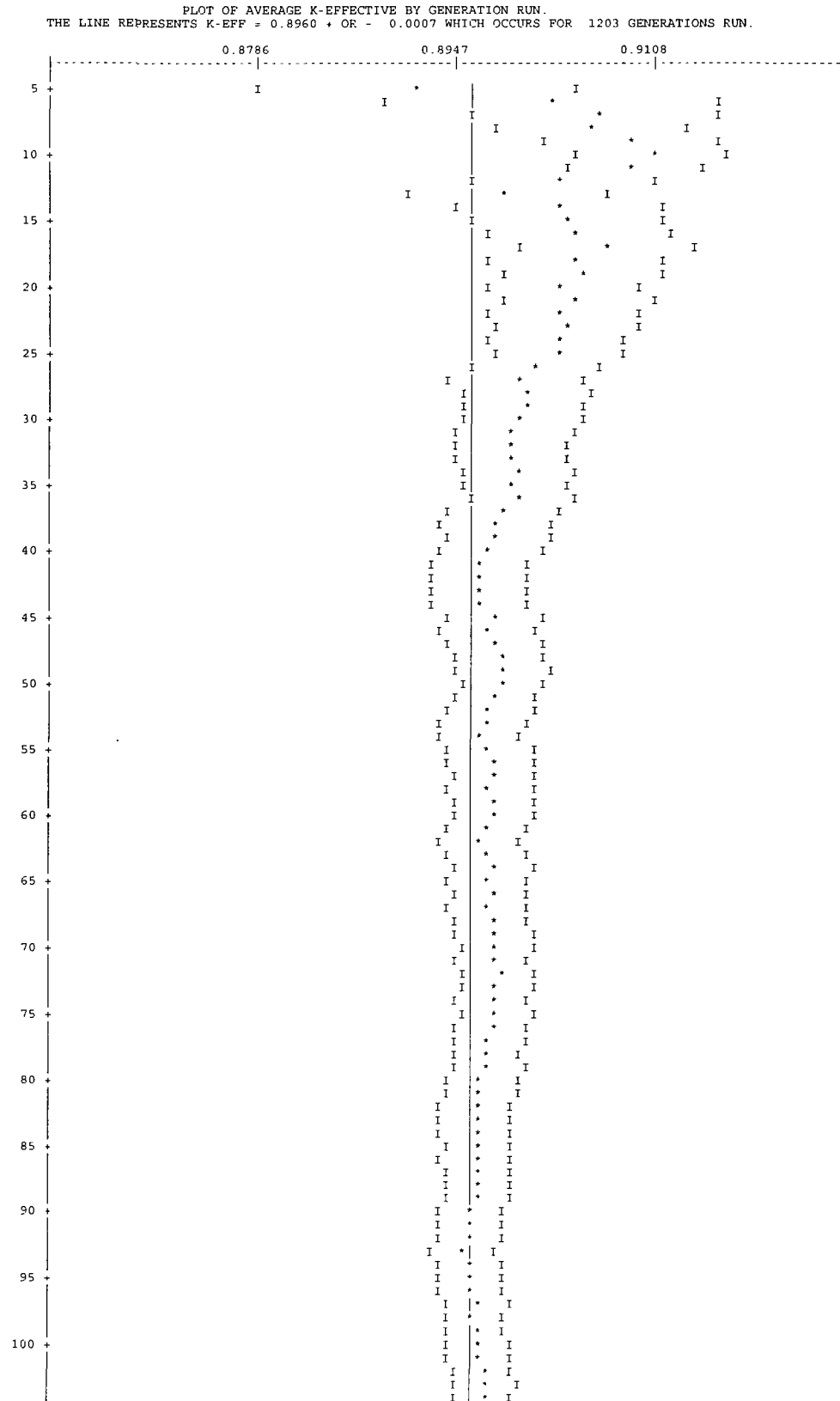
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
637	0.89544	+ OR - 0.00102	0.89442 TO 0.89646	0.89340 TO 0.89748	0.89239 TO 0.89849	566000
642	0.89559	+ OR - 0.00102	0.89457 TO 0.89661	0.89354 TO 0.89763	0.89252 TO 0.89865	561000
647	0.89560	+ OR - 0.00103	0.89457 TO 0.89663	0.89354 TO 0.89766	0.89251 TO 0.89869	556000
652	0.89560	+ OR - 0.00104	0.89456 TO 0.89664	0.89352 TO 0.89768	0.89248 TO 0.89871	551000
657	0.89578	+ OR - 0.00104	0.89474 TO 0.89682	0.89370 TO 0.89786	0.89265 TO 0.89890	546000
662	0.89588	+ OR - 0.00105	0.89483 TO 0.89693	0.89378 TO 0.89798	0.89273 TO 0.89903	541000
667	0.89581	+ OR - 0.00105	0.89475 TO 0.89686	0.89370 TO 0.89792	0.89265 TO 0.89897	536000
672	0.89578	+ OR - 0.00106	0.89472 TO 0.89684	0.89366 TO 0.89790	0.89260 TO 0.89896	531000
677	0.89591	+ OR - 0.00106	0.89484 TO 0.89697	0.89378 TO 0.89804	0.89272 TO 0.89910	526000
682	0.89595	+ OR - 0.00107	0.89487 TO 0.89702	0.89380 TO 0.89809	0.89272 TO 0.89917	521000
687	0.89587	+ OR - 0.00108	0.89479 TO 0.89695	0.89371 TO 0.89803	0.89263 TO 0.89911	516000
692	0.89584	+ OR - 0.00108	0.89476 TO 0.89692	0.89367 TO 0.89800	0.89259 TO 0.89909	511000
697	0.89563	+ OR - 0.00109	0.89454 TO 0.89671	0.89345 TO 0.89780	0.89237 TO 0.89888	506000
702	0.89550	+ OR - 0.00109	0.89441 TO 0.89659	0.89332 TO 0.89768	0.89223 TO 0.89877	501000
707	0.89539	+ OR - 0.00110	0.89429 TO 0.89649	0.89320 TO 0.89759	0.89210 TO 0.89868	496000
712	0.89535	+ OR - 0.00111	0.89425 TO 0.89646	0.89314 TO 0.89757	0.89203 TO 0.89867	491000
717	0.89524	+ OR - 0.00111	0.89413 TO 0.89635	0.89301 TO 0.89746	0.89190 TO 0.89857	486000
722	0.89524	+ OR - 0.00112	0.89412 TO 0.89636	0.89301 TO 0.89748	0.89189 TO 0.89860	481000
727	0.89515	+ OR - 0.00113	0.89403 TO 0.89628	0.89290 TO 0.89741	0.89177 TO 0.89854	476000
732	0.89511	+ OR - 0.00113	0.89398 TO 0.89624	0.89284 TO 0.89737	0.89171 TO 0.89850	471000
737	0.89499	+ OR - 0.00114	0.89385 TO 0.89613	0.89271 TO 0.89726	0.89158 TO 0.89840	466000
742	0.89484	+ OR - 0.00114	0.89370 TO 0.89599	0.89256 TO 0.89713	0.89141 TO 0.89828	461000
747	0.89482	+ OR - 0.00115	0.89367 TO 0.89596	0.89252 TO 0.89711	0.89137 TO 0.89826	456000
752	0.89460	+ OR - 0.00115	0.89345 TO 0.89575	0.89230 TO 0.89690	0.89115 TO 0.89806	451000
757	0.89466	+ OR - 0.00115	0.89351 TO 0.89582	0.89235 TO 0.89697	0.89120 TO 0.89812	446000
762	0.89449	+ OR - 0.00115	0.89333 TO 0.89564	0.89218 TO 0.89680	0.89103 TO 0.89795	441000
767	0.89422	+ OR - 0.00115	0.89306 TO 0.89537	0.89191 TO 0.89653	0.89075 TO 0.89768	436000

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
772	0.89444	+ OR - 0.00116	0.89328 TO 0.89560	0.89213 TO 0.89676	0.89097 TO 0.89792	431000
777	0.89450	+ OR - 0.00117	0.89333 TO 0.89566	0.89216 TO 0.89683	0.89100 TO 0.89800	426000
782	0.89446	+ OR - 0.00118	0.89328 TO 0.89563	0.89210 TO 0.89681	0.89093 TO 0.89799	421000
787	0.89425	+ OR - 0.00118	0.89307 TO 0.89543	0.89189 TO 0.89661	0.89070 TO 0.89779	416000
792	0.89416	+ OR - 0.00119	0.89297 TO 0.89535	0.89178 TO 0.89654	0.89059 TO 0.89773	411000
797	0.89403	+ OR - 0.00120	0.89283 TO 0.89522	0.89163 TO 0.89642	0.89043 TO 0.89762	406000
802	0.89405	+ OR - 0.00119	0.89285 TO 0.89524	0.89166 TO 0.89643	0.89047 TO 0.89762	401000
807	0.89426	+ OR - 0.00120	0.89306 TO 0.89547	0.89186 TO 0.89667	0.89066 TO 0.89787	396000
812	0.89400	+ OR - 0.00120	0.89280 TO 0.89520	0.89160 TO 0.89640	0.89040 TO 0.89760	391000
817	0.89393	+ OR - 0.00121	0.89272 TO 0.89513	0.89151 TO 0.89634	0.89030 TO 0.89755	386000
822	0.89377	+ OR - 0.00121	0.89256 TO 0.89498	0.89136 TO 0.89619	0.89015 TO 0.89739	381000
827	0.89366	+ OR - 0.00122	0.89244 TO 0.89489	0.89122 TO 0.89611	0.89000 TO 0.89733	376000
832	0.89360	+ OR - 0.00123	0.89237 TO 0.89483	0.89114 TO 0.89606	0.88991 TO 0.89729	371000
837	0.89334	+ OR - 0.00124	0.89210 TO 0.89458	0.89086 TO 0.89582	0.88963 TO 0.89705	366000
842	0.89341	+ OR - 0.00124	0.89217 TO 0.89465	0.89093 TO 0.89589	0.88969 TO 0.89713	361000
847	0.89331	+ OR - 0.00125	0.89206 TO 0.89456	0.89081 TO 0.89581	0.88956 TO 0.89706	356000
852	0.89319	+ OR - 0.00126	0.89193 TO 0.89446	0.89067 TO 0.89572	0.88941 TO 0.89698	351000
857	0.89310	+ OR - 0.00128	0.89182 TO 0.89438	0.89055 TO 0.89566	0.88927 TO 0.89694	346000
862	0.89291	+ OR - 0.00129	0.89162 TO 0.89419	0.89033 TO 0.89548	0.88904 TO 0.89677	341000
867	0.89269	+ OR - 0.00130	0.89139 TO 0.89400	0.89009 TO 0.89530	0.88878 TO 0.89661	336000
872	0.89266	+ OR - 0.00131	0.89135 TO 0.89397	0.89004 TO 0.89528	0.88873 TO 0.89659	331000
877	0.89268	+ OR - 0.00131	0.89137 TO 0.89400	0.89006 TO 0.89531	0.88875 TO 0.89662	326000
882	0.89282	+ OR - 0.00131	0.89151 TO 0.89413	0.89019 TO 0.89545	0.88888 TO 0.89676	321000
887	0.89270	+ OR - 0.00133	0.89136 TO 0.89403	0.89003 TO 0.89536	0.88870 TO 0.89669	316000
892	0.89265	+ OR - 0.00134	0.89130 TO 0.89399	0.88996 TO 0.89533	0.88862 TO 0.89667	311000
897	0.89307	+ OR - 0.00135	0.89172 TO 0.89442	0.89038 TO 0.89576	0.88903 TO 0.89711	306000
902	0.89297	+ OR - 0.00136	0.89162 TO 0.89433	0.89026 TO 0.89569	0.88890 TO 0.89705	301000

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
907	0.89324	+ OR - 0.00136	0.89188 TO 0.89460	0.89051 TO 0.89597	0.88915 TO 0.89733	296000
912	0.89313	+ OR - 0.00136	0.89177 TO 0.89449	0.89041 TO 0.89585	0.88904 TO 0.89722	291000
917	0.89323	+ OR - 0.00138	0.89185 TO 0.89461	0.89047 TO 0.89599	0.88909 TO 0.89737	286000
922	0.89328	+ OR - 0.00139	0.89189 TO 0.89468	0.89050 TO 0.89607	0.88910 TO 0.89747	281000
927	0.89372	+ OR - 0.00139	0.89233 TO 0.89512	0.89093 TO 0.89651	0.88954 TO 0.89791	276000
932	0.89404	+ OR - 0.00140	0.89264 TO 0.89544	0.89124 TO 0.89684	0.88984 TO 0.89824	271000
937	0.89450	+ OR - 0.00139	0.89311 TO 0.89589	0.89172 TO 0.89728	0.89033 TO 0.89867	266000
942	0.89447	+ OR - 0.00141	0.89306 TO 0.89588	0.89165 TO 0.89729	0.89024 TO 0.89870	261000
947	0.89431	+ OR - 0.00143	0.89288 TO 0.89574	0.89145 TO 0.89717	0.89003 TO 0.89859	256000
952	0.89445	+ OR - 0.00144	0.89301 TO 0.89589	0.89157 TO 0.89733	0.89013 TO 0.89877	251000
957	0.89436	+ OR - 0.00143	0.89293 TO 0.89579	0.89151 TO 0.89721	0.89008 TO 0.89864	246000
962	0.89417	+ OR - 0.00145	0.89273 TO 0.89562	0.89128 TO 0.89706	0.88984 TO 0.89851	241000
967	0.89435	+ OR - 0.00146	0.89290 TO 0.89581	0.89144 TO 0.89727	0.88998 TO 0.89872	236000
972	0.89429	+ OR - 0.00148	0.89281 TO 0.89577	0.89133 TO 0.89725	0.88985 TO 0.89873	231000
977	0.89456	+ OR - 0.00148	0.89308 TO 0.89604	0.89160 TO 0.89752	0.89012 TO 0.89900	226000
982	0.89417	+ OR - 0.00149	0.89267 TO 0.89566	0.89118 TO 0.89716	0.88968 TO 0.89865	221000
987	0.89406	+ OR - 0.00152	0.89254 TO 0.89559	0.89102 TO 0.89711	0.88950 TO 0.89863	216000
992	0.89413	+ OR - 0.00154	0.89259 TO 0.89568	0.89105 TO 0.89722	0.88951 TO 0.89876	211000
997	0.89395	+ OR - 0.00156	0.89239 TO 0.89551	0.89082 TO 0.89707	0.88926 TO 0.89863	206000
1002	0.89395	+ OR - 0.00157	0.89238 TO 0.89552	0.89081 TO 0.89709	0.88924 TO 0.89866	201000
1007	0.89419	+ OR - 0.00160	0.89259 TO 0.89579	0.89098 TO 0.89739	0.88938 TO 0.89899	196000
1012	0.89408	+ OR - 0.00164	0.89244 TO 0.89573	0.89080 TO 0.89737	0.88916 TO 0.89901	191000
1017	0.89387	+ OR - 0.00167	0.89219 TO 0.89554	0.89052 TO 0.89722	0.88884 TO 0.89889	186000
1022	0.89355	+ OR - 0.00171	0.89184 TO 0.89527	0.89013 TO 0.89698	0.88842 TO 0.89869	181000
1027	0.89344	+ OR - 0.00176	0.89168 TO 0.89520	0.88993 TO 0.89695	0.88817 TO 0.89871	176000
1032	0.89359	+ OR - 0.00180	0.89179 TO 0.89540	0.88999 TO 0.89720	0.88818 TO 0.89901	171000
1037	0.89390	+ OR - 0.00185	0.89205 TO 0.89574	0.89020 TO 0.89759	0.88835 TO 0.89944	166000

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
1042	0.89388	+ OR - 0.00188	0.89200 TO 0.89575	0.89012 TO 0.89763	0.88824 TO 0.89951	161000
1047	0.89434	+ OR - 0.00190	0.89244 TO 0.89624	0.89054 TO 0.89813	0.88864 TO 0.90003	156000
1052	0.89453	+ OR - 0.00195	0.89258 TO 0.89648	0.89063 TO 0.89843	0.88868 TO 0.90038	151000
1057	0.89422	+ OR - 0.00200	0.89222 TO 0.89622	0.89022 TO 0.89822	0.88822 TO 0.90022	146000
1062	0.89360	+ OR - 0.00202	0.89159 TO 0.89562	0.88957 TO 0.89764	0.88755 TO 0.89966	141000
1067	0.89339	+ OR - 0.00203	0.89136 TO 0.89542	0.88934 TO 0.89745	0.88731 TO 0.89948	136000
1072	0.89415	+ OR - 0.00204	0.89211 TO 0.89619	0.89007 TO 0.89823	0.88803 TO 0.90027	131000
1077	0.89474	+ OR - 0.00208	0.89266 TO 0.89681	0.89058 TO 0.89889	0.88851 TO 0.90096	126000
1082	0.89508	+ OR - 0.00212	0.89296 TO 0.89720	0.89084 TO 0.89932	0.88872 TO 0.90144	121000
1087	0.89501	+ OR - 0.00216	0.89285 TO 0.89717	0.89069 TO 0.89933	0.88853 TO 0.90149	116000
1092	0.89482	+ OR - 0.00223	0.89259 TO 0.89706	0.89035 TO 0.89929	0.88812 TO 0.90153	111000
1097	0.89503	+ OR - 0.00229	0.89274 TO 0.89731	0.89045 TO 0.89960	0.88817 TO 0.90189	106000
1102	0.89566	+ OR - 0.00237	0.89329 TO 0.89802	0.89092 TO 0.90039	0.88856 TO 0.90275	101000
1107	0.89561	+ OR - 0.00244	0.89317 TO 0.89805	0.89074 TO 0.90049	0.88830 TO 0.90293	96000
1112	0.89507	+ OR - 0.00255	0.89251 TO 0.89762	0.88996 TO 0.90017	0.88741 TO 0.90272	91000
1117	0.89527	+ OR - 0.00265	0.89263 TO 0.89792	0.88998 TO 0.90057	0.88733 TO 0.90322	86000
1122	0.89515	+ OR - 0.00279	0.89236 TO 0.89794	0.88958 TO 0.90073	0.88679 TO 0.90352	81000
1127	0.89572	+ OR - 0.00285	0.89287 TO 0.89857	0.89002 TO 0.90142	0.88717 TO 0.90427	76000
1132	0.89576	+ OR - 0.00295	0.89281 TO 0.89871	0.88986 TO 0.90165	0.88692 TO 0.90460	71000
1137	0.89641	+ OR - 0.00311	0.89330 TO 0.89952	0.89019 TO 0.90264	0.88708 TO 0.90575	66000
1142	0.89591	+ OR - 0.00326	0.89265 TO 0.89917	0.88939 TO 0.90243	0.88613 TO 0.90569	61000
1147	0.89604	+ OR - 0.00352	0.89252 TO 0.89957	0.88899 TO 0.90309	0.88547 TO 0.90662	56000
1152	0.89754	+ OR - 0.00361	0.89392 TO 0.90115	0.89031 TO 0.90476	0.88669 TO 0.90838	51000
1157	0.89925	+ OR - 0.00367	0.89558 TO 0.90292	0.89191 TO 0.90659	0.88824 TO 0.91026	46000
1162	0.89929	+ OR - 0.00400	0.89529 TO 0.90329	0.89129 TO 0.90728	0.88730 TO 0.91128	41000
1167	0.90185	+ OR - 0.00413	0.89772 TO 0.90598	0.89359 TO 0.91011	0.88946 TO 0.91424	36000
1172	0.90473	+ OR - 0.00445	0.90028 TO 0.90918	0.89583 TO 0.91362	0.89139 TO 0.91807	31000

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
1177	0.90661	+ OR - 0.00447	0.90214 TO 0.91109	0.89766 TO 0.91556	0.89319 TO 0.92003	26000
1182	0.90513	+ OR - 0.00542	0.89971 TO 0.91055	0.89429 TO 0.91597	0.88887 TO 0.92139	21000
1187	0.90462	+ OR - 0.00654	0.89809 TO 0.91116	0.89155 TO 0.91770	0.88501 TO 0.92423	16000
1192	0.90129	+ OR - 0.00885	0.89244 TO 0.91015	0.88359 TO 0.91900	0.87473 TO 0.92785	11000
1197	0.90301	+ OR - 0.00813	0.89488 TO 0.91114	0.88675 TO 0.91926	0.87862 TO 0.92739	6000



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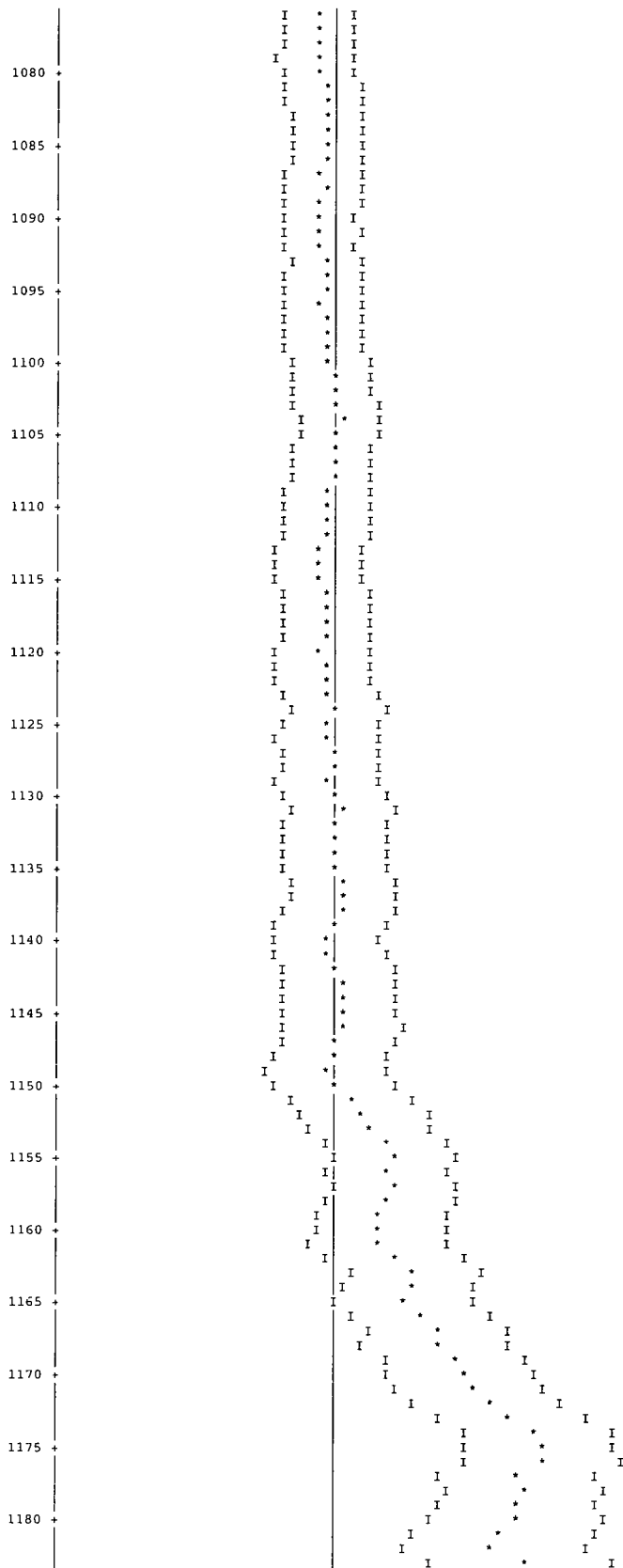
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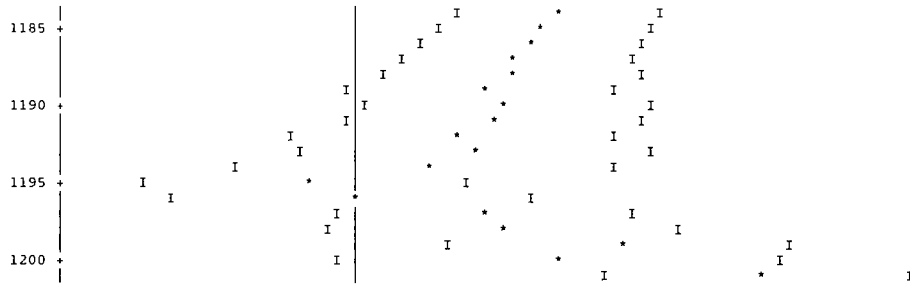












GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	SKIPPING 3 GENERATIONS
									PERCENT DEVIATION
1	0.0001			1.15906E-04	2.6399	1.24682E-03	0.8113	0.00000E+00	0.0000
2	0.0006			5.30927E-04	0.8489	2.58406E-03	0.2550	0.00000E+00	0.0000
3	0.0007			6.37244E-04	0.7231	5.16051E-04	0.4371	0.00000E+00	0.0000
4	0.0004			3.61739E-04	0.9316	2.75979E-04	0.5533	0.00000E+00	0.0000
5	0.0006			4.95953E-04	0.7663	5.19655E-04	0.4174	0.00000E+00	0.0000
6	0.0007			6.30678E-04	0.5838	1.17802E-03	0.3372	0.00000E+00	0.0000
7	0.0007			6.17082E-04	0.6394	1.33636E-03	0.3352	0.00000E+00	0.0000
8	0.0007			6.51906E-04	1.0317	1.32331E-03	0.4530	0.00000E+00	0.0000
9	0.0010			8.76805E-04	1.2629	1.70744E-03	0.5290	0.00000E+00	0.0000
10	0.0020			1.82750E-03	1.2042	3.48738E-03	0.5153	0.00000E+00	0.0000
11	0.0046			4.13279E-03	1.0065	5.82339E-03	0.5354	0.00000E+00	0.0000
12	0.0065			5.83378E-03	1.0512	6.36455E-03	0.6660	0.00000E+00	0.0000
13	0.0067			5.97500E-03	1.0600	8.36976E-03	0.6245	0.00000E+00	0.0000
14	0.0057			5.07462E-03	1.0934	1.06577E-02	0.5148	0.00000E+00	0.0000
15	0.0011			9.72058E-04	1.9130	5.36482E-03	0.5775	0.00000E+00	0.0000
16	0.0008			6.81455E-04	2.5720	3.37848E-03	0.6513	0.00000E+00	0.0000
17	0.0012			1.04935E-03	2.8709	2.08826E-03	0.9768	0.00000E+00	0.0000
18	0.0016			1.43756E-03	2.7740	2.11158E-03	1.0450	0.00000E+00	0.0000
19	0.0019			1.72396E-03	2.3100	3.60815E-03	0.7272	0.00000E+00	0.0000
20	0.0085			7.58284E-03	1.2034	1.42955E-02	0.4725	0.00000E+00	0.0000
21	0.0048			4.27904E-03	1.7006	5.99441E-03	0.7166	0.00000E+00	0.0000
22	0.0128			1.15042E-02	0.9810	1.47838E-02	0.4785	0.00000E+00	0.0000
23	0.0757			6.78354E-02	0.4004	8.37234E-02	0.1931	0.00000E+00	0.0000
24	0.2228			1.99619E-01	0.2243	2.20541E-01	0.1080	0.00000E+00	0.0000
25	0.2184			1.95709E-01	0.2293	2.06575E-01	0.1129	0.00000E+00	0.0000
26	0.3012			2.69875E-01	0.1764	2.75820E-01	0.0920	0.00000E+00	0.0000
27	0.1182			1.05926E-01	0.3261	1.05296E-01	0.1776	0.00000E+00	0.0000
SYSTEM TOTAL =				8.95957E-01	0.0776	9.88970E-01	0.0233	0.00000E+00	0.0000

THE WEIGHT LOST IN THE ALBEDO PORTION OF THE PROBLEM = 1.2370E-02 + OR - 0.0001

ELAPSED TIME 28.77900 MINUTES

RANDOM NUMBER= 415C58355882

```
                                FREQUENCY FOR GENERATIONS    4 TO 1203
0.8240 TO 0.8274      *
0.8274 TO 0.8309      **
0.8309 TO 0.8343      ***
0.8343 TO 0.8377      ****
0.8377 TO 0.8411      *****
0.8411 TO 0.8445      *
0.8445 TO 0.8480      *****
0.8480 TO 0.8514      *
0.8514 TO 0.8548      *****
0.8548 TO 0.8582      *****
0.8582 TO 0.8616      *****
0.8616 TO 0.8650      *****
0.8650 TO 0.8685      *****
0.8685 TO 0.8719      *****
0.8719 TO 0.8753      *****
0.8753 TO 0.8787      *****
0.8787 TO 0.8821      *****
0.8821 TO 0.8855      *****
0.8855 TO 0.8890      *****
0.8890 TO 0.8924      *****
0.8924 TO 0.8958      *****
0.8958 TO 0.8992      *****
0.8992 TO 0.9026      *****
0.9026 TO 0.9060      *****
0.9060 TO 0.9095      *****
0.9095 TO 0.9129      *****
0.9129 TO 0.9163      *****
0.9163 TO 0.9197      *****
0.9197 TO 0.9231      *****
0.9231 TO 0.9265      *****
0.9265 TO 0.9300      *****
0.9300 TO 0.9334      *****
0.9334 TO 0.9368      *****
0.9368 TO 0.9402      *****
0.9402 TO 0.9436      *****
0.9436 TO 0.9470      *****
0.9470 TO 0.9505      *****
0.9505 TO 0.9539      *****
0.9539 TO 0.9573      **
0.9573 TO 0.9607      *
0.9607 TO 0.9641      **
0.9641 TO 0.9675      *
0.9675 TO 0.9710      *
0.9710 TO 0.9744      *
0.9744 TO 0.9778      *
0.9778 TO 0.9812      *
0.9812 TO 0.9846      *
0.9846 TO 0.9880      *
0.9880 TO 0.9915      *
0.9915 TO 0.9949      *
```

```
                                FREQUENCY FOR GENERATIONS 304 TO 1203
0.8240 TO 0.8274      *
0.8274 TO 0.8309      **
0.8309 TO 0.8343      ***
0.8343 TO 0.8377      ****
0.8377 TO 0.8411      *****
0.8411 TO 0.8445      *
0.8445 TO 0.8480      **
0.8480 TO 0.8514      ***
0.8514 TO 0.8548      ****
0.8548 TO 0.8582      *****
0.8582 TO 0.8616      *
0.8616 TO 0.8650      **
0.8650 TO 0.8685      ***
0.8685 TO 0.8719      ****
0.8719 TO 0.8753      *****
0.8753 TO 0.8787      *
0.8787 TO 0.8821      **
0.8821 TO 0.8855      ***
0.8855 TO 0.8890      ****
0.8890 TO 0.8924      *****
0.8924 TO 0.8958      *
0.8958 TO 0.8992      **
0.8992 TO 0.9026      ***
0.9026 TO 0.9060      ****
0.9060 TO 0.9095      *****
0.9095 TO 0.9129      *
0.9129 TO 0.9163      **
0.9163 TO 0.9197      ***
0.9197 TO 0.9231      ****
0.9231 TO 0.9265      *****
0.9265 TO 0.9300      *
0.9300 TO 0.9334      **
0.9334 TO 0.9368      ***
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0.9402 TO 0.9436      *****
0.9436 TO 0.9470      *
0.9470 TO 0.9505      **
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0.9539 TO 0.9573      ****
0.9573 TO 0.9607      *****
0.9607 TO 0.9641      *
0.9641 TO 0.9675      **
0.9675 TO 0.9710      ***
0.9710 TO 0.9744      ****
0.9744 TO 0.9778      *****
0.9778 TO 0.9812      *
0.9812 TO 0.9846      **
0.9846 TO 0.9880      ***
0.9880 TO 0.9915      ****
0.9915 TO 0.9949      *****
```



FREQUENCY FOR GENERATIONS 604 TO 1203

```
0.8240 TO 0.8274 *
0.8274 TO 0.8309 **
0.8309 TO 0.8343 **
0.8343 TO 0.8377 **
0.8377 TO 0.8411 **
0.8411 TO 0.8445 ***
0.8445 TO 0.8480 *****
0.8480 TO 0.8514 *****
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0.8650 TO 0.8685 *****
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0.8821 TO 0.8855 *****
0.8855 TO 0.8890 *****
0.8890 TO 0.8924 *****
0.8924 TO 0.8958 *****
0.8958 TO 0.8992 *****
0.8992 TO 0.9026 *****
0.9026 TO 0.9060 *****
0.9060 TO 0.9095 *****
0.9095 TO 0.9129 *****
0.9129 TO 0.9163 *****
0.9163 TO 0.9197 *****
0.9197 TO 0.9231 *****
0.9231 TO 0.9265 *****
0.9265 TO 0.9300 *****
0.9300 TO 0.9334 *****
0.9334 TO 0.9368 *****
0.9368 TO 0.9402 *****
0.9402 TO 0.9436 *****
0.9436 TO 0.9470 *****
0.9470 TO 0.9505 *****
0.9505 TO 0.9539 **
0.9539 TO 0.9573 *
0.9573 TO 0.9607 *
0.9607 TO 0.9641 *
0.9641 TO 0.9675 *
0.9675 TO 0.9710 *
0.9710 TO 0.9744 *
0.9744 TO 0.9778 *
0.9778 TO 0.9812 *
0.9812 TO 0.9846 *
0.9846 TO 0.9880 *
0.9880 TO 0.9915 *
0.9915 TO 0.9949 *
```

FREQUENCY FOR GENERATIONS 904 TO 1203

0.8240 TO 0.8274 \*  
0.8274 TO 0.8309 \*  
0.8309 TO 0.8343 \*  
0.8343 TO 0.8377 \*  
0.8377 TO 0.8411 \*  
0.8411 TO 0.8445 \*\*  
0.8445 TO 0.8480 \*\*\*  
0.8480 TO 0.8514 \*\*\*\*  
0.8514 TO 0.8548 \*\*\*\*  
0.8548 TO 0.8582 \*\*\*\*\*  
0.8582 TO 0.8616 \*\*\*\*\*  
0.8616 TO 0.8650 \*\*\*\*\*  
0.8650 TO 0.8685 \*\*\*\*\*  
0.8685 TO 0.8719 \*\*\*\*\*  
0.8719 TO 0.8753 \*\*\*\*\*  
0.8753 TO 0.8787 \*\*\*\*\*  
0.8787 TO 0.8821 \*\*\*\*\*  
0.8821 TO 0.8855 \*\*\*\*\*  
0.8855 TO 0.8890 \*\*\*\*\*  
0.8890 TO 0.8924 \*\*\*\*\*  
0.8924 TO 0.8958 \*\*\*\*\*  
0.8958 TO 0.8992 \*\*\*\*\*  
0.8992 TO 0.9026 \*\*\*\*\*  
0.9026 TO 0.9060 \*\*\*\*\*  
0.9060 TO 0.9095 \*\*\*\*\*  
0.9095 TO 0.9129 \*\*\*\*\*  
0.9129 TO 0.9163 \*\*\*\*\*  
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0.9334 TO 0.9368 \*\*\*\*\*  
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0.9744 TO 0.9778 \*  
0.9778 TO 0.9812 \*  
0.9812 TO 0.9846 \*  
0.9846 TO 0.9880 \*  
0.9880 TO 0.9915 \*  
0.9915 TO 0.9949 \*

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 28.77900 MINUTES  
.....  
\*

Figure 6.6.8-2 Maximum Reactivity DIDO Configuration – Infinite Array

```
NAC International
OSCALENT Banner Generation Utility v3.6 (20010221)
+-----+
I JOB INFORMATION I
+-----+

Working Directory:      D:\HJP\PLATEMIN_THCLAMIN_FUELLMIN_HTELEMIN_UM-MAX_UWMAX_OCFMAX\
Output File Name:      plateMin_thclamin_fuellMin_hteleMin_um-Max_uwMax_OCFMax.out
Start Date:            February 21, 2001
Start Time:            17:18:06

+-----+
I SOFTWARE INFORMATION I
+-----+

Program Name:          Scale 4.3 for Windows NT 4.0
Version:               4.3.1
Installation Date:     June 10, 1998
Code Verification Package #: EA913-1010-94, Rev. 0
Code Verification Date: June 10, 1998
Program Location:     G:\scale43\win_nt\exe

+-----+
I SYSTEM INFORMATION I
+-----+

Computer Type:         Dell Precision 410
Operating System:     Windows NT Version 4.0
Computer ID:          57NTY (MAC# 00C04F600F94)
Serial Number:        57NTY
Login ID:              zjf
System Verification Date: July 3, 2000
```

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT with Loose DIDO HEU Fuel, Accident Condition, Radial Shift Pattern - Centere
'Fuel Tube Thick - Nominal Fuel Tube OD - Nominal Fuel Tube Height - Nominal
'Fuel Base Plate - Nominal Fuel Plate Diameter - Nominal Fuel Plate Thickness
'Fuel Plate Clad Thickness - Min Active Fuel Length - Min Fuel Element Height
'U235 Fuel Mass - Max Uranium Weight Fraction - Max Cylinder Pitch - Outer_Fix
27GROUPNDF4 LATTICECELL
'Material Description for LWT Analysis - DIDO HEU Fuel
URANIUM 1 DEN=0.5477 1.0 293.0 92235 94.0 92238 06.0 END
AL 1 DEN=1.7930 1.0 293.0 END
AL 2 1.00 293.0 END
H2O 3 DEN=0.9998 1.00 293.0 END
ARBMGLC 0.9437 3 0 1 0
6012 2 1001 6 8016 2
4 0.5840 END
H2O 4 0.4160 293.0 END
PB 5 1.00 293.0 END
SS304 6 1.00 293.0 END
AL 7 1.00 293.0 END
SS304 8 1.00 293.0 END
H2O 9 DEN=0.0001 1.00 293.0 END
END COMP
SYMMSLABCELL 0.9800 0.0650 1 3 0.1300 2 END

READ PARAM TBA=5 TME=90 RUN=YES PLT=NO
GEN=1203 NPG=1000 END PARAM
READ START XSM=-16.85 XSP=16.85 YSM=16.85 YSP=-16.85
ZSM=26.67 ZSP=473.35 END START
READ GEOM
UNIT 1
COM='Fueled Annular Sections Tube 1 Loose '
'Fuel Annulus 1
CYLINDER 3 1 3.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.0625 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.1275 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
'Fuel Annulus 2
CYLINDER 3 1 3.5300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.5625 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.6275 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 58.7500 0.0000 ORIGIN 0.0000 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.0625 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 4.1275 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
'Fuel Annulus 4
CYLINDER 3 1 4.5300 58.7500 0.0000
CYLINDER 2 1 4.5625 58.7500 0.0000
CYLINDER 1 1 4.6275 58.7500 0.0000
CYLINDER 2 1 4.6599 58.7500 0.0000
UNIT 2
COM='Axial Clad Sections Tube 1 Loose '
'Clad Axial End Piece 1
CYLINDER 3 1 3.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.5300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 1.3750 0.0000 ORIGIN 0.0000 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
'Clad Axial End Piece 4
CYLINDER 3 1 4.5300 1.3750 0.0000
CYLINDER 2 1 4.6599 1.3750 0.0000
UNIT 3
COM='Fuel Element Tube 1'
CYLINDER 3 1 4.6600 61.5000 0.0000
HOLE 2 0.0000 0.0000 0.0000
HOLE 1 0.0000 0.0000 1.3750
HOLE 2 0.0000 0.0000 60.1250
UNIT 4
COM='Basket Fuel Tube - Fuel Down Radial Centered'
CYLINDER 3 1 5.0927 73.1773 0.0000
HOLE 3 0.0000 0.0000 0.0000
CYLINDER 2 1 5.3974 73.1773 0.0000
UNIT 5
COM='Basket Fuel Tube - Fuel Up Radial Centered'
CYLINDER 3 1 5.0927 73.1773 0.0000
HOLE 3 0.0000 0.0000 11.6772
CYLINDER 2 1 5.3974 73.1773 0.0000
UNIT 6
COM='Basket Bottom Plate Hole '
CYLINDER 3 1 1.27 1.2698 0.0000
UNIT 7
COM='Basket Bottom Plate '
CYLINDER 6 1 16.8466 1.2698 0.0000
HOLE 6 0.0000 0.0000 0.0000
HOLE 6 10.7950 0.0000 0.0000
HOLE 6 5.3975 9.3487 0.0000
HOLE 6 -5.3975 9.3487 0.0000
HOLE 6 -10.7950 0.0000 0.0000
HOLE 6 -5.3975 -9.3487 0.0000
HOLE 6 5.3975 -9.3487 0.0000
UNIT 8
COM='Heat Transfer Bar / Rod '
CYLINDER 7 1 0.3165 73.1773 0.0000
UNIT 9
COM='Basket Fuel Down'
CYLINDER 3 1 16.1926 73.1773 0.0000
HOLE 4 0.0000 0.0000 0.0000
HOLE 4 10.7950 0.0000 0.0000
HOLE 8 4.9493 2.8575 0.0000
HOLE 8 4.6024 3.3881 0.0000
HOLE 8 5.2354 2.2917 0.0000
HOLE 4 5.3975 9.3487 0.0000
HOLE 8 0.0000 5.7150 0.0000

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```

HOLE 8 -0.6330 5.6798 0.0000
HOLE 8 0.6330 5.6798 0.0000
HOLE 4 -5.3975 9.3487 0.0000
HOLE 8 -4.9493 2.8575 0.0000
HOLE 8 -5.2354 2.2917 0.0000
HOLE 8 -4.6024 3.3881 0.0000
HOLE 4 -10.7950 0.0000 0.0000
HOLE 8 -4.9493 -2.8575 0.0000
HOLE 8 -4.6024 -3.3881 0.0000
HOLE 8 -5.2354 -2.2917 0.0000
HOLE 4 -5.3975 -9.3487 0.0000
HOLE 8 0.0000 -5.7150 0.0000
HOLE 8 0.6330 -5.6798 0.0000
HOLE 8 -0.6330 -5.6798 0.0000
HOLE 4 5.3975 -9.3487 0.0000
HOLE 8 4.9493 -2.8575 0.0000
HOLE 8 5.2354 -2.2917 0.0000
HOLE 8 4.6024 -3.3881 0.0000
CYLINDER 7 1 16.6688 73.1773 0.0000
CYLINDER 3 1 16.8466 73.1773 0.0000
UNIT 10
COM='Basket Fuel Up'
CYLINDER 3 1 16.1926 73.1773 0.0000
HOLE 5 0.0000 0.0000 0.0000
HOLE 5 10.7950 0.0000 0.0000
HOLE 8 4.9493 2.8575 0.0000
HOLE 8 4.6024 3.3881 0.0000
HOLE 8 5.2354 2.2917 0.0000
HOLE 5 5.3975 9.3487 0.0000
HOLE 8 0.0000 5.7150 0.0000
HOLE 8 -0.6330 5.6798 0.0000
HOLE 8 0.6330 5.6798 0.0000
HOLE 5 -5.3975 9.3487 0.0000
HOLE 8 -4.9493 2.8575 0.0000
HOLE 8 -5.2354 2.2917 0.0000
HOLE 8 -4.6024 3.3881 0.0000
HOLE 5 -10.7950 0.0000 0.0000
HOLE 8 -4.9493 -2.8575 0.0000
HOLE 8 -4.6024 -3.3881 0.0000
HOLE 8 -5.2354 -2.2917 0.0000
HOLE 5 -5.3975 -9.3487 0.0000
HOLE 8 0.0000 -5.7150 0.0000
HOLE 8 0.6330 -5.6798 0.0000
HOLE 8 -0.6330 -5.6798 0.0000
HOLE 5 5.3975 -9.3487 0.0000
HOLE 8 4.9493 -2.8575 0.0000
HOLE 8 5.2354 -2.2917 0.0000
HOLE 8 4.6024 -3.3881 0.0000
CYLINDER 7 1 16.6688 73.1773 0.0000
CYLINDER 3 1 16.8466 73.1773 0.0000
UNIT 11
COM='Cask Cavity '
CYLINDER 3 1 16.9863 446.6844 0.0000
HOLE 7 0.0000 0.0000 0.0001
HOLE 10 0.0000 0.0000 1.2700
HOLE 7 0.0000 0.0000 74.4475
HOLE 9 0.0000 0.0000 75.7174
HOLE 7 0.0000 0.0000 148.8949
HOLE 10 0.0000 0.0000 150.1648
HOLE 7 0.0000 0.0000 223.3423
HOLE 9 0.0000 0.0000 224.6122
HOLE 7 0.0000 0.0000 297.7897
HOLE 10 0.0000 0.0000 299.0596
HOLE 7 0.0000 0.0000 372.2371
HOLE 9 0.0000 0.0000 373.5070
UNIT 12
COM='Cask Shield Radial Configuration '
CYLINDER 3 1 16.9863 446.6844 0.0000
HOLE 11 0.0000 0.0000 0.0000
CYLINDER 8 1 18.9103 446.6844 0.0000
CYLINDER 5 1 33.4645 446.6844 0.0000
CYLINDER 8 1 36.5189 446.6844 0.0000
CYLINDER 9 1 49.2189 446.6844 0.0000
CYLINDER 8 1 49.8183 446.6844 0.0000
CUBOID 9 1 4P49.8183 446.6844 0.0000
UNIT 13
COM='LWT Lid '
CYLINDER 8 1 36.5189 28.5750 0.5994
CYLINDER 9 1 49.8183 28.5750 0.5994
CYLINDER 8 1 49.8183 28.5750 0.0000
CUBOID 9 1 4P49.8183 28.5750 0.0000
UNIT 14
COM='LWT Bottom Weldment '
CYLINDER 5 1 26.3525 16.5100 8.8900
CYLINDER 8 1 36.5189 26.0706 0.0000
CYLINDER 9 1 49.8183 26.0706 0.0000
CYLINDER 8 1 49.8183 26.6700 0.0000
CUBOID 9 1 4P49.8183 26.6700 0.0000
GLOBAL UNIT 15
COM='LWT Cask '
ARRAY 1 -49.8183 -49.8183 0.0000
END GEOM
READ ARRAY
ARA=1 NUX=1 NUZ=3 FILL 14 12 13 END FILL
END ARRAY
READ BOUNDS ALL=MIRROR END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CENTER ELEMENT - FUEL ELEVATION '
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-5.4 YUL=5.4 ZUL=57.4
XLR=5.4 YLR=-5.4 ZLR=57.4 END
TTL='X-Y PLOT OF BASKET - FUEL ELEVATION '
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-17.0 YUL=17.0 ZUL=57.4
XLR=17.0 YLR=-17.0 ZLR=57.4 END
TTL='X-Y PLOT OF CASK - FUEL ELEVATION '

```

```
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-49.8 YUL=49.8 ZUL=57.4
XLR=49.8 YLR=-49.8 ZLR=57.4 END
TTL='X-Z PLOT OF BOTTOM BASKET - CENTER FUEL ELEMENT CROSS SECTION '
SCR=YES PIC=MAT LPI=10
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-5.4 YUL=0.0 ZUL=77.4
XLR=5.4 YLR=0.0 ZLR=57.4 END
TTL='X-Z PLOT OF BOTTOM BASKET - CENTER FUEL ELEMENT ROW '
SCR=YES PIC=MAT LPI=10
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-17.0 YUL=0.0 ZUL=101.1
XLR=17.0 YLR=0.0 ZLR=26.7 END
TTL='Y-Z (X=0) PLOT OF BOTTOM BASKET '
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=1500
XUL=0.0 YUL=-17.0 ZUL=101.1
XLR=0.0 YLR=17.0 ZLR=26.7 END
TTL='X-Z PLOT OF BOTTOM BASKET - TOP FUEL ELEMENT ROW '
SCR=YES PIC=MAT LPI=10
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-17.0 YUL=9.3 ZUL=101.1
XLR=17.0 YLR=9.3 ZLR=26.7 END
TTL='X-Z PLOT OF CASK CAVITY '
SCR=YES PIC=MAT LPI=5
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-17.0 YUL=0.0 ZUL=474.4
XLR=17.0 YLR=0.0 ZLR=25.7 END
TTL='X-Z PLOT OF CASK '
SCR=YES PIC=MAT LPI=5
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-49.8 YUL=0.0 ZUL=502.9
XLR=49.8 YLR=0.0 ZLR=0.0 END
END PLOT
END DATA
```

```
SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.88 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 4.28 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1748.06 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1755.97 (SECONDS).
```







'Fuel Tube Thick - Nominal Fuel Tube OD - Nominal Fuel Tube Height - Nominal  
'Fuel Base Plate - Nominal Fuel Plate Diameter - Nominal Fuel Plate Thickness  
'Fuel Plate Clad Thickness - Min Active Fuel Length - Min Fuel Element Height  
'U235 Fuel Mass - Max Uranium Weight Fraction - Max Cylinder Pitch - Outer\_Fix  
'Material Description for LWT Analysis - DIDO HEU Fuel  
'Fuel Tube Thick - Nominal Fuel Tube OD - Nominal Fuel Tube Height - Nominal  
'Fuel Base Plate - Nominal Fuel Plate Diameter - Nominal Fuel Plate Thickness  
'Fuel Plate Clad Thickness - Min Active Fuel Length - Min Fuel Element Height  
'U235 Fuel Mass - Max Uranium Weight Fraction - Max Cylinder Pitch - Outer\_Fix  
'Material Description for LWT Analysis - DIDO HEU Fuel

LWT WITH LOOSE DIDO HEU FUEL, ACCIDENT CONDITION, RADIAL SHIFT PATTERN - CENTERE

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDF4 LIBRARY  
MXA 9 MIXTURES  
MSC 11 COMPOSITION SPECIFICATIONS  
IZM 3 MATERIAL ZONES  
GE LATTICECELL GEOMETRY  
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA  
MSLN 0 FUEL SOLUTIONS

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

SC URANIUM STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.5477 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
92000 1.00 ATOM/MOLECULE  
92235 94.000 WT%  
92238 6.000 WT%

END

SC AL STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 1.7930 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC AL STANDARD COMPOSITION  
MX 2 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9998 SPECIFIED DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

SC ARBMGLC STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 0.5940 VOLUME FRACTION  
ROTH 0.9437 SPECIFIED DENSITY  
NEL 3 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
6012 2.00 ATOMS/MOLECULE  
1001 6.00 ATOMS/MOLECULE  
8016 2.00 ATOMS/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 0.4160 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

SC PB STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND

TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE  
END

SC SS304 STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

END

SC AL STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC SS304 STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

END

SC H2O STANDARD COMPOSITION  
MX 9 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.0001 SPECIFIED DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

CTP SYMMSLABCELL CELL TYPE  
PITCH 0.9800 CM CENTER TO CENTER SPACING  
FUELOD 0.0650 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 3 MIXTURE NO. OF MODERATOR  
CLADOD 0.1300 CM CLAD OUTER DIAMETER  
MCLAD 2 MIXTURE NO. OF CLAD

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL  
ZONE 2 IS CLAD  
ZONE 3 IS MOD

```

.....
LWT WITH LOOSE DIDO HEU FUEL, ACCIDENT CONDITION, RADIAL SHIFT PATTERN - CENTERE
.....
***** DATA LIBRARY INFORMATION *****
UNIT          DATA SET NAME          VOLUME      UNIT FUNCTION
NUMBER        NAME                          NAME
-----
89  G:\scale43\DATA LIB\FT89F001    STANDARD COMPOSITION LIBRARY
82  G:\scale43\DATA LIB\FT82F001    CROSS SECTION LIBRARY
11  D:\hjp\plateMin_thclMin_fuellMin_hteleMin_u  SHORT CROSS SECTION LIBRARY
90  D:\hjp\plateMin_thclMin_fuellMin_hteleMin_u  INPUT DATA DIRECT ACCESS
.....

                STANDARD COMPOSITION LIBRARY DATA
                -----
UNIT NUMBER : 89
DATASET NAME : G:\scale43\DATA LIB\FT89F001
LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
                637 STANDARD COMPOSITIONS, 490 NUCLIDES
                90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
CREATION DATE: 6/30/95

                CROSS SECTION LIBRARY DATA
                -----
UNIT NUMBER : 82
DATASET NAME : G:\scale43\DATA LIB\FT82F001
LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
                BASED ON ENDF-B VERSION 4 DATA
                COMPILED FOR NRC      1/27/89
                LAST UPDATED
                L.M.PETRIE - ORNL
                08/12/94
.....

```

```

..... 0 IO'S WERE USED BEFORE READING KENO V DATA .....
..... 0 IO'S WERE USED READING THE KENO V PARAMETER DATA .....

'Fuel Annulus 1
'Fuel Annulus 2
'Fuel Annulus 3
'Fuel Annulus 4
'Clad Axial End Piece 1
'Clad Axial End Piece 2
'Clad Axial End Piece 3
'Clad Axial End Piece 4

***** 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.

```

```

BBBBBBBBBBB  OOOOOOOOOO  NN      NN      AAAAAAAAAA  MM      MM  IIIIIIIIIII  2222222222
BBBBBBBBBBB  OOOOOOOOOOOO  NNN     NN     AAAAAAAAAAAA  MMM     MMM  IIIIIIIIIII  222222222222
BB      BB  OO      OO  NNNN    NN     AAAAAAA  MM      MM      MM      MM      II  22      22
BB      BB  OO      OO  NN  NN   NN     AA      AA  MM  MM  MM  MM  II  22      22
BB      BB  OO      OO  NN  NN   NN     AA      AA  MM  MM  MM  MM  II  22      22
BBBBBBBBBBB  OO      OO  NN  NN   NN     AAAAAAAAAAAA  MMM     MM      MM      II  22      22
BBBBBBBBBBB  OO      OO  NN  NN   NN     AAAAAAAAAAAA  MM      M  MM      MM      II  22      22
BB      BB  OO      OO  NN  NN   NN     AA      AA  MM      MM      II  22      22
BB      BB  OO      OO  NN  NN   NN     AA      AA  MM      MM      II  22      22
BB      BB  OO      OO  NN  NN   NN     AA      AA  MM      MM      II  22      22
BBBBBBBBBBB  OOOOOOOOOOOO  NN      NNN     AA      AA  MM      MM  IIIIIIIIIII  222222222222
BBBBBBBBBBB  OOOOOOOOOOOO  NN      NN     AA      AA  MM      MM  IIIIIIIIIII  222222222222
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCCCC  AAAAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE      EE      PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE      EE      PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE      EE      PP      PP  CC      CC
SSSSSSSSSS  CC      CC  AAAAAAAAAAAA  LL      EEEEEEEEE  PPPPPPPPPP  CC
SSSSSSSSSS  CC      CC  AAAAAAAAAAAA  LL      EEEEEEEEE  PPPPPPPPPP  CC
SS      SS  CC      CC  AA      AA  LL      EE      EE      PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE      EE      PP      PP  CC      CC
SSSSSSSSSS  CCCCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
    
```

```

00000000  2222222222  //  2222222222  11  //  00000000  11
00000000  222222222222  //  222222222222  111  //  000000000  111
00      00  22      22  //  22      22  1111  //  00      00  1111
00      00  22      22  //  22      22  11      //  00      00  11
00      00  22      22  //  22      22  11      //  00      00  11
00      00  22      22  //  22      22  11      //  00      00  11
00      00  22      22  //  22      22  11      //  00      00  11
00      00  22      22  //  22      22  11      //  00      00  11
00      00  22      22  //  22      22  11      //  00      00  11
00      00  22      22  //  22      22  11      //  00      00  11
000000000  222222222222  //  222222222222  11111111  //  000000000  11111111
00000000  222222222222  //  222222222222  11111111  //  00000000  11111111
    
```

```

11      7777777777  //  11      8888888888  //  11      2222222222
111     7777777777  //  111     888888888888  //  111     222222222222
1111    77          //  1111   88          //  1111   22
11      77          //  11      88          //  11      22
11      77          //  11      88          //  11      22
11      77          //  11      88          //  11      22
11      77          //  11      88          //  11      22
11      77          //  11      88          //  11      22
11      77          //  11      88          //  11      22
11      77          //  11      88          //  11      22
11111111  77          //  11111111  888888888888  //  11111111  222222222222
11111111  77          //  11111111  888888888888  //  11111111  222222222222
    
```



-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

PROBLEM DESCRIPTION

IGR--GEOMETRY (0/1/2/3--INF MED/SLAB/CYL/SPHERE) 1  
IZM--NUMBER OF ZONES OR MATERIAL REGIONS 9  
MS--MIXING TABLE LENGTH 21  
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 21 ENTRIES.  
4Q ARRAY HAS 21 ENTRIES.  
5Q ARRAY HAS 21 ENTRIES.  
6Q ARRAY HAS 9 ENTRIES.  
7Q ARRAY HAS 9 ENTRIES.  
8Q ARRAY HAS 9 ENTRIES.  
9Q ARRAY HAS 9 ENTRIES.  
10Q ARRAY HAS 21 ENTRIES.  
11Q ARRAY HAS 9 ENTRIES.

MIXING TABLE

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	1.31908E-03	1092235
2	1	92238	8.31332E-05	1092238
3	1	13027	4.00184E-02	1013027
4	2	13027	6.03066E-02	2013027
5	7	13027	6.03066E-02	7013027
6	3	1001	6.68762E-02	3001001
7	4	1001	5.98801E-02	4001001
8	9	1001	6.68896E-06	9001001
9	3	8016	3.34381E-02	3008016
10	4	8016	2.45894E-02	4008016
11	9	8016	3.34448E-06	9008016
12	4	6012	1.07014E-02	4006012
13	5	82000	3.29690E-02	5082000
14	6	24304	1.74286E-02	6024304
15	8	24304	1.74286E-02	8024304
16	6	25055	1.73633E-03	6025055
17	8	25055	1.73633E-03	8025055
18	6	26304	5.93579E-02	6026304
19	8	26304	5.93579E-02	8026304
20	6	28304	7.72070E-03	6028304
21	8	28304	7.72070E-03	8028304

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	3.25000E-02	2.93000E+02	4.53946E+00	0
2	2	6.50000E-02	2.93000E+02	0.00000E+00	0
3	3	4.90000E-01	2.93000E+02	0.00000E+00	0
4	4	5.49000E+00	2.93000E+02	0.00000E+00	0
5	5	1.04900E+01	2.93000E+02	0.00000E+00	0
6	6	1.54900E+01	2.93000E+02	0.00000E+00	0
7	7	2.04900E+01	2.93000E+02	0.00000E+00	0
8	8	2.54900E+01	2.93000E+02	0.00000E+00	0
9	9	3.04900E+01	2.93000E+02	0.00000E+00	0

4087 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 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 13027 AL-27 1193 218 G FROM LOG 11 TO LOG 18 BONDARENKO TRIGGER 0  
 COPY 13027 AL-27 1193 218 G FROM LOG 18 TO LOG 1 BONDARENKO TRIGGER 0  
 COPY 13027 AL-27 1193 218 G FROM LOG 18 TO LOG 1 BONDARENKO TRIGGER 0

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COPY	13027	AL-27 1193 218 G	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	24304	CR 1191 WT SS-30	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	24304	CR 1191 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	24304	CR 1191 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	25055	MANGANESE-55	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	25055	MANGANESE-55	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	25055	MANGANESE-55	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	26304	FE 1192 WT SS-30	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	26304	FE 1192 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	26304	FE 1192 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	28304	NI 1190 WT SS-30	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	28304	NI 1190 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	28304	NI 1190 WT SS-30	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	82000	PB 1288 218NGP	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 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89  
LAST UPDATED  
L.M.PETRIE - ORNL

08/12/94

TAPE ID	4321	NUMBER OF NUCLIDES	21
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 08/12/94	ID	3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID	4001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID	9001001
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94	ID	4006012
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID	3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID	4008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID	9008016
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID	1013027
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID	2013027
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID	7013027
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID	6024304
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID	8024304
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID	6025055
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID	8025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID	6026304
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID	8026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID	6028304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID	8028304
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID	5082000
URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID	1092235
URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	ID	1092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.27 SECONDS





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-1Q ARRAY HAS      1 ENTRIES.
  0Q ARRAY HAS      9 ENTRIES.
  1Q ARRAY HAS     12 ENTRIES.
SELECT 21 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

  4 RESONANCE CALCULATIONS HAVE BEEN REQUESTED
-1 OUTPUT OPTION FOR AMPX FORMATTED CROSS SECTION DATA
2001 MAXIMUM NUMBER OF RESONANCE MESH INTERVALS
  2 ORDER OF RESONANCE LEVEL PROCESSING

THE STORAGE ALLOCATED FOR THIS CASE IS 100000 WORDS

  2Q ARRAY HAS     21 ENTRIES.
  3Q ARRAY HAS     60 ENTRIES.
  4Q ARRAY HAS     21 ENTRIES.

GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
TAPE IDENTIFICATION NUMBER      4321
NUMBER OF NUCLIDES ON TAPE       21
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 1680 WORDS
XSDRN TAPE 4321

SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
BASED ON ENDF-B VERSION 4 DATA
COMPILED FOR NRC 1/27/89
LAST UPDATED
L.M.PETRIE - ORNL

08/12/94

NUCLIDES FROM XSDRN TAPE
  1 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 3001001
  2 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 4001001
  3 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 9001001
  4 CARBON-12 ENDF/B-IV MAT 1274/THRM1065 UPDATED 08/12/94 4006012
  5 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 3008016
  6 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 4008016
  7 OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 9008016
  8 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 1013027
  9 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 2013027
 10 AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 7013027
 11 CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 6024304
 12 CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8024304
 13 MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 6025055
 14 MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 8025055
 15 FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 6026304
 16 FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8026304
 17 NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 6028304
 18 NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8028304
 19 PB 1288 218NGP 042375 P-3 293K UPDATED 08/12/94 5082000
 20 URANIUM-235 ENDF/B-IV MAT 1261 UPDATED 08/12/94 1092235
 21 URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 1092238

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 3001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 4001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94 9001001 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CARBON-12 ENDF/B-IV MAT 1274/THRM1065 UPDATED 08/12/94 4006012 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 3008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 4008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 9008016 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 1013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 2013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

AL-27 1193 218 GP 040375(5) UPDATED 08/12/94 7013027 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 6024304 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8024304 TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 6025055 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE
MASS NUMBER (A) = 54.466 TEMPERATURE (KELVIN) = 293.000
POTENTIAL SCATTER SIGMA = 2.590 LUMPED NUCLEAR DENSITY = 1.7363295E-03

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SPIN FACTOR (G) = 14.448 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 = 55.845 SIGMA(PER ABSORBER ATOM) = 3.4663022E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 55.925 SIGMA(PER ABSORBER ATOM) = 1.2557598E+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
8	-5.518788E-04	0.000000E+00	-3.944190E-01
9	-2.797993E-03	0.000000E+00	-2.293471E+00
10	-3.291452E-01	0.000000E+00	-3.820862E+01
11	-2.680562E+00	0.000000E+00	-1.159996E+02

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 3.33719E+00  
FISSION 0.00000E+00

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 8025055 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 54.466 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 2.590 LUMPED NUCLEAR DENSITY = 1.7363295E-03  
SPIN FACTOR (G) = 14.448 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 = 55.845 SIGMA(PER ABSORBER ATOM) = 3.4663022E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 55.925 SIGMA(PER ABSORBER ATOM) = 1.2557598E+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
8	-5.518788E-04	0.000000E+00	-3.944190E-01
9	-2.797993E-03	0.000000E+00	-2.293471E+00
10	-3.291452E-01	0.000000E+00	-3.820862E+01
11	-2.680562E+00	0.000000E+00	-1.159996E+02

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 3.33719E+00  
FISSION 0.00000E+00

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375) \* UPDATED 08/12/94 6026304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375) \* UPDATED 08/12/94 8026304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375) \* UPDATED 08/12/94 6028304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375) \* UPDATED 08/12/94 8028304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

PB 1288 218NGP 042375 P-3 293K UPDATED 08/12/94 5082000 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261 UPDATED 08/12/94 1092235 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 233.025 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 11.500 LUMPED NUCLEAR DENSITY = 1.3190822E-03  
SPIN FACTOR (G) = 15171.100 LUMP DIMENSION (A-BAR) = 6.4999998E-02  
INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 1.5211706E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM) = 4.0850834E+01

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 238.051 SIGMA(PER ABSORBER ATOM) = 7.7685082E-01

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-1.712865E+00	-1.053512E+00	-4.421081E-02
13	-5.191924E+00	-2.544281E+00	-1.184106E-01
14	-3.743466E+00	-2.214335E+00	-2.824813E-02
15	-2.253279E-04	-1.715397E-04	1.537884E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.15925E+02  
FISSION 1.28649E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262

UPDATED 08/12/94 1092238 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A)	=	236.006	TEMPERATURE (KELVIN)	=	293.000
POTENTIAL SCATTER SIGMA	=	10.599	LUMPED NUCLEAR DENSITY	=	8.3133229E-05
SPIN FACTOR (G)	=	656.527	LUMP DIMENSION (A-BAR)	=	6.4999998E-02
INNER RADIUS	=	0.0000000E+00	DANCOFF CORRECTION (C)	=	1.5211706E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM) = 6.4818372E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 235.044 SIGMA(PER ABSORBER ATOM) = 1.8885785E+02

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-1.309125E-04	0.000000E+00	-1.475272E-03
10	-7.025824E-03	-3.903629E-08	-5.099698E-02
11	-3.303697E-01	0.000000E+00	-1.054719E+00
12	-3.107242E+00	0.000000E+00	-3.725560E+00
13	-3.585465E+00	0.000000E+00	-1.189779E+00
14	-6.584399E+00	0.000000E+00	-3.875874E-01
15	-4.155954E-09	0.000000E+00	3.752471E-09

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.57082E+02  
FISSION 5.33631E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

THIS XSDRN WORKING TAPE WAS CREATED 02/21/01 AT 17:18:13  
THE TITLE OF THE PARENT CASE IS AS FOLLOWS  
SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89

TAPE ID	4321	NUMBER OF NUCLIDES	21
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 08/12/94	ID 3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 4001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 9001001
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94	ID 4006012
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 4008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 9008016
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 1013027
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 2013027
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 7013027
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 6024304
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8024304
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID 6025055
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID 8025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 6026304
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 6028304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8028304
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 5082000
URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID 1092235
URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	ID 1092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.11 SECONDS









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***** 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 YES ***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO ***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO PWT PRINT WEIGHT AVERAGE ARRAY NO ***
*** PKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO ***
*** P1D PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO ***
*** TRK PRINT TRACKING INFORMATION NO ***
*****
PARAMETER INPUT COMPLETED
```

```
..... 0 IO'S WERE USED READING THE PARAMETER DATA .....
***** DATA READING COMPLETED *****
```

```

*****
***
***
***
*****
***
UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION
NUMBER        -----          NAME            -----
-----
***
XSC 14        D:\hjp\plateMin_thclaMin_fuellMin_hteleMin_u          MIXED CROSS SECTIONS
***
ALB 79        G:\scale43\DATALIB\FT79F001                              INPUT ALBEDOS
***
WTS 80        G:\scale43\DATALIB\FT80F001                              INPUT WEIGHTS
***
SKT 16        UNKNOWN                                                  WRITE SCRATCH DATA
***
BIN 95        D:\hjp\plateMin_thclaMin_fuellMin_hteleMin_u          BINARY INPUT DATA
***
RST 95        D:\hjp\plateMin_thclaMin_fuellMin_hteleMin_u          READ RESTART DATA
***
LIB 4         D:\hjp\plateMin_thclaMin_fuellMin_hteleMin_u          INPUT AMPX WORKING LIBRARY
***
8            D:\hjp\plateMin_thclaMin_fuellMin_hteleMin_u          INPUT DATA DIRECT ACCESS
***
9            UNKNOWN                                                  SUPER GROUPED DIRECT ACCESS
***
10           UNKNOWN                                                  XSEC MIXING DIRECT ACCESS
***
*****

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..... 0 IO'S WERE USED PREPARING INPUT DATA .....

CROSS SECTIONS READ FROM THE AMPX WORKING LIBRARY ON UNIT 4

MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD = 3.0E-05

MIXTURE =	1	DENSITY (G/CC) =	2.3407					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
1013027	4.00184E-02	7.66010E-01	13027	26.9818	AL-27 1193 218 GP 040375(5)		UPDATED	
08/12/94								
1092235	1.31908E-03	2.19951E-01	92235	235.0441	URANIUM-235 ENDF/B-IV MAT 1261		UPDATED	
08/12/94								
1092238	8.31332E-05	1.40394E-02	92238	238.0510	URANIUM-238 ENDF/B-IV MAT 1262		UPDATED	
08/12/94								
MIXTURE =	2	DENSITY (G/CC) =	2.7020					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
2013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)		UPDATED	
08/12/94								
MIXTURE =	3	DENSITY (G/CC) =	0.99977					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
3001001	6.68762E-02	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED	
08/12/94								
3008016	3.34381E-02	8.88074E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED	
08/12/94								
MIXTURE =	4	DENSITY (G/CC) =	0.96635					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
4001001	5.98801E-02	1.03684E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED	
08/12/94								
4006012	1.07014E-02	2.20668E-01	6000	12.0001	CARBON-12 ENDF/B-IV MAT 1274/THRM1065		UPDATED	
08/12/94								
4008016	2.45894E-02	6.75649E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED	
08/12/94								
MIXTURE =	5	DENSITY (G/CC) =	11.344					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
5082000	3.29690E-02	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K		UPDATED	
08/12/94								
MIXTURE =	6	DENSITY (G/CC) =	7.9200					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
6024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED	
08/12/94								
6025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED	
08/12/94								
6026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED	
08/12/94								
6028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED	
08/12/94								
MIXTURE =	7	DENSITY (G/CC) =	2.7020					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
7013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)		UPDATED	
08/12/94								
MIXTURE =	8	DENSITY (G/CC) =	7.9200					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
8024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED	
08/12/94								
8025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED	
08/12/94								
8026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED	
08/12/94								
8028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED	
08/12/94								
MIXTURE =	9	DENSITY (G/CC) =	0.99997E-04					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE			
9001001	6.68896E-06	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED	
08/12/94								
9008016	3.34448E-06	8.88074E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED	
08/12/94								
3001001					HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	
4001001					HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	
9001001					HYDROGEN ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	
4006012					CARBON-12 ENDF/B-IV MAT 1274/THRM1065		UPDATED 08/12/94	
3008016					OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED 08/12/94	
4008016					OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED 08/12/94	
9008016					OXYGEN-16 ENDF/B-IV MAT 1276		UPDATED 08/12/94	
1013027					AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	
2013027					AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	
7013027					AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	
6024304					CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	
8024304					CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	
6025055					MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	
8025055					MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	
6026304					FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	
8026304					FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	
6028304					NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	
8028304					NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	
5082000					PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	
1092235					URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	
1092238					URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	

KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 3 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 4 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 9 WERE CORRECTED FOR BAD MOMENTS.  
 ..... 0 IO'S WERE USED MIXING CROSS-SECTIONS .....

---

1-D CROSS SECTION ARRAY ID NUMBERS  
1 2002 1452 27 18 1018  
..... 0 IO'S WERE USED PREPARING THE CROSS SECTIONS .....

```
***** ADDITIONAL INFORMATION *****
NUMBER OF ENERGY GROUPS      27      USE LATTICE GEOMETRY      YES
NO. OF FISSION SPECTRUM SOURCE GROUP  1      GLOBAL ARRAY NUMBER      1
NO. OF SCATTERING ANGLES IN XSECS    2      NUMBER OF UNITS IN THE GLOBAL X DIR.    1
ENTRIES/NEUTRON IN THE NEUTRON BANK  22      NUMBER OF UNITS IN THE GLOBAL Y DIR.    1
ENTRIES/NEUTRON IN THE FISSION BANK  15      NUMBER OF UNITS IN THE GLOBAL Z DIR.    3
NUMBER OF MIXTURES USED          8      USE A GLOBAL REFLECTOR      YES
NUMBER OF BIAS ID'S USED        1      USE NESTED HOLES          YES
NUMBER OF DIFFERENTIAL ALBEDOS USED  0      NUMBER OF HOLES          75
TOTAL INPUT GEOMETRY REGIONS      56      MAXIMUM HOLE NESTING LEVEL    5
NUMBER OF GEOMETRY REGIONS USED    56      USE NESTED ARRAYS          NO
LARGEST GEOMETRY UNIT NUMBER      15      NUMBER OF ARRAYS USED        1
LARGEST ARRAY NUMBER              1      MAXIMUM ARRAY NESTING LEVEL    1
+X BOUNDARY CONDITION      MIRROR    -X BOUNDARY CONDITION      MIRROR
+Y BOUNDARY CONDITION      MIRROR    -Y BOUNDARY CONDITION      MIRROR
+Z BOUNDARY CONDITION      MIRROR    -Z BOUNDARY CONDITION      MIRROR
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***** SPACE AND SUPERGROUP INFORMATION *****
100000 WORDS IS THE TOTAL SPACE AVAILABLE.
42609 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
57391 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
99738 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
57331 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
1037 WORDS ARE NEEDED FOR THE LARGEST GROUP.
43862 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
53220 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
53408 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.

SUPERGROUP      STARTING      ENDING      XSEC      ALBEDO      TOTAL
GROUP           GROUP         GROUP       LENGTH     LENGTH     LENGTH
1                1             27         2010       0          10551

..... 0 IO'S WERE USED IN SUPERGROUPING .....
..... 0 IO'S WERE USED LOADING THE DATA .....
```



REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
					UNIT	1		
FUELED ANNULAR SECTIONS			TUBE	1	LOOSE			
1 CYLINDER	3	1	RADIUS =	3.0300	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
2 CYLINDER	2	1	RADIUS =	3.0625	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
3 CYLINDER	1	1	RADIUS =	3.1275	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
4 CYLINDER	2	1	RADIUS =	3.1600	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
5 CYLINDER	3	1	RADIUS =	3.5300	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
6 CYLINDER	2	1	RADIUS =	3.5625	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
7 CYLINDER	1	1	RADIUS =	3.6275	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
8 CYLINDER	2	1	RADIUS =	3.6600	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
9 CYLINDER	3	1	RADIUS =	4.0300	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
10 CYLINDER	2	1	RADIUS =	4.0625	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
11 CYLINDER	1	1	RADIUS =	4.1275	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
12 CYLINDER	2	1	RADIUS =	4.1600	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
13 CYLINDER	3	1	RADIUS =	4.5300	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
14 CYLINDER	2	1	RADIUS =	4.5625	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
15 CYLINDER	1	1	RADIUS =	4.6275	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	
16 CYLINDER	2	1	RADIUS =	4.6599	+Z =	58.750	-Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000	

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM				
----- UNIT 2 -----							
AXIAL CLAD SECTIONS	TUBE	1	LOOSE				
1 CYLINDER	3	1	RADIUS = 3.0300	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2 CYLINDER	2	1	RADIUS = 3.1600	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	3	1	RADIUS = 3.5300	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4 CYLINDER	2	1	RADIUS = 3.6600	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5 CYLINDER	3	1	RADIUS = 4.0300	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
6 CYLINDER	2	1	RADIUS = 4.1600	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
7 CYLINDER	3	1	RADIUS = 4.5300	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
8 CYLINDER	2	1	RADIUS = 4.6599	+Z = 1.3750	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
----- UNIT 3 -----							
FUEL ELEMENT	TUBE	1					
1 CYLINDER	3	1	RADIUS = 4.6600	+Z = 61.500	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	1		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	2
HOLE NUMBER	2		AT X = 0.00000	Y = 0.00000	Z = 1.3750	IS UNIT NUMBER	1
HOLE NUMBER	3		AT X = 0.00000	Y = 0.00000	Z = 60.125	IS UNIT NUMBER	2
----- UNIT 4 -----							
BASKET FUEL TUBE - FUEL DOWN			RADIAL CENTERED				
1 CYLINDER	3	1	RADIUS = 5.0927	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	4		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	3
2 CYLINDER	2	1	RADIUS = 5.3974	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
----- UNIT 5 -----							
BASKET FUEL TUBE - FUEL UP			RADIAL CENTERED				
1 CYLINDER	3	1	RADIUS = 5.0927	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	5		AT X = 0.00000	Y = 0.00000	Z = 11.677	IS UNIT NUMBER	3
2 CYLINDER	2	1	RADIUS = 5.3974	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
 NUM ID

----- UNIT 6 -----

BASKET BOTTOM PLATE HOLE

1 CYLINDER 3 1 RADIUS = 1.2700 +Z = 1.2698 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

----- UNIT 7 -----

BASKET BOTTOM PLATE

1 CYLINDER 6 1 RADIUS = 16.847 +Z = 1.2698 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

HOLE NUMBER 6 AT X = 0.00000 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 6

HOLE NUMBER 7 AT X = 10.795 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 6

HOLE NUMBER 8 AT X = 5.3975 Y = 9.3487 Z = 0.00000 IS UNIT NUMBER 6

HOLE NUMBER 9 AT X = -5.3975 Y = 9.3487 Z = 0.00000 IS UNIT NUMBER 6

HOLE NUMBER 10 AT X = -10.795 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 6

HOLE NUMBER 11 AT X = -5.3975 Y = -9.3487 Z = 0.00000 IS UNIT NUMBER 6

HOLE NUMBER 12 AT X = 5.3975 Y = -9.3487 Z = 0.00000 IS UNIT NUMBER 6

----- UNIT 8 -----

HEAT TRANSFER BAR / ROD

1 CYLINDER 7 1 RADIUS = 0.31650 +Z = 73.177 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			----- UNIT 9 -----					
BASKET FUEL DOWN								
1	CYLINDER	3 1	RADIUS = 16.193	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
	HOLE NUMBER	13	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	14	AT X = 10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	15	AT X = 4.9493	Y = 2.8575	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	16	AT X = 4.6024	Y = 3.3881	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	17	AT X = 5.2354	Y = 2.2917	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	18	AT X = 5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	19	AT X = 0.00000	Y = 5.7150	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	20	AT X = -0.63300	Y = 5.6798	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	21	AT X = 0.63300	Y = 5.6798	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	22	AT X = -5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	23	AT X = -4.9493	Y = 2.8575	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	24	AT X = -5.2354	Y = 2.2917	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	25	AT X = -4.6024	Y = 3.3881	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	26	AT X = -10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	27	AT X = -4.9493	Y = -2.8575	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	28	AT X = -4.6024	Y = -3.3881	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	29	AT X = -5.2354	Y = -2.2917	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	30	AT X = -5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	31	AT X = 0.00000	Y = -5.7150	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	32	AT X = 0.63300	Y = -5.6798	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	33	AT X = -0.63300	Y = -5.6798	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	34	AT X = 5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	4	
	HOLE NUMBER	35	AT X = 4.9493	Y = -2.8575	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	36	AT X = 5.2354	Y = -2.2917	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	37	AT X = 4.6024	Y = -3.3881	Z = 0.00000	IS UNIT NUMBER	8	
2	CYLINDER	7 1	RADIUS = 16.669	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
3	CYLINDER	3 1	RADIUS = 16.847	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			----- UNIT 10 -----					
BASKET FUEL UP								
1	CYLINDER	3 1	RADIUS = 16.193	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
	HOLE NUMBER	38	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	5	
	HOLE NUMBER	39	AT X = 10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	5	
	HOLE NUMBER	40	AT X = 4.9493	Y = 2.8575	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	41	AT X = 4.6024	Y = 3.3881	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	42	AT X = 5.2354	Y = 2.2917	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	43	AT X = 5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	5	
	HOLE NUMBER	44	AT X = 0.00000	Y = 5.7150	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	45	AT X = -0.63300	Y = 5.6798	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	46	AT X = 0.63300	Y = 5.6798	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	47	AT X = -5.3975	Y = 9.3487	Z = 0.00000	IS UNIT NUMBER	5	
	HOLE NUMBER	48	AT X = -4.9493	Y = 2.8575	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	49	AT X = -5.2354	Y = 2.2917	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	50	AT X = -4.6024	Y = 3.3881	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	51	AT X = -10.795	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	5	
	HOLE NUMBER	52	AT X = -4.9493	Y = -2.8575	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	53	AT X = -4.6024	Y = -3.3881	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	54	AT X = -5.2354	Y = -2.2917	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	55	AT X = -5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	5	
	HOLE NUMBER	56	AT X = 0.00000	Y = -5.7150	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	57	AT X = 0.63300	Y = -5.6798	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	58	AT X = -0.63300	Y = -5.6798	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	59	AT X = 5.3975	Y = -9.3487	Z = 0.00000	IS UNIT NUMBER	5	
	HOLE NUMBER	60	AT X = 4.9493	Y = -2.8575	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	61	AT X = 5.2354	Y = -2.2917	Z = 0.00000	IS UNIT NUMBER	8	
	HOLE NUMBER	62	AT X = 4.6024	Y = -3.3881	Z = 0.00000	IS UNIT NUMBER	8	
2	CYLINDER	7 1	RADIUS = 16.669	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3	CYLINDER	3 1	RADIUS = 16.847	+Z = 73.177	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
			----- UNIT 11 -----					
CASK CAVITY								
1	CYLINDER	3 1	RADIUS = 16.986	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
	HOLE NUMBER	63	AT X = 0.00000	Y = 0.00000	Z = 1.00000E-04	IS UNIT NUMBER	7	
	HOLE NUMBER	64	AT X = 0.00000	Y = 0.00000	Z = 1.2700	IS UNIT NUMBER	10	
	HOLE NUMBER	65	AT X = 0.00000	Y = 0.00000	Z = 74.448	IS UNIT NUMBER	7	
	HOLE NUMBER	66	AT X = 0.00000	Y = 0.00000	Z = 75.717	IS UNIT NUMBER	9	
	HOLE NUMBER	67	AT X = 0.00000	Y = 0.00000	Z = 148.89	IS UNIT NUMBER	7	
	HOLE NUMBER	68	AT X = 0.00000	Y = 0.00000	Z = 150.16	IS UNIT NUMBER	10	
	HOLE NUMBER	69	AT X = 0.00000	Y = 0.00000	Z = 223.34	IS UNIT NUMBER	7	
	HOLE NUMBER	70	AT X = 0.00000	Y = 0.00000	Z = 224.61	IS UNIT NUMBER	9	
	HOLE NUMBER	71	AT X = 0.00000	Y = 0.00000	Z = 297.79	IS UNIT NUMBER	7	
	HOLE NUMBER	72	AT X = 0.00000	Y = 0.00000	Z = 299.06	IS UNIT NUMBER	10	
	HOLE NUMBER	73	AT X = 0.00000	Y = 0.00000	Z = 372.24	IS UNIT NUMBER	7	
	HOLE NUMBER	74	AT X = 0.00000	Y = 0.00000	Z = 373.51	IS UNIT NUMBER	9	
			----- UNIT 12 -----					
CASK SHIELD RADIAL CONFIGURATION								
1	CYLINDER	3 1	RADIUS = 16.986	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
	HOLE NUMBER	75	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	11	
2	CYLINDER	8 1	RADIUS = 18.910	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
3	CYLINDER	5 1	RADIUS = 33.465	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
4	CYLINDER	8 1	RADIUS = 36.519	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
5	CYLINDER	9 1	RADIUS = 49.219	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
6	CYLINDER	8 1	RADIUS = 49.818	+Z = 446.68	-Z = 0.00000	CENTERLINE IS AT	X = 0.00000 Y = 0.00000	
7	CUBOID	9 1	+X = 49.818	-X = -49.818	+Y = 49.818	-Y = -49.818	+Z = 446.68 -Z = 0.00000	

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REGION          MEDIA BIAS          GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM
                NUM    ID

                ----- UNIT    13 -----

LWT LID
  1 CYLINDER      8  1  RADIUS = 36.519  +Z = 28.575  -Z = 0.59940  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  2 CYLINDER      9  1  RADIUS = 49.818  +Z = 28.575  -Z = 0.59940  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  3 CYLINDER      8  1  RADIUS = 49.818  +Z = 28.575  -Z = 0.00000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  4 CUBOID        9  1  +X = 49.818  -X = -49.818  +Y = 49.818  -Y = -49.818  +Z = 28.575  -Z = 0.00000

                ----- UNIT    14 -----

LWT BOTTOM WELDMENT
  1 CYLINDER      5  1  RADIUS = 26.353  +Z = 16.510  -Z = 8.8900  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  2 CYLINDER      8  1  RADIUS = 36.519  +Z = 26.071  -Z = 0.00000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  3 CYLINDER      9  1  RADIUS = 49.818  +Z = 26.071  -Z = 0.00000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  4 CYLINDER      8  1  RADIUS = 49.818  +Z = 26.670  -Z = 0.00000  CENTERLINE IS AT X = 0.00000  Y = 0.00000
  5 CUBOID        9  1  +X = 49.818  -X = -49.818  +Y = 49.818  -Y = -49.818  +Z = 26.670  -Z = 0.00000

                ***** GLOBAL *****
                ----- UNIT    15  EXTERNAL TO LATTICE 1 -----

LWT CASK
  1 ARRAY NUMBER  1  +X = 49.818  -X = -49.818  +Y = 49.818  -Y = -49.818  +Z = 501.93  -Z = 0.00000
    
```

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----  
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
14  
Z LAYER 2, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
12  
Z LAYER 3, X COLUMN 1 TO 1 LEFT TO FIGHT Y ROW 1 TO 1 BOTTOM TO TOP  
13



VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	1.69451E+03 CM**3	1.69451E+03 CM**3
		2	3.65458E+01 CM**3	1.73105E+03 CM**3
		3	7.42612E+01 CM**3	1.80531E+03 CM**3
		4	3.77155E+01 CM**3	1.84303E+03 CM**3
		5	4.56862E+02 CM**3	2.29989E+03 CM**3
		6	4.25442E+01 CM**3	2.34243E+03 CM**3
		7	8.62583E+01 CM**3	2.42869E+03 CM**3
		8	4.37139E+01 CM**3	2.47241E+03 CM**3
		9	5.25153E+02 CM**3	2.99756E+03 CM**3
		10	4.85422E+01 CM**3	3.04610E+03 CM**3
		11	9.82551E+01 CM**3	3.14436E+03 CM**3
		12	4.97122E+01 CM**3	3.19407E+03 CM**3
		13	5.93444E+02 CM**3	3.78751E+03 CM**3
		14	5.45405E+01 CM**3	3.84205E+03 CM**3
		15	1.10252E+02 CM**3	3.95231E+03 CM**3
		16	5.55391E+01 CM**3	4.00785E+03 CM**3
2	1	17	3.96586E+01 CM**3	3.96586E+01 CM**3
		18	3.47606E+00 CM**3	4.31347E+01 CM**3
		19	1.06925E+01 CM**3	5.38272E+01 CM**3
		20	4.03762E+00 CM**3	5.78648E+01 CM**3
		21	1.22908E+01 CM**3	7.01557E+01 CM**3
		22	4.59916E+00 CM**3	7.47548E+01 CM**3
		23	1.38891E+01 CM**3	8.86439E+01 CM**3
		24	5.15671E+00 CM**3	9.38006E+01 CM**3
3	1	25	1.79337E-01 CM**3	4.19563E+03 CM**3
4	1	26	1.76679E+03 CM**3	5.96242E+03 CM**3
	2	27	7.34815E+02 CM**3	6.69723E+03 CM**3
5	1	28	1.76679E+03 CM**3	5.96242E+03 CM**3
	2	29	7.34815E+02 CM**3	6.69723E+03 CM**3
6	1	30	6.43417E+00 CM**3	6.43417E+00 CM**3
7	1	31	1.08713E+03 CM**3	1.13216E+03 CM**3
8	1	32	2.30289E+01 CM**3	2.30289E+01 CM**3
9	1	33	1.29829E+04 CM**3	6.02781E+04 CM**3
	2	34	3.59751E+03 CM**3	6.38756E+04 CM**3
	3	35	1.36994E+03 CM**3	6.52455E+04 CM**3
10	1	36	1.29829E+04 CM**3	6.02781E+04 CM**3
	2	37	3.59751E+03 CM**3	6.38756E+04 CM**3
	3	38	1.36994E+03 CM**3	6.52455E+04 CM**3
11	1	39	6.63421E+03 CM**3	4.04900E+05 CM**3
12	1	40	0.00000E+00 CM**3	4.04900E+05 CM**3
	2	41	9.69190E+04 CM**3	5.01819E+05 CM**3
	3	42	1.06970E+06 CM**3	1.57152E+06 CM**3
	4	43	2.99966E+05 CM**3	1.87148E+06 CM**3
	5	44	1.52801E+06 CM**3	3.39950E+06 CM**3
	6	45	8.33038E+04 CM**3	3.48280E+06 CM**3
	7	46	9.51639E+05 CM**3	4.43444E+06 CM**3
13	1	47	1.17210E+05 CM**3	1.17210E+05 CM**3
	2	48	1.00916E+05 CM**3	2.18126E+05 CM**3
	3	49	4.67352E+03 CM**3	2.22799E+05 CM**3
	4	50	6.08776E+04 CM**3	2.83677E+05 CM**3
14	1	51	1.66245E+04 CM**3	1.66245E+04 CM**3
	2	52	9.26041E+04 CM**3	1.09229E+05 CM**3
	3	53	9.40439E+04 CM**3	2.03273E+05 CM**3
	4	54	4.67353E+03 CM**3	2.07946E+05 CM**3
	5	55	5.68191E+04 CM**3	2.64765E+05 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 56 IS AN ARRAY PLACEMENT BOUNDARY REGION				
15	1	56	4.98288E+06 CM**3	4.98288E+06 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	42	1	3	7.11692E+04 CM**3
		2	2	1.53492E+03 CM**3
		3	1	3.11897E+03 CM**3
		4	2	1.58405E+03 CM**3
		5	3	1.91882E+04 CM**3
		6	2	1.78686E+03 CM**3
		7	1	3.62285E+03 CM**3
		8	2	1.83598E+03 CM**3
		9	3	2.20564E+04 CM**3
		10	2	2.03877E+03 CM**3
		11	1	4.12672E+03 CM**3
		12	2	2.08791E+03 CM**3
		13	3	2.49247E+04 CM**3
		14	2	2.29070E+03 CM**3
		15	1	4.63060E+03 CM**3
		16	2	2.33264E+03 CM**3
2	84	1	3	3.33133E+03 CM**3
		2	2	2.91989E+02 CM**3
		3	3	8.98172E+02 CM**3
		4	2	3.39160E+02 CM**3
		5	3	1.03243E+03 CM**3
		6	2	3.86329E+02 CM**3
		7	3	1.16669E+03 CM**3
		8	2	4.33163E+02 CM**3

3	42	1	3	7.53214E+00	CM**3
4	21	1	3	3.71026E+04	CM**3
		2	2	1.54311E+04	CM**3
5	21	1	3	3.71026E+04	CM**3
		2	2	1.54311E+04	CM**3
6	42	1	3	2.70235E+02	CM**3
7	6	1	6	6.52275E+03	CM**3
8	108	1	7	2.48712E+03	CM**3
9	3	1	3	3.89488E+04	CM**3
		2	7	1.07925E+04	CM**3
		3	3	4.10981E+03	CM**3
10	3	1	3	3.89488E+04	CM**3
		2	7	1.07925E+04	CM**3
		3	3	4.10981E+03	CM**3
11	1	1	3	6.63421E+03	CM**3
12	1	1	3	0.00000E+00	CM**3
		2	8	9.69190E+04	CM**3
		3	5	1.06970E+06	CM**3
		4	8	2.99966E+05	CM**3
		5	9	1.52801E+06	CM**3
		6	8	8.33038E+04	CM**3
		7	9	9.51639E+05	CM**3
13	1	1	8	1.17210E+05	CM**3
		2	9	1.00916E+05	CM**3
		3	8	4.67352E+03	CM**3
		4	9	6.08776E+04	CM**3
14	1	1	5	1.66245E+04	CM**3
		2	8	9.26041E+04	CM**3
		3	9	9.40439E+04	CM**3
		4	8	4.67353E+03	CM**3
		5	9	5.68191E+04	CM**3
15	1	1		4.98288E+06	CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	1.54991E+04 CM**3	3.62788E+04
2	4.78047E+04 CM**3	1.29168E+05
3	3.11002E+05 CM**3	3.10931E+05
5	1.08632E+06 CM**3	1.23233E+07
6	6.52275E+03 CM**3	5.16602E+04
7	2.40722E+04 CM**3	6.50430E+04
8	6.99350E+05 CM**3	5.53885E+06
9	2.79231E+06 CM**3	2.79223E+02

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*****
***
***          BIASING INFORMATION          ***
***
***  A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S.  ***
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..... 0 TO'S WERE USED IN KENO-V BEFORE TRACKING .....
..... 0.01100 MINUTES WERE USED PROCESSING DATA. ....

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VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 3.11048E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 1.68500E+01 -X=-1.68500E+01 +Y=-1.68500E+01 -Y= 1.68500E+01 +Z= 4.73350E+02 -Z= 2.66700E+01  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

0.93233 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.93867 MINUTES.

GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
1	9.49538E-01	9.66667E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.27358E-01	9.90570E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.25396E-01	1.01433E+00	9.25396E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.74601E-01	1.03717E+00	9.49998E-01	2.46028E-02	0.00000E+00	0.00000E+00
5	9.07974E-01	1.06100E+00	9.35990E-01	1.99497E-02	0.00000E+00	0.00000E+00
6	9.58538E-01	1.08383E+00	9.41627E-01	1.51911E-02	0.00000E+00	0.00000E+00
7	9.45317E-01	1.10683E+00	9.42365E-01	1.17901E-02	0.00000E+00	0.00000E+00
8	9.27517E-01	1.13067E+00	9.39890E-01	9.93954E-03	0.00000E+00	0.00000E+00
9	9.71780E-01	1.15250E+00	9.44446E-01	9.55624E-03	0.00000E+00	0.00000E+00
10	9.06022E-01	1.17633E+00	9.39643E-01	9.56871E-03	0.00000E+00	0.00000E+00
11	9.35873E-01	1.20117E+00	9.39224E-01	8.44920E-03	0.00000E+00	0.00000E+00
12	9.12748E-01	1.22400E+00	9.36577E-01	8.00758E-03	0.00000E+00	0.00000E+00
13	9.34845E-01	1.24783E+00	9.36419E-01	7.24484E-03	0.00000E+00	0.00000E+00
14	9.15009E-01	1.27067E+00	9.34635E-01	6.85004E-03	0.00000E+00	0.00000E+00
15	9.62264E-01	1.29450E+00	9.36760E-01	6.64988E-03	0.00000E+00	0.00000E+00
16	9.41319E-01	1.31733E+00	9.37086E-01	6.16520E-03	0.00000E+00	0.00000E+00
17	9.05721E-01	1.34117E+00	9.34995E-01	6.10851E-03	0.00000E+00	0.00000E+00
18	9.35457E-01	1.36583E+00	9.35024E-01	5.71406E-03	0.00000E+00	0.00000E+00
19	9.73335E-01	1.38883E+00	9.37277E-01	5.82133E-03	0.00000E+00	0.00000E+00
20	9.36168E-01	1.41250E+00	9.37216E-01	5.48875E-03	0.00000E+00	0.00000E+00
21	9.18860E-01	1.43733E+00	9.36250E-01	5.28096E-03	0.00000E+00	0.00000E+00
22	9.40510E-01	1.46100E+00	9.36463E-01	5.01448E-03	0.00000E+00	0.00000E+00
23	9.45995E-01	1.48400E+00	9.36917E-01	4.79127E-03	0.00000E+00	0.00000E+00
24	9.49764E-01	1.50783E+00	9.37501E-01	4.60547E-03	0.00000E+00	0.00000E+00
25	9.13888E-01	1.53067E+00	9.36474E-01	4.51885E-03	0.00000E+00	0.00000E+00
26	9.37879E-01	1.55450E+00	9.36532E-01	4.32687E-03	0.00000E+00	0.00000E+00
27	9.80078E-01	1.57633E+00	9.38274E-01	4.50088E-03	0.00000E+00	0.00000E+00
28	9.93904E-01	1.60117E+00	9.36566E-01	4.68895E-03	0.00000E+00	0.00000E+00
29	9.35162E-01	1.62400E+00	9.36516E-01	4.47367E-03	0.00000E+00	0.00000E+00
30	9.07047E-01	1.64683E+00	9.35463E-01	4.43755E-03	0.00000E+00	0.00000E+00
31	9.15548E-01	1.67067E+00	9.34776E-01	4.33652E-03	0.00000E+00	0.00000E+00
32	9.11447E-01	1.69450E+00	9.33999E-01	4.26104E-03	0.00000E+00	0.00000E+00
33	9.42132E-01	1.71833E+00	9.34261E-01	4.12963E-03	0.00000E+00	0.00000E+00
34	9.73521E-01	1.74033E+00	9.35488E-01	4.18249E-03	0.00000E+00	0.00000E+00
35	9.12017E-01	1.76400E+00	9.34777E-01	4.11569E-03	0.00000E+00	0.00000E+00
36	9.48197E-01	1.78783E+00	9.35171E-01	4.01226E-03	0.00000E+00	0.00000E+00
37	9.47007E-01	1.81167E+00	9.35510E-01	3.91059E-03	0.00000E+00	0.00000E+00
38	9.50145E-01	1.83450E+00	9.35916E-01	3.82209E-03	0.00000E+00	0.00000E+00
39	9.31024E-01	1.85833E+00	9.35784E-01	3.71971E-03	0.00000E+00	0.00000E+00
40	8.87928E-01	1.88300E+00	9.34525E-01	3.83328E-03	0.00000E+00	0.00000E+00
41	9.50054E-01	1.90683E+00	9.34923E-01	3.75487E-03	0.00000E+00	0.00000E+00
42	9.24555E-01	1.92983E+00	9.34664E-01	3.66896E-03	0.00000E+00	0.00000E+00
43	9.51347E-01	1.95267E+00	9.35071E-01	3.60142E-03	0.00000E+00	0.00000E+00
44	9.12795E-01	1.97733E+00	9.34540E-01	3.55442E-03	0.00000E+00	0.00000E+00
45	9.30073E-01	2.00117E+00	9.34436E-01	3.47233E-03	0.00000E+00	0.00000E+00
46	9.45772E-01	2.02500E+00	9.34694E-01	3.40226E-03	0.00000E+00	0.00000E+00
47	9.21591E-01	2.04783E+00	9.34403E-01	3.33852E-03	0.00000E+00	0.00000E+00
48	9.44161E-01	2.07067E+00	9.34615E-01	3.27202E-03	0.00000E+00	0.00000E+00
49	9.44982E-01	2.09367E+00	9.34835E-01	3.20923E-03	0.00000E+00	0.00000E+00
50	9.45684E-01	2.11750E+00	9.35061E-01	3.14978E-03	0.00000E+00	0.00000E+00
51	9.57844E-01	2.14033E+00	9.35526E-01	3.11967E-03	0.00000E+00	0.00000E+00
52	9.32145E-01	2.16317E+00	9.35459E-01	3.05739E-03	0.00000E+00	0.00000E+00
53	1.00046E+00	2.18517E+00	9.36733E-01	3.25659E-03	0.00000E+00	0.00000E+00
54	9.76345E-01	2.20900E+00	9.37495E-01	3.28295E-03	0.00000E+00	0.00000E+00
55	9.33856E-01	2.23183E+00	9.37426E-01	3.22114E-03	0.00000E+00	0.00000E+00
56	9.18827E-01	2.25383E+00	9.37082E-01	3.17964E-03	0.00000E+00	0.00000E+00
57	9.33764E-01	2.27667E+00	9.37022E-01	3.12187E-03	0.00000E+00	0.00000E+00
58	9.50672E-01	2.30050E+00	9.37265E-01	3.07529E-03	0.00000E+00	0.00000E+00
59	9.34552E-01	2.32433E+00	9.37218E-01	3.02123E-03	0.00000E+00	0.00000E+00
60	9.62475E-01	2.34817E+00	9.37653E-01	3.00046E-03	0.00000E+00	0.00000E+00
61	9.76074E-01	2.37200E+00	9.38304E-01	3.02020E-03	0.00000E+00	0.00000E+00
62	9.37632E-01	2.39383E+00	9.38293E-01	2.96946E-03	0.00000E+00	0.00000E+00
63	9.41751E-01	2.41683E+00	9.38350E-01	2.92092E-03	0.00000E+00	0.00000E+00
64	9.59089E-01	2.43867E+00	9.38684E-01	2.89283E-03	0.00000E+00	0.00000E+00
65	9.70014E-01	2.46250E+00	9.39182E-01	2.88965E-03	0.00000E+00	0.00000E+00
66	9.45509E-01	2.48550E+00	9.39281E-01	2.84586E-03	0.00000E+00	0.00000E+00
67	8.79076E-01	2.50917E+00	9.38354E-01	2.95087E-03	0.00000E+00	0.00000E+00
68	9.18401E-01	2.53217E+00	9.38052E-01	2.92150E-03	0.00000E+00	0.00000E+00
69	9.40542E-01	2.55600E+00	9.38089E-01	2.87781E-03	0.00000E+00	0.00000E+00
70	9.83618E-01	2.57783E+00	9.38759E-01	2.91316E-03	0.00000E+00	0.00000E+00
71	9.30024E-01	2.60167E+00	9.38632E-01	2.87342E-03	0.00000E+00	0.00000E+00
72	9.66689E-01	2.62450E+00	9.39033E-01	2.86029E-03	0.00000E+00	0.00000E+00
73	9.07280E-01	2.64933E+00	9.38586E-01	2.85496E-03	0.00000E+00	0.00000E+00
74	9.27001E-01	2.67400E+00	9.38425E-01	2.81963E-03	0.00000E+00	0.00000E+00
75	9.21773E-01	2.69683E+00	9.38197E-01	2.79007E-03	0.00000E+00	0.00000E+00
76	9.45134E-01	2.71983E+00	9.38290E-01	2.75371E-03	0.00000E+00	0.00000E+00
77	9.50359E-01	2.74300E+00	9.38451E-01	2.72151E-03	0.00000E+00	0.00000E+00
78	9.26346E-01	2.76550E+00	9.38292E-01	2.69018E-03	0.00000E+00	0.00000E+00
79	9.65130E-01	2.78933E+00	9.38641E-01	2.67779E-03	0.00000E+00	0.00000E+00
80	9.06211E-01	2.81317E+00	9.38225E-01	2.67574E-03	0.00000E+00	0.00000E+00
81	9.64114E-01	2.83517E+00	9.38553E-01	2.66194E-03	0.00000E+00	0.00000E+00
82	9.59074E-01	2.85900E+00	9.38809E-01	2.64094E-03	0.00000E+00	0.00000E+00
83	9.28865E-01	2.88183E+00	9.38687E-01	2.61102E-03	0.00000E+00	0.00000E+00
84	9.42305E-01	2.90567E+00	9.38731E-01	2.57936E-03	0.00000E+00	0.00000E+00
85	9.54830E-01	2.92933E+00	9.38925E-01	2.55547E-03	0.00000E+00	0.00000E+00
86	9.07779E-01	2.95233E+00	9.38554E-01	2.55194E-03	0.00000E+00	0.00000E+00
87	9.23838E-01	2.97700E+00	9.38381E-01	2.52767E-03	0.00000E+00	0.00000E+00
88	9.22466E-01	2.99900E+00	9.38196E-01	2.50496E-03	0.00000E+00	0.00000E+00
89	9.51520E-01	3.02283E+00	9.38349E-01	2.48073E-03	0.00000E+00	0.00000E+00
90	9.20859E-01	3.04567E+00	9.38150E-01	2.46042E-03	0.00000E+00	0.00000E+00
91	9.30163E-01	3.07033E+00	9.38060E-01	2.43427E-03	0.00000E+00	0.00000E+00
92	9.03638E-01	3.09417E+00	9.37678E-01	2.43727E-03	0.00000E+00	0.00000E+00
93	9.63904E-01	3.11700E+00	9.37966E-01	2.42750E-03	0.00000E+00	0.00000E+00
94	9.40290E-01	3.14000E+00	9.37991E-01	2.40110E-03	0.00000E+00	0.00000E+00
95	9.67088E-01	3.16200E+00	9.38304E-01	2.39566E-03	0.00000E+00	0.00000E+00
96	9.38079E-01	3.18567E+00	9.38195E-01	2.37254E-03	0.00000E+00	0.00000E+00
97	9.16710E-01	3.20950E+00	9.37969E-01	2.35830E-03	0.00000E+00	0.00000E+00
98	9.04349E-01	3.23333E+00	9.37619E-01	2.35974E-03	0.00000E+00	0.00000E+00
99	9.45791E-01	3.25717E+00	9.37703E-01	2.33680E-03	0.00000E+00	0.00000E+00
100	9.22640E-01	3.28100E+00	9.37550E-01	2.31793E-03	0.00000E+00	0.00000E+00
101	9.47696E-01	3.30383E+00	9.37652E-01	2.29669E-03	0.00000E+00	0.00000E+00
102	9.21694E-01	3.32667E+00	9.37493E-01	2.27920E-03	0.00000E+00	0.00000E+00
103	9.27957E-01	3.34967E+00	9.37398E-01	2.25850E-03	0.00000E+00	0.00000E+00
104	9.61926E-01	3.37333E+00	9.37639E-01	2.24914E-03	0.00000E+00	0.00000E+00

105	9.38029E-01	3.39717E+00	9.37642E-01	2.22720E-03	0.00000E+00	0.00000E+00
106	9.61417E-01	3.42100E+00	9.37871E-01	2.21749E-03	0.00000E+00	0.00000E+00
107	9.17091E-01	3.44483E+00	9.37673E-01	2.20517E-03	0.00000E+00	0.00000E+00
108	9.09695E-01	3.46950E+00	9.37409E-01	2.20016E-03	0.00000E+00	0.00000E+00
109	9.09150E-01	3.49333E+00	9.37145E-01	2.19544E-03	0.00000E+00	0.00000E+00
110	8.82745E-01	3.51617E+00	9.36641E-01	2.23258E-03	0.00000E+00	0.00000E+00
111	9.72105E-01	3.54000E+00	9.36967E-01	2.23580E-03	0.00000E+00	0.00000E+00
112	9.43321E-01	3.56283E+00	9.37024E-01	2.21614E-03	0.00000E+00	0.00000E+00
113	9.39161E-01	3.58767E+00	9.37044E-01	2.19617E-03	0.00000E+00	0.00000E+00
114	9.82694E-01	3.60950E+00	9.37451E-01	2.21431E-03	0.00000E+00	0.00000E+00
115	9.44917E-01	3.63333E+00	9.37517E-01	2.19562E-03	0.00000E+00	0.00000E+00
116	9.35272E-01	3.65633E+00	9.37498E-01	2.17636E-03	0.00000E+00	0.00000E+00
117	9.58157E-01	3.68000E+00	9.37677E-01	2.16482E-03	0.00000E+00	0.00000E+00
118	9.67329E-01	3.70300E+00	9.37933E-01	2.16125E-03	0.00000E+00	0.00000E+00
119	9.56101E-01	3.72667E+00	9.38088E-01	2.14831E-03	0.00000E+00	0.00000E+00
120	9.25867E-01	3.75050E+00	9.37985E-01	2.13255E-03	0.00000E+00	0.00000E+00
121	9.54698E-01	3.77433E+00	9.38125E-01	2.11921E-03	0.00000E+00	0.00000E+00
122	9.52020E-01	3.79717E+00	9.38241E-01	2.10466E-03	0.00000E+00	0.00000E+00
123	9.57472E-01	3.82017E+00	9.38400E-01	2.09324E-03	0.00000E+00	0.00000E+00
124	9.01513E-01	3.84400E+00	9.38097E-01	2.09791E-03	0.00000E+00	0.00000E+00
125	9.23868E-01	3.86683E+00	9.37982E-01	2.08400E-03	0.00000E+00	0.00000E+00
126	9.42828E-01	3.88967E+00	9.38021E-01	2.06749E-03	0.00000E+00	0.00000E+00
127	9.25702E-01	3.91250E+00	9.37922E-01	2.05325E-03	0.00000E+00	0.00000E+00
128	9.27309E-01	3.93533E+00	9.37838E-01	2.03863E-03	0.00000E+00	0.00000E+00
129	9.37097E-01	3.95933E+00	9.37829E-01	2.02553E-03	0.00000E+00	0.00000E+00
130	9.27498E-01	3.98400E+00	9.37752E-01	2.00829E-03	0.00000E+00	0.00000E+00
131	9.58525E-01	4.00683E+00	9.37913E-01	1.99915E-03	0.00000E+00	0.00000E+00
132	9.68885E-01	4.02983E+00	9.38151E-01	1.99797E-03	0.00000E+00	0.00000E+00
133	9.52461E-01	4.05450E+00	9.38260E-01	1.98567E-03	0.00000E+00	0.00000E+00
134	9.24990E-01	4.07917E+00	9.38160E-01	1.97313E-03	0.00000E+00	0.00000E+00
135	9.10651E-01	4.10300E+00	9.37953E-01	1.96913E-03	0.00000E+00	0.00000E+00
136	9.25992E-01	4.12583E+00	9.37863E-01	1.95642E-03	0.00000E+00	0.00000E+00
137	9.20223E-01	4.15067E+00	9.37733E-01	1.94626E-03	0.00000E+00	0.00000E+00
138	9.41400E-01	4.17433E+00	9.37760E-01	1.93209E-03	0.00000E+00	0.00000E+00
139	9.15200E-01	4.19733E+00	9.37595E-01	1.92499E-03	0.00000E+00	0.00000E+00
140	9.17256E-01	4.22100E+00	9.37448E-01	1.91667E-03	0.00000E+00	0.00000E+00
141	9.58561E-01	4.24400E+00	9.37600E-01	1.90888E-03	0.00000E+00	0.00000E+00
142	9.54807E-01	4.26683E+00	9.37722E-01	1.89918E-03	0.00000E+00	0.00000E+00
143	9.37850E-01	4.29067E+00	9.37723E-01	1.88566E-03	0.00000E+00	0.00000E+00
144	9.51011E-01	4.31350E+00	9.37817E-01	1.87467E-03	0.00000E+00	0.00000E+00
145	9.08446E-01	4.33733E+00	9.37612E-01	1.87281E-03	0.00000E+00	0.00000E+00
146	9.33168E-01	4.36117E+00	9.37581E-01	1.86002E-03	0.00000E+00	0.00000E+00
147	9.39235E-01	4.38400E+00	9.37592E-01	1.84718E-03	0.00000E+00	0.00000E+00
148	9.44775E-01	4.40683E+00	9.37641E-01	1.83514E-03	0.00000E+00	0.00000E+00
149	9.33997E-01	4.42983E+00	9.37617E-01	1.82278E-03	0.00000E+00	0.00000E+00
150	9.29083E-01	4.45367E+00	9.37559E-01	1.81134E-03	0.00000E+00	0.00000E+00
151	9.53913E-01	4.47650E+00	9.37669E-01	1.80249E-03	0.00000E+00	0.00000E+00
152	9.15940E-01	4.50033E+00	9.37524E-01	1.79628E-03	0.00000E+00	0.00000E+00
153	9.32896E-01	4.52400E+00	9.37493E-01	1.78461E-03	0.00000E+00	0.00000E+00
154	9.22501E-01	4.54700E+00	9.37394E-01	1.77557E-03	0.00000E+00	0.00000E+00
155	9.45032E-01	4.56900E+00	9.37444E-01	1.76464E-03	0.00000E+00	0.00000E+00
156	9.63012E-01	4.59267E+00	9.37610E-01	1.76099E-03	0.00000E+00	0.00000E+00
157	9.65988E-01	4.61567E+00	9.37794E-01	1.75914E-03	0.00000E+00	0.00000E+00
158	9.11861E-01	4.63950E+00	9.37627E-01	1.75571E-03	0.00000E+00	0.00000E+00
159	9.48924E-01	4.66233E+00	9.37699E-01	1.74598E-03	0.00000E+00	0.00000E+00
160	9.37244E-01	4.68517E+00	9.37696E-01	1.73490E-03	0.00000E+00	0.00000E+00
161	9.26593E-01	4.70983E+00	9.37627E-01	1.72536E-03	0.00000E+00	0.00000E+00
162	9.49352E-01	4.73367E+00	9.37700E-01	1.71611E-03	0.00000E+00	0.00000E+00
163	9.53957E-01	4.75667E+00	9.37801E-01	1.70841E-03	0.00000E+00	0.00000E+00
164	9.49314E-01	4.77950E+00	9.37872E-01	1.69931E-03	0.00000E+00	0.00000E+00
165	9.46746E-01	4.80333E+00	9.37926E-01	1.68973E-03	0.00000E+00	0.00000E+00
166	9.76021E-01	4.82617E+00	9.38159E-01	1.68539E-03	0.00000E+00	0.00000E+00
167	9.42887E-01	4.84900E+00	9.38187E-01	1.68533E-03	0.00000E+00	0.00000E+00
168	9.19916E-01	4.87100E+00	9.38077E-01	1.67875E-03	0.00000E+00	0.00000E+00
169	9.42499E-01	4.89483E+00	9.38104E-01	1.66888E-03	0.00000E+00	0.00000E+00
170	9.67871E-01	4.91767E+00	9.38281E-01	1.66835E-03	0.00000E+00	0.00000E+00
171	9.31285E-01	4.94067E+00	9.38239E-01	1.65897E-03	0.00000E+00	0.00000E+00
172	9.23169E-01	4.96433E+00	9.38151E-01	1.65156E-03	0.00000E+00	0.00000E+00
173	1.00631E+00	4.98633E+00	9.38549E-01	1.64895E-03	0.00000E+00	0.00000E+00
174	9.56174E-01	5.00933E+00	9.38652E-01	1.64283E-03	0.00000E+00	0.00000E+00
175	9.44454E-01	5.03300E+00	9.38685E-01	1.63741E-03	0.00000E+00	0.00000E+00
176	9.28782E-01	5.05683E+00	9.38628E-01	1.66474E-03	0.00000E+00	0.00000E+00
177	9.53540E-01	5.07967E+00	9.38714E-01	1.65739E-03	0.00000E+00	0.00000E+00
178	9.69673E-01	5.10350E+00	9.38890E-01	1.65731E-03	0.00000E+00	0.00000E+00
179	9.65518E-01	5.12650E+00	9.39040E-01	1.65477E-03	0.00000E+00	0.00000E+00
180	9.45176E-01	5.14933E+00	9.39074E-01	1.64581E-03	0.00000E+00	0.00000E+00
181	9.16883E-01	5.17217E+00	9.38950E-01	1.64128E-03	0.00000E+00	0.00000E+00
182	9.24655E-01	5.19600E+00	9.38871E-01	1.63407E-03	0.00000E+00	0.00000E+00
183	9.76833E-01	5.21883E+00	9.39081E-01	1.63849E-03	0.00000E+00	0.00000E+00
184	9.41853E-01	5.24083E+00	9.39096E-01	1.62954E-03	0.00000E+00	0.00000E+00
185	9.45393E-01	5.26467E+00	9.39130E-01	1.62097E-03	0.00000E+00	0.00000E+00
186	9.31129E-01	5.28750E+00	9.39087E-01	1.61272E-03	0.00000E+00	0.00000E+00
187	9.40526E-01	5.31233E+00	9.39095E-01	1.60400E-03	0.00000E+00	0.00000E+00
188	9.19446E-01	5.33600E+00	9.38989E-01	1.59885E-03	0.00000E+00	0.00000E+00
189	9.51800E-01	5.35900E+00	9.39058E-01	1.59175E-03	0.00000E+00	0.00000E+00
190	9.22636E-01	5.38183E+00	9.38970E-01	1.58567E-03	0.00000E+00	0.00000E+00
191	9.66691E-01	5.40467E+00	9.39117E-01	1.58406E-03	0.00000E+00	0.00000E+00
192	9.62568E-01	5.42850E+00	9.39240E-01	1.58053E-03	0.00000E+00	0.00000E+00
193	9.36855E-01	5.45233E+00	9.39228E-01	1.57228E-03	0.00000E+00	0.00000E+00
194	8.67588E-01	5.47700E+00	9.38855E-01	1.60796E-03	0.00000E+00	0.00000E+00
195	9.37215E-01	5.50000E+00	9.38846E-01	1.59963E-03	0.00000E+00	0.00000E+00
196	8.97593E-01	5.52367E+00	9.38634E-01	1.60551E-03	0.00000E+00	0.00000E+00
197	9.06624E-01	5.54667E+00	9.38469E-01	1.60567E-03	0.00000E+00	0.00000E+00
198	9.76595E-01	5.56950E+00	9.38664E-01	1.60925E-03	0.00000E+00	0.00000E+00
199	9.11062E-01	5.59233E+00	9.38524E-01	1.60718E-03	0.00000E+00	0.00000E+00
200	8.97753E-01	5.61617E+00	9.38318E-01	1.61225E-03	0.00000E+00	0.00000E+00
201	9.37698E-01	5.64000E+00	9.38315E-01	1.60413E-03	0.00000E+00	0.00000E+00
202	9.92385E-01	5.66200E+00	9.38585E-01	1.61882E-03	0.00000E+00	0.00000E+00
203	9.69492E-01	5.68583E+00	9.38739E-01	1.61807E-03	0.00000E+00	0.00000E+00
204	9.46732E-01	5.70867E+00	9.38779E-01	1.61053E-03	0.00000E+00	0.00000E+00
205	9.24176E-01	5.73250E+00	9.38707E-01	1.60419E-03	0.00000E+00	0.00000E+00
206	9.67610E-01	5.75533E+00	9.38848E-01	1.60258E-03	0.00000E+00	0.00000E+00
207	9.27192E-01	5.77917E+00	9.38792E-01	1.59576E-03	0.00000E+00	0.00000E+00
208	9.96263E-01	5.82117E+00	9.39070E-01	1.61237E-03	0.00000E+00	0.00000E+00
209	9.44437E-01	5.82117E+00	9.39096E-01	1.60472E-03	0.00000E+00	0.00000E+00
210	9.42144E-01	5.84783E+00	9.39111E-01	1.59705E-03	0.00000E+00	0.00000E+00
211	9.84103E-01	5.87167E+00	9.39326E-01	1.60390E-03	0.00000E+00	0.00000E+00
212	9.27594E-01	5.89533E+00	9.39270E-01	1.59722E-03	0.00000E+00	0.00000E+00

213	9.47447E-01	5.91917E+00	9.39309E-01	1.59011E-03	0.00000E+00	0.00000E+00
214	9.50908E-01	5.94383E+00	9.39364E-01	1.58353E-03	0.00000E+00	0.00000E+00
215	9.58715E-01	5.96683E+00	9.39455E-01	1.57870E-03	0.00000E+00	0.00000E+00
216	9.24961E-01	5.99150E+00	9.39387E-01	1.57276E-03	0.00000E+00	0.00000E+00
217	9.13433E-01	6.01433E+00	9.39294E-01	1.56817E-03	0.00000E+00	0.00000E+00
218	9.71157E-01	6.03817E+00	9.39442E-01	1.56785E-03	0.00000E+00	0.00000E+00
219	9.76932E-01	6.06100E+00	9.39615E-01	1.57014E-03	0.00000E+00	0.00000E+00
220	9.13037E-01	6.08483E+00	9.39493E-01	1.56767E-03	0.00000E+00	0.00000E+00
221	9.41447E-01	6.10867E+00	9.39502E-01	1.56052E-03	0.00000E+00	0.00000E+00
222	9.23828E-01	6.13250E+00	9.39430E-01	1.55504E-03	0.00000E+00	0.00000E+00
223	8.88887E-01	6.15633E+00	9.39202E-01	1.56480E-03	0.00000E+00	0.00000E+00
224	9.14007E-01	6.18100E+00	9.39088E-01	1.56186E-03	0.00000E+00	0.00000E+00
225	9.32980E-01	6.20483E+00	9.39061E-01	1.55508E-03	0.00000E+00	0.00000E+00
226	9.81846E-01	6.22683E+00	9.39252E-01	1.55986E-03	0.00000E+00	0.00000E+00
227	9.68973E-01	6.24867E+00	9.39384E-01	1.55852E-03	0.00000E+00	0.00000E+00
228	8.94740E-01	6.27433E+00	9.39186E-01	1.56413E-03	0.00000E+00	0.00000E+00
229	9.18278E-01	6.29733E+00	9.39094E-01	1.55995E-03	0.00000E+00	0.00000E+00
230	9.44474E-01	6.32017E+00	9.39118E-01	1.55327E-03	0.00000E+00	0.00000E+00
231	9.73623E-01	6.34400E+00	9.39268E-01	1.55380E-03	0.00000E+00	0.00000E+00
232	9.32279E-01	6.36600E+00	9.39238E-01	1.54733E-03	0.00000E+00	0.00000E+00
233	9.49064E-01	6.38967E+00	9.39281E-01	1.54120E-03	0.00000E+00	0.00000E+00
234	9.92940E-01	6.41267E+00	9.39512E-01	1.55187E-03	0.00000E+00	0.00000E+00
235	9.29619E-01	6.43550E+00	9.39469E-01	1.54578E-03	0.00000E+00	0.00000E+00
236	9.30159E-01	6.45933E+00	9.39430E-01	1.53968E-03	0.00000E+00	0.00000E+00
237	8.90670E-01	6.48400E+00	9.39222E-01	1.54709E-03	0.00000E+00	0.00000E+00
238	9.61941E-01	6.50683E+00	9.39318E-01	1.54352E-03	0.00000E+00	0.00000E+00
239	9.84050E-01	6.52983E+00	9.39507E-01	1.54854E-03	0.00000E+00	0.00000E+00
240	9.18877E-01	6.55267E+00	9.39421E-01	1.54446E-03	0.00000E+00	0.00000E+00
241	9.90503E-01	6.57650E+00	9.39634E-01	1.55276E-03	0.00000E+00	0.00000E+00
242	9.16239E-01	6.59933E+00	9.39537E-01	1.54935E-03	0.00000E+00	0.00000E+00
243	9.17816E-01	6.62317E+00	9.39447E-01	1.54554E-03	0.00000E+00	0.00000E+00
244	9.08668E-01	6.64600E+00	9.39319E-01	1.54438E-03	0.00000E+00	0.00000E+00
245	9.68559E-01	6.66983E+00	9.39440E-01	1.54271E-03	0.00000E+00	0.00000E+00
246	9.51985E-01	6.69267E+00	9.39491E-01	1.53724E-03	0.00000E+00	0.00000E+00
247	9.54398E-01	6.71467E+00	9.39552E-01	1.53216E-03	0.00000E+00	0.00000E+00
248	9.23769E-01	6.73850E+00	9.39488E-01	1.52727E-03	0.00000E+00	0.00000E+00
249	9.75270E-01	6.76050E+00	9.39633E-01	1.52795E-03	0.00000E+00	0.00000E+00
250	8.94501E-01	6.78433E+00	9.39451E-01	1.53262E-03	0.00000E+00	0.00000E+00
251	9.48733E-01	6.80800E+00	9.39488E-01	1.52691E-03	0.00000E+00	0.00000E+00
252	9.35980E-01	6.83100E+00	9.39474E-01	1.52085E-03	0.00000E+00	0.00000E+00
253	9.79347E-01	6.85483E+00	9.39633E-01	1.52309E-03	0.00000E+00	0.00000E+00
254	9.10337E-01	6.87850E+00	9.39517E-01	1.52148E-03	0.00000E+00	0.00000E+00
255	9.55501E-01	6.90150E+00	9.39580E-01	1.51677E-03	0.00000E+00	0.00000E+00
256	9.31794E-01	6.92517E+00	9.39549E-01	1.51110E-03	0.00000E+00	0.00000E+00
257	9.50651E-01	6.94817E+00	9.39593E-01	1.50579E-03	0.00000E+00	0.00000E+00
258	9.65015E-01	6.97200E+00	9.39692E-01	1.50318E-03	0.00000E+00	0.00000E+00
259	9.34965E-01	6.99483E+00	9.39674E-01	1.49744E-03	0.00000E+00	0.00000E+00
260	9.30063E-01	7.01867E+00	9.39636E-01	1.49208E-03	0.00000E+00	0.00000E+00
261	9.63928E-01	7.04150E+00	9.39730E-01	1.48927E-03	0.00000E+00	0.00000E+00
262	9.10698E-01	7.06533E+00	9.39618E-01	1.48773E-03	0.00000E+00	0.00000E+00
263	9.55887E-01	7.08917E+00	9.39681E-01	1.48333E-03	0.00000E+00	0.00000E+00
264	9.53464E-01	7.11200E+00	9.39733E-01	1.47859E-03	0.00000E+00	0.00000E+00
265	8.97046E-01	7.13583E+00	9.39571E-01	1.48187E-03	0.00000E+00	0.00000E+00
266	9.28045E-01	7.16050E+00	9.39527E-01	1.47689E-03	0.00000E+00	0.00000E+00
267	9.09391E-01	7.18433E+00	9.39414E-01	1.47570E-03	0.00000E+00	0.00000E+00
268	9.85255E-01	7.20717E+00	9.39586E-01	1.48021E-03	0.00000E+00	0.00000E+00
269	9.2915E-01	7.23100E+00	9.39561E-01	1.47486E-03	0.00000E+00	0.00000E+00
270	9.41335E-01	7.25383E+00	9.39568E-01	1.46937E-03	0.00000E+00	0.00000E+00
271	9.18650E-01	7.27867E+00	9.39490E-01	1.46596E-03	0.00000E+00	0.00000E+00
272	9.50063E-01	7.30233E+00	9.39529E-01	1.46104E-03	0.00000E+00	0.00000E+00
273	9.43201E-01	7.32617E+00	9.39543E-01	1.45570E-03	0.00000E+00	0.00000E+00
274	9.06694E-01	7.34917E+00	9.39422E-01	1.45536E-03	0.00000E+00	0.00000E+00
275	9.51824E-01	7.37200E+00	9.39467E-01	1.45073E-03	0.00000E+00	0.00000E+00
276	9.17806E-01	7.39667E+00	9.39388E-01	1.44759E-03	0.00000E+00	0.00000E+00
277	9.10898E-01	7.42050E+00	9.39285E-01	1.44603E-03	0.00000E+00	0.00000E+00
278	9.52998E-01	7.44333E+00	9.39334E-01	1.44164E-03	0.00000E+00	0.00000E+00
279	9.62492E-01	7.46633E+00	9.39418E-01	1.43886E-03	0.00000E+00	0.00000E+00
280	9.57823E-01	7.49000E+00	9.39484E-01	1.43520E-03	0.00000E+00	0.00000E+00
281	9.39945E-01	7.51383E+00	9.39486E-01	1.43005E-03	0.00000E+00	0.00000E+00
282	9.52223E-01	7.53667E+00	9.39531E-01	1.42566E-03	0.00000E+00	0.00000E+00
283	9.64879E-01	7.55967E+00	9.39621E-01	1.42343E-03	0.00000E+00	0.00000E+00
284	9.70561E-01	7.58350E+00	9.39731E-01	1.42261E-03	0.00000E+00	0.00000E+00
285	9.78155E-01	7.60633E+00	9.39867E-01	1.42407E-03	0.00000E+00	0.00000E+00
286	9.64362E-01	7.62917E+00	9.39953E-01	1.42166E-03	0.00000E+00	0.00000E+00
287	9.11065E-01	7.65300E+00	9.39852E-01	1.42028E-03	0.00000E+00	0.00000E+00
288	8.89182E-01	7.67683E+00	9.39675E-01	1.42635E-03	0.00000E+00	0.00000E+00
289	9.95390E-01	7.69967E+00	9.39869E-01	1.43456E-03	0.00000E+00	0.00000E+00
290	8.88753E-01	7.72350E+00	9.39691E-01	1.44055E-03	0.00000E+00	0.00000E+00
291	9.34134E-01	7.74733E+00	9.39672E-01	1.43569E-03	0.00000E+00	0.00000E+00
292	9.33624E-01	7.77017E+00	9.39651E-01	1.43088E-03	0.00000E+00	0.00000E+00
293	9.16708E-01	7.79400E+00	9.39573E-01	1.42813E-03	0.00000E+00	0.00000E+00
294	8.90530E-01	7.81783E+00	9.39405E-01	1.43311E-03	0.00000E+00	0.00000E+00
295	9.49421E-01	7.84067E+00	9.39435E-01	1.42854E-03	0.00000E+00	0.00000E+00
296	9.39398E-01	7.86450E+00	9.39435E-01	1.42367E-03	0.00000E+00	0.00000E+00
297	9.47277E-01	7.88833E+00	9.39462E-01	1.41909E-03	0.00000E+00	0.00000E+00
298	9.41025E-01	7.91200E+00	9.39467E-01	1.41429E-03	0.00000E+00	0.00000E+00
299	9.29999E-01	7.93500E+00	9.39435E-01	1.40988E-03	0.00000E+00	0.00000E+00
300	9.39157E-01	7.95883E+00	9.39434E-01	1.40515E-03	0.00000E+00	0.00000E+00
301	9.42934E-01	7.98167E+00	9.39446E-01	1.40049E-03	0.00000E+00	0.00000E+00
302	9.39666E-01	8.00450E+00	9.39447E-01	1.39581E-03	0.00000E+00	0.00000E+00
303	9.31815E-01	8.02733E+00	9.39421E-01	1.39140E-03	0.00000E+00	0.00000E+00
304	9.46213E-01	8.05117E+00	9.39444E-01	1.38697E-03	0.00000E+00	0.00000E+00
305	9.14904E-01	8.07600E+00	9.39363E-01	1.38475E-03	0.00000E+00	0.00000E+00
306	9.23716E-01	8.09967E+00	9.39311E-01	1.38115E-03	0.00000E+00	0.00000E+00
307	9.45717E-01	8.12267E+00	9.39332E-01	1.37677E-03	0.00000E+00	0.00000E+00
308	9.63413E-01	8.14467E+00	9.39411E-01	1.37452E-03	0.00000E+00	0.00000E+00
309	9.18006E-01	8.16833E+00	9.39341E-01	1.37181E-03	0.00000E+00	0.00000E+00
310	8.92698E-01	8.19217E+00	9.39190E-01	1.37571E-03	0.00000E+00	0.00000E+00
311	9.67557E-01	8.21500E+00	9.39282E-01	1.37432E-03	0.00000E+00	0.00000E+00
312	9.57126E-01	8.23800E+00	9.39339E-01	1.37109E-03	0.00000E+00	0.00000E+00
313	9.31290E-01	8.26083E+00	9.39313E-01	1.36692E-03	0.00000E+00	0.00000E+00
314	9.44222E-01	8.28467E+00	9.39329E-01	1.36262E-03	0.00000E+00	0.00000E+00
315	9.41217E-01	8.30750E+00	9.39335E-01	1.35827E-03	0.00000E+00	0.00000E+00
316	9.53593E-01	8.33133E+00	9.39381E-01	1.35470E-03	0.00000E+00	0.00000E+00
317	9.31452E-01	8.35417E+00	9.39355E-01	1.35063E-03	0.00000E+00	0.00000E+00
318	9.08266E-01	8.37717E+00	9.39257E-01	1.34994E-03	0.00000E+00	0.00000E+00
319	9.37460E-01	8.40083E+00	9.39251E-01	1.34568E-03	0.00000E+00	0.00000E+00

320	9.38285E-01	8.42467E+00	9.39248E-01	1.34145E-03	0.00000E+00	0.00000E+00
321	9.13572E-01	8.44767E+00	9.39168E-01	1.33966E-03	0.00000E+00	0.00000E+00
322	9.49265E-01	8.47133E+00	9.39199E-01	1.33584E-03	0.00000E+00	0.00000E+00
323	9.39618E-01	8.49517E+00	9.39201E-01	1.33167E-03	0.00000E+00	0.00000E+00
324	9.11437E-01	8.51983E+00	9.39114E-01	1.33032E-03	0.00000E+00	0.00000E+00
325	9.97960E-01	8.54283E+00	9.39297E-01	1.33865E-03	0.00000E+00	0.00000E+00
326	9.52573E-01	8.56567E+00	9.39338E-01	1.33515E-03	0.00000E+00	0.00000E+00
327	9.20705E-01	8.58950E+00	9.39280E-01	1.33226E-03	0.00000E+00	0.00000E+00
328	9.07825E-01	8.61333E+00	9.39184E-01	1.33167E-03	0.00000E+00	0.00000E+00
329	9.31026E-01	8.63717E+00	9.39159E-01	1.32783E-03	0.00000E+00	0.00000E+00
330	9.70184E-01	8.66000E+00	9.39253E-01	1.32715E-03	0.00000E+00	0.00000E+00
331	9.42351E-01	8.68283E+00	9.39263E-01	1.32314E-03	0.00000E+00	0.00000E+00
332	9.50763E-01	8.70667E+00	9.39298E-01	1.31959E-03	0.00000E+00	0.00000E+00
333	9.82450E-01	8.72867E+00	9.39428E-01	1.32204E-03	0.00000E+00	0.00000E+00
334	9.18881E-01	8.75250E+00	9.39366E-01	1.31950E-03	0.00000E+00	0.00000E+00
335	9.38450E-01	8.77533E+00	9.39363E-01	1.31554E-03	0.00000E+00	0.00000E+00
336	9.21143E-01	8.79917E+00	9.39309E-01	1.31273E-03	0.00000E+00	0.00000E+00
337	9.14949E-01	8.82383E+00	9.39236E-01	1.31082E-03	0.00000E+00	0.00000E+00
338	9.36758E-01	8.84667E+00	9.39229E-01	1.30693E-03	0.00000E+00	0.00000E+00
339	9.45463E-01	8.87050E+00	9.39247E-01	1.30318E-03	0.00000E+00	0.00000E+00
340	9.28761E-01	8.89333E+00	9.39216E-01	1.29969E-03	0.00000E+00	0.00000E+00
341	9.07910E-01	8.91717E+00	9.39124E-01	1.29914E-03	0.00000E+00	0.00000E+00
342	9.27775E-01	8.94100E+00	9.39091E-01	1.29574E-03	0.00000E+00	0.00000E+00
343	9.24335E-01	8.96483E+00	9.39047E-01	1.29266E-03	0.00000E+00	0.00000E+00
344	9.34777E-01	8.98867E+00	9.39035E-01	1.28893E-03	0.00000E+00	0.00000E+00
345	9.43687E-01	9.00967E+00	9.39048E-01	1.28524E-03	0.00000E+00	0.00000E+00
346	9.11846E-01	9.03433E+00	9.38969E-01	1.28394E-03	0.00000E+00	0.00000E+00
347	9.10129E-01	9.05817E+00	9.38866E-01	1.28294E-03	0.00000E+00	0.00000E+00
348	9.22585E-01	9.08233E+00	9.38938E-01	1.28095E-03	0.00000E+00	0.00000E+00
349	9.21278E-01	9.10667E+00	9.38788E-01	1.27740E-03	0.00000E+00	0.00000E+00
350	9.46399E-01	9.12967E+00	9.38810E-01	1.27392E-03	0.00000E+00	0.00000E+00
351	9.41957E-01	9.15250E+00	9.38819E-01	1.27029E-03	0.00000E+00	0.00000E+00
352	9.43312E-01	9.17533E+00	9.38832E-01	1.26672E-03	0.00000E+00	0.00000E+00
353	9.44722E-01	9.19917E+00	9.38848E-01	1.26322E-03	0.00000E+00	0.00000E+00
354	9.21439E-01	9.22383E+00	9.38799E-01	1.26060E-03	0.00000E+00	0.00000E+00
355	9.33778E-01	9.24683E+00	9.38785E-01	1.25710E-03	0.00000E+00	0.00000E+00
356	9.41920E-01	9.27150E+00	9.38794E-01	1.25358E-03	0.00000E+00	0.00000E+00
357	9.32474E-01	9.29433E+00	9.38776E-01	1.25017E-03	0.00000E+00	0.00000E+00
358	9.79291E-01	9.31717E+00	9.38890E-01	1.25183E-03	0.00000E+00	0.00000E+00
359	9.55704E-01	9.34100E+00	9.38937E-01	1.24921E-03	0.00000E+00	0.00000E+00
360	9.57182E-01	9.36400E+00	9.38988E-01	1.24676E-03	0.00000E+00	0.00000E+00
361	9.53013E-01	9.38683E+00	9.39027E-01	1.24389E-03	0.00000E+00	0.00000E+00
362	9.07709E-01	9.41067E+00	9.38940E-01	1.24348E-03	0.00000E+00	0.00000E+00
363	9.61226E-01	9.43350E+00	9.39001E-01	1.24157E-03	0.00000E+00	0.00000E+00
364	9.06823E-01	9.45733E+00	9.38913E-01	1.24132E-03	0.00000E+00	0.00000E+00
365	9.23508E-01	9.48117E+00	9.38870E-01	1.23862E-03	0.00000E+00	0.00000E+00
366	9.59195E-01	9.50400E+00	9.38926E-01	1.23648E-03	0.00000E+00	0.00000E+00
367	9.34420E-01	9.52783E+00	9.38914E-01	1.23315E-03	0.00000E+00	0.00000E+00
368	9.68963E-01	9.55067E+00	9.38996E-01	1.23251E-03	0.00000E+00	0.00000E+00
369	9.50643E-01	9.57450E+00	9.39027E-01	1.22956E-03	0.00000E+00	0.00000E+00
370	9.54914E-01	9.59733E+00	9.39071E-01	1.22697E-03	0.00000E+00	0.00000E+00
371	9.46119E-01	9.62033E+00	9.39090E-01	1.22379E-03	0.00000E+00	0.00000E+00
372	9.34350E-01	9.64317E+00	9.39077E-01	1.22054E-03	0.00000E+00	0.00000E+00
373	9.95746E-01	9.66783E+00	9.38960E-01	1.22284E-03	0.00000E+00	0.00000E+00
374	9.14995E-01	9.69067E+00	9.38989E-01	1.22072E-03	0.00000E+00	0.00000E+00
375	9.25020E-01	9.71367E+00	9.38858E-01	1.21854E-03	0.00000E+00	0.00000E+00
376	9.52837E-01	9.73750E+00	9.38896E-01	1.21585E-03	0.00000E+00	0.00000E+00
377	9.06733E-01	9.76033E+00	9.38810E-01	1.21563E-03	0.00000E+00	0.00000E+00
378	9.26923E-01	9.78417E+00	9.38778E-01	1.21281E-03	0.00000E+00	0.00000E+00
379	9.48775E-01	9.80700E+00	9.38805E-01	1.20988E-03	0.00000E+00	0.00000E+00
380	9.03598E-01	9.83083E+00	9.38712E-01	1.21026E-03	0.00000E+00	0.00000E+00
381	9.09665E-01	9.85467E+00	9.38635E-01	1.20950E-03	0.00000E+00	0.00000E+00
382	9.40097E-01	9.87833E+00	9.38639E-01	1.20631E-03	0.00000E+00	0.00000E+00
383	9.67118E-01	9.90033E+00	9.38714E-01	1.20546E-03	0.00000E+00	0.00000E+00
384	9.08400E-01	9.92417E+00	9.38634E-01	1.20492E-03	0.00000E+00	0.00000E+00
385	9.35608E-01	9.94700E+00	9.38627E-01	1.20180E-03	0.00000E+00	0.00000E+00
386	9.36297E-01	9.97083E+00	9.38620E-01	1.19868E-03	0.00000E+00	0.00000E+00
387	9.42066E-01	9.99367E+00	9.38629E-01	1.19559E-03	0.00000E+00	0.00000E+00
388	9.35191E-01	1.00175E+01	9.38621E-01	1.19255E-03	0.00000E+00	0.00000E+00
389	8.97222E-01	1.00413E+01	9.38514E-01	1.19424E-03	0.00000E+00	0.00000E+00
390	9.30595E-01	1.00642E+01	9.38493E-01	1.19133E-03	0.00000E+00	0.00000E+00
391	9.25689E-01	1.00880E+01	9.38460E-01	1.18872E-03	0.00000E+00	0.00000E+00
392	9.62236E-01	1.01128E+01	9.38521E-01	1.18724E-03	0.00000E+00	0.00000E+00
393	9.65988E-01	1.01365E+01	9.38591E-01	1.18628E-03	0.00000E+00	0.00000E+00
394	9.54448E-01	1.01585E+01	9.38632E-01	1.18394E-03	0.00000E+00	0.00000E+00
395	9.72413E-01	1.01813E+01	9.38718E-01	1.18405E-03	0.00000E+00	0.00000E+00
396	9.49476E-01	1.02043E+01	9.38745E-01	1.18135E-03	0.00000E+00	0.00000E+00
397	9.28210E-01	1.02282E+01	9.38718E-01	1.17866E-03	0.00000E+00	0.00000E+00
398	9.87399E-01	1.02518E+01	9.38841E-01	1.18209E-03	0.00000E+00	0.00000E+00
399	9.36637E-01	1.02757E+01	9.38836E-01	1.17912E-03	0.00000E+00	0.00000E+00
400	9.34826E-01	1.02985E+01	9.38826E-01	1.17620E-03	0.00000E+00	0.00000E+00
401	8.83044E-01	1.03233E+01	9.38866E-01	1.18155E-03	0.00000E+00	0.00000E+00
402	9.58315E-01	1.03462E+01	9.38735E-01	1.17961E-03	0.00000E+00	0.00000E+00
403	9.47168E-01	1.03690E+01	9.38756E-01	1.17685E-03	0.00000E+00	0.00000E+00
404	9.40690E-01	1.03928E+01	9.38761E-01	1.17393E-03	0.00000E+00	0.00000E+00
405	9.24255E-01	1.04167E+01	9.38725E-01	1.17157E-03	0.00000E+00	0.00000E+00
406	9.26128E-01	1.04395E+01	9.38694E-01	1.16908E-03	0.00000E+00	0.00000E+00
407	9.04208E-01	1.04643E+01	9.38609E-01	1.16930E-03	0.00000E+00	0.00000E+00
408	9.22815E-01	1.04880E+01	9.38570E-01	1.16706E-03	0.00000E+00	0.00000E+00
409	9.67198E-01	1.05110E+01	9.38640E-01	1.16631E-03	0.00000E+00	0.00000E+00
410	9.27545E-01	1.05348E+01	9.38613E-01	1.16377E-03	0.00000E+00	0.00000E+00
411	9.17396E-01	1.05577E+01	9.38561E-01	1.16208E-03	0.00000E+00	0.00000E+00
412	9.41994E-01	1.05805E+01	9.38569E-01	1.15927E-03	0.00000E+00	0.00000E+00
413	9.31300E-01	1.06043E+01	9.38552E-01	1.15658E-03	0.00000E+00	0.00000E+00
414	9.43036E-01	1.06282E+01	9.38563E-01	1.15382E-03	0.00000E+00	0.00000E+00
415	1.00201E+00	1.06510E+01	9.38716E-01	1.16123E-03	0.00000E+00	0.00000E+00
416	9.21520E-01	1.06748E+01	9.38675E-01	1.15917E-03	0.00000E+00	0.00000E+00
417	9.34770E-01	1.06987E+01	9.38665E-01	1.15641E-03	0.00000E+00	0.00000E+00
418	9.07589E-01	1.07225E+01	9.38590E-01	1.15604E-03	0.00000E+00	0.00000E+00
419	9.08249E-01	1.07462E+01	9.38518E-01	1.15556E-03	0.00000E+00	0.00000E+00
420	9.46312E-01	1.07710E+01	9.38536E-01	1.15294E-03	0.00000E+00	0.00000E+00
421	9.58714E-01	1.07938E+01	9.38585E-01	1.15120E-03	0.00000E+00	0.00000E+00
422	9.00820E-01	1.08185E+01	9.38495E-01	1.15197E-03	0.00000E+00	0.00000E+00
423	9.37089E-01	1.08415E+01	9.38491E-01	1.14923E-03	0.00000E+00	0.00000E+00
424	9.86161E-01	1.08633E+01	9.38604E-01	1.15206E-03	0.00000E+00	0.00000E+00
425	9.77884E-01	1.08863E+01	9.38697E-01	1.15307E-03	0.00000E+00	0.00000E+00
426	9.66077E-01	1.09092E+01	9.38762E-01	1.15216E-03	0.00000E+00	0.00000E+00
427	9.48712E-01	1.09320E+01	9.38785E-01	1.14969E-03	0.00000E+00	0.00000E+00

428	9.68704E-01	1.09558E+01	9.38855E-01	1.14913E-03	0.00000E+00	0.00000E+00
429	9.55306E-01	1.09787E+01	9.38894E-01	1.14709E-03	0.00000E+00	0.00000E+00
430	9.19911E-01	1.10035E+01	9.38849E-01	1.14526E-03	0.00000E+00	0.00000E+00
431	9.27123E-01	1.10263E+01	9.38822E-01	1.14292E-03	0.00000E+00	0.00000E+00
432	9.99755E-01	1.10492E+01	9.38964E-01	1.14903E-03	0.00000E+00	0.00000E+00
433	9.60097E-01	1.10730E+01	9.39013E-01	1.14741E-03	0.00000E+00	0.00000E+00
434	9.31431E-01	1.10975E+01	9.38955E-01	1.14488E-03	0.00000E+00	0.00000E+00
435	9.24533E-01	1.11215E+01	9.38922E-01	1.14272E-03	0.00000E+00	0.00000E+00
436	9.46137E-01	1.11445E+01	9.38979E-01	1.14020E-03	0.00000E+00	0.00000E+00
437	9.50072E-01	1.11673E+01	9.39004E-01	1.13786E-03	0.00000E+00	0.00000E+00
438	9.50420E-01	1.11902E+01	9.39030E-01	1.13555E-03	0.00000E+00	0.00000E+00
439	9.15100E-01	1.12150E+01	9.38976E-01	1.13427E-03	0.00000E+00	0.00000E+00
440	9.56027E-01	1.12387E+01	9.39014E-01	1.13235E-03	0.00000E+00	0.00000E+00
441	9.57646E-01	1.12625E+01	9.39057E-01	1.13057E-03	0.00000E+00	0.00000E+00
442	9.46629E-01	1.12863E+01	9.39074E-01	1.12812E-03	0.00000E+00	0.00000E+00
443	9.42689E-01	1.13102E+01	9.39082E-01	1.12559E-03	0.00000E+00	0.00000E+00
444	9.06844E-01	1.13340E+01	9.39009E-01	1.12541E-03	0.00000E+00	0.00000E+00
445	8.90291E-01	1.13587E+01	9.38899E-01	1.12824E-03	0.00000E+00	0.00000E+00
446	9.33697E-01	1.13825E+01	9.38888E-01	1.12576E-03	0.00000E+00	0.00000E+00
447	9.54983E-01	1.14053E+01	9.38924E-01	1.12381E-03	0.00000E+00	0.00000E+00
448	9.69413E-01	1.14292E+01	9.38992E-01	1.12337E-03	0.00000E+00	0.00000E+00
449	9.71913E-01	1.14520E+01	9.39066E-01	1.12327E-03	0.00000E+00	0.00000E+00
450	9.31640E-01	1.14767E+01	9.39049E-01	1.12088E-03	0.00000E+00	0.00000E+00
451	9.08462E-01	1.14997E+01	9.38981E-01	1.12045E-03	0.00000E+00	0.00000E+00
452	9.55838E-01	1.15235E+01	9.39019E-01	1.11859E-03	0.00000E+00	0.00000E+00
453	8.95889E-01	1.15463E+01	9.38923E-01	1.12019E-03	0.00000E+00	0.00000E+00
454	9.18999E-01	1.15702E+01	9.38879E-01	1.11858E-03	0.00000E+00	0.00000E+00
455	8.80548E-01	1.15938E+01	9.38750E-01	1.12351E-03	0.00000E+00	0.00000E+00
456	9.27797E-01	1.16177E+01	9.38726E-01	1.12129E-03	0.00000E+00	0.00000E+00
457	9.22671E-01	1.16415E+01	9.38691E-01	1.11938E-03	0.00000E+00	0.00000E+00
458	9.66367E-01	1.16653E+01	9.38751E-01	1.11857E-03	0.00000E+00	0.00000E+00
459	9.26899E-01	1.16900E+01	9.38725E-01	1.11643E-03	0.00000E+00	0.00000E+00
460	8.95283E-01	1.17138E+01	9.38631E-01	1.11803E-03	0.00000E+00	0.00000E+00
461	9.38385E-01	1.17377E+01	9.38552E-01	1.11727E-03	0.00000E+00	0.00000E+00
462	9.46708E-01	1.17605E+01	9.38582E-01	1.11523E-03	0.00000E+00	0.00000E+00
463	9.07869E-01	1.17852E+01	9.38516E-01	1.11480E-03	0.00000E+00	0.00000E+00
464	8.98300E-01	1.18082E+01	9.38429E-01	1.11579E-03	0.00000E+00	0.00000E+00
465	9.45685E-01	1.18320E+01	9.38444E-01	1.11348E-03	0.00000E+00	0.00000E+00
466	9.61955E-01	1.18567E+01	9.38495E-01	1.11224E-03	0.00000E+00	0.00000E+00
467	8.89168E-01	1.18805E+01	9.38389E-01	1.11490E-03	0.00000E+00	0.00000E+00
468	9.54388E-01	1.19033E+01	9.38423E-01	1.11303E-03	0.00000E+00	0.00000E+00
469	9.26787E-01	1.19272E+01	9.38398E-01	1.11093E-03	0.00000E+00	0.00000E+00
470	9.01678E-01	1.19510E+01	9.38320E-01	1.11133E-03	0.00000E+00	0.00000E+00
471	9.50547E-01	1.19738E+01	9.38346E-01	1.10926E-03	0.00000E+00	0.00000E+00
472	9.52515E-01	1.19967E+01	9.38376E-01	1.10731E-03	0.00000E+00	0.00000E+00
473	9.44461E-01	1.20195E+01	9.38389E-01	1.10503E-03	0.00000E+00	0.00000E+00
474	9.10779E-01	1.20443E+01	9.38331E-01	1.10424E-03	0.00000E+00	0.00000E+00
475	8.98324E-01	1.20682E+01	9.38246E-01	1.10514E-03	0.00000E+00	0.00000E+00
476	9.83666E-01	1.20910E+01	9.38342E-01	1.10696E-03	0.00000E+00	0.00000E+00
477	9.23606E-01	1.21148E+01	9.38311E-01	1.10506E-03	0.00000E+00	0.00000E+00
478	9.53784E-01	1.21377E+01	9.38343E-01	1.10322E-03	0.00000E+00	0.00000E+00
479	9.16858E-01	1.21623E+01	9.38298E-01	1.10183E-03	0.00000E+00	0.00000E+00
480	9.49425E-01	1.21853E+01	9.38322E-01	1.09976E-03	0.00000E+00	0.00000E+00
481	8.95088E-01	1.22090E+01	9.38231E-01	1.10117E-03	0.00000E+00	0.00000E+00
482	9.06154E-01	1.22328E+01	9.38165E-01	1.10090E-03	0.00000E+00	0.00000E+00
483	9.79822E-01	1.22548E+01	9.38251E-01	1.10202E-03	0.00000E+00	0.00000E+00
484	9.26159E-01	1.22787E+01	9.38226E-01	1.10002E-03	0.00000E+00	0.00000E+00
485	9.45075E-01	1.23007E+01	9.38240E-01	1.09783E-03	0.00000E+00	0.00000E+00
486	9.68298E-01	1.23235E+01	9.38302E-01	1.09732E-03	0.00000E+00	0.00000E+00
487	9.34389E-01	1.23473E+01	9.38294E-01	1.09588E-03	0.00000E+00	0.00000E+00
488	9.55932E-01	1.23702E+01	9.38331E-01	1.09343E-03	0.00000E+00	0.00000E+00
489	9.07645E-01	1.23948E+01	9.38268E-01	1.09300E-03	0.00000E+00	0.00000E+00
490	9.57325E-01	1.24178E+01	9.38307E-01	1.09146E-03	0.00000E+00	0.00000E+00
491	9.02099E-01	1.24425E+01	9.38233E-01	1.09174E-03	0.00000E+00	0.00000E+00
492	9.82575E-01	1.24645E+01	9.38323E-01	1.09326E-03	0.00000E+00	0.00000E+00
493	9.51446E-01	1.24873E+01	9.38350E-01	1.09136E-03	0.00000E+00	0.00000E+00
494	9.53624E-01	1.25120E+01	9.38381E-01	1.08958E-03	0.00000E+00	0.00000E+00
495	9.79774E-01	1.25340E+01	9.38465E-01	1.09060E-03	0.00000E+00	0.00000E+00
496	9.54342E-01	1.25570E+01	9.38497E-01	1.08887E-03	0.00000E+00	0.00000E+00
497	9.28966E-01	1.25807E+01	9.38478E-01	1.08684E-03	0.00000E+00	0.00000E+00
498	9.59628E-01	1.26037E+01	9.38520E-01	1.08548E-03	0.00000E+00	0.00000E+00
499	9.19447E-01	1.26275E+01	9.38482E-01	1.08397E-03	0.00000E+00	0.00000E+00
500	9.11680E-01	1.26512E+01	9.38428E-01	1.08313E-03	0.00000E+00	0.00000E+00
501	9.70748E-01	1.26750E+01	9.38493E-01	1.08290E-03	0.00000E+00	0.00000E+00
502	9.27489E-01	1.26988E+01	9.38471E-01	1.08096E-03	0.00000E+00	0.00000E+00
503	9.69445E-01	1.27217E+01	9.38533E-01	1.08057E-03	0.00000E+00	0.00000E+00
504	9.34773E-01	1.27465E+01	9.38525E-01	1.07844E-03	0.00000E+00	0.00000E+00
505	9.15393E-01	1.27693E+01	9.38479E-01	1.07727E-03	0.00000E+00	0.00000E+00
506	9.31199E-01	1.27932E+01	9.38465E-01	1.07523E-03	0.00000E+00	0.00000E+00
507	9.25936E-01	1.28160E+01	9.38440E-01	1.07339E-03	0.00000E+00	0.00000E+00
508	9.49934E-01	1.28388E+01	9.38463E-01	1.07150E-03	0.00000E+00	0.00000E+00
509	9.35312E-01	1.28627E+01	9.38456E-01	1.06941E-03	0.00000E+00	0.00000E+00
510	9.42506E-01	1.28855E+01	9.38444E-01	1.06733E-03	0.00000E+00	0.00000E+00
511	8.88290E-01	1.29103E+01	9.38366E-01	1.06978E-03	0.00000E+00	0.00000E+00
512	9.33835E-01	1.29332E+01	9.38357E-01	1.06772E-03	0.00000E+00	0.00000E+00
513	9.12717E-01	1.29570E+01	9.38307E-01	1.06681E-03	0.00000E+00	0.00000E+00
514	9.74707E-01	1.29790E+01	9.38378E-01	1.06709E-03	0.00000E+00	0.00000E+00
515	9.28346E-01	1.30027E+01	9.38358E-01	1.06519E-03	0.00000E+00	0.00000E+00
516	9.28062E-01	1.30257E+01	9.38338E-01	1.06330E-03	0.00000E+00	0.00000E+00
517	9.40332E-01	1.30495E+01	9.38342E-01	1.06124E-03	0.00000E+00	0.00000E+00
518	9.43171E-01	1.30732E+01	9.38352E-01	1.05923E-03	0.00000E+00	0.00000E+00
519	9.33438E-01	1.30962E+01	9.38342E-01	1.05722E-03	0.00000E+00	0.00000E+00
520	9.40989E-01	1.31190E+01	9.38347E-01	1.05519E-03	0.00000E+00	0.00000E+00
521	9.27610E-01	1.31428E+01	9.38326E-01	1.05336E-03	0.00000E+00	0.00000E+00
522	9.55027E-01	1.31657E+01	9.38359E-01	1.05182E-03	0.00000E+00	0.00000E+00
523	9.49024E-01	1.31885E+01	9.38379E-01	1.05000E-03	0.00000E+00	0.00000E+00
524	9.45034E-01	1.32123E+01	9.38392E-01	1.04806E-03	0.00000E+00	0.00000E+00
525	9.57488E-01	1.32343E+01	9.38428E-01	1.04669E-03	0.00000E+00	0.00000E+00
526	8.86605E-01	1.32582E+01	9.38333E-01	1.04901E-03	0.00000E+00	0.00000E+00
527	9.01363E-01	1.32820E+01	9.38263E-01	1.04938E-03	0.00000E+00	0.00000E+00
528	9.01442E-01	1.33058E+01	9.38193E-01	1.04972E-03	0.00000E+00	0.00000E+00
529	9.02342E-01	1.33295E+01	9.38125E-01	1.04993E-03	0.00000E+00	0.00000E+00
530	9.69731E-01	1.33525E+01	9.38185E-01	1.04965E-03	0.00000E+00	0.00000E+00
531	9.54672E-01	1.33753E+01	9.38216E-01	1.04813E-03	0.00000E+00	0.00000E+00
532	9.20068E-01	1.33982E+01	9.38182E-01	1.04671E-03	0.00000E+00	0.00000E+00
533	9.40693E-01	1.34220E+01	9.38186E-01	1.04474E-03	0.00000E+00	0.00000E+00
534	9.40306E-01	1.34458E+01	9.38190E-01	1.04279E-03	0.00000E+00	0.00000E+00
535	9.13337E-01	1.34705E+01	9.38144E-01	1.04187E-03	0.00000E+00	0.00000E+00

536	9.35768E-01	1.34943E+01	9.38139E-01	1.03993E-03	0.00000E+00	0.00000E+00
537	9.27914E-01	1.35182E+01	9.38120E-01	1.03816E-03	0.00000E+00	0.00000E+00
538	9.12905E-01	1.35428E+01	9.38073E-01	1.03729E-03	0.00000E+00	0.00000E+00
539	9.57329E-01	1.35657E+01	9.38109E-01	1.03597E-03	0.00000E+00	0.00000E+00
540	9.42952E-01	1.35887E+01	9.38118E-01	1.03409E-03	0.00000E+00	0.00000E+00
541	9.01678E-01	1.36133E+01	9.38050E-01	1.03438E-03	0.00000E+00	0.00000E+00
542	9.52520E-01	1.36362E+01	9.38077E-01	1.03281E-03	0.00000E+00	0.00000E+00
543	9.40350E-01	1.36592E+01	9.38081E-01	1.03091E-03	0.00000E+00	0.00000E+00
544	9.69920E-01	1.36820E+01	9.38140E-01	1.03068E-03	0.00000E+00	0.00000E+00
545	9.72675E-01	1.37048E+01	9.38204E-01	1.03074E-03	0.00000E+00	0.00000E+00
546	9.82117E-01	1.37287E+01	9.38284E-01	1.03201E-03	0.00000E+00	0.00000E+00
547	9.36257E-01	1.37515E+01	9.38281E-01	1.03012E-03	0.00000E+00	0.00000E+00
548	9.29249E-01	1.37753E+01	9.38264E-01	1.02836E-03	0.00000E+00	0.00000E+00
549	9.15145E-01	1.37983E+01	9.38222E-01	1.02735E-03	0.00000E+00	0.00000E+00
550	9.28437E-01	1.38220E+01	9.38204E-01	1.02563E-03	0.00000E+00	0.00000E+00
551	9.42862E-01	1.38458E+01	9.38212E-01	1.02380E-03	0.00000E+00	0.00000E+00
552	9.34042E-01	1.38697E+01	9.38205E-01	1.02196E-03	0.00000E+00	0.00000E+00
553	9.14296E-01	1.38935E+01	9.38161E-01	1.02103E-03	0.00000E+00	0.00000E+00
554	9.69382E-01	1.39163E+01	9.38218E-01	1.02074E-03	0.00000E+00	0.00000E+00
555	9.13431E-01	1.39392E+01	9.38173E-01	1.01988E-03	0.00000E+00	0.00000E+00
556	9.45486E-01	1.39612E+01	9.38186E-01	1.01812E-03	0.00000E+00	0.00000E+00
557	9.59166E-01	1.39850E+01	9.38224E-01	1.01699E-03	0.00000E+00	0.00000E+00
558	9.87518E-01	1.40070E+01	9.38313E-01	1.01902E-03	0.00000E+00	0.00000E+00
559	9.28154E-01	1.40308E+01	9.38295E-01	1.01736E-03	0.00000E+00	0.00000E+00
560	9.29636E-01	1.40545E+01	9.38279E-01	1.01569E-03	0.00000E+00	0.00000E+00
561	9.68078E-01	1.40775E+01	9.38332E-01	1.01523E-03	0.00000E+00	0.00000E+00
562	9.30675E-01	1.41013E+01	9.38319E-01	1.01351E-03	0.00000E+00	0.00000E+00
563	9.13440E-01	1.41250E+01	9.38274E-01	1.01267E-03	0.00000E+00	0.00000E+00
564	9.45130E-01	1.41470E+01	9.38287E-01	1.01094E-03	0.00000E+00	0.00000E+00
565	9.26970E-01	1.41708E+01	9.38266E-01	1.00935E-03	0.00000E+00	0.00000E+00
566	9.29468E-01	1.41947E+01	9.38251E-01	1.00768E-03	0.00000E+00	0.00000E+00
567	9.07029E-01	1.42193E+01	9.38196E-01	1.00741E-03	0.00000E+00	0.00000E+00
568	9.11395E-01	1.42432E+01	9.38148E-01	1.00674E-03	0.00000E+00	0.00000E+00
569	9.36097E-01	1.42660E+01	9.38145E-01	1.00497E-03	0.00000E+00	0.00000E+00
570	9.77811E-01	1.42898E+01	9.38214E-01	1.00563E-03	0.00000E+00	0.00000E+00
571	9.54758E-01	1.43127E+01	9.38244E-01	1.00428E-03	0.00000E+00	0.00000E+00
572	9.47146E-01	1.43357E+01	9.38259E-01	1.00264E-03	0.00000E+00	0.00000E+00
573	9.28991E-01	1.43585E+01	9.38243E-01	1.00101E-03	0.00000E+00	0.00000E+00
574	8.87358E-01	1.43823E+01	9.38154E-01	1.00321E-03	0.00000E+00	0.00000E+00
575	9.75028E-01	1.44052E+01	9.38218E-01	1.00352E-03	0.00000E+00	0.00000E+00
576	9.77525E-01	1.44272E+01	9.38287E-01	1.00411E-03	0.00000E+00	0.00000E+00
577	9.18977E-01	1.44518E+01	9.38253E-01	1.00293E-03	0.00000E+00	0.00000E+00
578	9.32075E-01	1.44748E+01	9.38243E-01	1.00124E-03	0.00000E+00	0.00000E+00
579	9.25098E-01	1.44977E+01	9.38220E-01	9.99764E-04	0.00000E+00	0.00000E+00
580	9.21433E-01	1.45223E+01	9.38191E-01	9.98456E-04	0.00000E+00	0.00000E+00
581	9.40642E-01	1.45452E+01	9.38195E-01	9.96739E-04	0.00000E+00	0.00000E+00
582	9.79132E-01	1.45682E+01	9.38266E-01	9.97519E-04	0.00000E+00	0.00000E+00
583	9.82711E-01	1.45910E+01	9.38342E-01	9.98734E-04	0.00000E+00	0.00000E+00
584	9.41636E-01	1.46138E+01	9.38348E-01	9.97033E-04	0.00000E+00	0.00000E+00
585	9.32929E-01	1.46377E+01	9.38338E-01	9.95365E-04	0.00000E+00	0.00000E+00
586	9.42901E-01	1.46615E+01	9.38346E-01	9.93690E-04	0.00000E+00	0.00000E+00
587	9.11376E-01	1.46853E+01	9.38300E-01	9.93060E-04	0.00000E+00	0.00000E+00
588	9.65887E-01	1.47073E+01	9.38347E-01	9.92481E-04	0.00000E+00	0.00000E+00
589	9.68138E-01	1.47310E+01	9.38398E-01	9.92088E-04	0.00000E+00	0.00000E+00
590	9.36696E-01	1.47548E+01	9.38395E-01	9.90404E-04	0.00000E+00	0.00000E+00
591	8.92257E-01	1.47797E+01	9.38317E-01	9.91819E-04	0.00000E+00	0.00000E+00
592	9.52667E-01	1.48033E+01	9.38341E-01	9.90435E-04	0.00000E+00	0.00000E+00
593	1.01253E+00	1.48263E+01	9.38467E-01	9.96694E-04	0.00000E+00	0.00000E+00
594	9.72563E-01	1.48492E+01	9.38524E-01	9.96674E-04	0.00000E+00	0.00000E+00
595	9.46801E-01	1.48712E+01	9.38538E-01	9.95090E-04	0.00000E+00	0.00000E+00
596	9.15585E-01	1.48950E+01	9.38499E-01	9.94164E-04	0.00000E+00	0.00000E+00
597	9.18616E-01	1.49187E+01	9.38466E-01	9.93055E-04	0.00000E+00	0.00000E+00
598	9.29666E-01	1.49425E+01	9.38451E-01	9.91497E-04	0.00000E+00	0.00000E+00
599	8.82997E-01	1.49663E+01	9.38358E-01	9.94184E-04	0.00000E+00	0.00000E+00
600	9.96421E-01	1.49892E+01	9.38455E-01	9.97258E-04	0.00000E+00	0.00000E+00
601	9.49348E-01	1.50122E+01	9.38474E-01	9.95757E-04	0.00000E+00	0.00000E+00
602	9.30217E-01	1.50358E+01	9.38460E-01	9.94192E-04	0.00000E+00	0.00000E+00
603	9.20505E-01	1.50588E+01	9.38430E-01	9.92986E-04	0.00000E+00	0.00000E+00
604	9.56219E-01	1.50817E+01	9.38460E-01	9.91775E-04	0.00000E+00	0.00000E+00
605	9.85087E-01	1.51045E+01	9.38537E-01	9.93144E-04	0.00000E+00	0.00000E+00
606	9.23140E-01	1.51283E+01	9.38511E-01	9.91826E-04	0.00000E+00	0.00000E+00
607	9.39363E-01	1.51512E+01	9.38513E-01	9.90186E-04	0.00000E+00	0.00000E+00
608	9.45778E-01	1.51742E+01	9.38525E-01	9.88623E-04	0.00000E+00	0.00000E+00
609	9.19351E-01	1.51980E+01	9.38493E-01	9.87499E-04	0.00000E+00	0.00000E+00
610	9.52071E-01	1.52208E+01	9.38516E-01	9.86126E-04	0.00000E+00	0.00000E+00
611	9.79187E-01	1.52437E+01	9.38528E-01	9.86730E-04	0.00000E+00	0.00000E+00
612	9.50653E-01	1.52675E+01	9.38602E-01	9.85348E-04	0.00000E+00	0.00000E+00
613	9.44038E-01	1.52913E+01	9.38611E-01	9.83774E-04	0.00000E+00	0.00000E+00
614	9.44213E-01	1.53142E+01	9.38620E-01	9.82208E-04	0.00000E+00	0.00000E+00
615	9.33929E-01	1.53380E+01	9.38613E-01	9.80634E-04	0.00000E+00	0.00000E+00
616	9.31973E-01	1.53618E+01	9.38602E-01	9.79095E-04	0.00000E+00	0.00000E+00
617	9.07024E-01	1.53857E+01	9.38550E-01	9.78850E-04	0.00000E+00	0.00000E+00
618	9.98090E-01	1.54085E+01	9.38647E-01	9.82028E-04	0.00000E+00	0.00000E+00
619	9.62230E-01	1.54305E+01	9.38685E-01	9.81179E-04	0.00000E+00	0.00000E+00
620	9.21974E-01	1.54543E+01	9.38658E-01	9.79964E-04	0.00000E+00	0.00000E+00
621	9.16871E-01	1.54780E+01	9.38623E-01	9.79012E-04	0.00000E+00	0.00000E+00
622	9.23423E-01	1.55018E+01	9.38598E-01	9.77739E-04	0.00000E+00	0.00000E+00
623	8.95480E-01	1.55257E+01	9.38529E-01	9.78630E-04	0.00000E+00	0.00000E+00
624	9.71361E-01	1.55485E+01	9.38582E-01	9.78480E-04	0.00000E+00	0.00000E+00
625	9.53844E-01	1.55723E+01	9.38606E-01	9.77215E-04	0.00000E+00	0.00000E+00
626	9.30552E-01	1.55962E+01	9.38593E-01	9.75733E-04	0.00000E+00	0.00000E+00
627	9.35378E-01	1.56200E+01	9.38588E-01	9.74184E-04	0.00000E+00	0.00000E+00
628	9.44078E-01	1.56420E+01	9.38597E-01	9.72666E-04	0.00000E+00	0.00000E+00
629	9.54964E-01	1.56657E+01	9.38623E-01	9.71465E-04	0.00000E+00	0.00000E+00
630	9.27703E-01	1.56887E+01	9.38606E-01	9.70072E-04	0.00000E+00	0.00000E+00
631	1.00296E+00	1.57123E+01	9.38708E-01	9.73917E-04	0.00000E+00	0.00000E+00
632	9.31571E-01	1.57362E+01	9.38697E-01	9.72436E-04	0.00000E+00	0.00000E+00
633	9.69320E-01	1.57600E+01	9.38745E-01	9.72106E-04	0.00000E+00	0.00000E+00
634	9.89042E-01	1.57828E+01	9.38825E-01	9.73824E-04	0.00000E+00	0.00000E+00
635	9.32962E-01	1.58058E+01	9.38816E-01	9.72329E-04	0.00000E+00	0.00000E+00
636	9.40863E-01	1.58295E+01	9.38819E-01	9.70799E-04	0.00000E+00	0.00000E+00
637	8.92825E-01	1.58543E+01	9.38746E-01	9.71972E-04	0.00000E+00	0.00000E+00
638	9.29157E-01	1.58782E+01	9.38717E-01	9.70882E-04	0.00000E+00	0.00000E+00
639	9.86603E-01	1.59000E+01	9.38808E-01	9.73607E-04	0.00000E+00	0.00000E+00
640	9.60582E-01	1.59230E+01	9.38842E-01	9.72679E-04	0.00000E+00	0.00000E+00
641	9.70939E-01	1.59468E+01	9.38892E-01	9.72453E-04	0.00000E+00	0.00000E+00
642	9.42895E-01	1.59705E+01	9.38899E-01	9.70953E-04	0.00000E+00	0.00000E+00
643	9.51506E-01	1.59935E+01	9.38918E-01	9.69637E-04	0.00000E+00	0.00000E+00



644	9.27407E-01	1.60172E+01	9.38900E-01	9.68291E-04	0.00000E+00	0.00000E+00
645	9.29923E-01	1.60410E+01	9.38886E-01	9.66885E-04	0.00000E+00	0.00000E+00
646	9.30328E-01	1.60640E+01	9.38873E-01	9.65474E-04	0.00000E+00	0.00000E+00
647	9.44038E-01	1.60877E+01	9.38881E-01	9.64009E-04	0.00000E+00	0.00000E+00
648	9.21504E-01	1.61115E+01	9.38854E-01	9.62891E-04	0.00000E+00	0.00000E+00
649	9.43148E-01	1.61343E+01	9.38861E-01	9.61425E-04	0.00000E+00	0.00000E+00
650	9.63170E-01	1.61582E+01	9.38901E-01	9.60768E-04	0.00000E+00	0.00000E+00
651	9.08608E-01	1.61812E+01	9.38854E-01	9.60411E-04	0.00000E+00	0.00000E+00
652	9.23426E-01	1.62048E+01	9.38830E-01	9.59236E-04	0.00000E+00	0.00000E+00
653	9.53679E-01	1.62287E+01	9.38853E-01	9.58033E-04	0.00000E+00	0.00000E+00
654	9.56435E-01	1.62517E+01	9.38880E-01	9.56943E-04	0.00000E+00	0.00000E+00
655	9.40723E-01	1.62745E+01	9.38883E-01	9.55480E-04	0.00000E+00	0.00000E+00
656	9.25284E-01	1.62973E+01	9.38862E-01	9.54245E-04	0.00000E+00	0.00000E+00
657	9.08590E-01	1.63212E+01	9.38816E-01	9.53907E-04	0.00000E+00	0.00000E+00
658	9.26671E-01	1.63440E+01	9.38797E-01	9.52632E-04	0.00000E+00	0.00000E+00
659	9.01560E-01	1.63688E+01	9.38741E-01	9.52868E-04	0.00000E+00	0.00000E+00
660	9.77940E-01	1.63917E+01	9.38800E-01	9.53282E-04	0.00000E+00	0.00000E+00
661	9.58119E-01	1.64155E+01	9.38830E-01	9.52286E-04	0.00000E+00	0.00000E+00
662	9.42903E-01	1.64383E+01	9.38836E-01	9.50862E-04	0.00000E+00	0.00000E+00
663	9.34902E-01	1.64622E+01	9.38830E-01	9.49441E-04	0.00000E+00	0.00000E+00
664	9.29915E-01	1.64850E+01	9.38816E-01	9.48101E-04	0.00000E+00	0.00000E+00
665	9.24465E-01	1.65078E+01	9.38795E-01	9.46917E-04	0.00000E+00	0.00000E+00
666	9.34045E-01	1.65317E+01	9.38788E-01	9.45517E-04	0.00000E+00	0.00000E+00
667	9.49178E-01	1.65555E+01	9.38803E-01	9.44224E-04	0.00000E+00	0.00000E+00
668	9.39517E-01	1.65775E+01	9.38804E-01	9.42805E-04	0.00000E+00	0.00000E+00
669	9.40568E-01	1.66013E+01	9.38807E-01	9.41395E-04	0.00000E+00	0.00000E+00
670	9.65484E-01	1.66242E+01	9.38847E-01	9.40832E-04	0.00000E+00	0.00000E+00
671	9.38007E-01	1.66480E+01	9.38846E-01	9.39426E-04	0.00000E+00	0.00000E+00
672	9.41043E-01	1.66718E+01	9.38849E-01	9.38028E-04	0.00000E+00	0.00000E+00
673	9.48740E-01	1.66947E+01	9.38864E-01	9.36745E-04	0.00000E+00	0.00000E+00
674	9.22209E-01	1.67185E+01	9.38839E-01	9.35679E-04	0.00000E+00	0.00000E+00
675	9.64288E-01	1.67423E+01	9.38877E-01	9.35052E-04	0.00000E+00	0.00000E+00
676	9.23147E-01	1.67642E+01	9.38862E-01	9.33775E-04	0.00000E+00	0.00000E+00
677	9.75030E-01	1.67880E+01	9.38916E-01	9.33929E-04	0.00000E+00	0.00000E+00
678	9.36713E-01	1.68118E+01	9.38913E-01	9.32552E-04	0.00000E+00	0.00000E+00
679	9.47822E-01	1.68347E+01	9.38926E-01	9.31267E-04	0.00000E+00	0.00000E+00
680	9.67767E-01	1.68585E+01	9.38968E-01	9.30865E-04	0.00000E+00	0.00000E+00
681	9.78379E-01	1.68813E+01	9.39026E-01	9.31303E-04	0.00000E+00	0.00000E+00
682	9.30224E-01	1.69052E+01	9.39013E-01	9.30023E-04	0.00000E+00	0.00000E+00
683	9.52216E-01	1.69290E+01	9.39033E-01	9.28859E-04	0.00000E+00	0.00000E+00
684	9.07414E-01	1.69518E+01	9.38986E-01	9.28654E-04	0.00000E+00	0.00000E+00
685	9.76482E-01	1.69748E+01	9.39041E-01	9.28917E-04	0.00000E+00	0.00000E+00
686	9.61002E-01	1.69967E+01	9.39073E-01	9.28113E-04	0.00000E+00	0.00000E+00
687	9.48217E-01	1.70205E+01	9.39087E-01	9.26853E-04	0.00000E+00	0.00000E+00
688	9.19925E-01	1.70443E+01	9.39059E-01	9.25923E-04	0.00000E+00	0.00000E+00
689	9.18225E-01	1.70672E+01	9.39028E-01	9.25071E-04	0.00000E+00	0.00000E+00
690	9.29547E-01	1.70920E+01	9.39015E-01	9.23828E-04	0.00000E+00	0.00000E+00
691	9.74512E-01	1.71148E+01	9.39066E-01	9.23924E-04	0.00000E+00	0.00000E+00
692	9.23995E-01	1.71387E+01	9.39044E-01	9.22843E-04	0.00000E+00	0.00000E+00
693	9.44968E-01	1.71625E+01	9.39053E-01	9.21546E-04	0.00000E+00	0.00000E+00
694	9.37986E-01	1.71862E+01	9.39051E-01	9.20215E-04	0.00000E+00	0.00000E+00
695	8.71771E-01	1.72110E+01	9.38954E-01	9.24000E-04	0.00000E+00	0.00000E+00
696	9.57521E-01	1.72338E+01	9.38981E-01	9.23056E-04	0.00000E+00	0.00000E+00
697	9.11858E-01	1.72577E+01	9.38942E-01	9.22553E-04	0.00000E+00	0.00000E+00
698	9.74981E-01	1.72805E+01	9.38994E-01	9.22680E-04	0.00000E+00	0.00000E+00
699	9.47938E-01	1.73043E+01	9.39007E-01	9.21445E-04	0.00000E+00	0.00000E+00
700	9.30839E-01	1.73282E+01	9.38995E-01	9.20198E-04	0.00000E+00	0.00000E+00
701	9.56392E-01	1.73520E+01	9.39020E-01	9.19218E-04	0.00000E+00	0.00000E+00
702	9.04129E-01	1.73748E+01	9.38970E-01	9.19256E-04	0.00000E+00	0.00000E+00
703	9.49497E-01	1.73987E+01	9.38921E-01	9.19226E-04	0.00000E+00	0.00000E+00
704	9.35171E-01	1.74225E+01	9.38916E-01	9.17931E-04	0.00000E+00	0.00000E+00
705	9.61477E-01	1.74453E+01	9.38948E-01	9.17186E-04	0.00000E+00	0.00000E+00
706	9.14978E-01	1.74700E+01	9.38914E-01	9.16515E-04	0.00000E+00	0.00000E+00
707	9.25121E-01	1.74938E+01	9.38895E-01	9.15423E-04	0.00000E+00	0.00000E+00
708	9.46967E-01	1.75167E+01	9.38906E-01	9.14197E-04	0.00000E+00	0.00000E+00
709	9.40055E-01	1.75405E+01	9.38908E-01	9.12904E-04	0.00000E+00	0.00000E+00
710	9.35305E-01	1.75633E+01	9.38903E-01	9.11628E-04	0.00000E+00	0.00000E+00
711	9.73473E-01	1.75872E+01	9.38951E-01	9.11647E-04	0.00000E+00	0.00000E+00
712	9.70251E-01	1.76100E+01	9.38995E-01	9.11428E-04	0.00000E+00	0.00000E+00
713	9.19442E-01	1.76330E+01	9.38968E-01	9.10561E-04	0.00000E+00	0.00000E+00
714	9.04699E-01	1.76568E+01	9.38920E-01	9.10554E-04	0.00000E+00	0.00000E+00
715	9.45347E-01	1.76805E+01	9.38929E-01	9.09321E-04	0.00000E+00	0.00000E+00
716	9.01123E-01	1.77035E+01	9.38876E-01	9.09589E-04	0.00000E+00	0.00000E+00
717	9.61063E-01	1.77273E+01	9.38907E-01	9.08846E-04	0.00000E+00	0.00000E+00
718	9.36848E-01	1.77502E+01	9.38904E-01	9.07580E-04	0.00000E+00	0.00000E+00
719	9.01023E-01	1.77740E+01	9.38851E-01	9.07852E-04	0.00000E+00	0.00000E+00
720	9.34268E-01	1.77987E+01	9.38845E-01	9.06609E-04	0.00000E+00	0.00000E+00
721	9.08481E-01	1.78215E+01	9.38803E-01	9.06332E-04	0.00000E+00	0.00000E+00
722	9.29685E-01	1.78453E+01	9.38790E-01	9.05161E-04	0.00000E+00	0.00000E+00
723	9.11574E-01	1.78692E+01	9.38752E-01	9.04692E-04	0.00000E+00	0.00000E+00
724	9.83318E-01	1.78920E+01	9.38814E-01	9.05544E-04	0.00000E+00	0.00000E+00
725	9.66869E-01	1.79150E+01	9.38853E-01	9.05123E-04	0.00000E+00	0.00000E+00
726	9.18746E-01	1.79378E+01	9.38825E-01	9.04299E-04	0.00000E+00	0.00000E+00
727	9.17843E-01	1.79625E+01	9.38796E-01	9.03514E-04	0.00000E+00	0.00000E+00
728	9.60154E-01	1.79863E+01	9.38825E-01	9.02748E-04	0.00000E+00	0.00000E+00
729	9.68030E-01	1.80092E+01	9.38866E-01	9.02400E-04	0.00000E+00	0.00000E+00
730	9.64705E-01	1.80330E+01	9.38901E-01	9.01859E-04	0.00000E+00	0.00000E+00
731	9.46238E-01	1.80558E+01	9.38911E-01	9.00677E-04	0.00000E+00	0.00000E+00
732	9.50756E-01	1.80788E+01	9.38927E-01	8.99589E-04	0.00000E+00	0.00000E+00
733	9.17882E-01	1.81017E+01	9.38899E-01	8.98818E-04	0.00000E+00	0.00000E+00
734	9.20579E-01	1.81255E+01	9.38874E-01	8.97938E-04	0.00000E+00	0.00000E+00
735	9.46260E-01	1.81483E+01	9.38884E-01	8.96769E-04	0.00000E+00	0.00000E+00
736	9.64619E-01	1.81722E+01	9.38919E-01	8.96233E-04	0.00000E+00	0.00000E+00
737	9.51975E-01	1.81950E+01	9.38936E-01	8.95189E-04	0.00000E+00	0.00000E+00
738	9.41043E-01	1.82180E+01	9.38939E-01	8.93976E-04	0.00000E+00	0.00000E+00
739	9.45898E-01	1.82417E+01	9.38949E-01	8.92812E-04	0.00000E+00	0.00000E+00
740	9.65496E-01	1.82655E+01	9.38985E-01	8.92327E-04	0.00000E+00	0.00000E+00
741	9.13476E-01	1.82893E+01	9.38950E-01	8.91787E-04	0.00000E+00	0.00000E+00
742	9.18150E-01	1.83132E+01	9.38922E-01	8.91025E-04	0.00000E+00	0.00000E+00
743	9.26568E-01	1.83370E+01	9.38905E-01	8.89978E-04	0.00000E+00	0.00000E+00
744	9.18823E-01	1.83607E+01	9.38878E-01	8.89189E-04	0.00000E+00	0.00000E+00
745	9.49542E-01	1.83845E+01	9.38893E-01	8.88108E-04	0.00000E+00	0.00000E+00
746	9.54471E-01	1.84083E+01	9.38914E-01	8.87160E-04	0.00000E+00	0.00000E+00
747	9.36317E-01	1.84322E+01	9.38910E-01	8.85976E-04	0.00000E+00	0.00000E+00
748	9.31862E-01	1.84550E+01	9.38901E-01	8.84838E-04	0.00000E+00	0.00000E+00
749	9.36146E-01	1.84778E+01	9.38897E-01	8.83660E-04	0.00000E+00	0.00000E+00
750	9.62301E-01	1.85017E+01	9.38928E-01	8.83032E-04	0.00000E+00	0.00000E+00
751	9.90744E-01	1.85247E+01	9.38997E-01	8.84562E-04	0.00000E+00	0.00000E+00

752	9.38020E-01	1.85475E+01	9.38996E-01	8.83383E-04	0.00000E+00	0.00000E+00
753	9.26880E-01	1.85712E+01	9.38980E-01	8.82351E-04	0.00000E+00	0.00000E+00
754	9.26182E-01	1.85950E+01	9.38963E-01	8.81343E-04	0.00000E+00	0.00000E+00
755	9.36351E-01	1.86180E+01	9.38960E-01	8.80179E-04	0.00000E+00	0.00000E+00
756	9.03621E-01	1.86418E+01	9.38913E-01	8.80259E-04	0.00000E+00	0.00000E+00
757	9.57084E-01	1.86637E+01	9.38937E-01	8.79422E-04	0.00000E+00	0.00000E+00
758	9.31246E-01	1.86875E+01	9.38927E-01	8.78317E-04	0.00000E+00	0.00000E+00
759	9.35875E-01	1.87113E+01	9.38923E-01	8.77165E-04	0.00000E+00	0.00000E+00
760	9.86561E-01	1.87352E+01	9.38985E-01	8.78259E-04	0.00000E+00	0.00000E+00
761	9.25748E-01	1.87580E+01	9.38968E-01	8.77274E-04	0.00000E+00	0.00000E+00
762	9.39688E-01	1.87818E+01	9.38969E-01	8.76120E-04	0.00000E+00	0.00000E+00
763	9.55200E-01	1.88057E+01	9.38990E-01	8.75228E-04	0.00000E+00	0.00000E+00
764	9.67303E-01	1.88295E+01	9.39037E-01	8.74868E-04	0.00000E+00	0.00000E+00
765	9.60331E-01	1.88523E+01	9.39055E-01	8.74166E-04	0.00000E+00	0.00000E+00
766	9.58079E-01	1.88762E+01	9.39080E-01	8.73376E-04	0.00000E+00	0.00000E+00
767	9.92942E-01	1.88990E+01	9.39151E-01	8.75071E-04	0.00000E+00	0.00000E+00
768	9.36634E-01	1.89218E+01	9.39147E-01	8.73934E-04	0.00000E+00	0.00000E+00
769	9.69284E-01	1.89448E+01	9.39187E-01	8.73678E-04	0.00000E+00	0.00000E+00
770	9.02905E-01	1.89685E+01	9.39139E-01	8.73818E-04	0.00000E+00	0.00000E+00
771	9.31800E-01	1.89923E+01	9.39130E-01	8.72733E-04	0.00000E+00	0.00000E+00
772	9.20422E-01	1.90153E+01	9.39106E-01	8.71937E-04	0.00000E+00	0.00000E+00
773	9.70387E-01	1.90382E+01	9.39146E-01	8.71750E-04	0.00000E+00	0.00000E+00
774	9.01684E-01	1.90620E+01	9.39098E-01	8.71972E-04	0.00000E+00	0.00000E+00
775	9.38387E-01	1.90848E+01	9.39097E-01	8.70843E-04	0.00000E+00	0.00000E+00
776	9.01963E-01	1.91077E+01	9.39049E-01	8.71040E-04	0.00000E+00	0.00000E+00
777	9.48430E-01	1.91325E+01	9.39061E-01	8.69999E-04	0.00000E+00	0.00000E+00
778	9.19217E-01	1.91562E+01	9.39035E-01	8.69254E-04	0.00000E+00	0.00000E+00
779	9.26475E-01	1.91792E+01	9.39019E-01	8.68285E-04	0.00000E+00	0.00000E+00
780	9.92574E-01	1.92020E+01	9.39088E-01	8.69866E-04	0.00000E+00	0.00000E+00
781	9.34852E-01	1.92248E+01	9.39082E-01	8.68795E-04	0.00000E+00	0.00000E+00
782	9.24003E-01	1.92487E+01	9.39063E-01	8.67896E-04	0.00000E+00	0.00000E+00
783	9.25178E-01	1.92733E+01	9.39045E-01	8.66966E-04	0.00000E+00	0.00000E+00
784	9.45854E-01	1.92963E+01	9.39054E-01	8.65901E-04	0.00000E+00	0.00000E+00
785	9.53401E-01	1.93192E+01	9.39072E-01	8.64988E-04	0.00000E+00	0.00000E+00
786	9.93710E-01	1.93430E+01	9.39142E-01	8.66691E-04	0.00000E+00	0.00000E+00
787	9.39756E-01	1.93658E+01	9.39143E-01	8.65586E-04	0.00000E+00	0.00000E+00
788	9.40221E-01	1.93888E+01	9.39144E-01	8.64486E-04	0.00000E+00	0.00000E+00
789	9.26972E-01	1.94117E+01	9.39129E-01	8.63525E-04	0.00000E+00	0.00000E+00
790	9.19882E-01	1.94355E+01	9.39104E-01	8.62774E-04	0.00000E+00	0.00000E+00
791	9.36054E-01	1.94583E+01	9.39100E-01	8.61689E-04	0.00000E+00	0.00000E+00
792	9.57824E-01	1.94822E+01	9.39124E-01	8.60923E-04	0.00000E+00	0.00000E+00
793	9.56740E-01	1.95060E+01	9.39146E-01	8.60123E-04	0.00000E+00	0.00000E+00
794	9.60888E-01	1.95288E+01	9.39174E-01	8.59475E-04	0.00000E+00	0.00000E+00
795	9.37800E-01	1.95517E+01	9.39172E-01	8.58392E-04	0.00000E+00	0.00000E+00
796	9.25421E-01	1.95755E+01	9.39155E-01	8.57485E-04	0.00000E+00	0.00000E+00
797	9.09263E-01	1.95983E+01	9.39117E-01	8.57231E-04	0.00000E+00	0.00000E+00
798	9.52050E-01	1.96213E+01	9.39133E-01	8.56307E-04	0.00000E+00	0.00000E+00
799	9.12904E-01	1.96460E+01	9.39101E-01	8.55865E-04	0.00000E+00	0.00000E+00
800	9.36917E-01	1.96698E+01	9.39098E-01	8.54796E-04	0.00000E+00	0.00000E+00
801	9.70928E-01	1.96927E+01	9.39138E-01	8.54655E-04	0.00000E+00	0.00000E+00
802	9.10008E-01	1.97165E+01	9.39101E-01	8.54362E-04	0.00000E+00	0.00000E+00
803	9.26777E-01	1.97403E+01	9.39086E-01	8.53433E-04	0.00000E+00	0.00000E+00
804	9.24964E-01	1.97640E+01	9.39068E-01	8.52550E-04	0.00000E+00	0.00000E+00
805	9.37624E-01	1.97870E+01	9.39066E-01	8.51490E-04	0.00000E+00	0.00000E+00
806	9.05660E-01	1.98108E+01	9.39025E-01	8.51452E-04	0.00000E+00	0.00000E+00
807	9.06577E-01	1.98355E+01	9.38984E-01	8.51372E-04	0.00000E+00	0.00000E+00
808	9.19422E-01	1.98583E+01	9.38960E-01	8.50661E-04	0.00000E+00	0.00000E+00
809	9.18639E-01	1.98822E+01	9.38934E-01	8.49980E-04	0.00000E+00	0.00000E+00
810	9.19503E-01	1.99068E+01	9.38910E-01	8.49268E-04	0.00000E+00	0.00000E+00
811	9.26878E-01	1.99298E+01	9.38896E-01	8.48348E-04	0.00000E+00	0.00000E+00
812	9.43545E-01	1.99527E+01	9.38901E-01	8.47319E-04	0.00000E+00	0.00000E+00
813	9.55380E-01	1.99755E+01	9.38922E-01	8.46517E-04	0.00000E+00	0.00000E+00
814	9.11339E-01	2.00003E+01	9.38888E-01	8.46156E-04	0.00000E+00	0.00000E+00
815	9.09312E-01	2.00240E+01	9.38851E-01	8.45898E-04	0.00000E+00	0.00000E+00
816	9.37536E-01	2.00470E+01	9.38850E-01	8.44859E-04	0.00000E+00	0.00000E+00
817	9.70622E-01	2.00688E+01	9.38889E-01	8.44722E-04	0.00000E+00	0.00000E+00
818	9.57916E-01	2.00918E+01	9.38912E-01	8.44008E-04	0.00000E+00	0.00000E+00
819	9.27445E-01	2.01157E+01	9.38898E-01	8.43092E-04	0.00000E+00	0.00000E+00
820	9.44088E-01	2.01385E+01	9.38904E-01	8.42084E-04	0.00000E+00	0.00000E+00
821	9.30320E-01	2.01623E+01	9.38894E-01	8.41121E-04	0.00000E+00	0.00000E+00
822	9.32914E-01	2.01862E+01	9.38887E-01	8.40126E-04	0.00000E+00	0.00000E+00
823	9.30894E-01	2.02090E+01	9.38877E-01	8.39159E-04	0.00000E+00	0.00000E+00
824	9.30168E-01	2.02337E+01	9.38866E-01	8.38204E-04	0.00000E+00	0.00000E+00
825	9.22443E-01	2.02575E+01	9.38846E-01	8.37428E-04	0.00000E+00	0.00000E+00
826	9.66003E-01	2.02803E+01	9.38879E-01	8.37061E-04	0.00000E+00	0.00000E+00
827	9.29377E-01	2.03042E+01	9.38867E-01	8.36125E-04	0.00000E+00	0.00000E+00
828	9.55647E-01	2.03262E+01	9.38888E-01	8.35359E-04	0.00000E+00	0.00000E+00
829	9.13633E-01	2.03500E+01	9.38857E-01	8.34907E-04	0.00000E+00	0.00000E+00
830	9.50101E-01	2.03737E+01	9.38871E-01	8.34009E-04	0.00000E+00	0.00000E+00
831	9.48961E-01	2.03967E+01	9.38883E-01	8.33091E-04	0.00000E+00	0.00000E+00
832	9.48862E-01	2.04205E+01	9.38895E-01	8.32173E-04	0.00000E+00	0.00000E+00
833	9.41736E-01	2.04433E+01	9.38898E-01	8.31178E-04	0.00000E+00	0.00000E+00
834	9.37363E-01	2.04680E+01	9.38897E-01	8.30181E-04	0.00000E+00	0.00000E+00
835	9.66748E-01	2.04910E+01	9.38930E-01	8.29857E-04	0.00000E+00	0.00000E+00
836	1.01260E+00	2.05138E+01	9.39018E-01	8.33555E-04	0.00000E+00	0.00000E+00
837	9.00539E-01	2.05367E+01	9.38972E-01	8.33830E-04	0.00000E+00	0.00000E+00
838	9.62066E-01	2.05605E+01	9.39000E-01	8.33290E-04	0.00000E+00	0.00000E+00
839	9.10203E-01	2.05833E+01	9.38965E-01	8.33005E-04	0.00000E+00	0.00000E+00
840	9.38133E-01	2.06072E+01	9.38964E-01	8.32011E-04	0.00000E+00	0.00000E+00
841	9.02632E-01	2.06300E+01	9.38921E-01	8.32146E-04	0.00000E+00	0.00000E+00
842	9.67458E-01	2.06530E+01	9.38955E-01	8.31849E-04	0.00000E+00	0.00000E+00
843	9.28494E-01	2.06758E+01	9.38943E-01	8.30952E-04	0.00000E+00	0.00000E+00
844	9.21864E-01	2.07005E+01	9.38922E-01	8.30213E-04	0.00000E+00	0.00000E+00
845	9.43201E-01	2.07235E+01	9.38927E-01	8.29243E-04	0.00000E+00	0.00000E+00
846	9.35636E-01	2.07463E+01	9.38924E-01	8.28269E-04	0.00000E+00	0.00000E+00
847	9.09182E-01	2.07710E+01	9.38888E-01	8.28037E-04	0.00000E+00	0.00000E+00
848	9.36806E-01	2.07940E+01	9.38886E-01	8.27061E-04	0.00000E+00	0.00000E+00
849	8.90424E-01	2.08177E+01	9.38829E-01	8.28063E-04	0.00000E+00	0.00000E+00
850	9.36661E-01	2.08425E+01	9.38826E-01	8.27090E-04	0.00000E+00	0.00000E+00
851	9.57491E-01	2.08653E+01	9.38848E-01	8.26407E-04	0.00000E+00	0.00000E+00
852	9.41807E-01	2.08873E+01	9.38852E-01	8.25442E-04	0.00000E+00	0.00000E+00
853	9.48774E-01	2.09102E+01	9.38863E-01	8.24554E-04	0.00000E+00	0.00000E+00
854	9.42511E-01	2.09330E+01	9.38868E-01	8.23597E-04	0.00000E+00	0.00000E+00
855	9.02756E-01	2.09568E+01	9.38825E-01	8.23719E-04	0.00000E+00	0.00000E+00
856	9.06990E-01	2.09798E+01	9.38788E-01	8.23598E-04	0.00000E+00	0.00000E+00
857	9.91736E-01	2.10027E+01	9.38850E-01	8.24962E-04	0.00000E+00	0.00000E+00
858	9.72841E-01	2.10273E+01	9.38890E-01	8.24954E-04	0.00000E+00	0.00000E+00
859	9.29756E-01	2.10512E+01	9.38879E-01	8.24060E-04	0.00000E+00	0.00000E+00

860	9.35268E-01	2.10740E+01	9.38875E-01	8.23109E-04	0.00000E+00	0.00000E+00
861	9.34254E-01	2.10970E+01	9.38869E-01	8.22168E-04	0.00000E+00	0.00000E+00
862	9.33841E-01	2.11207E+01	9.38863E-01	8.21233E-04	0.00000E+00	0.00000E+00
863	9.20073E-01	2.13437E+01	9.38842E-01	8.20563E-04	0.00000E+00	0.00000E+00
864	9.22749E-01	2.11665E+01	9.38823E-01	8.19829E-04	0.00000E+00	0.00000E+00
865	9.26794E-01	2.11903E+01	9.38809E-01	8.18997E-04	0.00000E+00	0.00000E+00
866	9.08680E-01	2.12142E+01	9.38774E-01	8.18791E-04	0.00000E+00	0.00000E+00
867	9.27036E-01	2.12370E+01	9.38761E-01	8.17957E-04	0.00000E+00	0.00000E+00
868	1.00571E+00	2.12580E+01	9.38838E-01	8.20661E-04	0.00000E+00	0.00000E+00
869	9.37281E-01	2.12810E+01	9.38836E-01	8.19715E-04	0.00000E+00	0.00000E+00
870	9.50696E-01	2.13047E+01	9.38850E-01	8.18885E-04	0.00000E+00	0.00000E+00
871	9.35703E-01	2.13285E+01	9.38846E-01	8.17950E-04	0.00000E+00	0.00000E+00
872	9.30543E-01	2.13523E+01	9.38837E-01	8.17065E-04	0.00000E+00	0.00000E+00
873	9.11515E-01	2.13762E+01	9.38805E-01	8.16729E-04	0.00000E+00	0.00000E+00
874	9.64393E-01	2.13990E+01	9.38835E-01	8.16319E-04	0.00000E+00	0.00000E+00
875	9.15660E-01	2.14237E+01	9.38808E-01	8.15816E-04	0.00000E+00	0.00000E+00
876	9.69804E-01	2.14467E+01	9.38844E-01	8.15653E-04	0.00000E+00	0.00000E+00
877	9.24031E-01	2.14705E+01	9.38827E-01	8.14896E-04	0.00000E+00	0.00000E+00
878	9.13524E-01	2.14942E+01	9.38798E-01	8.14478E-04	0.00000E+00	0.00000E+00
879	9.21083E-01	2.15172E+01	9.38778E-01	8.13799E-04	0.00000E+00	0.00000E+00
880	8.98358E-01	2.15418E+01	9.38731E-01	8.14174E-04	0.00000E+00	0.00000E+00
881	9.44424E-01	2.15647E+01	9.38738E-01	8.13273E-04	0.00000E+00	0.00000E+00
882	9.32353E-01	2.15885E+01	9.38731E-01	8.12381E-04	0.00000E+00	0.00000E+00
883	9.86574E-01	2.16123E+01	9.38785E-01	8.13273E-04	0.00000E+00	0.00000E+00
884	8.83376E-01	2.16352E+01	9.38722E-01	8.14776E-04	0.00000E+00	0.00000E+00
885	9.04659E-01	2.16590E+01	9.38684E-01	8.14767E-04	0.00000E+00	0.00000E+00
886	9.26387E-01	2.16828E+01	9.38670E-01	8.13964E-04	0.00000E+00	0.00000E+00
887	9.05810E-01	2.17067E+01	9.38633E-01	8.13891E-04	0.00000E+00	0.00000E+00
888	9.09202E-01	2.17303E+01	9.38599E-01	8.13650E-04	0.00000E+00	0.00000E+00
889	9.47268E-01	2.17542E+01	9.38609E-01	8.12791E-04	0.00000E+00	0.00000E+00
890	9.51634E-01	2.17772E+01	9.38624E-01	8.12007E-04	0.00000E+00	0.00000E+00
891	9.47755E-01	2.18008E+01	9.38634E-01	8.11159E-04	0.00000E+00	0.00000E+00
892	9.63209E-01	2.18247E+01	9.38662E-01	8.10717E-04	0.00000E+00	0.00000E+00
893	9.34602E-01	2.18467E+01	9.38657E-01	8.09819E-04	0.00000E+00	0.00000E+00
894	9.24959E-01	2.18695E+01	9.38642E-01	8.09057E-04	0.00000E+00	0.00000E+00
895	9.20309E-01	2.18933E+01	9.38621E-01	8.08411E-04	0.00000E+00	0.00000E+00
896	9.12534E-01	2.19172E+01	9.38592E-01	8.08033E-04	0.00000E+00	0.00000E+00
897	9.60613E-01	2.19410E+01	9.38617E-01	8.07505E-04	0.00000E+00	0.00000E+00
898	9.07657E-01	2.19648E+01	9.38582E-01	8.07343E-04	0.00000E+00	0.00000E+00
899	9.47533E-01	2.19885E+01	9.38592E-01	8.06504E-04	0.00000E+00	0.00000E+00
900	8.98525E-01	2.20123E+01	9.38547E-01	8.06840E-04	0.00000E+00	0.00000E+00
901	9.36608E-01	2.20352E+01	9.38545E-01	8.05945E-04	0.00000E+00	0.00000E+00
902	9.48771E-01	2.20582E+01	9.38557E-01	8.05129E-04	0.00000E+00	0.00000E+00
903	9.61735E-01	2.20828E+01	9.38582E-01	8.04646E-04	0.00000E+00	0.00000E+00
904	9.57278E-01	2.21057E+01	9.38603E-01	8.04021E-04	0.00000E+00	0.00000E+00
905	9.42837E-01	2.21295E+01	9.38608E-01	8.03144E-04	0.00000E+00	0.00000E+00
906	9.06335E-01	2.21533E+01	9.38572E-01	8.03049E-04	0.00000E+00	0.00000E+00
907	9.27818E-01	2.21772E+01	9.38560E-01	8.02249E-04	0.00000E+00	0.00000E+00
908	9.33947E-01	2.22000E+01	9.38555E-01	8.01379E-04	0.00000E+00	0.00000E+00
909	9.72791E-01	2.22228E+01	9.38593E-01	8.01385E-04	0.00000E+00	0.00000E+00
910	9.22613E-01	2.22458E+01	9.38575E-01	8.00695E-04	0.00000E+00	0.00000E+00
911	9.27260E-01	2.22697E+01	9.38563E-01	7.99911E-04	0.00000E+00	0.00000E+00
912	9.40504E-01	2.22933E+01	9.38565E-01	7.99034E-04	0.00000E+00	0.00000E+00
913	9.27604E-01	2.23163E+01	9.38553E-01	7.98247E-04	0.00000E+00	0.00000E+00
914	9.32108E-01	2.23390E+01	9.38546E-01	7.97402E-04	0.00000E+00	0.00000E+00
915	9.9948E-01	2.23638E+01	9.38547E-01	7.96530E-04	0.00000E+00	0.00000E+00
916	9.07274E-01	2.23887E+01	9.38513E-01	7.96394E-04	0.00000E+00	0.00000E+00
917	9.60385E-01	2.24115E+01	9.38537E-01	7.95882E-04	0.00000E+00	0.00000E+00
918	9.38172E-01	2.24353E+01	9.38537E-01	7.95013E-04	0.00000E+00	0.00000E+00
919	9.27022E-01	2.24582E+01	9.38524E-01	7.94244E-04	0.00000E+00	0.00000E+00
920	9.34728E-01	2.24820E+01	9.38520E-01	7.93390E-04	0.00000E+00	0.00000E+00
921	9.46692E-01	2.25058E+01	9.38529E-01	7.92576E-04	0.00000E+00	0.00000E+00
922	9.23109E-01	2.25287E+01	9.38512E-01	7.91891E-04	0.00000E+00	0.00000E+00
923	8.87189E-01	2.25525E+01	9.38456E-01	7.92991E-04	0.00000E+00	0.00000E+00
924	9.61856E-01	2.25753E+01	9.38482E-01	7.92537E-04	0.00000E+00	0.00000E+00
925	9.20343E-01	2.26000E+01	9.38462E-01	7.91922E-04	0.00000E+00	0.00000E+00
926	9.84631E-01	2.26230E+01	9.38512E-01	7.92641E-04	0.00000E+00	0.00000E+00
927	9.28523E-01	2.26450E+01	9.38501E-01	7.91857E-04	0.00000E+00	0.00000E+00
928	9.23518E-01	2.26697E+01	9.38485E-01	7.91167E-04	0.00000E+00	0.00000E+00
929	9.56012E-01	2.26925E+01	9.38504E-01	7.90539E-04	0.00000E+00	0.00000E+00
930	9.47862E-01	2.27163E+01	9.38514E-01	7.89751E-04	0.00000E+00	0.00000E+00
931	1.00085E+00	2.27383E+01	9.38581E-01	7.91749E-04	0.00000E+00	0.00000E+00
932	9.32273E-01	2.27622E+01	9.38574E-01	7.90926E-04	0.00000E+00	0.00000E+00
933	9.59697E-01	2.27850E+01	9.38597E-01	7.90402E-04	0.00000E+00	0.00000E+00
934	9.74502E-01	2.28088E+01	9.38636E-01	7.90492E-04	0.00000E+00	0.00000E+00
935	9.19740E-01	2.28325E+01	9.38615E-01	7.89904E-04	0.00000E+00	0.00000E+00
936	9.30225E-01	2.28563E+01	9.38606E-01	7.89109E-04	0.00000E+00	0.00000E+00
937	9.02700E-01	2.28812E+01	9.38568E-01	7.89200E-04	0.00000E+00	0.00000E+00
938	9.81155E-01	2.29040E+01	9.38613E-01	7.89668E-04	0.00000E+00	0.00000E+00
939	9.7186E-01	2.29268E+01	9.38613E-01	7.89590E-04	0.00000E+00	0.00000E+00
940	9.17643E-01	2.29488E+01	9.38626E-01	7.89066E-04	0.00000E+00	0.00000E+00
941	9.70050E-01	2.29708E+01	9.38659E-01	7.88935E-04	0.00000E+00	0.00000E+00
942	8.94729E-01	2.29947E+01	9.38613E-01	7.89480E-04	0.00000E+00	0.00000E+00
943	9.46672E-01	2.30183E+01	9.38621E-01	7.88687E-04	0.00000E+00	0.00000E+00
944	9.37264E-01	2.30422E+01	9.38620E-01	7.87851E-04	0.00000E+00	0.00000E+00
945	9.42056E-01	2.30660E+01	9.38623E-01	7.87023E-04	0.00000E+00	0.00000E+00
946	9.09905E-01	2.30898E+01	9.38593E-01	7.86777E-04	0.00000E+00	0.00000E+00
947	9.44193E-01	2.31137E+01	9.38599E-01	7.85967E-04	0.00000E+00	0.00000E+00
948	9.35474E-01	2.31373E+01	9.38596E-01	7.85142E-04	0.00000E+00	0.00000E+00
949	9.61784E-01	2.31612E+01	9.38620E-01	7.84695E-04	0.00000E+00	0.00000E+00
950	9.39951E-01	2.31842E+01	9.38621E-01	7.83868E-04	0.00000E+00	0.00000E+00
951	9.60090E-01	2.32070E+01	9.38644E-01	7.83368E-04	0.00000E+00	0.00000E+00
952	9.40739E-01	2.32298E+01	9.38646E-01	7.82547E-04	0.00000E+00	0.00000E+00
953	9.60578E-01	2.32528E+01	9.38669E-01	7.82063E-04	0.00000E+00	0.00000E+00
954	9.25059E-01	2.32757E+01	9.38655E-01	7.81372E-04	0.00000E+00	0.00000E+00
955	9.35311E-01	2.32995E+01	9.38652E-01	7.80560E-04	0.00000E+00	0.00000E+00
956	9.60339E-01	2.33215E+01	9.38674E-01	7.80072E-04	0.00000E+00	0.00000E+00
957	9.10698E-01	2.33462E+01	9.38645E-01	7.79806E-04	0.00000E+00	0.00000E+00
958	9.43670E-01	2.33690E+01	9.38650E-01	7.79007E-04	0.00000E+00	0.00000E+00
959	9.20223E-01	2.33928E+01	9.38631E-01	7.78431E-04	0.00000E+00	0.00000E+00
960	9.60063E-01	2.34157E+01	9.38653E-01	7.77940E-04	0.00000E+00	0.00000E+00
961	9.27028E-01	2.34395E+01	9.38641E-01	7.77223E-04	0.00000E+00	0.00000E+00
962	9.13701E-01	2.34633E+01	9.38615E-01	7.76847E-04	0.00000E+00	0.00000E+00
963	9.78438E-01	2.34853E+01	9.38657E-01	7.77144E-04	0.00000E+00	0.00000E+00
964	9.62132E-01	2.35090E+01	9.38681E-01	7.76719E-04	0.00000E+00	0.00000E+00
965	9.22775E-01	2.35338E+01	9.38655E-01	7.76088E-04	0.00000E+00	0.00000E+00
966	9.88247E-01	2.35576E+01	9.38633E-01	7.75924E-04	0.00000E+00	0.00000E+00
967	9.01881E-01	2.35813E+01	9.38595E-01	7.76055E-04	0.00000E+00	0.00000E+00

968	9.35932E-01	2.36052E+01	9.38592E-01	7.75256E-04	0.00000E+00	0.00000E+00
969	9.31346E-01	2.36290E+01	9.38585E-01	7.74490E-04	0.00000E+00	0.00000E+00
970	9.59867E-01	2.36518E+01	9.38607E-01	7.74002E-04	0.00000E+00	0.00000E+00
971	9.30092E-01	2.36757E+01	9.38598E-01	7.73253E-04	0.00000E+00	0.00000E+00
972	9.25621E-01	2.36985E+01	9.38584E-01	7.72571E-04	0.00000E+00	0.00000E+00
973	8.99646E-01	2.37223E+01	9.38544E-01	7.72816E-04	0.00000E+00	0.00000E+00
974	9.13953E-01	2.37462E+01	9.38519E-01	7.72435E-04	0.00000E+00	0.00000E+00
975	9.71791E-01	2.37700E+01	9.38553E-01	7.72398E-04	0.00000E+00	0.00000E+00
976	9.52036E-01	2.37928E+01	9.38567E-01	7.71729E-04	0.00000E+00	0.00000E+00
977	9.03184E-01	2.38167E+01	9.38531E-01	7.71790E-04	0.00000E+00	0.00000E+00
978	9.51272E-01	2.38405E+01	9.38544E-01	7.71110E-04	0.00000E+00	0.00000E+00
979	9.86197E-01	2.38625E+01	9.38593E-01	7.71863E-04	0.00000E+00	0.00000E+00
980	9.35043E-01	2.38862E+01	9.38589E-01	7.71082E-04	0.00000E+00	0.00000E+00
981	9.29248E-01	2.39092E+01	9.38580E-01	7.70353E-04	0.00000E+00	0.00000E+00
982	9.33718E-01	2.39338E+01	9.38575E-01	7.69582E-04	0.00000E+00	0.00000E+00
983	9.42042E-01	2.39567E+01	9.38578E-01	7.68805E-04	0.00000E+00	0.00000E+00
984	8.88027E-01	2.39805E+01	9.38527E-01	7.69745E-04	0.00000E+00	0.00000E+00
985	9.14078E-01	2.40043E+01	9.38502E-01	7.69364E-04	0.00000E+00	0.00000E+00
986	9.70847E-01	2.40282E+01	9.38535E-01	7.69284E-04	0.00000E+00	0.00000E+00
987	9.29961E-01	2.40510E+01	9.38526E-01	7.68552E-04	0.00000E+00	0.00000E+00
988	9.53439E-01	2.40748E+01	9.38541E-01	7.67921E-04	0.00000E+00	0.00000E+00
989	9.33792E-01	2.40987E+01	9.38536E-01	7.67158E-04	0.00000E+00	0.00000E+00
990	9.49253E-01	2.41223E+01	9.38547E-01	7.66458E-04	0.00000E+00	0.00000E+00
991	9.62434E-01	2.41472E+01	9.38571E-01	7.66063E-04	0.00000E+00	0.00000E+00
992	8.98207E-01	2.41710E+01	9.38530E-01	7.66374E-04	0.00000E+00	0.00000E+00
993	9.59347E-01	2.41938E+01	9.38551E-01	7.65889E-04	0.00000E+00	0.00000E+00
994	9.10898E-01	2.42167E+01	9.38524E-01	7.65624E-04	0.00000E+00	0.00000E+00
995	9.39084E-01	2.42405E+01	9.38524E-01	7.64853E-04	0.00000E+00	0.00000E+00
996	9.33349E-01	2.42643E+01	9.38519E-01	7.64101E-04	0.00000E+00	0.00000E+00
997	9.87495E-01	2.42872E+01	9.38568E-01	7.64918E-04	0.00000E+00	0.00000E+00
998	9.25661E-01	2.43100E+01	9.38555E-01	7.64259E-04	0.00000E+00	0.00000E+00
999	9.34588E-01	2.43338E+01	9.38551E-01	7.63503E-04	0.00000E+00	0.00000E+00
1000	9.45410E-01	2.43568E+01	9.38558E-01	7.62768E-04	0.00000E+00	0.00000E+00
1001	9.39255E-01	2.43805E+01	9.38559E-01	7.62005E-04	0.00000E+00	0.00000E+00
1002	9.32947E-01	2.44043E+01	9.38553E-01	7.61263E-04	0.00000E+00	0.00000E+00
1003	9.12819E-01	2.44282E+01	9.38527E-01	7.60936E-04	0.00000E+00	0.00000E+00
1004	9.73663E-01	2.44510E+01	9.38563E-01	7.60985E-04	0.00000E+00	0.00000E+00
1005	9.47157E-01	2.44758E+01	9.38571E-01	7.60274E-04	0.00000E+00	0.00000E+00
1006	9.54433E-01	2.44987E+01	9.38587E-01	7.59681E-04	0.00000E+00	0.00000E+00
1007	9.36710E-01	2.45225E+01	9.38585E-01	7.58927E-04	0.00000E+00	0.00000E+00
1008	9.69821E-01	2.45453E+01	9.38616E-01	7.58808E-04	0.00000E+00	0.00000E+00
1009	9.67534E-01	2.45682E+01	9.38645E-01	7.58597E-04	0.00000E+00	0.00000E+00
1010	9.60390E-01	2.45920E+01	9.38666E-01	7.58151E-04	0.00000E+00	0.00000E+00
1011	9.39272E-01	2.46148E+01	9.38667E-01	7.57400E-04	0.00000E+00	0.00000E+00
1012	9.50145E-01	2.46387E+01	9.38678E-01	7.56735E-04	0.00000E+00	0.00000E+00
1013	9.53153E-01	2.46617E+01	9.38693E-01	7.56122E-04	0.00000E+00	0.00000E+00
1014	9.23548E-01	2.46863E+01	9.38678E-01	7.55522E-04	0.00000E+00	0.00000E+00
1015	9.16007E-01	2.47092E+01	9.38655E-01	7.55108E-04	0.00000E+00	0.00000E+00
1016	9.35179E-01	2.47330E+01	9.38652E-01	7.54371E-04	0.00000E+00	0.00000E+00
1017	9.56556E-01	2.47558E+01	9.38670E-01	7.53833E-04	0.00000E+00	0.00000E+00
1018	9.18734E-01	2.47807E+01	9.38650E-01	7.53347E-04	0.00000E+00	0.00000E+00
1019	9.16668E-01	2.48035E+01	9.38628E-01	7.52916E-04	0.00000E+00	0.00000E+00
1020	9.25423E-01	2.48273E+01	9.38615E-01	7.52288E-04	0.00000E+00	0.00000E+00
1021	9.14754E-01	2.48502E+01	9.38592E-01	7.51914E-04	0.00000E+00	0.00000E+00
1022	9.07734E-01	2.48748E+01	9.38562E-01	7.51785E-04	0.00000E+00	0.00000E+00
1023	9.56991E-01	2.48968E+01	9.38580E-01	7.51265E-04	0.00000E+00	0.00000E+00
1024	8.95227E-01	2.49207E+01	9.38537E-01	7.51728E-04	0.00000E+00	0.00000E+00
1025	9.12037E-01	2.49453E+01	9.38511E-01	7.51439E-04	0.00000E+00	0.00000E+00
1026	8.98296E-01	2.49683E+01	9.38472E-01	7.51732E-04	0.00000E+00	0.00000E+00
1027	9.21735E-01	2.49920E+01	9.38456E-01	7.51175E-04	0.00000E+00	0.00000E+00
1028	9.64811E-01	2.50150E+01	9.38481E-01	7.50882E-04	0.00000E+00	0.00000E+00
1029	9.36293E-01	2.50388E+01	9.38479E-01	7.50154E-04	0.00000E+00	0.00000E+00
1030	9.53964E-01	2.50625E+01	9.38494E-01	7.49575E-04	0.00000E+00	0.00000E+00
1031	9.18974E-01	2.50855E+01	9.38475E-01	7.49087E-04	0.00000E+00	0.00000E+00
1032	1.00510E+00	2.51083E+01	9.38540E-01	7.51150E-04	0.00000E+00	0.00000E+00
1033	8.88793E-01	2.51312E+01	9.38492E-01	7.51970E-04	0.00000E+00	0.00000E+00
1034	9.14311E-01	2.51560E+01	9.38468E-01	7.51607E-04	0.00000E+00	0.00000E+00
1035	9.29491E-01	2.51788E+01	9.38460E-01	7.50929E-04	0.00000E+00	0.00000E+00
1036	9.04914E-01	2.52017E+01	9.38427E-01	7.50904E-04	0.00000E+00	0.00000E+00
1037	9.42794E-01	2.52255E+01	9.38432E-01	7.50190E-04	0.00000E+00	0.00000E+00
1038	9.38853E-01	2.52483E+01	9.38432E-01	7.49465E-04	0.00000E+00	0.00000E+00
1039	9.30468E-01	2.52722E+01	9.38432E-01	7.48788E-04	0.00000E+00	0.00000E+00
1040	9.86186E-01	2.52960E+01	9.38470E-01	7.49478E-04	0.00000E+00	0.00000E+00
1041	9.20355E-01	2.53188E+01	9.38452E-01	7.48959E-04	0.00000E+00	0.00000E+00
1042	9.61868E-01	2.53427E+01	9.38475E-01	7.48577E-04	0.00000E+00	0.00000E+00
1043	9.53092E-01	2.53655E+01	9.38489E-01	7.47990E-04	0.00000E+00	0.00000E+00
1044	9.07531E-01	2.53893E+01	9.38459E-01	7.47862E-04	0.00000E+00	0.00000E+00
1045	9.15629E-01	2.54132E+01	9.38437E-01	7.47465E-04	0.00000E+00	0.00000E+00
1046	1.02357E+00	2.54360E+01	9.38519E-01	7.51188E-04	0.00000E+00	0.00000E+00
1047	8.82422E-01	2.54608E+01	9.38465E-01	7.52386E-04	0.00000E+00	0.00000E+00
1048	9.25004E-01	2.54837E+01	9.38452E-01	7.51777E-04	0.00000E+00	0.00000E+00
1049	9.45780E-01	2.55075E+01	9.38459E-01	7.51091E-04	0.00000E+00	0.00000E+00
1050	8.74873E-01	2.55322E+01	9.38399E-01	7.52823E-04	0.00000E+00	0.00000E+00
1051	9.35099E-01	2.55560E+01	9.38396E-01	7.52111E-04	0.00000E+00	0.00000E+00
1052	9.23574E-01	2.55798E+01	9.38381E-01	7.51527E-04	0.00000E+00	0.00000E+00
1053	8.74252E-01	2.56045E+01	9.38320E-01	7.53287E-04	0.00000E+00	0.00000E+00
1054	9.85759E-01	2.56265E+01	9.38365E-01	7.53921E-04	0.00000E+00	0.00000E+00
1055	9.45428E-01	2.56493E+01	9.38372E-01	7.53234E-04	0.00000E+00	0.00000E+00
1056	9.43343E-01	2.56722E+01	9.38377E-01	7.52534E-04	0.00000E+00	0.00000E+00
1057	9.64986E-01	2.56952E+01	9.38402E-01	7.52243E-04	0.00000E+00	0.00000E+00
1058	9.30655E-01	2.57188E+01	9.38395E-01	7.51567E-04	0.00000E+00	0.00000E+00
1059	9.61544E-01	2.57418E+01	9.38417E-01	7.51175E-04	0.00000E+00	0.00000E+00
1060	9.57602E-01	2.57657E+01	9.38435E-01	7.50683E-04	0.00000E+00	0.00000E+00
1061	9.25422E-01	2.57885E+01	9.38423E-01	7.50075E-04	0.00000E+00	0.00000E+00
1062	9.67254E-01	2.58123E+01	9.38450E-01	7.49860E-04	0.00000E+00	0.00000E+00
1063	9.89360E-01	2.58352E+01	9.38498E-01	7.50688E-04	0.00000E+00	0.00000E+00
1064	8.97188E-01	2.58590E+01	9.38459E-01	7.50989E-04	0.00000E+00	0.00000E+00
1065	9.55907E-01	2.58818E+01	9.38475E-01	7.50462E-04	0.00000E+00	0.00000E+00
1066	8.90272E-01	2.59065E+01	9.38430E-01	7.51124E-04	0.00000E+00	0.00000E+00
1067	9.24183E-01	2.59295E+01	9.38417E-01	7.50537E-04	0.00000E+00	0.00000E+00
1068	8.95895E-01	2.59533E+01	9.38377E-01	7.50893E-04	0.00000E+00	0.00000E+00
1069	9.38783E-01	2.59762E+01	9.38377E-01	7.50189E-04	0.00000E+00	0.00000E+00
1070	9.51304E-01	2.59990E+01	9.38389E-01	7.49584E-04	0.00000E+00	0.00000E+00
1071	9.36803E-01	2.60238E+01	9.38388E-01	7.48884E-04	0.00000E+00	0.00000E+00
1072	9.04873E-01	2.60475E+01	9.38356E-01	7.48839E-04	0.00000E+00	0.00000E+00
1073	9.17795E-01	2.60705E+01	9.38337E-01	7.48386E-04	0.00000E+00	0.00000E+00
1074	9.50613E-01	2.60942E+01	9.38349E-01	7.47775E-04	0.00000E+00	0.00000E+00
1075	9.30687E-01	2.61180E+01	9.38341E-01	7.47112E-04	0.00000E+00	0.00000E+00

1076	9.32428E-01	2.61410E+01	9.38336E-01	7.46436E-04	0.00000E+00	0.00000E+00
1077	9.48388E-01	2.61638E+01	9.38345E-01	7.45800E-04	0.00000E+00	0.00000E+00
1078	9.22466E-01	2.61877E+01	9.38329E-01	7.45276E-04	0.00000E+00	0.00000E+00
1079	9.32593E-01	2.62122E+01	9.38315E-01	7.44729E-04	0.00000E+00	0.00000E+00
1080	9.16644E-01	2.62352E+01	9.38295E-01	7.44308E-04	0.00000E+00	0.00000E+00
1081	9.18269E-01	2.62590E+01	9.38276E-01	7.43849E-04	0.00000E+00	0.00000E+00
1082	9.55646E-01	2.62828E+01	9.38292E-01	7.43334E-04	0.00000E+00	0.00000E+00
1083	9.44335E-01	2.63057E+01	9.38298E-01	7.42667E-04	0.00000E+00	0.00000E+00
1084	9.25116E-01	2.63295E+01	9.38286E-01	7.42080E-04	0.00000E+00	0.00000E+00
1085	9.03483E-01	2.63533E+01	9.38253E-01	7.42091E-04	0.00000E+00	0.00000E+00
1086	9.44617E-01	2.63772E+01	9.38259E-01	7.41429E-04	0.00000E+00	0.00000E+00
1087	9.16163E-01	2.64008E+01	9.38239E-01	7.41026E-04	0.00000E+00	0.00000E+00
1088	9.07352E-01	2.64247E+01	9.38211E-01	7.40889E-04	0.00000E+00	0.00000E+00
1089	9.43691E-01	2.64485E+01	9.38216E-01	7.40224E-04	0.00000E+00	0.00000E+00
1090	9.03327E-01	2.64723E+01	9.38184E-01	7.40238E-04	0.00000E+00	0.00000E+00
1091	8.88026E-01	2.64980E+01	9.38137E-01	7.40991E-04	0.00000E+00	0.00000E+00
1092	9.54301E-01	2.65208E+01	9.38152E-01	7.40460E-04	0.00000E+00	0.00000E+00
1093	9.83354E-01	2.65455E+01	9.38194E-01	7.40940E-04	0.00000E+00	0.00000E+00
1094	9.30533E-01	2.65693E+01	9.38187E-01	7.40294E-04	0.00000E+00	0.00000E+00
1095	8.99736E-01	2.65932E+01	9.38152E-01	7.40453E-04	0.00000E+00	0.00000E+00
1096	9.45797E-01	2.66170E+01	9.38159E-01	7.39809E-04	0.00000E+00	0.00000E+00
1097	9.46175E-01	2.66388E+01	9.38166E-01	7.39169E-04	0.00000E+00	0.00000E+00
1098	9.66585E-01	2.66618E+01	9.38192E-01	7.38949E-04	0.00000E+00	0.00000E+00
1099	8.97523E-01	2.66857E+01	9.38155E-01	7.39206E-04	0.00000E+00	0.00000E+00
1100	9.75841E-01	2.67093E+01	9.38189E-01	7.39329E-04	0.00000E+00	0.00000E+00
1101	9.90322E-01	2.67323E+01	9.38236E-01	7.40178E-04	0.00000E+00	0.00000E+00
1102	9.22798E-01	2.67552E+01	9.38222E-01	7.39638E-04	0.00000E+00	0.00000E+00
1103	9.27561E-01	2.67772E+01	9.38213E-01	7.39029E-04	0.00000E+00	0.00000E+00
1104	9.31462E-01	2.68010E+01	9.38207E-01	7.38384E-04	0.00000E+00	0.00000E+00
1105	9.53463E-01	2.68238E+01	9.38230E-01	7.38069E-04	0.00000E+00	0.00000E+00
1106	9.54171E-01	2.68467E+01	9.38244E-01	7.37542E-04	0.00000E+00	0.00000E+00
1107	9.37351E-01	2.68697E+01	9.38243E-01	7.36874E-04	0.00000E+00	0.00000E+00
1108	9.05548E-01	2.68933E+01	9.38214E-01	7.36801E-04	0.00000E+00	0.00000E+00
1109	9.05221E-01	2.69182E+01	9.38184E-01	7.36738E-04	0.00000E+00	0.00000E+00
1110	9.85107E-01	2.69402E+01	9.38226E-01	7.37290E-04	0.00000E+00	0.00000E+00
1111	9.12616E-01	2.69648E+01	9.38203E-01	7.36987E-04	0.00000E+00	0.00000E+00
1112	9.67415E-01	2.69877E+01	9.38229E-01	7.36793E-04	0.00000E+00	0.00000E+00
1113	9.12251E-01	2.70115E+01	9.38206E-01	7.36501E-04	0.00000E+00	0.00000E+00
1114	9.62824E-01	2.70362E+01	9.38228E-01	7.36171E-04	0.00000E+00	0.00000E+00
1115	9.18163E-01	2.70592E+01	9.38210E-01	7.35730E-04	0.00000E+00	0.00000E+00
1116	9.22717E-01	2.70828E+01	9.38196E-01	7.35201E-04	0.00000E+00	0.00000E+00
1117	9.57151E-01	2.71058E+01	9.38213E-01	7.34738E-04	0.00000E+00	0.00000E+00
1118	9.74900E-01	2.71297E+01	9.38246E-01	7.34815E-04	0.00000E+00	0.00000E+00
1119	9.64975E-01	2.71525E+01	9.38270E-01	7.34547E-04	0.00000E+00	0.00000E+00
1120	9.47854E-01	2.71753E+01	9.38279E-01	7.33940E-04	0.00000E+00	0.00000E+00
1121	8.98628E-01	2.72000E+01	9.38243E-01	7.34139E-04	0.00000E+00	0.00000E+00
1122	9.10932E-01	2.72248E+01	9.38219E-01	7.33888E-04	0.00000E+00	0.00000E+00
1123	9.24210E-01	2.72487E+01	9.38206E-01	7.33340E-04	0.00000E+00	0.00000E+00
1124	9.16405E-01	2.72723E+01	9.38187E-01	7.32944E-04	0.00000E+00	0.00000E+00
1125	9.38150E-01	2.72962E+01	9.38187E-01	7.32291E-04	0.00000E+00	0.00000E+00
1126	9.58066E-01	2.73190E+01	9.38204E-01	7.31853E-04	0.00000E+00	0.00000E+00
1127	9.10032E-01	2.73428E+01	9.38179E-01	7.31631E-04	0.00000E+00	0.00000E+00
1128	9.10568E-01	2.73677E+01	9.38155E-01	7.31392E-04	0.00000E+00	0.00000E+00
1129	9.11948E-01	2.73913E+01	9.38132E-01	7.31112E-04	0.00000E+00	0.00000E+00
1130	9.35171E-01	2.74143E+01	9.38129E-01	7.30469E-04	0.00000E+00	0.00000E+00
1131	9.33174E-01	2.74380E+01	9.38125E-01	7.29834E-04	0.00000E+00	0.00000E+00
1132	9.55790E-01	2.74610E+01	9.38140E-01	7.29256E-04	0.00000E+00	0.00000E+00
1133	9.43953E-01	2.74848E+01	9.38145E-01	7.28729E-04	0.00000E+00	0.00000E+00
1134	9.17241E-01	2.75085E+01	9.38127E-01	7.28319E-04	0.00000E+00	0.00000E+00
1135	9.29098E-01	2.75323E+01	9.38119E-01	7.27720E-04	0.00000E+00	0.00000E+00
1136	9.31610E-01	2.75553E+01	9.38113E-01	7.27100E-04	0.00000E+00	0.00000E+00
1137	9.31269E-01	2.75782E+01	9.38107E-01	7.26484E-04	0.00000E+00	0.00000E+00
1138	9.69908E-01	2.76010E+01	9.38135E-01	7.26384E-04	0.00000E+00	0.00000E+00
1139	9.45357E-01	2.76238E+01	9.38142E-01	7.25773E-04	0.00000E+00	0.00000E+00
1140	8.99880E-01	2.76468E+01	9.38108E-01	7.25914E-04	0.00000E+00	0.00000E+00
1141	9.18903E-01	2.76707E+01	9.38091E-01	7.25472E-04	0.00000E+00	0.00000E+00
1142	9.57568E-01	2.76935E+01	9.38108E-01	7.25037E-04	0.00000E+00	0.00000E+00
1143	9.66128E-01	2.77163E+01	9.38133E-01	7.24817E-04	0.00000E+00	0.00000E+00
1144	9.84791E-01	2.77393E+01	9.38174E-01	7.25334E-04	0.00000E+00	0.00000E+00
1145	9.45275E-01	2.77630E+01	9.38180E-01	7.24726E-04	0.00000E+00	0.00000E+00
1146	9.25944E-01	2.77860E+01	9.38169E-01	7.24171E-04	0.00000E+00	0.00000E+00
1147	9.37324E-01	2.78107E+01	9.38168E-01	7.23538E-04	0.00000E+00	0.00000E+00
1148	9.13569E-01	2.78345E+01	9.38147E-01	7.23225E-04	0.00000E+00	0.00000E+00
1149	9.56348E-01	2.78573E+01	9.38163E-01	7.22769E-04	0.00000E+00	0.00000E+00
1150	9.30874E-01	2.78802E+01	9.38156E-01	7.22167E-04	0.00000E+00	0.00000E+00
1151	9.42039E-01	2.79032E+01	9.38160E-01	7.21546E-04	0.00000E+00	0.00000E+00
1152	9.08727E-01	2.79278E+01	9.38134E-01	7.21372E-04	0.00000E+00	0.00000E+00
1153	9.44263E-01	2.79517E+01	9.38140E-01	7.20765E-04	0.00000E+00	0.00000E+00
1154	9.56480E-01	2.79745E+01	9.38155E-01	7.20315E-04	0.00000E+00	0.00000E+00
1155	9.50713E-01	2.79973E+01	9.38166E-01	7.19773E-04	0.00000E+00	0.00000E+00
1156	9.14870E-01	2.80203E+01	9.38146E-01	7.19432E-04	0.00000E+00	0.00000E+00
1157	9.40514E-01	2.80442E+01	9.38148E-01	7.18812E-04	0.00000E+00	0.00000E+00
1158	9.67724E-01	2.80670E+01	9.38174E-01	7.18645E-04	0.00000E+00	0.00000E+00
1159	9.04789E-01	2.80908E+01	9.38145E-01	7.18603E-04	0.00000E+00	0.00000E+00
1160	9.67256E-01	2.81137E+01	9.38170E-01	7.18422E-04	0.00000E+00	0.00000E+00
1161	9.71579E-01	2.81375E+01	9.38199E-01	7.18381E-04	0.00000E+00	0.00000E+00
1162	9.04867E-01	2.81622E+01	9.38170E-01	7.18336E-04	0.00000E+00	0.00000E+00
1163	9.36354E-01	2.81860E+01	9.38169E-01	7.17719E-04	0.00000E+00	0.00000E+00
1164	9.26787E-01	2.82098E+01	9.38159E-01	7.17168E-04	0.00000E+00	0.00000E+00
1165	9.48700E-01	2.82337E+01	9.38168E-01	7.16608E-04	0.00000E+00	0.00000E+00
1166	9.28933E-01	2.82573E+01	9.38160E-01	7.16036E-04	0.00000E+00	0.00000E+00
1167	9.48152E-01	2.82803E+01	9.38168E-01	7.15473E-04	0.00000E+00	0.00000E+00
1168	9.48642E-01	2.83032E+01	9.38177E-01	7.14915E-04	0.00000E+00	0.00000E+00
1169	9.45000E-01	2.83260E+01	9.38183E-01	7.14326E-04	0.00000E+00	0.00000E+00
1170	8.99952E-01	2.83498E+01	9.38151E-01	7.14465E-04	0.00000E+00	0.00000E+00
1171	9.35812E-01	2.83727E+01	9.38149E-01	7.13856E-04	0.00000E+00	0.00000E+00
1172	9.25186E-01	2.83965E+01	9.38138E-01	7.13332E-04	0.00000E+00	0.00000E+00
1173	9.19110E-01	2.84203E+01	9.38121E-01	7.12908E-04	0.00000E+00	0.00000E+00
1174	9.42315E-01	2.84432E+01	9.38125E-01	7.12308E-04	0.00000E+00	0.00000E+00
1175	9.04755E-01	2.84670E+01	9.38096E-01	7.12269E-04	0.00000E+00	0.00000E+00
1176	9.66406E-01	2.84898E+01	9.38121E-01	7.12070E-04	0.00000E+00	0.00000E+00
1177	9.55823E-01	2.85137E+01	9.38136E-01	7.11624E-04	0.00000E+00	0.00000E+00
1178	9.47044E-01	2.85375E+01	9.38143E-01	7.11058E-04	0.00000E+00	0.00000E+00
1179	9.15941E-01	2.85603E+01	9.38124E-01	7.10705E-04	0.00000E+00	0.00000E+00
1180	9.59063E-01	2.85833E+01	9.38142E-01	7.10323E-04	0.00000E+00	0.00000E+00
1181	9.03423E-01	2.86070E+01	9.38113E-01	7.10331E-04	0.00000E+00	0.00000E+00
1182	9.16915E-01	2.86308E+01	9.38095E-01	7.09956E-04	0.00000E+00	0.00000E+00
1183	9.05548E-01	2.86547E+01	9.38067E-01	7.09890E-04	0.00000E+00	0.00000E+00

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1184	9.47179E-01	2.86785E+01	9.38075E-01	7.09331E-04	0.00000E+00	0.00000E+00
1185	9.60084E-01	2.87013E+01	9.38093E-01	7.08975E-04	0.00000E+00	0.00000E+00
1186	9.56989E-01	2.87243E+01	9.38109E-01	7.08556E-04	0.00000E+00	0.00000E+00
1187	9.08298E-01	2.87472E+01	9.38084E-01	7.08405E-04	0.00000E+00	0.00000E+00
1188	9.48080E-01	2.87710E+01	9.38093E-01	7.07857E-04	0.00000E+00	0.00000E+00
1189	9.44883E-01	2.87957E+01	9.38098E-01	7.07284E-04	0.00000E+00	0.00000E+00
1190	9.18628E-01	2.88203E+01	9.38082E-01	7.06878E-04	0.00000E+00	0.00000E+00
1191	9.34015E-01	2.88433E+01	9.38079E-01	7.06292E-04	0.00000E+00	0.00000E+00
1192	9.63594E-01	2.88670E+01	9.38100E-01	7.06024E-04	0.00000E+00	0.00000E+00
1193	9.68365E-01	2.88908E+01	9.38125E-01	7.05888E-04	0.00000E+00	0.00000E+00
1194	9.39015E-01	2.89137E+01	9.38126E-01	7.05296E-04	0.00000E+00	0.00000E+00
1195	9.56916E-01	2.89375E+01	9.38142E-01	7.04881E-04	0.00000E+00	0.00000E+00
1196	9.53049E-01	2.89605E+01	9.38154E-01	7.04401E-04	0.00000E+00	0.00000E+00
1197	9.20751E-01	2.89842E+01	9.38140E-01	7.03962E-04	0.00000E+00	0.00000E+00
1198	9.36968E-01	2.90072E+01	9.38139E-01	7.03374E-04	0.00000E+00	0.00000E+00
1199	9.03918E-01	2.90310E+01	9.38110E-01	7.03367E-04	0.00000E+00	0.00000E+00
1200	9.39716E-01	2.90538E+01	9.38112E-01	7.02781E-04	0.00000E+00	0.00000E+00
1201	9.27605E-01	2.90777E+01	9.38103E-01	7.02249E-04	0.00000E+00	0.00000E+00
1202	9.20185E-01	2.91005E+01	9.38088E-01	7.01823E-04	0.00000E+00	0.00000E+00
1203	9.79878E-01	2.91225E+01	9.38123E-01	7.02101E-04	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

LIFETIME = 1.29025E-04 + OR - 1.25620E-07      GENERATION TIME = 1.00056E-04 + OR - 1.07505E-07  
 NU BAR = 2.41912E+00 + OR - 3.78543E-06      AVERAGE FISSION GROUP = 2.46004E+01 + OR - 2.21850E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 3.04781E-02 + OR - 6.68436E-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	0.93813	+ OR - 0.00070	0.93743 TO 0.93884	0.93673 TO 0.93954	0.93603 TO 0.94024	1200000
4	0.93810	+ OR - 0.00070	0.93740 TO 0.93881	0.93670 TO 0.93951	0.93600 TO 0.94021	1199000
5	0.93813	+ OR - 0.00070	0.93743 TO 0.93883	0.93672 TO 0.93953	0.93602 TO 0.94024	1198000
6	0.93811	+ OR - 0.00070	0.93741 TO 0.93881	0.93670 TO 0.93952	0.93600 TO 0.94022	1197000
7	0.93810	+ OR - 0.00070	0.93740 TO 0.93881	0.93670 TO 0.93951	0.93599 TO 0.94022	1196000
8	0.93811	+ OR - 0.00070	0.93741 TO 0.93882	0.93671 TO 0.93952	0.93600 TO 0.94023	1195000
9	0.93809	+ OR - 0.00070	0.93738 TO 0.93879	0.93668 TO 0.93949	0.93597 TO 0.94020	1194000
10	0.93811	+ OR - 0.00070	0.93741 TO 0.93882	0.93670 TO 0.93952	0.93600 TO 0.94023	1193000
11	0.93811	+ OR - 0.00070	0.93741 TO 0.93882	0.93670 TO 0.93952	0.93600 TO 0.94023	1192000
12	0.93814	+ OR - 0.00071	0.93743 TO 0.93884	0.93673 TO 0.93955	0.93602 TO 0.94025	1191000
17	0.93816	+ OR - 0.00071	0.93746 TO 0.93887	0.93675 TO 0.93958	0.93604 TO 0.94028	1186000
22	0.93815	+ OR - 0.00071	0.93744 TO 0.93886	0.93673 TO 0.93957	0.93602 TO 0.94028	1181000
27	0.93812	+ OR - 0.00071	0.93741 TO 0.93883	0.93670 TO 0.93954	0.93599 TO 0.94025	1176000
32	0.93823	+ OR - 0.00071	0.93752 TO 0.93894	0.93680 TO 0.93965	0.93609 TO 0.94036	1171000
37	0.93820	+ OR - 0.00071	0.93749 TO 0.93891	0.93677 TO 0.93963	0.93606 TO 0.94034	1166000
42	0.93824	+ OR - 0.00072	0.93753 TO 0.93896	0.93681 TO 0.93967	0.93610 TO 0.94039	1161000
47	0.93827	+ OR - 0.00072	0.93755 TO 0.93899	0.93683 TO 0.93970	0.93611 TO 0.94042	1156000
52	0.93824	+ OR - 0.00072	0.93752 TO 0.93896	0.93680 TO 0.93968	0.93608 TO 0.94040	1151000
57	0.93818	+ OR - 0.00072	0.93745 TO 0.93890	0.93673 TO 0.93962	0.93601 TO 0.94034	1146000
62	0.93811	+ OR - 0.00072	0.93739 TO 0.93884	0.93667 TO 0.93956	0.93595 TO 0.94028	1141000
67	0.93811	+ OR - 0.00072	0.93739 TO 0.93883	0.93666 TO 0.93956	0.93594 TO 0.94028	1136000
72	0.93807	+ OR - 0.00072	0.93734 TO 0.93879	0.93662 TO 0.93952	0.93589 TO 0.94024	1131000
77	0.93810	+ OR - 0.00073	0.93737 TO 0.93883	0.93665 TO 0.93955	0.93592 TO 0.94028	1126000
82	0.93807	+ OR - 0.00073	0.93735 TO 0.93880	0.93662 TO 0.93953	0.93589 TO 0.94026	1121000
87	0.93810	+ OR - 0.00073	0.93737 TO 0.93883	0.93664 TO 0.93956	0.93591 TO 0.94030	1116000
92	0.93816	+ OR - 0.00073	0.93743 TO 0.93889	0.93669 TO 0.93962	0.93596 TO 0.94036	1111000

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	0.93814	+ OR - 0.00074	0.93740 TO 0.93887	0.93667 TO 0.93961	0.93593 TO 0.94034	1106000
102	0.93818	+ OR - 0.00074	0.93744 TO 0.93892	0.93670 TO 0.93966	0.93597 TO 0.94039	1101000
107	0.93817	+ OR - 0.00074	0.93743 TO 0.93891	0.93669 TO 0.93965	0.93595 TO 0.94039	1096000
112	0.93823	+ OR - 0.00074	0.93749 TO 0.93897	0.93675 TO 0.93971	0.93601 TO 0.94045	1091000
117	0.93817	+ OR - 0.00074	0.93743 TO 0.93891	0.93669 TO 0.93965	0.93594 TO 0.94040	1086000
122	0.93811	+ OR - 0.00074	0.93736 TO 0.93885	0.93662 TO 0.93960	0.93588 TO 0.94034	1081000
127	0.93815	+ OR - 0.00075	0.93740 TO 0.93889	0.93665 TO 0.93964	0.93591 TO 0.94039	1076000
132	0.93812	+ OR - 0.00075	0.93737 TO 0.93887	0.93662 TO 0.93962	0.93587 TO 0.94037	1071000
137	0.93817	+ OR - 0.00075	0.93742 TO 0.93892	0.93667 TO 0.93968	0.93592 TO 0.94043	1066000
142	0.93818	+ OR - 0.00075	0.93742 TO 0.93893	0.93667 TO 0.93968	0.93591 TO 0.94044	1061000
147	0.93820	+ OR - 0.00076	0.93744 TO 0.93895	0.93668 TO 0.93971	0.93592 TO 0.94047	1056000
152	0.93821	+ OR - 0.00076	0.93745 TO 0.93897	0.93669 TO 0.93973	0.93593 TO 0.94049	1051000
157	0.93817	+ OR - 0.00076	0.93741 TO 0.93893	0.93665 TO 0.93970	0.93588 TO 0.94046	1046000
162	0.93819	+ OR - 0.00077	0.93742 TO 0.93895	0.93666 TO 0.93972	0.93589 TO 0.94049	1041000
167	0.93811	+ OR - 0.00077	0.93734 TO 0.93888	0.93658 TO 0.93965	0.93581 TO 0.94042	1036000
172	0.93812	+ OR - 0.00077	0.93735 TO 0.93889	0.93658 TO 0.93966	0.93580 TO 0.94043	1031000
177	0.93802	+ OR - 0.00077	0.93725 TO 0.93879	0.93648 TO 0.93957	0.93571 TO 0.94034	1026000
182	0.93799	+ OR - 0.00077	0.93722 TO 0.93876	0.93644 TO 0.93954	0.93567 TO 0.94031	1021000
187	0.93795	+ OR - 0.00078	0.93717 TO 0.93872	0.93639 TO 0.93950	0.93561 TO 0.94028	1016000
192	0.93791	+ OR - 0.00078	0.93713 TO 0.93869	0.93635 TO 0.93947	0.93557 TO 0.94025	1011000
197	0.93806	+ OR - 0.00078	0.93728 TO 0.93883	0.93650 TO 0.93961	0.93572 TO 0.94039	1006000
202	0.93803	+ OR - 0.00078	0.93725 TO 0.93881	0.93647 TO 0.93959	0.93570 TO 0.94036	1001000
207	0.93799	+ OR - 0.00078	0.93720 TO 0.93877	0.93642 TO 0.93955	0.93564 TO 0.94033	996000
212	0.93788	+ OR - 0.00078	0.93710 TO 0.93866	0.93632 TO 0.93944	0.93554 TO 0.94022	991000
217	0.93787	+ OR - 0.00078	0.93708 TO 0.93865	0.93630 TO 0.93944	0.93552 TO 0.94022	986000
222	0.93783	+ OR - 0.00079	0.93704 TO 0.93862	0.93626 TO 0.93940	0.93547 TO 0.94019	981000
227	0.93783	+ OR - 0.00079	0.93705 TO 0.93862	0.93626 TO 0.93940	0.93547 TO 0.94019	976000



NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE		67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
	K-EFFECTIVE	DEVIATION				
232	0.93786	+ OR - 0.00079	0.93707 TO 0.93865	0.93628 TO 0.93943	0.93550 TO 0.94022	971000
237	0.93786	+ OR - 0.00079	0.93707 TO 0.93864	0.93628 TO 0.93943	0.93549 TO 0.94022	966000
242	0.93777	+ OR - 0.00079	0.93698 TO 0.93856	0.93619 TO 0.93934	0.93541 TO 0.94013	961000
247	0.93776	+ OR - 0.00079	0.93697 TO 0.93855	0.93618 TO 0.93934	0.93539 TO 0.94013	956000
252	0.93777	+ OR - 0.00079	0.93698 TO 0.93856	0.93618 TO 0.93935	0.93539 TO 0.94014	951000
257	0.93773	+ OR - 0.00079	0.93693 TO 0.93852	0.93614 TO 0.93931	0.93535 TO 0.94011	946000
262	0.93771	+ OR - 0.00080	0.93691 TO 0.93851	0.93612 TO 0.93930	0.93532 TO 0.94010	941000
267	0.93776	+ OR - 0.00080	0.93696 TO 0.93856	0.93616 TO 0.93935	0.93536 TO 0.94015	936000
272	0.93771	+ OR - 0.00080	0.93691 TO 0.93852	0.93611 TO 0.93932	0.93531 TO 0.94012	931000
277	0.93778	+ OR - 0.00080	0.93697 TO 0.93858	0.93617 TO 0.93938	0.93537 TO 0.94019	926000
282	0.93769	+ OR - 0.00081	0.93689 TO 0.93850	0.93608 TO 0.93931	0.93528 TO 0.94011	921000
287	0.93758	+ OR - 0.00081	0.93678 TO 0.93839	0.93597 TO 0.93920	0.93516 TO 0.94001	916000
292	0.93764	+ OR - 0.00081	0.93683 TO 0.93844	0.93602 TO 0.93925	0.93522 TO 0.94005	911000
297	0.93769	+ OR - 0.00081	0.93688 TO 0.93849	0.93607 TO 0.93930	0.93526 TO 0.94011	906000
302	0.93768	+ OR - 0.00081	0.93687 TO 0.93849	0.93606 TO 0.93931	0.93525 TO 0.94012	901000
307	0.93771	+ OR - 0.00082	0.93689 TO 0.93853	0.93608 TO 0.93934	0.93526 TO 0.94016	896000
312	0.93770	+ OR - 0.00082	0.93688 TO 0.93852	0.93606 TO 0.93933	0.93525 TO 0.94015	891000
317	0.93768	+ OR - 0.00082	0.93686 TO 0.93851	0.93604 TO 0.93933	0.93522 TO 0.94015	886000
322	0.93773	+ OR - 0.00083	0.93691 TO 0.93856	0.93608 TO 0.93938	0.93526 TO 0.94021	881000
327	0.93769	+ OR - 0.00083	0.93687 TO 0.93852	0.93604 TO 0.93935	0.93522 TO 0.94017	876000
332	0.93768	+ OR - 0.00083	0.93685 TO 0.93851	0.93602 TO 0.93934	0.93519 TO 0.94016	871000
337	0.93769	+ OR - 0.00083	0.93686 TO 0.93852	0.93603 TO 0.93935	0.93520 TO 0.94019	866000
342	0.93774	+ OR - 0.00084	0.93691 TO 0.93858	0.93607 TO 0.93941	0.93523 TO 0.94025	861000
347	0.93782	+ OR - 0.00084	0.93698 TO 0.93865	0.93614 TO 0.93949	0.93530 TO 0.94033	856000
352	0.93783	+ OR - 0.00084	0.93699 TO 0.93867	0.93614 TO 0.93952	0.93530 TO 0.94036	851000
357	0.93785	+ OR - 0.00085	0.93700 TO 0.93870	0.93615 TO 0.93954	0.93531 TO 0.94039	846000
362	0.93777	+ OR - 0.00085	0.93692 TO 0.93862	0.93607 TO 0.93947	0.93522 TO 0.94032	841000

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
367	0.93778	+ OR - 0.00085	0.93692 TO 0.93863	0.93607 TO 0.93948	0.93522 TO 0.94034	836000
372	0.93770	+ OR - 0.00086	0.93684 TO 0.93855	0.93598 TO 0.93941	0.93513 TO 0.94027	831000
377	0.93781	+ OR - 0.00086	0.93695 TO 0.93867	0.93609 TO 0.93953	0.93523 TO 0.94039	826000
382	0.93788	+ OR - 0.00086	0.93702 TO 0.93875	0.93616 TO 0.93961	0.93530 TO 0.94047	821000
387	0.93788	+ OR - 0.00087	0.93702 TO 0.93875	0.93615 TO 0.93962	0.93529 TO 0.94048	816000
392	0.93793	+ OR - 0.00087	0.93706 TO 0.93880	0.93619 TO 0.93967	0.93532 TO 0.94054	811000
397	0.93783	+ OR - 0.00087	0.93696 TO 0.93870	0.93609 TO 0.93958	0.93521 TO 0.94045	806000
402	0.93782	+ OR - 0.00087	0.93694 TO 0.93869	0.93607 TO 0.93956	0.93520 TO 0.94044	801000
407	0.93788	+ OR - 0.00088	0.93700 TO 0.93875	0.93612 TO 0.93963	0.93524 TO 0.94051	796000
412	0.93789	+ OR - 0.00088	0.93701 TO 0.93877	0.93613 TO 0.93965	0.93525 TO 0.94053	791000
417	0.93784	+ OR - 0.00088	0.93695 TO 0.93872	0.93607 TO 0.93960	0.93519 TO 0.94048	786000
422	0.93792	+ OR - 0.00088	0.93704 TO 0.93881	0.93615 TO 0.93969	0.93527 TO 0.94058	781000
427	0.93776	+ OR - 0.00089	0.93687 TO 0.93865	0.93599 TO 0.93953	0.93510 TO 0.94042	776000
432	0.93765	+ OR - 0.00089	0.93677 TO 0.93854	0.93588 TO 0.93943	0.93499 TO 0.94031	771000
437	0.93762	+ OR - 0.00089	0.93673 TO 0.93851	0.93584 TO 0.93940	0.93495 TO 0.94030	766000
442	0.93757	+ OR - 0.00090	0.93668 TO 0.93847	0.93578 TO 0.93936	0.93489 TO 0.94026	761000
447	0.93765	+ OR - 0.00090	0.93675 TO 0.93855	0.93585 TO 0.93945	0.93496 TO 0.94035	756000
452	0.93759	+ OR - 0.00090	0.93669 TO 0.93849	0.93578 TO 0.93939	0.93488 TO 0.94029	751000
457	0.93778	+ OR - 0.00090	0.93688 TO 0.93868	0.93597 TO 0.93958	0.93507 TO 0.94048	746000
462	0.93784	+ OR - 0.00090	0.93693 TO 0.93874	0.93603 TO 0.93964	0.93513 TO 0.94055	741000
467	0.93795	+ OR - 0.00090	0.93705 TO 0.93886	0.93615 TO 0.93976	0.93524 TO 0.94067	736000
472	0.93796	+ OR - 0.00091	0.93705 TO 0.93887	0.93614 TO 0.93978	0.93524 TO 0.94068	731000
477	0.93800	+ OR - 0.00091	0.93709 TO 0.93891	0.93618 TO 0.93982	0.93527 TO 0.94073	726000
482	0.93809	+ OR - 0.00091	0.93718 TO 0.93901	0.93627 TO 0.93992	0.93536 TO 0.94083	721000
487	0.93801	+ OR - 0.00092	0.93709 TO 0.93892	0.93618 TO 0.93984	0.93526 TO 0.94075	716000
492	0.93798	+ OR - 0.00092	0.93707 TO 0.93890	0.93615 TO 0.93982	0.93524 TO 0.94073	711000
497	0.93787	+ OR - 0.00092	0.93695 TO 0.93879	0.93603 TO 0.93971	0.93511 TO 0.94063	706000

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
502	0.93787	+ OR - 0.00092	0.93695 TO 0.93880	0.93603 TO 0.93972	0.93510 TO 0.94065	701000
507	0.93789	+ OR - 0.00093	0.93696 TO 0.93882	0.93604 TO 0.93975	0.93511 TO 0.94068	696000
512	0.93795	+ OR - 0.00093	0.93702 TO 0.93888	0.93609 TO 0.93981	0.93515 TO 0.94075	691000
517	0.93796	+ OR - 0.00094	0.93702 TO 0.93889	0.93608 TO 0.93983	0.93515 TO 0.94077	686000
522	0.93794	+ OR - 0.00094	0.93700 TO 0.93889	0.93606 TO 0.93983	0.93511 TO 0.94077	681000
527	0.93801	+ OR - 0.00094	0.93707 TO 0.93896	0.93612 TO 0.93990	0.93518 TO 0.94085	676000
532	0.93808	+ OR - 0.00095	0.93713 TO 0.93902	0.93618 TO 0.93997	0.93523 TO 0.94092	671000
537	0.93812	+ OR - 0.00095	0.93717 TO 0.93908	0.93622 TO 0.94003	0.93526 TO 0.94098	666000
542	0.93816	+ OR - 0.00096	0.93720 TO 0.93912	0.93624 TO 0.94007	0.93529 TO 0.94103	661000
547	0.93799	+ OR - 0.00096	0.93703 TO 0.93895	0.93607 TO 0.93991	0.93511 TO 0.94087	656000
552	0.93805	+ OR - 0.00097	0.93709 TO 0.93902	0.93612 TO 0.93999	0.93515 TO 0.94095	651000
557	0.93804	+ OR - 0.00097	0.93707 TO 0.93901	0.93609 TO 0.93998	0.93512 TO 0.94095	646000
562	0.93795	+ OR - 0.00097	0.93698 TO 0.93892	0.93600 TO 0.93990	0.93503 TO 0.94087	641000
567	0.93806	+ OR - 0.00098	0.93708 TO 0.93904	0.93610 TO 0.94002	0.93512 TO 0.94099	636000
572	0.93800	+ OR - 0.00098	0.93702 TO 0.93898	0.93603 TO 0.93997	0.93505 TO 0.94095	631000
577	0.93800	+ OR - 0.00098	0.93702 TO 0.93899	0.93604 TO 0.93997	0.93505 TO 0.94095	626000
582	0.93799	+ OR - 0.00099	0.93700 TO 0.93898	0.93601 TO 0.93997	0.93502 TO 0.94095	621000
587	0.93795	+ OR - 0.00099	0.93696 TO 0.93895	0.93597 TO 0.93994	0.93498 TO 0.94093	616000
592	0.93791	+ OR - 0.00100	0.93692 TO 0.93891	0.93592 TO 0.93990	0.93492 TO 0.94090	611000
597	0.93779	+ OR - 0.00099	0.93679 TO 0.93878	0.93580 TO 0.93977	0.93481 TO 0.94077	606000
602	0.93779	+ OR - 0.00099	0.93679 TO 0.93878	0.93580 TO 0.93977	0.93481 TO 0.94076	601000
607	0.93773	+ OR - 0.00100	0.93673 TO 0.93872	0.93573 TO 0.93972	0.93474 TO 0.94072	596000
612	0.93763	+ OR - 0.00100	0.93663 TO 0.93863	0.93563 TO 0.93963	0.93462 TO 0.94063	591000
617	0.93767	+ OR - 0.00101	0.93667 TO 0.93868	0.93566 TO 0.93969	0.93465 TO 0.94070	586000
622	0.93761	+ OR - 0.00101	0.93661 TO 0.93862	0.93560 TO 0.93963	0.93459 TO 0.94064	581000
627	0.93762	+ OR - 0.00101	0.93660 TO 0.93863	0.93559 TO 0.93964	0.93458 TO 0.94066	576000
632	0.93749	+ OR - 0.00101	0.93647 TO 0.93850	0.93546 TO 0.93952	0.93444 TO 0.94053	571000

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
637	0.93742	+ OR - 0.00102	0.93641 TO 0.93844	0.93539 TO 0.93945	0.93438 TO 0.94047	566000
642	0.93724	+ OR - 0.00102	0.93622 TO 0.93825	0.93521 TO 0.93927	0.93419 TO 0.94028	561000
647	0.93724	+ OR - 0.00102	0.93622 TO 0.93827	0.93519 TO 0.93929	0.93417 TO 0.94032	556000
652	0.93729	+ OR - 0.00103	0.93626 TO 0.93832	0.93523 TO 0.93935	0.93420 TO 0.94038	551000
657	0.93729	+ OR - 0.00104	0.93625 TO 0.93833	0.93522 TO 0.93936	0.93418 TO 0.94040	546000
662	0.93725	+ OR - 0.00104	0.93621 TO 0.93829	0.93517 TO 0.93933	0.93413 TO 0.94037	541000
667	0.93728	+ OR - 0.00105	0.93623 TO 0.93833	0.93518 TO 0.93938	0.93413 TO 0.94043	536000
672	0.93721	+ OR - 0.00106	0.93615 TO 0.93826	0.93509 TO 0.93932	0.93403 TO 0.94038	531000
677	0.93710	+ OR - 0.00106	0.93604 TO 0.93817	0.93498 TO 0.93923	0.93391 TO 0.94030	526000
682	0.93696	+ OR - 0.00107	0.93589 TO 0.93803	0.93482 TO 0.93910	0.93375 TO 0.94017	521000
687	0.93684	+ OR - 0.00107	0.93577 TO 0.93792	0.93470 TO 0.93899	0.93362 TO 0.94006	516000
692	0.93688	+ OR - 0.00108	0.93580 TO 0.93796	0.93472 TO 0.93904	0.93364 TO 0.94012	511000
697	0.93700	+ OR - 0.00108	0.93592 TO 0.93808	0.93483 TO 0.93916	0.93375 TO 0.94024	506000
702	0.93694	+ OR - 0.00109	0.93585 TO 0.93803	0.93477 TO 0.93911	0.93368 TO 0.94020	501000
707	0.93703	+ OR - 0.00109	0.93593 TO 0.93812	0.93484 TO 0.93921	0.93375 TO 0.94031	496000
712	0.93686	+ OR - 0.00110	0.93576 TO 0.93796	0.93466 TO 0.93906	0.93356 TO 0.94016	491000
717	0.93697	+ OR - 0.00110	0.93586 TO 0.93807	0.93476 TO 0.93918	0.93365 TO 0.94028	486000
722	0.93712	+ OR - 0.00111	0.93601 TO 0.93824	0.93490 TO 0.93935	0.93379 TO 0.94046	481000
727	0.93710	+ OR - 0.00112	0.93598 TO 0.93821	0.93487 TO 0.93933	0.93375 TO 0.94044	476000
732	0.93688	+ OR - 0.00112	0.93575 TO 0.93800	0.93463 TO 0.93912	0.93351 TO 0.94024	471000
737	0.93684	+ OR - 0.00113	0.93571 TO 0.93797	0.93458 TO 0.93910	0.93345 TO 0.94023	466000
742	0.93684	+ OR - 0.00114	0.93570 TO 0.93798	0.93456 TO 0.93912	0.93342 TO 0.94026	461000
747	0.93684	+ OR - 0.00115	0.93569 TO 0.93799	0.93454 TO 0.93914	0.93339 TO 0.94028	456000
752	0.93667	+ OR - 0.00115	0.93552 TO 0.93782	0.93436 TO 0.93898	0.93321 TO 0.94013	451000
757	0.93674	+ OR - 0.00116	0.93558 TO 0.93791	0.93442 TO 0.93907	0.93325 TO 0.94024	446000
762	0.93666	+ OR - 0.00117	0.93549 TO 0.93784	0.93432 TO 0.93901	0.93315 TO 0.94018	441000
767	0.93632	+ OR - 0.00117	0.93515 TO 0.93749	0.93397 TO 0.93866	0.93280 TO 0.93984	436000

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
772	0.93637	+ OR - 0.00118	0.93519 TO 0.93755	0.93401 TO 0.93873	0.93283 TO 0.93991	431000
777	0.93642	+ OR - 0.00119	0.93523 TO 0.93760	0.93404 TO 0.93879	0.93286 TO 0.93997	426000
782	0.93628	+ OR - 0.00119	0.93519 TO 0.93757	0.93400 TO 0.93876	0.93281 TO 0.93995	421000
787	0.93620	+ OR - 0.00120	0.93500 TO 0.93739	0.93381 TO 0.93859	0.93261 TO 0.93979	416000
792	0.93620	+ OR - 0.00121	0.93499 TO 0.93741	0.93378 TO 0.93861	0.93257 TO 0.93982	411000
797	0.93618	+ OR - 0.00122	0.93496 TO 0.93739	0.93374 TO 0.93861	0.93252 TO 0.93983	406000
802	0.93617	+ OR - 0.00123	0.93494 TO 0.93740	0.93372 TO 0.93862	0.93249 TO 0.93985	401000
807	0.93637	+ OR - 0.00124	0.93513 TO 0.93761	0.93390 TO 0.93885	0.93266 TO 0.94008	396000
812	0.93651	+ OR - 0.00125	0.93526 TO 0.93776	0.93401 TO 0.93901	0.93276 TO 0.94026	391000
817	0.93651	+ OR - 0.00126	0.93525 TO 0.93776	0.93399 TO 0.93902	0.93273 TO 0.94028	386000
822	0.93648	+ OR - 0.00127	0.93520 TO 0.93775	0.93393 TO 0.93903	0.93266 TO 0.94030	381000
827	0.93649	+ OR - 0.00129	0.93520 TO 0.93778	0.93391 TO 0.93906	0.93263 TO 0.94035	376000
832	0.93639	+ OR - 0.00130	0.93509 TO 0.93770	0.93379 TO 0.93900	0.93249 TO 0.94030	371000
837	0.93618	+ OR - 0.00130	0.93489 TO 0.93748	0.93359 TO 0.93878	0.93230 TO 0.94007	366000
842	0.93619	+ OR - 0.00130	0.93488 TO 0.93749	0.93358 TO 0.93879	0.93228 TO 0.94010	361000
847	0.93631	+ OR - 0.00132	0.93499 TO 0.93762	0.93367 TO 0.93894	0.93235 TO 0.94026	356000
852	0.93636	+ OR - 0.00133	0.93503 TO 0.93769	0.93370 TO 0.93902	0.93237 TO 0.94035	351000
857	0.93633	+ OR - 0.00133	0.93499 TO 0.93766	0.93366 TO 0.93899	0.93233 TO 0.94032	346000
862	0.93625	+ OR - 0.00135	0.93491 TO 0.93760	0.93356 TO 0.93895	0.93221 TO 0.94030	341000
867	0.93648	+ OR - 0.00136	0.93512 TO 0.93784	0.93375 TO 0.93921	0.93239 TO 0.94057	336000
872	0.93625	+ OR - 0.00137	0.93488 TO 0.93761	0.93351 TO 0.93898	0.93215 TO 0.94035	331000
877	0.93623	+ OR - 0.00138	0.93486 TO 0.93761	0.93348 TO 0.93899	0.93210 TO 0.94037	326000
882	0.93646	+ OR - 0.00139	0.93506 TO 0.93785	0.93367 TO 0.93924	0.93228 TO 0.94063	321000
887	0.93669	+ OR - 0.00139	0.93531 TO 0.93808	0.93392 TO 0.93947	0.93254 TO 0.94085	316000
892	0.93658	+ OR - 0.00140	0.93518 TO 0.93798	0.93378 TO 0.93938	0.93238 TO 0.94079	311000
897	0.93668	+ OR - 0.00142	0.93526 TO 0.93810	0.93384 TO 0.93952	0.93242 TO 0.94093	306000
902	0.93683	+ OR - 0.00143	0.93539 TO 0.93826	0.93396 TO 0.93969	0.93253 TO 0.94112	301000

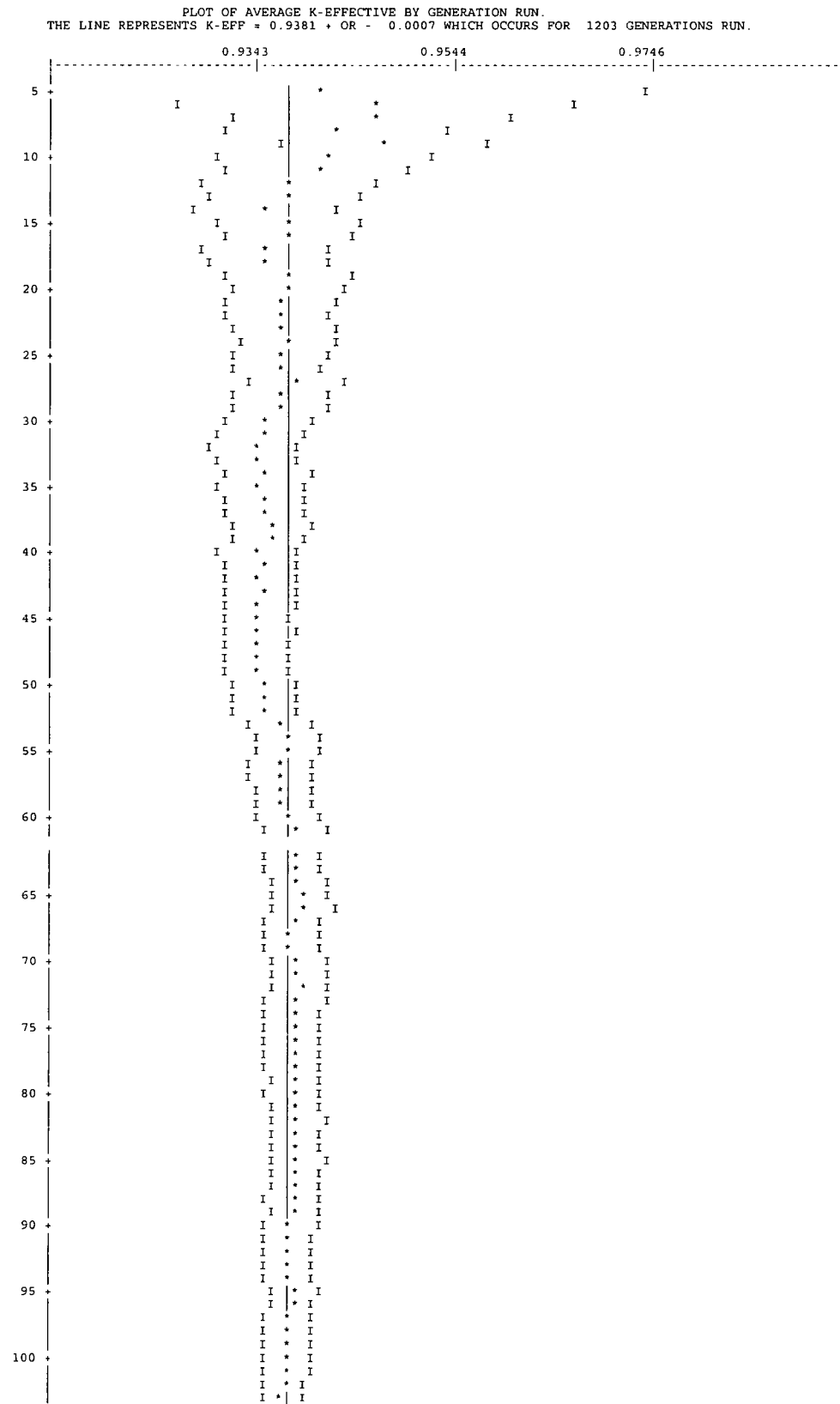
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
907	0.93678	+ OR - 0.00145	0.93534 TO 0.93823	0.93389 TO 0.93968	0.93244 TO 0.94113	296000
912	0.93674	+ OR - 0.00147	0.93527 TO 0.93821	0.93381 TO 0.93967	0.93234 TO 0.94114	291000
917	0.93680	+ OR - 0.00149	0.93531 TO 0.93828	0.93382 TO 0.93977	0.93234 TO 0.94126	286000
922	0.93685	+ OR - 0.00151	0.93534 TO 0.93836	0.93383 TO 0.93987	0.93231 TO 0.94138	281000
927	0.93685	+ OR - 0.00151	0.93534 TO 0.93837	0.93383 TO 0.93988	0.93231 TO 0.94140	276000
932	0.93657	+ OR - 0.00152	0.93505 TO 0.93809	0.93353 TO 0.93961	0.93201 TO 0.94113	271000
937	0.93656	+ OR - 0.00153	0.93502 TO 0.93809	0.93349 TO 0.93962	0.93196 TO 0.94116	266000
942	0.93636	+ OR - 0.00153	0.93483 TO 0.93789	0.93329 TO 0.93942	0.93176 TO 0.94095	261000
947	0.93636	+ OR - 0.00156	0.93481 TO 0.93792	0.93325 TO 0.93948	0.93169 TO 0.94104	256000
952	0.93614	+ OR - 0.00158	0.93456 TO 0.93772	0.93298 TO 0.93931	0.93139 TO 0.94089	251000
957	0.93610	+ OR - 0.00160	0.93449 TO 0.93770	0.93289 TO 0.93930	0.93128 TO 0.94091	246000
962	0.93616	+ OR - 0.00163	0.93453 TO 0.93779	0.93290 TO 0.93942	0.93127 TO 0.94105	241000
967	0.93619	+ OR - 0.00164	0.93455 TO 0.93783	0.93291 TO 0.93947	0.93127 TO 0.94111	236000
972	0.93618	+ OR - 0.00167	0.93451 TO 0.93785	0.93284 TO 0.93953	0.93117 TO 0.94120	231000
977	0.93636	+ OR - 0.00168	0.93468 TO 0.93804	0.93300 TO 0.93973	0.93132 TO 0.94141	226000
982	0.93612	+ OR - 0.00170	0.93442 TO 0.93782	0.93271 TO 0.93953	0.93101 TO 0.94123	221000
987	0.93628	+ OR - 0.00172	0.93457 TO 0.93800	0.93285 TO 0.93972	0.93113 TO 0.94144	216000
992	0.93621	+ OR - 0.00174	0.93447 TO 0.93795	0.93273 TO 0.93969	0.93098 TO 0.94144	211000
997	0.93597	+ OR - 0.00176	0.93421 TO 0.93773	0.93245 TO 0.93949	0.93070 TO 0.94125	206000
1002	0.93598	+ OR - 0.00180	0.93418 TO 0.93778	0.93238 TO 0.93958	0.93058 TO 0.94138	201000
1007	0.93575	+ OR - 0.00183	0.93392 TO 0.93758	0.93209 TO 0.93941	0.93026 TO 0.94124	196000
1012	0.93518	+ OR - 0.00186	0.93333 TO 0.93704	0.93147 TO 0.93889	0.92962 TO 0.94075	191000
1017	0.93514	+ OR - 0.00190	0.93324 TO 0.93703	0.93135 TO 0.93893	0.92945 TO 0.94082	186000
1022	0.93565	+ OR - 0.00193	0.93372 TO 0.93758	0.93178 TO 0.93951	0.92985 TO 0.94145	181000
1027	0.93618	+ OR - 0.00195	0.93423 TO 0.93814	0.93228 TO 0.94009	0.93033 TO 0.94204	176000
1032	0.93561	+ OR - 0.00196	0.93365 TO 0.93756	0.93170 TO 0.93952	0.92974 TO 0.94148	171000
1037	0.93620	+ OR - 0.00198	0.93422 TO 0.93818	0.93224 TO 0.94016	0.93026 TO 0.94214	166000

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
1042	0.93585	+ OR - 0.00201	0.93384 TO 0.93786	0.93183 TO 0.93987	0.92982 TO 0.94187	161000
1047	0.93583	+ OR - 0.00195	0.93388 TO 0.93778	0.93193 TO 0.93973	0.92998 TO 0.94168	156000
1052	0.93632	+ OR - 0.00197	0.93435 TO 0.93829	0.93239 TO 0.94026	0.93042 TO 0.94223	151000
1057	0.93610	+ OR - 0.00195	0.93415 TO 0.93805	0.93220 TO 0.94000	0.93025 TO 0.94195	146000
1062	0.93566	+ OR - 0.00199	0.93367 TO 0.93766	0.93168 TO 0.93965	0.92969 TO 0.94164	141000
1067	0.93582	+ OR - 0.00197	0.93385 TO 0.93779	0.93188 TO 0.93976	0.92991 TO 0.94173	136000
1072	0.93621	+ OR - 0.00201	0.93421 TO 0.93822	0.93220 TO 0.94022	0.93020 TO 0.94223	131000
1077	0.93622	+ OR - 0.00207	0.93415 TO 0.93830	0.93208 TO 0.94037	0.93000 TO 0.94245	126000
1082	0.93661	+ OR - 0.00214	0.93447 TO 0.93875	0.93234 TO 0.94088	0.93020 TO 0.94302	121000
1087	0.93703	+ OR - 0.00220	0.93484 TO 0.93923	0.93264 TO 0.94143	0.93044 TO 0.94363	116000
1092	0.93783	+ OR - 0.00221	0.93562 TO 0.94004	0.93341 TO 0.94225	0.93120 TO 0.94446	111000
1097	0.93768	+ OR - 0.00224	0.93544 TO 0.93992	0.93319 TO 0.94216	0.93095 TO 0.94440	106000
1102	0.93704	+ OR - 0.00220	0.93483 TO 0.93924	0.93263 TO 0.94144	0.93043 TO 0.94364	101000
1107	0.93674	+ OR - 0.00229	0.93445 TO 0.93903	0.93216 TO 0.94132	0.92987 TO 0.94361	96000
1112	0.93682	+ OR - 0.00226	0.93456 TO 0.93909	0.93229 TO 0.94135	0.93003 TO 0.94362	91000
1117	0.93695	+ OR - 0.00233	0.93462 TO 0.93928	0.93228 TO 0.94161	0.92995 TO 0.94395	86000
1122	0.93679	+ OR - 0.00233	0.93446 TO 0.93913	0.93213 TO 0.94146	0.92980 TO 0.94379	81000
1127	0.93728	+ OR - 0.00242	0.93486 TO 0.93971	0.93243 TO 0.94213	0.93001 TO 0.94456	76000
1132	0.93784	+ OR - 0.00253	0.93531 TO 0.94037	0.93279 TO 0.94290	0.93026 TO 0.94543	71000
1137	0.93839	+ OR - 0.00269	0.93570 TO 0.94108	0.93300 TO 0.94378	0.93031 TO 0.94647	66000
1142	0.93839	+ OR - 0.00276	0.93564 TO 0.94115	0.93288 TO 0.94391	0.93012 TO 0.94667	61000
1147	0.93719	+ OR - 0.00283	0.93436 TO 0.94002	0.93153 TO 0.94285	0.92870 TO 0.94568	56000
1152	0.93786	+ OR - 0.00299	0.93487 TO 0.94086	0.93188 TO 0.94385	0.92889 TO 0.94684	51000
1157	0.93748	+ OR - 0.00324	0.93424 TO 0.94072	0.93100 TO 0.94396	0.92776 TO 0.94720	46000
1162	0.93678	+ OR - 0.00318	0.93360 TO 0.93996	0.93041 TO 0.94315	0.92723 TO 0.94633	41000
1167	0.93664	+ OR - 0.00358	0.93306 TO 0.94022	0.92947 TO 0.94381	0.92589 TO 0.94739	36000
1172	0.93756	+ OR - 0.00394	0.93362 TO 0.94151	0.92968 TO 0.94545	0.92573 TO 0.94939	31000

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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
1177	0.93754	+ OR - 0.00427	0.93327 TO 0.94181	0.92900 TO 0.94608	0.92473 TO 0.95035	26000
1182	0.93970	+ OR - 0.00467	0.93503 TO 0.94437	0.93036 TO 0.94903	0.92569 TO 0.95370	21000
1187	0.94097	+ OR - 0.00508	0.93589 TO 0.94606	0.93080 TO 0.95114	0.92572 TO 0.95623	16000
1192	0.94058	+ OR - 0.00679	0.93379 TO 0.94737	0.92699 TO 0.95417	0.92020 TO 0.96096	11000
1197	0.93471	+ OR - 0.01046	0.92426 TO 0.94517	0.91380 TO 0.95562	0.90334 TO 0.96608	6000









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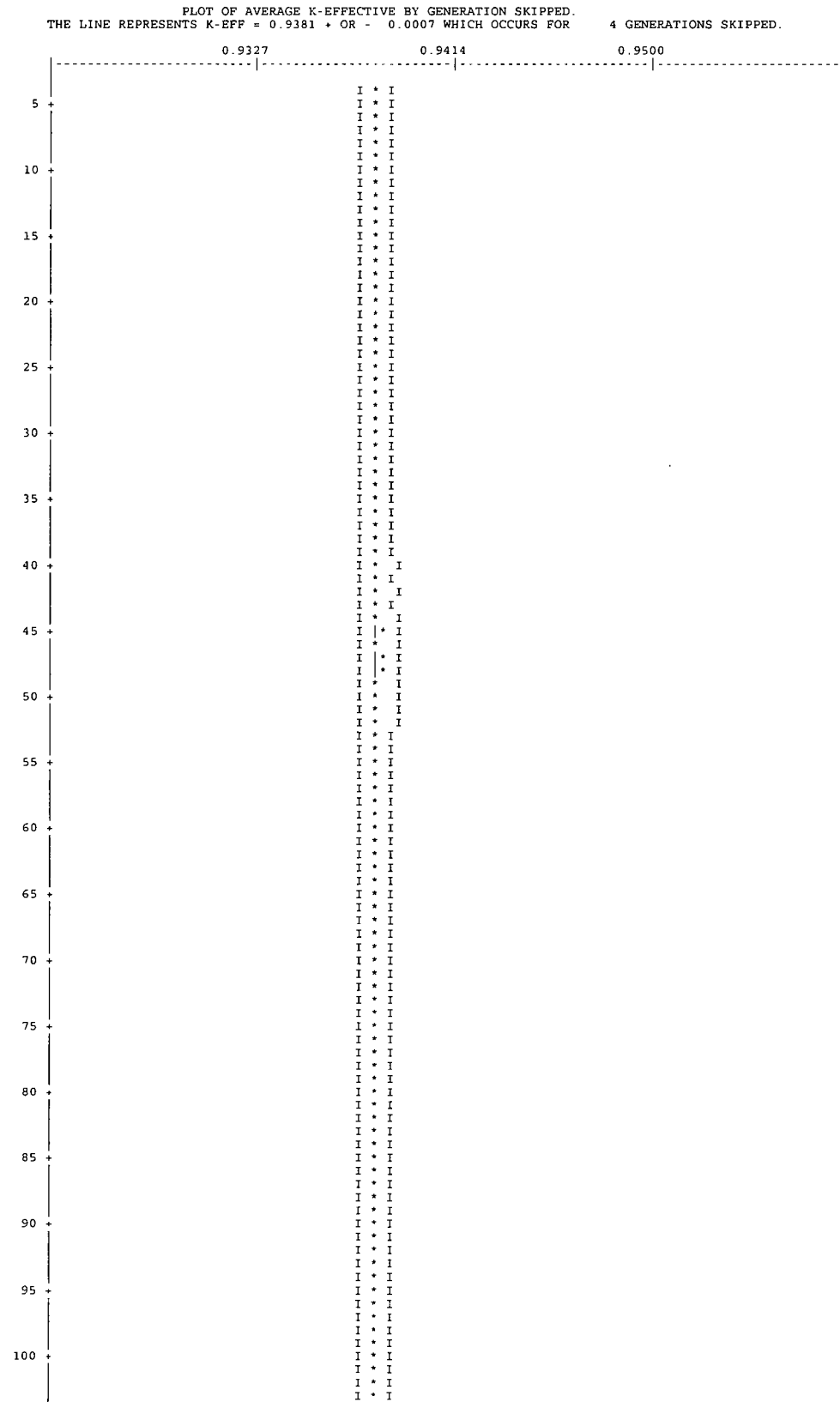




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1085	I*
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1090	I*I
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1095	I*I
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1100	I*I
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1105	I*I
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1110	I*I
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1115	I*I
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1120	I*
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1125	I*I
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1130	I*I
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1135	I*I
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1140	I*I
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1145	I*I
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1150	I*I
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1155	I*I
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1160	I*I
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1165	I*I
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1170	I*I
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1175	I*I
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1180	I*I
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1185	I*I
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	I*I
1190	I*I
	I*I
	I*I
	I*I
	I*I
	I*I
1195	I*I
	I*I
	I*I
	I*I
	I*I
	I*I
1200	I*I
	I*I
	I*I
	I*I
	I*I











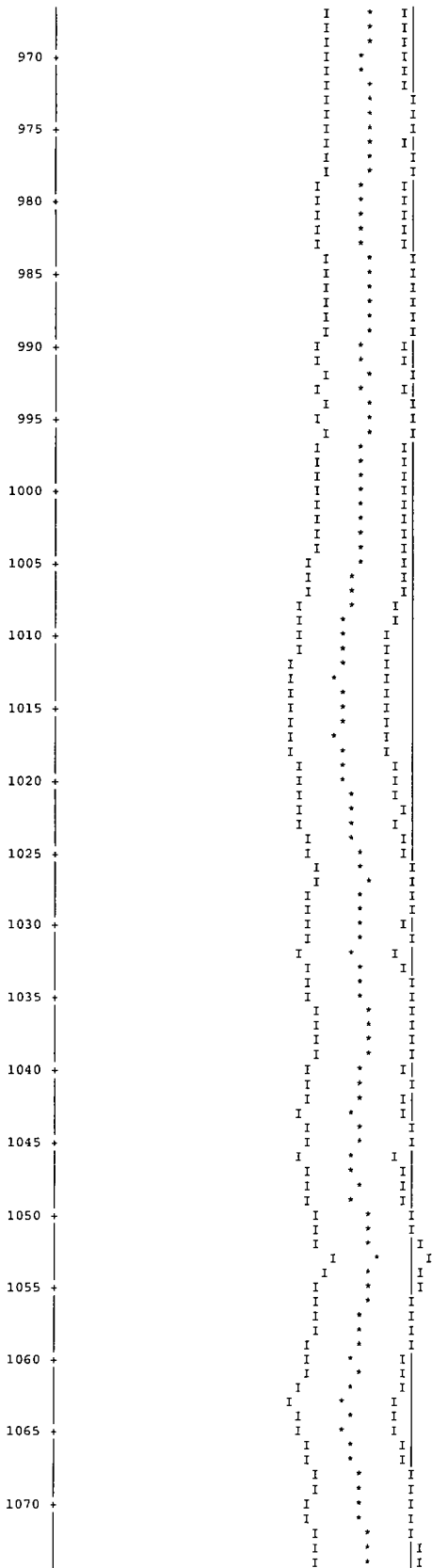


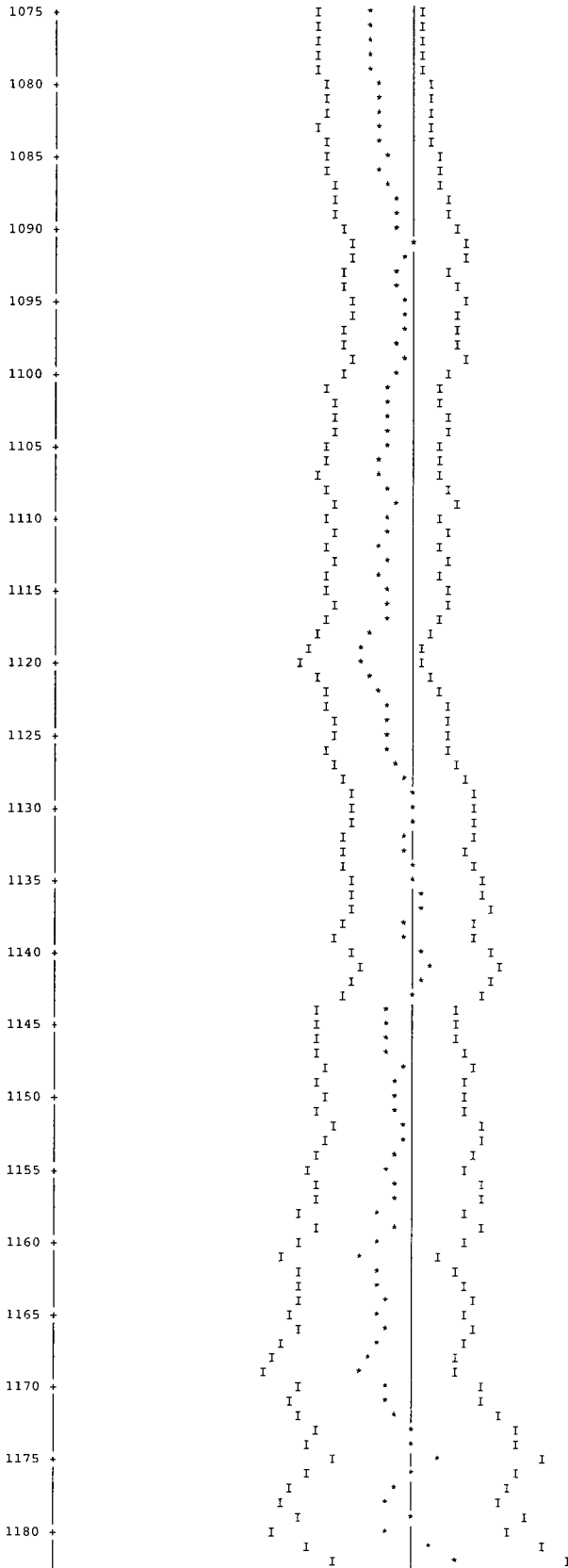


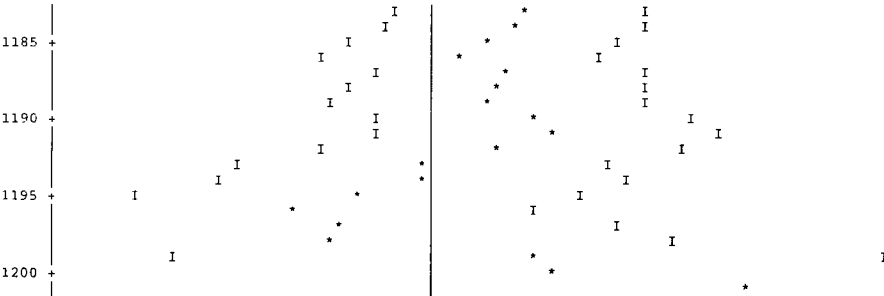














GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	SKIPPING 3 GENERATIONS
									PERCENT DEVIATION
1	0.0001			1.16021E-04	2.7239	1.28235E-03	0.8058	0.00000E+00	0.0000
2	0.0006			5.37105E-04	0.8501	2.61916E-03	0.2615	0.00000E+00	0.0000
3	0.0007			6.36084E-04	0.7171	5.64053E-04	0.4240	0.00000E+00	0.0000
4	0.0004			3.65024E-04	0.9455	3.10795E-04	0.5413	0.00000E+00	0.0000
5	0.0005			4.85982E-04	0.7449	6.75654E-04	0.3927	0.00000E+00	0.0000
6	0.0007			6.37578E-04	0.5699	2.36923E-03	0.3594	0.00000E+00	0.0000
7	0.0007			6.46534E-04	0.6280	4.51992E-03	0.3858	0.00000E+00	0.0000
8	0.0007			6.55531E-04	0.9764	3.63595E-03	0.4314	0.00000E+00	0.0000
9	0.0010			8.92779E-04	1.2147	3.58812E-03	0.4163	0.00000E+00	0.0000
10	0.0021			1.93895E-03	1.1809	9.08369E-03	0.4190	0.00000E+00	0.0000
11	0.0045			4.25875E-03	1.0450	1.16783E-02	0.4192	0.00000E+00	0.0000
12	0.0065			6.08684E-03	1.0529	1.03751E-02	0.4893	0.00000E+00	0.0000
13	0.0065			6.06546E-03	1.0763	1.32515E-02	0.4720	0.00000E+00	0.0000
14	0.0058			5.39501E-03	1.0500	1.70211E-02	0.3958	0.00000E+00	0.0000
15	0.0011			1.02704E-03	1.8212	8.80660E-03	0.4769	0.00000E+00	0.0000
16	0.0007			6.78870E-04	2.4958	5.05885E-03	0.5069	0.00000E+00	0.0000
17	0.0011			1.05328E-03	2.8411	2.85075E-03	0.7361	0.00000E+00	0.0000
18	0.0016			1.50301E-03	2.6453	2.74035E-03	0.8076	0.00000E+00	0.0000
19	0.0019			1.78180E-03	2.2783	4.58632E-03	0.6086	0.00000E+00	0.0000
20	0.0085			7.96153E-03	1.1565	1.62386E-02	0.4304	0.00000E+00	0.0000
21	0.0048			4.51121E-03	1.6031	6.50981E-03	0.6547	0.00000E+00	0.0000
22	0.0131			1.22697E-02	1.0000	1.52535E-02	0.4896	0.00000E+00	0.0000
23	0.0755			7.08406E-02	0.3751	8.10936E-02	0.1957	0.00000E+00	0.0000
24	0.2215			2.07785E-01	0.2114	2.11288E-01	0.1123	0.00000E+00	0.0000
25	0.2199			2.06269E-01	0.2137	1.99371E-01	0.1168	0.00000E+00	0.0000
26	0.3015			2.82848E-01	0.1849	2.65750E-01	0.1040	0.00000E+00	0.0000
27	0.1182			1.10886E-01	0.3190	1.00796E-01	0.1880	0.00000E+00	0.0000
SYSTEM TOTAL =				9.38133E-01	0.0749	1.00132E+00	0.0184	0.00000E+00	0.0000
ELAPSED TIME 29.12517 MINUTES									
RANDOM NUMBER= 3BD444363COD									

```
FREQUENCY FOR GENERATIONS    4 TO 1203
0.8664 TO 0.8692    *
0.8692 TO 0.8721    *
0.8721 TO 0.8749    **
0.8749 TO 0.8777    **
0.8777 TO 0.8806    **
0.8806 TO 0.8834    *****
0.8834 TO 0.8862    *****
0.8862 TO 0.8891    *****
0.8891 TO 0.8919    *****
0.8919 TO 0.8948    *****
0.8948 TO 0.8976    *****
0.8976 TO 0.9004    *****
0.9004 TO 0.9033    *****
0.9033 TO 0.9061    *****
0.9061 TO 0.9089    *****
0.9089 TO 0.9118    *****
0.9118 TO 0.9146    *****
0.9146 TO 0.9174    *****
0.9174 TO 0.9203    *****
0.9203 TO 0.9231    *****
0.9231 TO 0.9259    *****
0.9259 TO 0.9288    *****
0.9288 TO 0.9316    *****
0.9316 TO 0.9344    *****
0.9344 TO 0.9373    *****
0.9373 TO 0.9401    *****
0.9401 TO 0.9429    *****
0.9429 TO 0.9458    *****
0.9458 TO 0.9486    *****
0.9486 TO 0.9514    *****
0.9514 TO 0.9543    *****
0.9543 TO 0.9571    *****
0.9571 TO 0.9600    *****
0.9600 TO 0.9628    *****
0.9628 TO 0.9656    *****
0.9656 TO 0.9685    *****
0.9685 TO 0.9713    *****
0.9713 TO 0.9741    *****
0.9741 TO 0.9770    *****
0.9770 TO 0.9798    *****
0.9798 TO 0.9826    *****
0.9826 TO 0.9855    *****
0.9855 TO 0.9883    *****
0.9883 TO 0.9911    *****
0.9911 TO 0.9940    *****
0.9940 TO 0.9968    *****
0.9968 TO 0.9996    *****
0.9996 TO 1.0025    *****
1.0025 TO 1.0053    **
1.0053 TO 1.0081    **
1.0081 TO 1.0110    **
1.0110 TO 1.0138    **
1.0138 TO 1.0167    **
1.0167 TO 1.0195    **
1.0195 TO 1.0223    *
1.0223 TO 1.0252    *
```

FREQUENCY FOR GENERATIONS 304 TO 1203

```
0.8664 TO 0.8692 *
0.8692 TO 0.8721 **
0.8721 TO 0.8749 **
0.8749 TO 0.8777 *
0.8777 TO 0.8806 ****
0.8806 TO 0.8834 ****
0.8834 TO 0.8862 ****
0.8862 TO 0.8891 *****
0.8891 TO 0.8919 ****
0.8919 TO 0.8948 ****
0.8948 TO 0.8976 *****
0.8976 TO 0.9004 *****
0.9004 TO 0.9033 *****
0.9033 TO 0.9061 *****
0.9061 TO 0.9089 *****
0.9089 TO 0.9118 *****
0.9118 TO 0.9146 *****
0.9146 TO 0.9174 *****
0.9174 TO 0.9203 *****
0.9203 TO 0.9231 *****
0.9231 TO 0.9259 *****
0.9259 TO 0.9288 *****
0.9288 TO 0.9316 *****
0.9316 TO 0.9344 *****
0.9344 TO 0.9373 *****
0.9373 TO 0.9401 *****
0.9401 TO 0.9429 *****
0.9429 TO 0.9458 *****
0.9458 TO 0.9486 *****
0.9486 TO 0.9514 *****
0.9514 TO 0.9543 *****
0.9543 TO 0.9571 *****
0.9571 TO 0.9600 *****
0.9600 TO 0.9628 *****
0.9628 TO 0.9656 *****
0.9656 TO 0.9685 *****
0.9685 TO 0.9713 *****
0.9713 TO 0.9741 *****
0.9741 TO 0.9770 *****
0.9770 TO 0.9798 *****
0.9798 TO 0.9826 *****
0.9826 TO 0.9855 *****
0.9855 TO 0.9883 *****
0.9883 TO 0.9911 *****
0.9911 TO 0.9940 *****
0.9940 TO 0.9968 *****
0.9968 TO 0.9996 *****
0.9996 TO 1.0025 *****
1.0025 TO 1.0053 *****
1.0053 TO 1.0081 *****
1.0081 TO 1.0110 *****
1.0110 TO 1.0138 *****
1.0138 TO 1.0167 *****
1.0167 TO 1.0195 *****
1.0195 TO 1.0223 *****
1.0223 TO 1.0252 *****
```

FREQUENCY FOR GENERATIONS 604 TO 1203

0.8664	TO	0.8692	*
0.8692	TO	0.8721	*
0.8721	TO	0.8749	**
0.8749	TO	0.8777	*
0.8777	TO	0.8806	*
0.8806	TO	0.8834	**
0.8834	TO	0.8862	*
0.8862	TO	0.8891	****
0.8891	TO	0.8919	**
0.8919	TO	0.8948	**
0.8948	TO	0.8976	*****
0.8976	TO	0.9004	*****
0.9004	TO	0.9033	*****
0.9033	TO	0.9061	*****
0.9061	TO	0.9089	*****
0.9089	TO	0.9118	*****
0.9118	TO	0.9146	*****
0.9146	TO	0.9174	*****
0.9174	TO	0.9203	*****
0.9203	TO	0.9231	*****
0.9231	TO	0.9259	*****
0.9259	TO	0.9288	*****
0.9288	TO	0.9316	*****
0.9316	TO	0.9344	*****
0.9344	TO	0.9373	*****
0.9373	TO	0.9401	*****
0.9401	TO	0.9429	*****
0.9429	TO	0.9458	*****
0.9458	TO	0.9486	*****
0.9486	TO	0.9514	*****
0.9514	TO	0.9543	*****
0.9543	TO	0.9571	*****
0.9571	TO	0.9600	*****
0.9600	TO	0.9628	*****
0.9628	TO	0.9656	*****
0.9656	TO	0.9685	*****
0.9685	TO	0.9713	*****
0.9713	TO	0.9741	*****
0.9741	TO	0.9770	*****
0.9770	TO	0.9798	****
0.9798	TO	0.9826	**
0.9826	TO	0.9855	*****
0.9855	TO	0.9883	*****
0.9883	TO	0.9911	****
0.9911	TO	0.9940	****
0.9940	TO	0.9968	*
0.9968	TO	0.9996	*
0.9996	TO	1.0025	*
1.0025	TO	1.0053	**
1.0053	TO	1.0081	*
1.0081	TO	1.0110	*
1.0110	TO	1.0138	*
1.0138	TO	1.0167	*
1.0167	TO	1.0195	*
1.0195	TO	1.0223	*
1.0223	TO	1.0252	*

FREQUENCY FOR GENERATIONS 904 TO 1203

0.8664 TO 0.8692  
0.8692 TO 0.8721 \*\*  
0.8721 TO 0.8749  
0.8749 TO 0.8777  
0.8777 TO 0.8806  
0.8806 TO 0.8834 \*  
0.8834 TO 0.8862  
0.8862 TO 0.8891 \*\*\*\*  
0.8891 TO 0.8919 \*  
0.8919 TO 0.8948 \*  
0.8948 TO 0.8976 \*\*\*\*  
0.8976 TO 0.9004 \*\*\*\*  
0.9004 TO 0.9033 \*\*\*  
0.9033 TO 0.9061 \*\*\*\*\*  
0.9061 TO 0.9089 \*\*\*\*\*  
0.9089 TO 0.9118 \*\*\*\*\*  
0.9118 TO 0.9146 \*\*\*\*\*  
0.9146 TO 0.9174 \*\*\*\*\*  
0.9174 TO 0.9203 \*\*\*\*\*  
0.9203 TO 0.9231 \*\*\*\*\*  
0.9231 TO 0.9259 \*\*\*\*\*  
0.9259 TO 0.9288 \*\*\*\*\*  
0.9288 TO 0.9316 \*\*\*\*\*  
0.9316 TO 0.9344 \*\*\*\*\*  
0.9344 TO 0.9373 \*\*\*\*\*  
0.9373 TO 0.9401 \*\*\*\*\*  
0.9401 TO 0.9429 \*\*\*\*\*  
0.9429 TO 0.9458 \*\*\*\*\*  
0.9458 TO 0.9486 \*\*\*\*\*  
0.9486 TO 0.9514 \*\*\*\*\*  
0.9514 TO 0.9543 \*\*\*\*\*  
0.9543 TO 0.9571 \*\*\*\*\*  
0.9571 TO 0.9600 \*\*\*\*\*  
0.9600 TO 0.9628 \*\*\*\*\*  
0.9628 TO 0.9656 \*\*\*\*\*  
0.9656 TO 0.9685 \*\*\*\*\*  
0.9685 TO 0.9713 \*\*\*\*\*  
0.9713 TO 0.9741 \*\*\*\*  
0.9741 TO 0.9770 \*\*\*  
0.9770 TO 0.9798 \*  
0.9798 TO 0.9826 \*\*  
0.9826 TO 0.9855 \*\*\*\*  
0.9855 TO 0.9883 \*\*\*\*  
0.9883 TO 0.9911 \*\*  
0.9911 TO 0.9940  
0.9940 TO 0.9968  
0.9968 TO 0.9996  
0.9996 TO 1.0025 \*  
1.0025 TO 1.0053 \*  
1.0053 TO 1.0081  
1.0081 TO 1.0110  
1.0110 TO 1.0138  
1.0138 TO 1.0167  
1.0167 TO 1.0195  
1.0195 TO 1.0223  
1.0223 TO 1.0252 \*

.....  
\*  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 29.12517 MINUTES  
.....  
\*

**6.6.9      General Atomics Irradiated Fuel Material**

This section contains the output file for the most reactive configuration of GA IFM in the NAC-LWT cask.

Figure 6.6.9-1 Maximum Reactivity GA IFM Configuration

```
.
NAC International
QSCALENT Banner Generation Utility v5.1 (20020221)
+-----+
I JOB INFORMATION I
+-----+
.
Working Directory:          gaifm_173ps_000i_100h_000e_068t
Output File Name:         gaifm_173ps_000i_100h_000e_068t.out
Start Date:               Fri 05/16/2003
Start Time:               11:02a
.
+-----+
I SOFTWARE INFORMATION I
+-----+
.
Program Name:              Scale 4.3 for Windows NT 4.0/2000
Installation Date:         June 10, 1998
Code Verification Package #: EA9131010-127, Rev. 0
Code Verification Date:    June 10, 1998
Program Location:         G:\SCALE4.3\WIN_NT\EXE
.
+-----+
I SYSTEM INFORMATION I
+-----+
.
Computer Type:             Dell Precision 530
Operating System:         Windows 2000
Computer ID:               ROSEZ1-IT1215
Serial Number:            3VTCR01
Login ID:                  rose1
System Verification Date:  January 10, 2002
.
.
```

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT WITH GA IFM
27GROUPHDF4 INFHOMMEDIUM
' RERTR TRIGA FUEL - HOMOGENIZED (NO CLAD)
H2O 1 0.6816 293.0 END
U-235 1 DEN=0.10624 1.0 END
U-238 1 DEN=0.43306 1.0 END
ZR 1 DEN=0.94133 1.0 END
H 1 DEN=0.01625 1.0 END
C 1 DEN=0.00216 1.0 END
' HTGR FUEL MATRIX
H2O 3 1.0000 293.0 END
C 3 DEN=0.74050 1.0 END
TH 3 DEN=0.20480 1.0 END
SI 3 DEN=0.14739 1.0 END
O 3 DEN=0.00234 1.0 END
U-235 3 DEN=0.01997 1.0 END
U-238 3 DEN=0.00147 1.0 END
' CASK INTERIOR MODERATOR
H2O 4 0.0001 293.0 END
' CASK EXTERIOR MODERATOR
H2O 5 0.0001 293.0 END
' LEAD SHIELD
PB 6 1.0000 293.0 END
' NEUTRON SHIELD
H2O 7 0.0001 293.0 END
' STAINLESS STEEL
SS304 8 1.0000 293.0 END
' WATER
H2O 9 1.0000 293.0 END
END COMP
LWT WITH GA IFM
READ PARAM RUN=YES PLT=NO TME=5000 GEN=803 NPG=1000 TBA=5 END PARAM
READ GEOM
UNIT 1
COM='TRIGA/RERTR FHU - NO BASKET'
CYLINDER 1 1 5.0927 2P28.0000
CYLINDER 8 1 5.3975 2P28.0000
CYLINDER 4 1 5.7277 2P28.0000
CYLINDER 8 1 6.0325 2P28.0000
UNIT 2
COM='HTGR FHU - NO BASKET'
CYLINDER 3 1 5.7277 2P28.0000
CYLINDER 8 1 6.0325 2P28.0000
CYLINDER 4 1 6.3627 2P28.0000
CYLINDER 8 1 6.6675 2P28.0000
GLOBAL UNIT 5
COM='ASSEMBLED LWT'
CYLINDER 4 1 17.1500 2P28.0000
HOLE 1 0.0000 6.0325 0.0000
HOLE 2 0.0000 -6.6675 0.0000
CYLINDER 8 1 18.9103 2P28.0000
CYLINDER 6 1 33.4645 2P28.0000
CYLINDER 8 1 36.5188 2P28.0000
CYLINDER 7 1 49.2227 2P28.0000
CYLINDER 8 1 49.8221 2P28.0000
CUBOID 5 1 4P49.8221 2P28.0000
END GEOM
READ BOUNDS ALL=MIR END BOUNDS
READ PLOT
TTL='XY SLICE OF CASK'
SCR=YES PIC=MAT LPI=10
XUL=-50.0 YUL=50.0 ZUL=0.0 XLR=50.0 YLR=-50.0 ZLR=0.0
UAX=1.0 VDN=-1.0 NAX=1500 END
END PLOT
END DATA

```

SECONDARY MODULE 000008 HAS BEEN CALLED.

MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.44 (SECONDS).

SECONDARY MODULE 000002 HAS BEEN CALLED.

MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 4.45 (SECONDS).

SECONDARY MODULE 000009 HAS BEEN CALLED.

MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 538.87 (SECONDS).

MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 544.75 (SECONDS).

THE FOLLOWING DATA CARDS PRECEDE AN = CARD



```
CCCCCCCCC  SSSSSSSSS  AAAAAAAA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  222222222  55555555555
CC  CC  SS  SS  AA  AA  SS  SS  22  22  55
CC  SS  AA  AA  SS  22  55
CC  SS  AA  AA  SS  22  55
CC  SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  22  55555555555
CC  SSSSSSSSS  AAAAAAAAAA  SSSSSSSSS  22  55555555555
CC  SS  AA  AA  SS  22  55
CC  SS  AA  AA  SS  22  55
CC  CC  SS  SS  AA  AA  SS  SS  22  55  55
CCCCCCCCC  SSSSSSSSS  AA  AA  SSSSSSSSS  222222222  55555555555
CCCCCCCCC  SSSSSSSSS  AA  AA  SSSSSSSSS  222222222  55555555555
```

```
SSSSSSSSS  CCCCCCCCC  AAAAAAAA  LL  EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEE  PPPPPPPPP  CCCCCCCCC
SS  SS  CC  CC  AA  AA  LL  EE  PP  PP  CC  CC
SS  SS  CC  CC  AA  AA  LL  EE  PP  PP  CC  CC
SS  SS  CC  CC  AA  AA  LL  EE  PP  PP  CC  CC
SSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEE  PPPPPPPPP  CC
SSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEE  PPPPPPPPP  CC
SS  CC  AA  AA  LL  EE  PP  CC
SS  CC  AA  AA  LL  EE  PP  CC
SS  CC  AA  AA  LL  EE  PP  CC
SSSSSSSSS  CCCCCCCCC  AA  AA  LLLLLLLLL  EEEEEEEEE  PP  CCCCCCCCC
SSSSSSSSS  CCCCCCCCC  AA  AA  LLLLLLLLL  EEEEEEEEE  PP  CCCCCCCCC
```

```
0000000  5555555555  //  11  6666666666  //  0000000  3333333333
00000000  5555555555  //  111  6666666666  //  00000000  3333333333
00  00  55  1111  66  00  00  33  33
00  00  55  11  66  00  00  33  33
00  00  55  11  66  00  00  33  33
00  00  5555555555  11  6666666666  00  00  333
00  00  5555555555  11  6666666666  00  00  333
00  00  55  11  66  66  00  00  33
00  00  55  11  66  66  00  00  33
00  00  55  11  66  66  00  00  33
00000000  5555555555  //  1111111  6666666666  //  00000000  3333333333
0000000  5555555555  //  1111111  6666666666  //  0000000  3333333333
```

```
11  11  0000000  222222222  3333333333  222222222
111  111  000000000  2222222222  33333333333  2222222222
1111  1111  :::  00  00  22  22  33  33  22  22
11  11  :::  00  00  22  22  33  33  22  22
11  11  :::  00  00  22  22  33  33  22  22
11  11  :::  00  00  22  22  333  333  22  22
11  11  :::  00  00  22  22  333  333  22  22
11  11  :::  00  00  22  22  33  33  22  22
11  11  :::  00  00  22  22  33  33  22  22
11111111  11111111  00000000  2222222222  33333333333  2222222222
11111111  11111111  0000000  2222222222  33333333333  2222222222
```



\* RERTR TRIGA FUEL - HOMOGENIZED (NO CLAD)  
\* HTGF FUEL MATRIX  
\* CASK INTERIOR MODERATOR  
\* CASK EXTERIOR MODERATOR  
\* LEAD SHIELD  
\* NEUTRON SHIELD  
\* STAINLESS STEEL  
\* WATER  
\* RERTR TRIGA FUEL - HOMOGENIZED (NO CLAD)  
LWT WITH GA IFM

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

LIB 27GROUPNDP4 LIBRARY  
MX 9 MIXTURES  
MSC 19 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 H2O STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 0.6816 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC U-235 STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.1062 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
92235 1.00 ATOM/MOLECULE  
END

SC U-238 STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.4331 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
92238 1.00 ATOM/MOLECULE  
END

SC ZR STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9413 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
40000 1.00 ATOM/MOLECULE  
END

SC H STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.0162 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
1001 1.00 ATOM/MOLECULE  
END

SC C STANDARD COMPOSITION  
MX 1 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.0022 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
6012 1.00 ATOM/MOLECULE

\* HTGF FUEL MATRIX  
END

SC H2O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION

ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC C STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.7405 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
6012 1.00 ATOM/MOLECULE  
END

SC TH STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.2048 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
90000 1.00 ATOM/MOLECULE  
90232 100.000 WT%  
END

SC SI STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.1474 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
14000 1.00 ATOM/MOLECULE  
END

SC O STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.0023 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
8016 1.00 ATOM/MOLECULE  
END

SC U-235 STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.0200 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
92235 1.00 ATOM/MOLECULE  
END

SC U-238 STANDARD COMPOSITION  
MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.0015 SPECIFIED DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
92238 1.00 ATOM/MOLECULE

\* CASK INTERIOR MODERATOR  
END

SC H2O STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 0.0001 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

\* CASK EXTERIOR MODERATOR  
END

SC H2O STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 0.0001 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

\* LEAD SHIELD  
END

SC PB STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY

NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE

' NEUTRON SHIELD  
END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 0.0001 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

' STAINLESS STEEL  
END

SC SS304 STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

' WATER  
END

SC H2O STANDARD COMPOSITION  
MX 9 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

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

MIP MESSAGE NUMBER MP-22 FOLLOWS:  
\*\*WARNING\*\* STANDARD COMPOSITION SPECIFICATION CARD(S) MISSING  
FOR MIXTURE NUMBER 2



```

BBBBBBBBBBB C000000000 NN NN AAAAAAAAAA MM MM IIIIIIIIIII 2222222222
BBBBBBBBBBB O000000000 HNN NN AAAAAAAAAA MMM MM IIIIIIIIIII 2222222222
BB BB 00 00 HNNN NN AA AA MMMM MMMM II 22 22
BB BB 00 00 NN NH NN AA AA MM MM MM MM II 22 22
BB BB 00 00 NN NH NN AA AA MM MM MM MM II 22 22
BBBBBBBBBBB 00 00 NN NH NN ----- AAAAAAAAAA MM MM MM MM II 22
BBBBBBBBBBB 00 00 NN NH NN ----- AAAAAAAAAA MM M MM MM II 22
BB BB 00 00 NN NH NN AA AA MM MM MM MM II 22
BB BB 00 00 NN NH NN AA AA MM MM MM MM II 22
BB BB 00 00 NN NH NN AA AA MM MM MM MM II 22
BBBBBBBBBBB O000000000 NN HNN AA AA MM MM IIIIIIIIIII 2222222222
BBBBBBBBBBB O000000000 NN NN AA AA MM MM IIIIIIIIIII 2222222222
    
```

```

SSSSSSSSSS CCCCCCCCCC AAAAAAAAAA LL EEEEEEEEEEEE PFFFFFFFFPPP CCCCCCCCCC
SSSSSSSSSS CCCCCCCCCC AAAAAAAAAA LL EEEEEEEEEEEE PFFFFFFFFPPP CCCCCCCCCC
SS SS CC CC AA AA LL EE PP PP CC CC
SS SS CC CC AA AA LL EE PP PP CC CC
SS SS CC CC AA AA LL EE PP PP CC CC
SSSSSSSSSS CC AAAAAAAAAA LL EEEEEEEE ----- PFFFFFFFFPPP CC
SSSSSSSSSS CC AAAAAAAAAA LL EEEEEEEE ----- PFFFFFFFFPPP CC
SS SS CC AA AA LL EE PP CC CC
SS SS CC AA AA LL EE PP CC CC
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLLL EEEEEEEEEEEE PP CCCCCCCCCC
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLLL EEEEEEEEEEEE PP CCCCCCCCCC
    
```

```

000000 5555555555 // 11 6666666666 // 000000 333333333
00000000 5555555555 // 111 6666666666 // 00000000 3333333333
00 00 55 // 1111 66 // 00 00 33 33
00 00 55 // 11 66 // 00 00 33 33
00 00 55 // 11 66 // 00 00 33 33
00 00 5555555555 // 11 6666666666 // 00 00 333 333
00 00 5555555555 // 11 6666666666 // 00 00 333 333
00 00 55 // 11 66 66 // 00 00 33 33
00 00 55 // 11 66 66 // 00 00 33 33
00 00 55 // 11 66 66 // 00 00 33 33
00000000 5555555555 // 1111111 6666666666 // 00000000 3333333333
0000000 5555555555 // 1111111 6666666666 // 0000000 3333333333
    
```

```

11 11 000000 222222222 3333333333 222222222
111 111 00000000 2222222222 3333333333 222222222
1111 1111 ::: 00 00 22 22 ::: 33 33 22 22
11 11 ::: 00 00 22 22 ::: 33 33 22 22
11 11 ::: 00 00 22 22 ::: 333 333 22 22
11 11 22 22 333 333 22 22
11 11 ::: 00 00 22 22 ::: 33 33 22 22
11 11 ::: 00 00 22 22 ::: 33 33 22 22
11 11 ::: 00 00 22 22 ::: 33 33 22 22
1111111 1111111 00000000 2222222222 3333333333 2222222222
1111111 1111111 0000000 2222222222 3333333333 2222222222
    
```





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

LOGICAL ASSIGNMENTS

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

PROBLEM DESCRIPTION

IGR--GEOMETRY (0/1/2/3--1HF MED/SLAB/CYL/SPHERE) 1  
IZM--NUMBER OF ZONES OR MATERIAL REGIONS 9  
MS--MIXING TABLE LENGTH 26  
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 26 ENTRIES.  
4Q ARRAY HAS 26 ENTRIES.  
5Q ARRAY HAS 26 ENTRIES.  
6Q ARRAY HAS 9 ENTRIES.  
7Q ARRAY HAS 9 ENTRIES.  
8Q ARRAY HAS 9 ENTRIES.  
9Q ARRAY HAS 9 ENTRIES.  
10Q ARRAY HAS 26 ENTRIES.  
11Q ARRAY HAS 9 ENTRIES.

MIXING TABLE

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	1001	5.52201E-02	1001001
2	3	1001	6.67692E-02	3001001
3	4	1001	6.67692E-06	4001001
4	5	1001	6.67692E-06	5001001
5	7	1001	6.67692E-06	7001001
6	9	1001	6.67692E-02	9001001
7	1	8016	2.27549E-02	1008016
8	3	8016	3.34727E-02	3008016
9	4	8016	3.33846E-06	4008016
10	5	8016	3.33846E-06	5008016
11	7	8016	3.33846E-06	7008016
12	9	8016	3.33846E-02	9008016
13	1	92235	2.72201E-04	1092235
14	3	92235	5.11657E-05	3092235
15	1	92238	1.09554E-03	1092238
16	3	92238	3.71876E-06	3092238
17	1	40000	6.21447E-03	1040000
18	1	6012	1.08398E-04	1006012
19	3	6012	3.71616E-02	3006012
20	3	90232	5.31533E-04	3090232
21	3	14000	3.16038E-03	3014000
22	6	82000	3.29690E-02	6082000
23	8	24304	1.74286E-02	8024304
24	8	25055	1.73633E-03	8025055
25	8	26304	5.93579E-02	8026304
26	8	28304	7.72070E-03	8028304

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
5	5	2.10000E+01	2.93000E+02	0.00000E+00	0
6	6	2.60000E+01	2.93000E+02	0.00000E+00	0
7	7	3.10000E+01	2.93000E+02	0.00000E+00	0
8	8	3.60000E+01	2.93000E+02	0.00000E+00	0
9	9	4.10000E+01	2.93000E+02	0.00000E+00	0

4532 LOCATIONS OF 10000 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	1001	HYDROGEN	FROM LOG 18 TO LOG 1	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	1001	HYDROGEN	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	6012	CARBON-12	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	6012	CARBON-12	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	6012	CARBON-12	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	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	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	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	40000	ZIRCONIUM	FROM LOG 11 TO LOG 1	BONDARENKO TRIGGER 0
COPY	82000	PB 1288 218NGP	FROM LOG 11 TO LOG 1	BONDARENKO TRIGGER 0
COPY	90232	THORIUM-232	FROM LOG 11 TO LOG 1	BONDARENKO TRIGGER 0
COPY	92235	URANIUM-235	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	92235	URANIUM-235	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	92235	URANIUM-235	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	92238	URANIUM-238	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	92238	URANIUM-238	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	92238	URANIUM-238	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0

SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89  
LAST UPDATED  
L.M.PETRIE - ORNL

08/12/94

TAPE ID	4321	NUMBER OF NUCLIDES	26
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 08/12/94	ID 1001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 4001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 5001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 7001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 9001001
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94	ID 1006012
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94	ID 3006012
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 1008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 4008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 5008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 7008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 9008016
SILICON	ENDF/B-IV MAT 1194	UPDATED 08/12/94	ID 3014000
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8024304
MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	ID 8025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8028304
ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94	ID 1040000
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 6082000
THORIUM-232	ENDF/B-IV MAT 1296	UPDATED 08/12/94	ID 3030232
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	ID 1092235
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	ID 3092235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 1092238
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 3092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.17 SECONDS

```

NN      NN  IIIIIIIIIII  TTTTTTTTTTT  AAAAAAAAA  WW      WW  LL
NNN     NN  IIIIIIIIIII  TTTTTTTTTTT  AAAAAAAAAA  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          AAAAAAAAAA  WW     W  WW  LL
NN NN  NN  II          TT          AAAAAAAAAA  WW     WWW  WW  LL
NN NN  NN  II          TT          AA      AA  WW     WW  WW  WW  LL
NN NN  NN  II          TT          AA      AA  WWW    WWW  WW  WW  LL
NN NN  NN  II          TT          AA      AA  WWW    WWW  LLLLLLLLLLLL
NN NN  NN  IIIIIIIIIII  TTT          AA      AA  WWW    WWW  LLLLLLLLLLLL
NN NN  NN  IIIIIIIIIII  TT          AA      AA  WW     WW  LLLLLLLLLLLL

```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAA  LL          EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL          EEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL          EE          PP      PP  CC      CC
SS      CC  AA      AA  LL          EE          PP      PP  CC      CC
SS      CC  AA      AA  LL          EE          PP      PP  CC      CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL          EEEEEEEEE  -----  PPPPPPPPPPP  CC
SSSSSSSSSS  CC      AAAAAAAAAA  LL          EEEEEEEEE  -----  PPPPPPPPPPP  CC
SS      SS  CC      AA      AA  LL          EE          PP      CC
SS      SS  CC      AA      AA  LL          EE          PP      CC
SS      SS  CC      AA      AA  LL          EE          PP      CC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA      AA  LLLLLLLLLLL  EEEEEEEEEEE  PP      CCCCCCCCCC

```

```

0000000  55555555555  //          11          66666666666  //          0000000  3333333333
00000000  55555555555  //          111         66666666666  //          00000000  33333333333
00      00  55          1111        66          00      00  33      33
00      00  55          11          66          00      00  33      33
00      00  55          11          66          00      00  33      33
00      00  5555555555  11          66666666666  //          00      00  333
00      00  5555555555  11          66666666666  //          00      00  333
00      00  55          11          66      66  //          00      00  33
00      00  55          11          66      66  //          00      00  33
00      00  55          11          66      66  //          00      00  33
00000000  55555555555  //          1111111  66666666666  //          00000000  33333333333
0000000  5555555555  //          1111111  66666666666  //          0000000  3333333333

```

```

11      11          0000000  2222222222  3333333333  3333333333
111     111        00000000  2222222222  3333333333  3333333333
1111    1111      :::        00      00  22          22  :::        33      33  33
11      11        :::        00      00  22          22  :::        33      33
11      11        :::        00      00  22          22  :::        33      33
11      11        :::        00      00  22          22  :::        33      33
11      11        :::        00      00  22          22  :::        33      33
11      11        :::        00      00  22          22  :::        33      33
11      11        :::        00      00  22          22  :::        33      33
1111111  1111111  00000000  2222222222  3333333333  3333333333
1111111  1111111  0000000  2222222222  3333333333  3333333333

```



```

-1Q ARRAY HAS      1 ENTRIES.
  0Q ARRAY HAS      9 ENTRIES.
  1Q ARRAY HAS     12 ENTRIES.

SELECT 26 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

      6 RESONANCE CALCULATIONS HAVE BEEN REQUESTED
      -1 OUTPUT OPTION FOR AMPX FORMATTED CROSS SECTION DATA
      2001 MAXIMUM NUMBER OF RESONANCE MESH INTERVALS
      2 ORDER OF RESONANCE LEVEL PROCESSING

THE STORAGE ALLOCATED FOR THIS CASE IS    100000 WORDS

  2Q ARRAY HAS     26 ENTRIES.
  3Q ARRAY HAS     90 ENTRIES.
  4Q ARRAY HAS     26 ENTRIES.

GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
TAPE IDENTIFICATION NUMBER      4321
NUMBER OF NUCLIDES ON TAPE       26
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 1680 WORDS
XSDRN TAPE 4321
          SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
          BASED ON ENDF-B VERSION 4 DATA
          COMPILED FOR NRC 1/27/89
          LAST UPDATED
          L.M.PETRIE - ORNL
                                                    08/12/94

NUCLIDES FROM XSDRN TAPE
  1  HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      1001001
  2  HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      3001001
  3  HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      4001001
  4  HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      5001001
  5  HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      7001001
  6  HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      9001001
  7  CARBON-12     ENDF/B-IV MAT 1274/THRM1065      UPDATED 08/12/94      1006012
  8  CARBON-12     ENDF/B-IV MAT 1274/THRM1065      UPDATED 08/12/94      3006012
  9  OXYGEN-16     ENDF/B-IV MAT 1276      UPDATED 08/12/94      1008016
 10  OXYGEN-16     ENDF/B-IV MAT 1276      UPDATED 08/12/94      3008016
 11  OXYGEN-16     ENDF/B-IV MAT 1276      UPDATED 08/12/94      4008016
 12  OXYGEN-16     ENDF/B-IV MAT 1276      UPDATED 08/12/94      5008016
 13  OXYGEN-16     ENDF/B-IV MAT 1276      UPDATED 08/12/94      7008016
 14  OXYGEN-16     ENDF/B-IV MAT 1276      UPDATED 08/12/94      9008016
 15  SILICON       ENDF/B-IV MAT 1194      UPDATED 08/12/94      3014000
 16  CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'  UPDATED 08/12/94      8024304
 17  MANGANESE-55  ENDF/B-IV MAT 1197      UPDATED 08/12/94      8025055
 18  FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'  UPDATED 08/12/94      8026304
 19  NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'  UPDATED 08/12/94      8028304
 20  ZIRCONIUM     ENDF/B-IV MAT 7141      UPDATED 08/12/94      1040000
 21  PB 1288 218NGP 042375 P-3 293K      UPDATED 08/12/94      6082000
 22  THORIUM-232   ENDF/B-IV MAT 1296      UPDATED 08/12/94      3090232
 23  URANIUM-235   ENDF/B-IV MAT 1261      UPDATED 08/12/94      1092235
 24  URANIUM-235   ENDF/B-IV MAT 1261      UPDATED 08/12/94      3092235
 25  URANIUM-238   ENDF/B-IV MAT 1262      UPDATED 08/12/94      1092238
 26  URANIUM-238   ENDF/B-IV MAT 1262      UPDATED 08/12/94      3092238

HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      1001001      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      3001001      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      4001001      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      5001001      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      7001001      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

HYDROGEN      ENDF/B-IV MAT 1269/THRM1002      UPDATED 08/12/94      9001001      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CARBON-12     ENDF/B-IV MAT 1274/THRM1065      UPDATED 08/12/94      1006012      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

CARBON-12     ENDF/B-IV MAT 1274/THRM1065      UPDATED 08/12/94      3006012      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16     ENDF/B-IV MAT 1276      UPDATED 08/12/94      1008016      TEMPERATURE= 293.00
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

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OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 3008016 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 4008016 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 5008016 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 7008016 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

OXYGEN-16 ENDF/B-IV MAT 1276 UPDATED 08/12/94 9008016 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

SILICON ENDF/B-IV MAT 1194 UPDATED 08/12/94 3014000 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 0.00

CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8024304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

MANGANESE-55 ENDF/B-IV MAT 1197 UPDATED 08/12/94 8025055 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 54.466 TEMPERATURE (KELVIN) = 293.000

POTENTIAL SCATTER SIGMA = 2.590 LUMPED NUCLEAR DENSITY = 1.7363295E-03

SPIN FACTOR (G) = 14.448 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 = 55.845 SIGMA(PER ABSORBER ATOM)= 3.4663022E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 55.925 SIGMA(PER ABSORBER ATOM)= 1.2557598E+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
8	-5.518788E-04	0.000000E+00	-3.944190E-01
9	-2.797993E-03	0.000000E+00	-2.293471E+00
10	-3.291452E-01	0.000000E+00	-3.820962E+01
11	-2.680562E+00	0.000000E+00	-1.159996E+02

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 3.33719E+00  
FISSION 0.00000E+00

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

FE 1192 WT SS-304(1/EST) P-3 293K SF=5+4(42375)' UPDATED 08/12/94 6026304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 8028304 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

ZIRCONIUM ENDF/B-IV MAT 7141 UPDATED 08/12/94 1040000 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

PB 1288 218NGP 042375 P-3 293K UPDATED 08/12/94 6082000 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

THORIUM-232 ENDF/B-IV MAT 1296 UPDATED 08/12/94 3090232 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 230.040 TEMPERATURE (KELVIN) = 293.000

POTENTIAL SCATTER SIGMA = 10.150 LUMPED NUCLEAR DENSITY = 5.3153303E-04

SPIN FACTOR (G) = 666.676 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)= 2.5601689E+03

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.



MASS OF MODERATOR-2 = 13.617 SIGMA(PER ABSORBER ATOM)= 5.8951794E+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
9	-1.537706E-03	0.000000E+00	-1.274133E-02
10	-9.518421E-02	0.000000E+00	-5.100160E-01
11	-1.724563E+00	0.000000E+00	-2.284316E+00
12	-5.948936E+00	0.000000E+00	-9.034661E+00
13	-1.168305E+01	0.000000E+00	-1.439534E+00

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 5.75991E+01  
FISSION 0.00000E+00

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261

UPDATED 08/12/94 1092235 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	=	2.7220073E-04
SPIN FACTOR (G)	=	15171.100	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)= 4.1345737E+03

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 23.697 SIGMA(PER ABSORBER ATOM)= 5.2259918E+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	-1.562050E+00	-9.584369E-01	-4.085827E-02
13	-5.262661E+00	-2.581354E+00	-1.213858E-01
14	-3.765349E+00	-2.255217E+00	-2.806130E-02
15	-1.919643E-04	-1.459400E-04	1.329683E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.15993E+02  
FISSION 1.28668E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261

UPDATED 08/12/94 3092235 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	=	5.1165749E-05
SPIN FACTOR (G)	=	15171.100	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)= 2.6596197E+04

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 13.920 SIGMA(PER ABSORBER ATOM)= 6.2625801E+03

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	-2.344056E-01	-1.428800E-01	-6.240554E-03

13 -8.441902E-01 -4.162556E-01 -1.976475E-02  
14 -5.930282E-01 -3.583517E-01 -4.437619E-03  
15 -6.245016E-05 -4.746152E-05 3.750866E-08

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.26514E+02  
FISSION 1.34455E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262

UPDATED 08/12/94 1092238 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 = 1.0955411E-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) = 1.0272860E+03

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 22.105 SIGMA (PER ABSORBER ATOM) = 1.2047719E+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
9	-5.670995E-03	0.000000E+00	-6.271562E-02
10	-2.582614E-01	-1.776290E-06	-1.805436E+00
11	-5.712295E+00	0.000000E+00	-1.704868E+01
12	-3.260907E+01	0.000000E+00	-3.853433E+01
13	-4.122983E+01	0.000000E+00	-1.360831E+01
14	-7.892720E+01	0.000000E+00	-4.614881E+00
15	-5.014865E-08	0.000000E+00	9.319286E-08

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 8.34181E+01  
FISSION 5.30689E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262

UPDATED 08/12/94 3092238 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 = 3.7187583E-06  
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) = 3.6593247E+05

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 13.944 SIGMA (PER ABSORBER ATOM) = 8.6317186E+04

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	-1.458856E-05	0.000000E+00	-1.704482E-04
10	-8.678175E-04	-4.383982E-09	-6.304161E-03
11	-5.092458E-02	0.000000E+00	-1.643915E-01
12	-5.565513E-01	0.000000E+00	-6.664960E-01
13	-6.091141E-01	0.000000E+00	-2.016093E-01
14	-1.094999E+00	0.000000E+00	-6.417535E-02
15	-3.734067E-09	0.000000E+00	2.932041E-09

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.70632E+02  
FISSION 5.33689E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

THIS XSDPN WORKING TAPE WAS CREATED 05/16/03 AT 11:02:33  
THE TITLE OF THE PARENT CASE IS AS FOLLOWS  
SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89

TAPE ID	4321	NUMBER OF NUCLIDES	26
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 08/12/94	ID 1001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 4001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 5001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 7001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 9001001
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94	ID 1006012
CARBON-12	ENDF/B-IV MAT 1274/THRM1065	UPDATED 08/12/94	ID 3006012
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 1008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 4008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 5008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 7008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 9008016
SILICON	ENDF/B-IV MAT 1194	UPDATED 08/12/94	ID 3014000
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8024304
MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	ID 8025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 8028304
ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94	ID 1040000
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 6082000
THORIUM-232	ENDF/B-IV MAT 1296	UPDATED 08/12/94	ID 3090232
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	ID 1092235
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	ID 3092235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 1092238
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 3092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.11 SECONDS

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KK      KK  EE           NN  NN     NN  00      00     VV      VV
KKKKKKKK EEEEEEEEE   NI  NI     NN  00      00     ----- VV      VV
KKKKKKKK EEEEEEEEE   NN  NN     NN  00      00     ----- VV      VV
KK      KK  EE           NI  NI     NN  00      00     VV      VV
KK      KK  EE           NI  NI     NN  00      00     VV      VV
KK      KK  EE           NN  NN     NN  00      00     VV      VV
KK      KK  EE           NI  NI     NN  00      00     VV      VV
KK      KK  EEEEEEEEEEE  NI  NI     NN  000000000000   VVV
KK      KK  EEEEEEEEEEE  NI  NI     NI  0000000000     V
    
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SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SSSSSSSSSS  CC      AA      AA  LL      EE           P----- P----- P----- P-----
SSSSSSSSSS  CC      AA      AA  LL      EE           P----- P----- P----- P-----
SS      SS  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE           PP      PP  CC      CC
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00000000 555555555555  //      111     666666666666  //      000000000 333333333333
00      00 55      1111 66      00      00 33      33
00      00 55      11   66      00      00 33      33
00      00 55      11   66      00      00 33      33
00      00 5555555555  11   66666666666  00      00 333
00      00 5555555555  11   666666666666  00      00 333
00      00 55      11   66      66      00      00 33
00      00 55      11   66      66      00      00 33
00      00 55      11   66      66      00      00 33
00000000 555555555555  //      1111111 666666666666  //      000000000 333333333333
0000000  5555555555  //      1111111 66666666666  //      0000000  3333333333
    
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111     111     0000000000 22222222222 333333333333 77777777777
1111    1111    :::      00      00  22      22      :::      33      33  77      77
11      11      :::      00      00  22      22      :::      33      33  77      77
11      11      :::      00      00  22      22      :::      33      33  77      77
11      11      :::      00      00  22      22      :::      33      33  77      77
11      11      :::      00      00  22      22      :::      33      33  77      77
11      11      :::      00      00  22      22      :::      33      33  77      77
11      11      :::      00      00  22      22      :::      33      33  77      77
11111111 11111111 0000000000 222222222222 333333333333 77
11111111 11111111 00000000  222222222222 333333333333 77
    
```



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.....
***
***                               LWT WITH GA IFM                               ***
***                               .....                               ***
***                               NUMERIC PAFAMETERS                               ***
***                               .....                               ***
***
***      TME      MAXIMUM PROBLEM TIME (MIN)      *****      ***
***
***      TBA      TIME PER GENERATION (MIN)      5.00      ***
***
***      GEN      NUMBER OF GENERATIONS      803      ***
***
***      NPG      NUMBER PER GENERATION      1000      ***
***
***      NSK      NUMBER OF GENERATIONS TO BE SKIPPED      3      ***
***
***      BEG      BEGINNING GENERATION NUMBER      1      ***
***
***      RES      GENERATIONS BETWEEN CHECKPOINTS      0      ***
***
***      X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS      1      ***
***
***      N8K      NEUTRON BANK SIZE      1025      ***
***
***      Y8B      EXTRA POSITIONS IN NEUTRON BANK      0      ***
***
***      N8F      FISSION BANK SIZE      1000      ***
***
***      X8F      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 PANDOM NUMBER      BB827100001      ***
***
***      N88      NUMBER OF D.A. BLOCKS ON UNIT 8      200      ***
***
***      N8L      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      ***
***
.....

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.....
***                                     ***
***                               LWT WITH GA IFM                               ***
***                                     ***
.....
***                                     ***
***                               UNIT                                     ***
***                               NUMBER                                   ***
***                               DATA SET NAME                         ***
***                               -----                               ***
***                               VOLUME                                 ***
***                               NAME                                   ***
***                               -----                               ***
***                               UNIT FUNCTION                         ***
***                               -----                               ***
***                                     ***
*** XSC 14 D:\zjr\Lwt\GAIFM\Crit\DAMAGED\gaifm_173ps_00 MIXED CROSS SECTIONS ***
***                                     ***
*** ALB 79 M:\scale43\DATALIB\FT79F001 INPUT ALBEDOS ***
***                                     ***
*** WTS 80 M:\scale43\DATALIB\FT80F001 INPUT WEIGHTS ***
***                                     ***
*** SKT 16 UNKNOWN WRITE SCRATCH DATA ***
***                                     ***
*** BIN 95 D:\zjr\Lwt\GAIFM\Crit\DAMAGED\gaifm_173ps_00 BINARY INPUT DATA ***
***                                     ***
*** RST 95 D:\zjr\Lwt\GAIFM\Crit\DAMAGED\gaifm_173ps_00 READ RESTART DATA ***
***                                     ***
*** LIB 4 D:\zjr\Lwt\GAIFM\Crit\DAMAGED\gaifm_173ps_00 INPUT AMPX WORKING LIBRARY ***
***                                     ***
*** 8 D:\zjr\Lwt\GAIFM\Crit\DAMAGED\gaifm_173ps_00 INPUT DATA DIRECT ACCESS ***
***                                     ***
*** 9 UNKNOWN SUPER GROUPEL DIRECT ACCESS ***
***                                     ***
*** 10 UNKNOWN XSEC MIXING DIRECT ACCESS ***
***                                     ***
.....

```

..... 0 IO'S WERE USED PREPARING INPUT DATA .....

CROSS SECTIONS READ FROM THE AMPX WORKING LIBRARY ON UNIT 4



3008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
4008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
5008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
7008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
9008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
3014000	SILICON	ENDF/B-IV MAT 1194	UPDATED 08/12/94
8024304	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
8025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
8026304	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
8028304	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
1040000	ZIRCONIUM	ENDF/B-IV MAT 7141	UPDATED 08/12/94
6082000	PB 1268 218NGF 042375 P-3 293K		UPDATED 08/12/94
3090232	THORIUM-232	ENDF/B-IV MAT 1296	UPDATED 08/12/94
1092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
3092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
1092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94
3092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94

KENO MESSAGE NUMBER K5-222      2 TRANSFERS FOR MIXTURE      1 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222      2 TRANSFERS FOR MIXTURE      3 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222      2 TRANSFERS FOR MIXTURE      4 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222      2 TRANSFERS FOR MIXTURE      5 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222      2 TRANSFERS FOR MIXTURE      7 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      9 WERE CORRECTED FOR BAD MOMENTS.

..... 0 IO'S WERE USED MIXING CROSS-SECTIONS .....

1-D CROSS SECTION ARRAY ID NUMBERS  
 1 2002 1452 27 18 1018

..... 0 IO'S WERE USED PREPARING THE CROSS SECTIONS .....

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.....
***          LWT WITH GA IFM          ***
.....
***** ADDITIONAL INFORMATION *****
***
*** NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          NO ***
*** NO. OF FISSION SPECTRUM SOURCE GPOUP  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  17      NUMBER OF UNITS IN THE GLOBAL Y DIR.  0 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK  10      NUMBER OF UNITS IN THE GLOBAL Z DIR.  0 ***
*** NUMBER OF MIXTURES USED              7      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                 2 ***
*** TOTAL INPUT GEOMETRY REGIONS         15      MAXIMUM HOLE NESTING LEVEL       1 ***
*** NUMBER OF GEOMETRY REGIONS USED      15      USE NESTED ARRAYS                NO ***
*** LARGEST GEOMETRY UNIT NUMBER          5      NUMBER OF ARRAYS USED           0 ***
*** LARGEST ARRAY NUMBER                  1      MAXIMUM ARRAY NESTING LEVEL      0 ***
***
*** +X BOUNDARY CONDITION                 MIR     -X BOUNDARY CONDITION           MIR ***
*** +Y BOUNDARY CONDITION                 MIR     -Y BOUNDARY CONDITION           MIR ***
*** +Z BOUNDARY CONDITION                 MIR     -Z BOUNDARY CONDITION           MIR ***
.....

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LWT WITH GA IFM

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 1 -----

TRIGA/RERTR FHU - NO BASKET

1	CYLINDER	1	1	RADIUS = 5.0927	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
2	CYLINDER	8	1	RADIUS = 5.3975	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3	CYLINDER	4	1	RADIUS = 5.7277	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
4	CYLINDER	8	1	RADIUS = 6.0325	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

----- UNIT 2 -----

HTGR FHU - NO BASKET

1	CYLINDER	3	1	RADIUS = 5.7277	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
2	CYLINDER	8	1	RADIUS = 6.0325	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3	CYLINDER	4	1	RADIUS = 6.3627	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
4	CYLINDER	8	1	RADIUS = 6.6675	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000

..... GLOBAL .....  
----- UNIT 5 -----

ASSEMBLED LWT

1	CYLINDER	4	1	RADIUS = 17.150	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
	HOLE NUMBER	1		AT X = 0.00000	Y = 6.0325	Z = 0.00000	IS UNIT NUMBER	1	
	HOLE NUMBER	2		AT X = 0.00000	Y = -6.6675	Z = 0.00000	IS UNIT NUMBER	2	
2	CYLINDER	8	1	RADIUS = 18.910	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
3	CYLINDER	6	1	RADIUS = 33.465	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
4	CYLINDER	8	1	RADIUS = 36.519	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
5	CYLINDER	7	1	RADIUS = 49.223	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
6	CYLINDER	8	1	RADIUS = 49.822	+Z = 28.000	-Z = -28.000	CENTERLINE IS AT	X = 0.00000	Y = 0.00000
7	CUBOID	5	1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 28.000	-Z = -28.000

LWT WITH GA IFM  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	4.56283E+03 CM**3	4.56283E+03 CM**3
	2	2	5.62519E+02 CM**3	5.12535E+03 CM**3
	3	3	6.46283E+02 CM**3	5.77163E+03 CM**3
	4	4	6.30619E+02 CM**3	6.40225E+03 CM**3
2	1	5	5.77163E+03 CM**3	5.77163E+03 CM**3
	2	6	6.30619E+02 CM**3	6.40225E+03 CM**3
	3	7	7.20060E+02 CM**3	7.12231E+03 CM**3
	4	8	6.98721E+02 CM**3	7.82103E+03 CM**3
5	1	9	3.75214E+04 CM**3	5.17447E+04 CM**3
	2	10	1.11674E+04 CM**3	6.29122E+04 CM**3
	3	11	1.34106E+05 CM**3	1.97018E+05 CM**3
	4	12	3.76048E+04 CM**3	2.34623E+05 CM**3
	5	13	1.91631E+05 CM**3	4.26254E+05 CM**3
	6	14	1.04445E+04 CM**3	4.36699E+05 CM**3
	7	15	1.19323E+05 CM**3	5.56022E+05 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	1	1	1	4.56283E+03 CM**3
		2	8	5.62519E+02 CM**3
		3	4	6.46283E+02 CM**3
		4	8	6.30619E+02 CM**3
2	1	1	3	5.77163E+03 CM**3
		2	8	6.30619E+02 CM**3
		3	4	7.20060E+02 CM**3
		4	8	6.98721E+02 CM**3
5	1	1	4	3.75214E+04 CM**3
		2	8	1.11674E+04 CM**3
		3	6	1.34106E+05 CM**3
		4	8	3.76048E+04 CM**3
		5	7	1.91631E+05 CM**3
		6	8	1.04445E+04 CM**3
		7	5	1.19323E+05 CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	4.56283E+03 CM**3	9.94419E+03
3	5.77163E+03 CM**3	1.22050E+04
4	3.88678E+04 CM**3	3.88167E+00
5	1.19323E+05 CM**3	1.19105E+01
6	1.34106E+05 CM**3	1.52130E+06
7	1.91631E+05 CM**3	1.91281E+01
8	6.17393E+04 CM**3	4.86975E+05

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.....
***
***          BIASING INFORMATION          ***
***
*** A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S. ***
***
.....

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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....
..... 0.00550 MINUTES WERE USED PROCESSING DATA. ....

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VOLUME FRACTION OF FISSIONABLE MATERIAL IN THE CORE= 1.85864E-02

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED UNIFORMLY THROUGHOUT THE ENTIRE VOLUME DEFINED BY THE OUTERMOST GEOMETRY CARD.  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

1.49067 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 1.50400 MINUTES.

LWT WITH GA IFM

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	752 INDEPENDENT	FISSION POINTS WERE	GENERATED	0.00000E+00	0.00000E+00
1 6.83685E-01	1.51050E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING...ONLY	773 INDEPENDENT	FISSION POINTS WERE	GENERATED	0.00000E+00	0.00000E+00
2 6.90002E-01	1.52050E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING...ONLY	809 INDEPENDENT	FISSION POINTS WERE	GENERATED	0.00000E+00	0.00000E+00
3 7.23529E-01	1.52967E+00	7.23529E-01	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
4 7.41132E-01	1.53783E+00	7.32331E-01	8.80119E-03	0.00000E+00	0.00000E+00	0.00000E+00
5 7.14495E-01	1.54800E+00	7.26385E-01	7.82097E-03	0.00000E+00	0.00000E+00	0.00000E+00
6 7.14133E-01	1.55717E+00	7.23322E-01	6.32186E-03	0.00000E+00	0.00000E+00	0.00000E+00
7 7.15718E-01	1.56633E+00	7.21801E-01	5.12763E-03	0.00000E+00	0.00000E+00	0.00000E+00
8 7.35289E-01	1.57550E+00	7.24049E-01	4.75198E-03	0.00000E+00	0.00000E+00	0.00000E+00
9 7.25221E-01	1.58450E+00	7.24217E-01	4.01964E-03	0.00000E+00	0.00000E+00	0.00000E+00
10 7.27787E-01	1.59367E+00	7.24663E-01	3.50960E-03	0.00000E+00	0.00000E+00	0.00000E+00
11 7.22119E-01	1.60383E+00	7.24380E-01	3.10806E-03	0.00000E+00	0.00000E+00	0.00000E+00
12 7.48817E-01	1.61300E+00	7.26824E-01	3.70127E-03	0.00000E+00	0.00000E+00	0.00000E+00
13 7.24320E-01	1.62117E+00	7.26596E-01	3.35565E-03	0.00000E+00	0.00000E+00	0.00000E+00
14 7.45940E-01	1.63133E+00	7.28208E-01	3.46152E-03	0.00000E+00	0.00000E+00	0.00000E+00
15 7.16945E-01	1.64033E+00	7.27342E-01	3.29990E-03	0.00000E+00	0.00000E+00	0.00000E+00
16 7.30916E-01	1.64950E+00	7.27597E-01	3.06576E-03	0.00000E+00	0.00000E+00	0.00000E+00
17 6.88560E-01	1.65867E+00	7.24995E-01	3.86247E-03	0.00000E+00	0.00000E+00	0.00000E+00
18 7.26335E-01	1.66783E+00	7.25078E-01	3.61398E-03	0.00000E+00	0.00000E+00	0.00000E+00
19 7.12447E-01	1.67700E+00	7.24335E-01	3.47510E-03	0.00000E+00	0.00000E+00	0.00000E+00
20 7.32608E-01	1.68717E+00	7.24795E-01	3.30843E-03	0.00000E+00	0.00000E+00	0.00000E+00
21 7.24642E-01	1.69633E+00	7.24787E-01	3.12947E-03	0.00000E+00	0.00000E+00	0.00000E+00
22 7.04239E-01	1.70533E+00	7.23760E-01	3.14162E-03	0.00000E+00	0.00000E+00	0.00000E+00
23 7.38077E-01	1.71450E+00	7.24441E-01	3.06506E-03	0.00000E+00	0.00000E+00	0.00000E+00
24 7.03708E-01	1.72367E+00	7.23499E-01	3.07062E-03	0.00000E+00	0.00000E+00	0.00000E+00
25 7.20492E-01	1.73283E+00	7.23368E-01	2.93699E-03	0.00000E+00	0.00000E+00	0.00000E+00
26 7.47220E-01	1.74300E+00	7.24362E-01	2.98241E-03	0.00000E+00	0.00000E+00	0.00000E+00
27 6.86648E-01	1.75217E+00	7.22853E-01	3.23403E-03	0.00000E+00	0.00000E+00	0.00000E+00
28 7.29513E-01	1.76117E+00	7.23110E-01	3.11770E-03	0.00000E+00	0.00000E+00	0.00000E+00
29 7.28965E-01	1.77033E+00	7.23326E-01	3.00784E-03	0.00000E+00	0.00000E+00	0.00000E+00
30 7.22443E-01	1.77950E+00	7.23295E-01	2.89860E-03	0.00000E+00	0.00000E+00	0.00000E+00
31 7.34518E-01	1.78867E+00	7.23682E-01	2.82351E-03	0.00000E+00	0.00000E+00	0.00000E+00
32 7.42341E-01	1.79783E+00	7.24304E-01	2.79778E-03	0.00000E+00	0.00000E+00	0.00000E+00
33 7.25665E-01	1.80700E+00	7.24354E-01	2.70649E-03	0.00000E+00	0.00000E+00	0.00000E+00
34 7.38221E-01	1.81617E+00	7.24788E-01	2.65614E-03	0.00000E+00	0.00000E+00	0.00000E+00
35 7.32307E-01	1.82533E+00	7.25015E-01	2.58445E-03	0.00000E+00	0.00000E+00	0.00000E+00
36 7.06762E-01	1.83450E+00	7.24479E-01	2.56412E-03	0.00000E+00	0.00000E+00	0.00000E+00
37 7.40806E-01	1.84367E+00	7.24945E-01	2.53311E-03	0.00000E+00	0.00000E+00	0.00000E+00
38 7.45111E-01	1.85283E+00	7.25505E-01	2.52467E-03	0.00000E+00	0.00000E+00	0.00000E+00
39 7.24951E-01	1.86200E+00	7.25490E-01	2.45553E-03	0.00000E+00	0.00000E+00	0.00000E+00
40 7.23367E-01	1.87200E+00	7.25434E-01	2.39069E-03	0.00000E+00	0.00000E+00	0.00000E+00
41 7.62480E-01	1.88033E+00	7.26384E-01	2.51487E-03	0.00000E+00	0.00000E+00	0.00000E+00
42 7.19762E-01	1.88833E+00	7.26219E-01	2.45678E-03	0.00000E+00	0.00000E+00	0.00000E+00
43 6.95096E-01	1.89850E+00	7.25460E-01	2.51348E-03	0.00000E+00	0.00000E+00	0.00000E+00
44 7.06250E-01	1.90867E+00	7.25002E-01	2.49518E-03	0.00000E+00	0.00000E+00	0.00000E+00
45 7.21676E-01	1.91783E+00	7.24929E-01	2.43755E-03	0.00000E+00	0.00000E+00	0.00000E+00
46 7.25800E-01	1.92700E+00	7.24949E-01	2.38159E-03	0.00000E+00	0.00000E+00	0.00000E+00
47 7.10344E-01	1.93617E+00	7.24625E-01	2.35058E-03	0.00000E+00	0.00000E+00	0.00000E+00
48 7.45183E-01	1.94533E+00	7.25072E-01	2.34195E-03	0.00000E+00	0.00000E+00	0.00000E+00
49 7.19422E-01	1.95433E+00	7.24951E-01	2.29473E-03	0.00000E+00	0.00000E+00	0.00000E+00
50 7.31561E-01	1.96350E+00	7.25089E-01	2.25063E-03	0.00000E+00	0.00000E+00	0.00000E+00
51 7.13145E-01	1.97367E+00	7.24845E-01	2.21766E-03	0.00000E+00	0.00000E+00	0.00000E+00
52 7.12367E-01	1.98283E+00	7.24596E-01	2.18714E-03	0.00000E+00	0.00000E+00	0.00000E+00
53 7.25705E-01	1.99200E+00	7.24618E-01	2.14393E-03	0.00000E+00	0.00000E+00	0.00000E+00
54 7.28151E-01	2.00117E+00	7.24686E-01	2.10340E-03	0.00000E+00	0.00000E+00	0.00000E+00
55 7.32886E-01	2.01017E+00	7.24840E-01	2.06912E-03	0.00000E+00	0.00000E+00	0.00000E+00
56 7.27373E-01	2.01933E+00	7.24887E-01	2.03098E-03	0.00000E+00	0.00000E+00	0.00000E+00
57 7.30672E-01	2.02850E+00	7.24992E-01	1.99649E-03	0.00000E+00	0.00000E+00	0.00000E+00
58 7.64964E-01	2.03767E+00	7.25706E-01	2.08640E-03	0.00000E+00	0.00000E+00	0.00000E+00
59 7.10690E-01	2.04683E+00	7.25443E-01	2.06634E-03	0.00000E+00	0.00000E+00	0.00000E+00
60 7.16296E-01	2.05517E+00	7.25285E-01	2.03651E-03	0.00000E+00	0.00000E+00	0.00000E+00
61 7.06627E-01	2.06517E+00	7.24969E-01	2.02652E-03	0.00000E+00	0.00000E+00	0.00000E+00
62 7.37613E-01	2.07433E+00	7.25179E-01	2.00357E-03	0.00000E+00	0.00000E+00	0.00000E+00
63 6.94466E-01	2.08433E+00	7.24676E-01	2.03377E-03	0.00000E+00	0.00000E+00	0.00000E+00
64 7.18753E-01	2.09350E+00	7.24580E-01	2.00298E-03	0.00000E+00	0.00000E+00	0.00000E+00
65 7.30344E-01	2.10267E+00	7.24672E-01	1.97305E-03	0.00000E+00	0.00000E+00	0.00000E+00
66 7.25085E-01	2.11183E+00	7.24678E-01	1.94199E-03	0.00000E+00	0.00000E+00	0.00000E+00
67 7.05691E-01	2.12100E+00	7.24386E-01	1.93406E-03	0.00000E+00	0.00000E+00	0.00000E+00
68 6.95387E-01	2.13017E+00	7.23947E-01	1.95456E-03	0.00000E+00	0.00000E+00	0.00000E+00
69 7.35146E-01	2.13933E+00	7.24114E-01	1.93241E-03	0.00000E+00	0.00000E+00	0.00000E+00
70 6.96014E-01	2.14850E+00	7.23701E-01	1.94811E-03	0.00000E+00	0.00000E+00	0.00000E+00
721 7.57513E-01	8.21767E+00	7.22303E-01	7.13515E-04	0.00000E+00	0.00000E+00	0.00000E+00
722 7.42350E-01	8.22683E+00	7.22331E-01	7.13067E-04	0.00000E+00	0.00000E+00	0.00000E+00
723 7.12217E-01	8.23600E+00	7.22316E-01	7.12216E-04	0.00000E+00	0.00000E+00	0.00000E+00
724 7.12637E-01	8.24517E+00	7.22303E-01	7.11355E-04	0.00000E+00	0.00000E+00	0.00000E+00
725 6.93314E-01	8.25433E+00	7.22263E-01	7.11501E-04	0.00000E+00	0.00000E+00	0.00000E+00
726 7.18909E-01	8.26350E+00	7.22258E-01	7.10533E-04	0.00000E+00	0.00000E+00	0.00000E+00
727 7.17417E-01	8.27350E+00	7.22252E-01	7.09583E-04	0.00000E+00	0.00000E+00	0.00000E+00
728 7.38636E-01	8.28267E+00	7.22276E-01	7.09010E-04	0.00000E+00	0.00000E+00	0.00000E+00
729 7.28333E-01	8.29183E+00	7.22284E-01	7.08083E-04	0.00000E+00	0.00000E+00	0.00000E+00
730 7.37924E-01	8.30100E+00	7.22305E-01	7.07436E-04	0.00000E+00	0.00000E+00	0.00000E+00
731 6.88150E-01	8.31017E+00	7.22259E-01	7.08017E-04	0.00000E+00	0.00000E+00	0.00000E+00
732 6.96444E-01	8.32033E+00	7.22223E-01	7.07930E-04	0.00000E+00	0.00000E+00	0.00000E+00
733 6.94301E-01	8.32950E+00	7.22185E-01	7.07992E-04	0.00000E+00	0.00000E+00	0.00000E+00
734 7.42358E-01	8.33850E+00	7.22213E-01	7.07561E-04	0.00000E+00	0.00000E+00	0.00000E+00
735 7.14699E-01	8.34867E+00	7.22202E-01	7.06662E-04	0.00000E+00	0.00000E+00	0.00000E+00



736	7.08865E-01	8.35683E+00	7.22184E-01	7.05940E-04	0.00000E+00	0.00000E+00
737	6.97861E-01	8.36600E+00	7.22151E-01	7.05755E-04	0.00000E+00	0.00000E+00
738	7.14015E-01	8.37517E+00	7.22140E-01	7.04882E-04	0.00000E+00	0.00000E+00
739	7.48313E-01	8.38433E+00	7.22176E-01	7.04820E-04	0.00000E+00	0.00000E+00
740	7.16405E-01	8.39350E+00	7.22168E-01	7.03908E-04	0.00000E+00	0.00000E+00
741	7.17382E-01	8.40350E+00	7.22161E-01	7.02985E-04	0.00000E+00	0.00000E+00
742	7.08630E-01	8.41267E+00	7.22143E-01	7.02272E-04	0.00000E+00	0.00000E+00
743	7.48760E-01	8.42193E+00	7.22179E-01	7.02243E-04	0.00000E+00	0.00000E+00
744	7.05792E-01	8.43100E+00	7.22157E-01	7.01644E-04	0.00000E+00	0.00000E+00
745	6.88416E-01	8.44017E+00	7.22111E-01	7.02169E-04	0.00000E+00	0.00000E+00
746	7.47754E-01	8.44933E+00	7.22146E-01	7.02071E-04	0.00000E+00	0.00000E+00
747	7.47333E-01	8.45850E+00	7.22180E-01	7.01943E-04	0.00000E+00	0.00000E+00
748	7.45001E-01	8.46667E+00	7.22210E-01	7.01668E-04	0.00000E+00	0.00000E+00
749	7.06693E-01	8.47583E+00	7.22189E-01	7.01036E-04	0.00000E+00	0.00000E+00
750	7.28547E-01	8.48500E+00	7.22198E-01	7.00150E-04	0.00000E+00	0.00000E+00
751	7.44589E-01	8.49417E+00	7.22228E-01	6.99853E-04	0.00000E+00	0.00000E+00
752	7.34765E-01	8.50333E+00	7.22245E-01	6.99119E-04	0.00000E+00	0.00000E+00
753	7.24710E-01	8.51250E+00	7.22248E-01	6.98195E-04	0.00000E+00	0.00000E+00
754	7.06538E-01	8.52167E+00	7.22227E-01	6.97579E-04	0.00000E+00	0.00000E+00
755	7.08145E-01	8.53083E+00	7.22208E-01	6.96903E-04	0.00000E+00	0.00000E+00
756	7.10409E-01	8.54083E+00	7.22193E-01	6.96154E-04	0.00000E+00	0.00000E+00
757	7.22526E-01	8.54917E+00	7.22193E-01	6.95232E-04	0.00000E+00	0.00000E+00
758	7.46064E-01	8.55917E+00	7.22225E-01	6.95029E-04	0.00000E+00	0.00000E+00
759	7.32577E-01	8.56833E+00	7.22238E-01	6.94245E-04	0.00000E+00	0.00000E+00
760	7.62131E-01	8.57750E+00	7.22291E-01	6.95323E-04	0.00000E+00	0.00000E+00
761	7.14714E-01	8.58567E+00	7.22281E-01	6.94478E-04	0.00000E+00	0.00000E+00
762	6.93322E-01	8.59483E+00	7.22243E-01	6.94610E-04	0.00000E+00	0.00000E+00
763	6.90859E-01	8.60400E+00	7.22202E-01	6.94921E-04	0.00000E+00	0.00000E+00
764	6.89029E-01	8.61417E+00	7.22158E-01	6.95373E-04	0.00000E+00	0.00000E+00
765	7.40473E-01	8.62333E+00	7.22182E-01	6.94875E-04	0.00000E+00	0.00000E+00
766	6.97511E-01	8.63150E+00	7.22150E-01	6.94716E-04	0.00000E+00	0.00000E+00
767	7.08889E-01	8.64067E+00	7.22132E-01	6.94024E-04	0.00000E+00	0.00000E+00
768	7.29606E-01	8.64983E+00	7.22142E-01	6.93186E-04	0.00000E+00	0.00000E+00
769	7.04155E-01	8.65893E+00	7.22119E-01	6.92679E-04	0.00000E+00	0.00000E+00
770	7.19046E-01	8.66817E+00	7.22115E-01	6.91788E-04	0.00000E+00	0.00000E+00
771	6.99645E-01	8.67817E+00	7.22086E-01	6.91505E-04	0.00000E+00	0.00000E+00
772	7.20975E-01	8.68733E+00	7.22084E-01	6.90608E-04	0.00000E+00	0.00000E+00
773	7.34212E-01	8.69650E+00	7.22100E-01	6.89891E-04	0.00000E+00	0.00000E+00
774	7.23828E-01	8.70567E+00	7.22102E-01	6.89000E-04	0.00000E+00	0.00000E+00
775	7.08155E-01	8.71483E+00	7.22084E-01	6.88345E-04	0.00000E+00	0.00000E+00
776	7.58171E-01	8.72400E+00	7.22131E-01	6.89034E-04	0.00000E+00	0.00000E+00
777	7.23155E-01	8.73317E+00	7.22132E-01	6.88146E-04	0.00000E+00	0.00000E+00
778	7.22573E-01	8.74233E+00	7.22133E-01	6.87259E-04	0.00000E+00	0.00000E+00
779	7.50599E-01	8.75150E+00	7.22169E-01	6.87351E-04	0.00000E+00	0.00000E+00
780	6.86529E-01	8.76067E+00	7.22123E-01	6.87994E-04	0.00000E+00	0.00000E+00
781	7.09853E-01	8.76967E+00	7.22108E-01	6.87290E-04	0.00000E+00	0.00000E+00
782	7.15874E-01	8.77983E+00	7.22100E-01	6.86455E-04	0.00000E+00	0.00000E+00
783	7.24166E-01	8.78900E+00	7.22102E-01	6.85581E-04	0.00000E+00	0.00000E+00
784	7.21670E-01	8.79817E+00	7.22102E-01	6.84704E-04	0.00000E+00	0.00000E+00
785	6.92098E-01	8.80733E+00	7.22063E-01	6.84902E-04	0.00000E+00	0.00000E+00
786	7.49026E-01	8.81650E+00	7.22098E-01	6.84891E-04	0.00000E+00	0.00000E+00
787	7.03746E-01	8.82567E+00	7.22074E-01	6.84418E-04	0.00000E+00	0.00000E+00
788	6.94186E-01	8.83467E+00	7.22039E-01	6.84467E-04	0.00000E+00	0.00000E+00
789	7.23685E-01	8.84483E+00	7.22041E-01	6.83600E-04	0.00000E+00	0.00000E+00
790	6.97640E-01	8.85300E+00	7.22010E-01	6.83433E-04	0.00000E+00	0.00000E+00
791	7.19260E-01	8.86317E+00	7.22007E-01	6.82576E-04	0.00000E+00	0.00000E+00
792	7.02020E-01	8.87233E+00	7.21981E-01	6.82190E-04	0.00000E+00	0.00000E+00
793	7.24258E-01	8.88150E+00	7.21984E-01	6.81323E-04	0.00000E+00	0.00000E+00
794	6.97537E-01	8.89050E+00	7.21953E-01	6.81162E-04	0.00000E+00	0.00000E+00
795	7.59961E-01	8.89967E+00	7.22001E-01	6.81989E-04	0.00000E+00	0.00000E+00
796	7.00746E-01	8.90800E+00	7.21974E-01	6.81655E-04	0.00000E+00	0.00000E+00
797	7.19767E-01	8.91800E+00	7.21972E-01	6.80803E-04	0.00000E+00	0.00000E+00
798	7.00395E-01	8.92817E+00	7.21945E-01	6.80487E-04	0.00000E+00	0.00000E+00
799	7.55817E-01	8.93817E+00	7.21987E-01	6.80961E-04	0.00000E+00	0.00000E+00
800	7.35244E-01	8.94833E+00	7.22004E-01	6.80310E-04	0.00000E+00	0.00000E+00
801	7.11048E-01	8.95733E+00	7.21990E-01	6.79596E-04	0.00000E+00	0.00000E+00
802	6.96909E-01	8.96650E+00	7.21959E-01	6.79470E-04	0.00000E+00	0.00000E+00
803	7.46393E-01	8.97667E+00	7.21989E-01	6.79306E-04	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

LWT WITH GA IFM

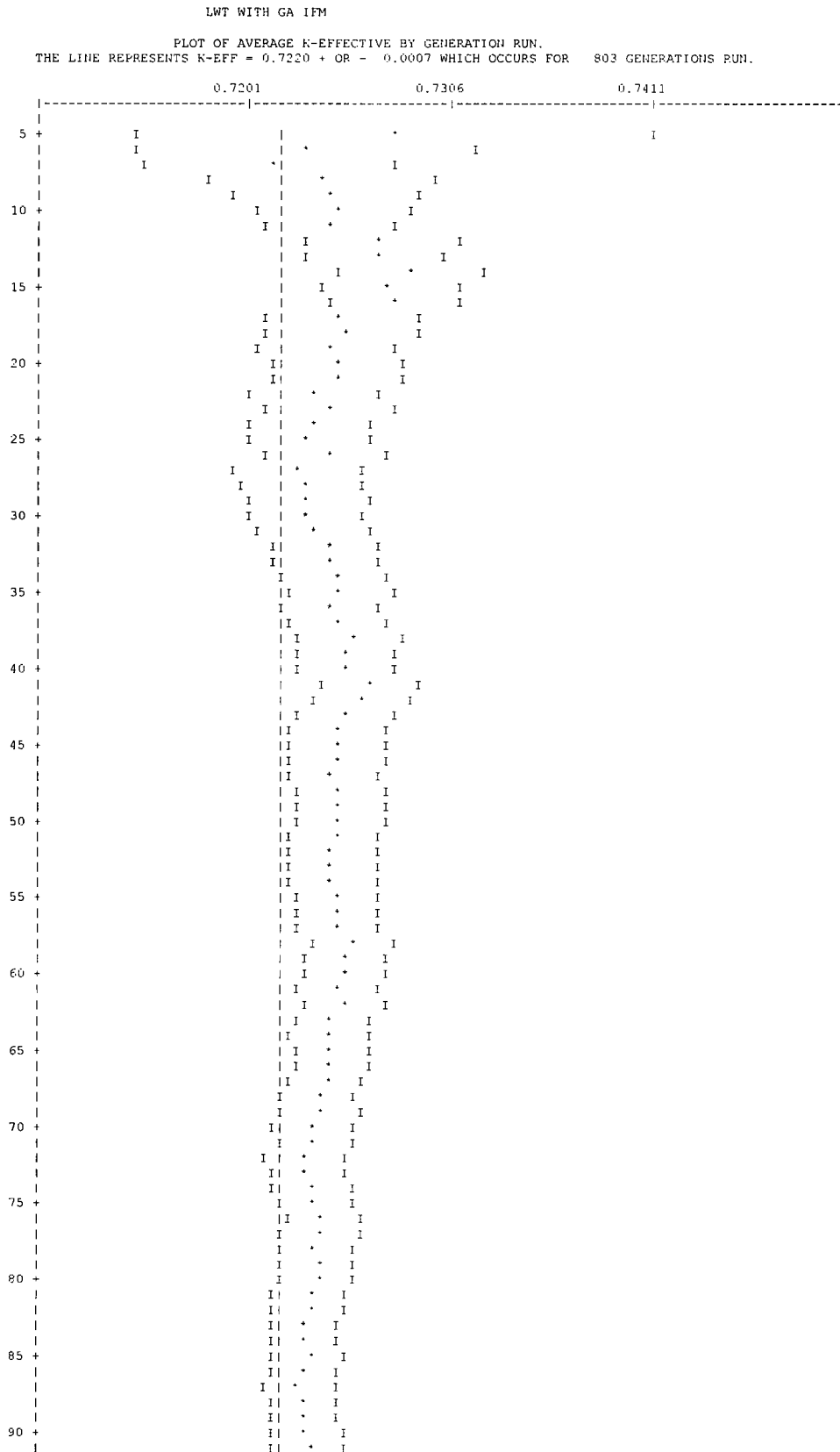
LIFETIME = 1.17843E-04 + OR - 1.60373E-07      GENERATION TIME = 5.55083E-05 + OR - 8.38097E-08  
 NU BAR = 2.42082E+00 + OR - 7.82673E-06      AVERAGE FISSION GROUP = 2.38836E+01 + OR - 1.52648E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 4.80629E-02 + OR - 6.19113E-05

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	0.72199	+ OR - 0.00068	0.72131 TO 0.72267	0.72063 TO 0.72335	0.71995 TO 0.72403	800000
4	0.72196	+ OR - 0.00068	0.72128 TO 0.72264	0.72060 TO 0.72332	0.71992 TO 0.72400	799000
5	0.72197	+ OR - 0.00068	0.72129 TO 0.72265	0.72061 TO 0.72334	0.71993 TO 0.72402	798000
6	0.72198	+ OR - 0.00068	0.72130 TO 0.72266	0.72062 TO 0.72335	0.71994 TO 0.72403	797000
7	0.72199	+ OR - 0.00068	0.72131 TO 0.72267	0.72062 TO 0.72336	0.71994 TO 0.72404	796000
8	0.72197	+ OR - 0.00068	0.72129 TO 0.72266	0.72061 TO 0.72334	0.71992 TO 0.72402	795000
9	0.72197	+ OR - 0.00068	0.72129 TO 0.72265	0.72060 TO 0.72334	0.71992 TO 0.72402	794000
10	0.72196	+ OR - 0.00069	0.72128 TO 0.72265	0.72059 TO 0.72333	0.71991 TO 0.72402	793000
11	0.72196	+ OR - 0.00069	0.72128 TO 0.72265	0.72059 TO 0.72333	0.71990 TO 0.72402	792000
12	0.72193	+ OR - 0.00069	0.72124 TO 0.72261	0.72056 TO 0.72330	0.71987 TO 0.72399	791000
17	0.72193	+ OR - 0.00069	0.72124 TO 0.72262	0.72055 TO 0.72331	0.71987 TO 0.72400	790000
22	0.72194	+ OR - 0.00069	0.72125 TO 0.72264	0.72056 TO 0.72333	0.71987 TO 0.72402	781000
27	0.72196	+ OR - 0.00069	0.72127 TO 0.72265	0.72057 TO 0.72335	0.71988 TO 0.72404	776000
32	0.72190	+ OR - 0.00070	0.72120 TO 0.72260	0.72050 TO 0.72329	0.71981 TO 0.72399	771000
37	0.72185	+ OR - 0.00070	0.72115 TO 0.72255	0.72045 TO 0.72326	0.71975 TO 0.72396	766000
42	0.72177	+ OR - 0.00070	0.72106 TO 0.72247	0.72036 TO 0.72317	0.71966 TO 0.72387	761000
47	0.72183	+ OR - 0.00071	0.72113 TO 0.72254	0.72042 TO 0.72324	0.71971 TO 0.72395	756000
52	0.72182	+ OR - 0.00071	0.72111 TO 0.72253	0.72040 TO 0.72323	0.71969 TO 0.72394	751000
57	0.72177	+ OR - 0.00071	0.72105 TO 0.72248	0.72034 TO 0.72320	0.71963 TO 0.72391	746000
62	0.72173	+ OR - 0.00072	0.72102 TO 0.72245	0.72030 TO 0.72316	0.71958 TO 0.72388	741000
67	0.72178	+ OR - 0.00072	0.72106 TO 0.72250	0.72034 TO 0.72322	0.71962 TO 0.72393	736000
72	0.72187	+ OR - 0.00072	0.72115 TO 0.72259	0.72043 TO 0.72331	0.71971 TO 0.72403	731000
77	0.72177	+ OR - 0.00072	0.72105 TO 0.72250	0.72033 TO 0.72322	0.71961 TO 0.72394	726000
82	0.72182	+ OR - 0.00073	0.72110 TO 0.72255	0.72037 TO 0.72328	0.71964 TO 0.72400	721000
87	0.72187	+ OR - 0.00073	0.72114 TO 0.72260	0.72041 TO 0.72333	0.71968 TO 0.72406	716000
92	0.72181	+ OR - 0.00073	0.72108 TO 0.72254	0.72035 TO 0.72328	0.71961 TO 0.72401	711000

NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	LWT WITH GA IFM			NUMBER OF HISTORIES
			67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	
97	0.72181	+ OR - 0.00074	0.72108 TO 0.72255	0.72034 TO 0.72329	0.71960 TO 0.72402	706000
102	0.72184	+ OR - 0.00074	0.72110 TO 0.72258	0.72036 TO 0.72332	0.71962 TO 0.72406	701000
107	0.72190	+ OR - 0.00074	0.72116 TO 0.72264	0.72042 TO 0.72338	0.71968 TO 0.72413	696000
112	0.72200	+ OR - 0.00074	0.72125 TO 0.72274	0.72051 TO 0.72348	0.71977 TO 0.72422	691000
117	0.72196	+ OR - 0.00075	0.72121 TO 0.72270	0.72046 TO 0.72345	0.71971 TO 0.72420	686000
122	0.72196	+ OR - 0.00075	0.72121 TO 0.72271	0.72046 TO 0.72346	0.71970 TO 0.72421	681000
127	0.72197	+ OR - 0.00076	0.72122 TO 0.72273	0.72046 TO 0.72349	0.71971 TO 0.72424	676000
132	0.72198	+ OR - 0.00076	0.72122 TO 0.72274	0.72046 TO 0.72350	0.71970 TO 0.72426	671000
137	0.72192	+ OR - 0.00076	0.72116 TO 0.72268	0.72040 TO 0.72345	0.71964 TO 0.72421	666000
142	0.72191	+ OR - 0.00077	0.72115 TO 0.72268	0.72038 TO 0.72344	0.71962 TO 0.72421	661000
147	0.72185	+ OR - 0.00077	0.72108 TO 0.72261	0.72031 TO 0.72338	0.71955 TO 0.72415	656000
152	0.72198	+ OR - 0.00077	0.72122 TO 0.72275	0.72045 TO 0.72352	0.71968 TO 0.72429	651000
157	0.72199	+ OR - 0.00077	0.72122 TO 0.72276	0.72045 TO 0.72354	0.71967 TO 0.72431	646000
162	0.72195	+ OR - 0.00078	0.72118 TO 0.72273	0.72040 TO 0.72351	0.71962 TO 0.72428	641000
167	0.72203	+ OR - 0.00078	0.72125 TO 0.72281	0.72047 TO 0.72359	0.71969 TO 0.72437	636000
172	0.72219	+ OR - 0.00078	0.72140 TO 0.72296	0.72062 TO 0.72375	0.71983 TO 0.72453	631000
177	0.72225	+ OR - 0.00079	0.72146 TO 0.72303	0.72067 TO 0.72382	0.71988 TO 0.72461	626000
182	0.72227	+ OR - 0.00079	0.72148 TO 0.72306	0.72069 TO 0.72385	0.71990 TO 0.72464	621000
187	0.72226	+ OR - 0.00080	0.72146 TO 0.72305	0.72067 TO 0.72385	0.71987 TO 0.72464	616000
192	0.72234	+ OR - 0.00080	0.72154 TO 0.72314	0.72074 TO 0.72394	0.71994 TO 0.72474	611000
197	0.72243	+ OR - 0.00080	0.72163 TO 0.72323	0.72082 TO 0.72403	0.72002 TO 0.72484	606000
202	0.72239	+ OR - 0.00081	0.72158 TO 0.72320	0.72077 TO 0.72400	0.71997 TO 0.72481	601000
207	0.72246	+ OR - 0.00081	0.72165 TO 0.72327	0.72084 TO 0.72409	0.72003 TO 0.72490	596000
212	0.72236	+ OR - 0.00081	0.72155 TO 0.72317	0.72074 TO 0.72399	0.71992 TO 0.72480	591000
217	0.72246	+ OR - 0.00081	0.72164 TO 0.72327	0.72083 TO 0.72408	0.72001 TO 0.72490	586000
222	0.72248	+ OR - 0.00082	0.72166 TO 0.72330	0.72084 TO 0.72412	0.72002 TO 0.72494	581000
227	0.72243	+ OR - 0.00083	0.72161 TO 0.72326	0.72078 TO 0.72409	0.71996 TO 0.72491	576000

LWT WITH GA IFM						
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
637	0.72076	+ OR - 0.00156	0.71920 TO 0.72231	0.71764 TO 0.72387	0.71609 TO 0.72543	166000
642	0.72062	+ OR - 0.00159	0.71903 TO 0.72221	0.71744 TO 0.72380	0.71585 TO 0.72539	161000
647	0.72102	+ OR - 0.00160	0.71942 TO 0.72262	0.71782 TO 0.72422	0.71622 TO 0.72582	156000
652	0.72100	+ OR - 0.00163	0.71927 TO 0.72262	0.71774 TO 0.72425	0.71612 TO 0.72588	151000
657	0.72156	+ OR - 0.00163	0.71993 TO 0.72318	0.71830 TO 0.72481	0.71668 TO 0.72644	146000
662	0.72127	+ OR - 0.00167	0.71960 TO 0.72295	0.71793 TO 0.72462	0.71626 TO 0.72629	141000
667	0.72109	+ OR - 0.00172	0.71938 TO 0.72281	0.71766 TO 0.72453	0.71595 TO 0.72624	136000
672	0.72085	+ OR - 0.00176	0.71909 TO 0.72261	0.71733 TO 0.72438	0.71557 TO 0.72614	131000
677	0.72067	+ OR - 0.00182	0.71885 TO 0.72249	0.71702 TO 0.72432	0.71520 TO 0.72614	126000
682	0.72036	+ OR - 0.00189	0.71848 TO 0.72225	0.71659 TO 0.72414	0.71470 TO 0.72603	121000
687	0.72069	+ OR - 0.00189	0.71880 TO 0.72258	0.71691 TO 0.72447	0.71502 TO 0.72636	116000
692	0.72086	+ OR - 0.00197	0.71890 TO 0.72283	0.71693 TO 0.72480	0.71496 TO 0.72677	111000
697	0.72029	+ OR - 0.00203	0.71826 TO 0.72232	0.71623 TO 0.72436	0.71420 TO 0.72639	106000
702	0.72032	+ OR - 0.00208	0.71824 TO 0.72240	0.71616 TO 0.72448	0.71408 TO 0.72656	101000
707	0.72002	+ OR - 0.00217	0.71785 TO 0.72218	0.71569 TO 0.72435	0.71352 TO 0.72652	96000
712	0.71981	+ OR - 0.00224	0.71758 TO 0.72205	0.71534 TO 0.72428	0.71310 TO 0.72652	91000
717	0.71915	+ OR - 0.00225	0.71691 TO 0.72140	0.71466 TO 0.72364	0.71242 TO 0.72589	86000
722	0.71895	+ OR - 0.00221	0.71674 TO 0.72116	0.71453 TO 0.72337	0.71232 TO 0.72558	81000
727	0.71948	+ OR - 0.00233	0.71716 TO 0.72181	0.71483 TO 0.72414	0.71250 TO 0.72647	76000
732	0.71958	+ OR - 0.00240	0.71719 TO 0.72198	0.71479 TO 0.72438	0.71239 TO 0.72677	71000
737	0.72019	+ OR - 0.00250	0.71769 TO 0.72268	0.71519 TO 0.72518	0.71269 TO 0.72768	66000
742	0.72012	+ OR - 0.00265	0.71747 TO 0.72278	0.71482 TO 0.72543	0.71216 TO 0.72809	61000
747	0.71945	+ OR - 0.00269	0.71677 TO 0.72214	0.71408 TO 0.72482	0.71140 TO 0.72751	56000
752	0.71823	+ OR - 0.00283	0.71541 TO 0.72106	0.71258 TO 0.72388	0.70975 TO 0.72671	51000
757	0.71864	+ OR - 0.00311	0.71553 TO 0.72175	0.71243 TO 0.72486	0.70932 TO 0.72797	46000
762	0.71729	+ OR - 0.00317	0.71412 TO 0.72045	0.71096 TO 0.72362	0.70779 TO 0.72678	41000
767	0.71894	+ OR - 0.00331	0.71563 TO 0.72226	0.71232 TO 0.72557	0.70900 TO 0.72888	36000

NO. OF INITIAL GENERATIONS SKIPPED	LWT WITH GA IFM						NUMBER OF HISTORIES
	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL		
772	0.71963	+ OR - 0.00375	0.71587 TO 0.72338	0.71212 TO 0.72714	0.70837 TO 0.73069		31000
777	0.71773	+ OR - 0.00414	0.71359 TO 0.72187	0.70944 TO 0.72602	0.70530 TO 0.73016		26000
782	0.71788	+ OR - 0.00463	0.71325 TO 0.72252	0.70862 TO 0.72715	0.70399 TO 0.73178		21000
787	0.71780	+ OR - 0.00545	0.71235 TO 0.72325	0.70691 TO 0.72870	0.70146 TO 0.73415		16000
792	0.72255	+ OR - 0.00715	0.71540 TO 0.72971	0.70825 TO 0.73686	0.70109 TO 0.74401		11000
797	0.72430	+ OR - 0.01016	0.71414 TO 0.73446	0.70398 TO 0.74463	0.69381 TO 0.75479		6000



		I	*	I
		I	*	I
		I	*	I
95 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
		I	*	I
		I	*	I
100 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
105 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
110 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
115 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
120 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
125 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
130 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
135 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
140 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
145 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
150 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
155 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
160 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
165 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
170 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
175 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
180 +		I	*	I
		I	*	I
		I	*	I
		I	*	I
185 +		I	*	I
		I	*	I

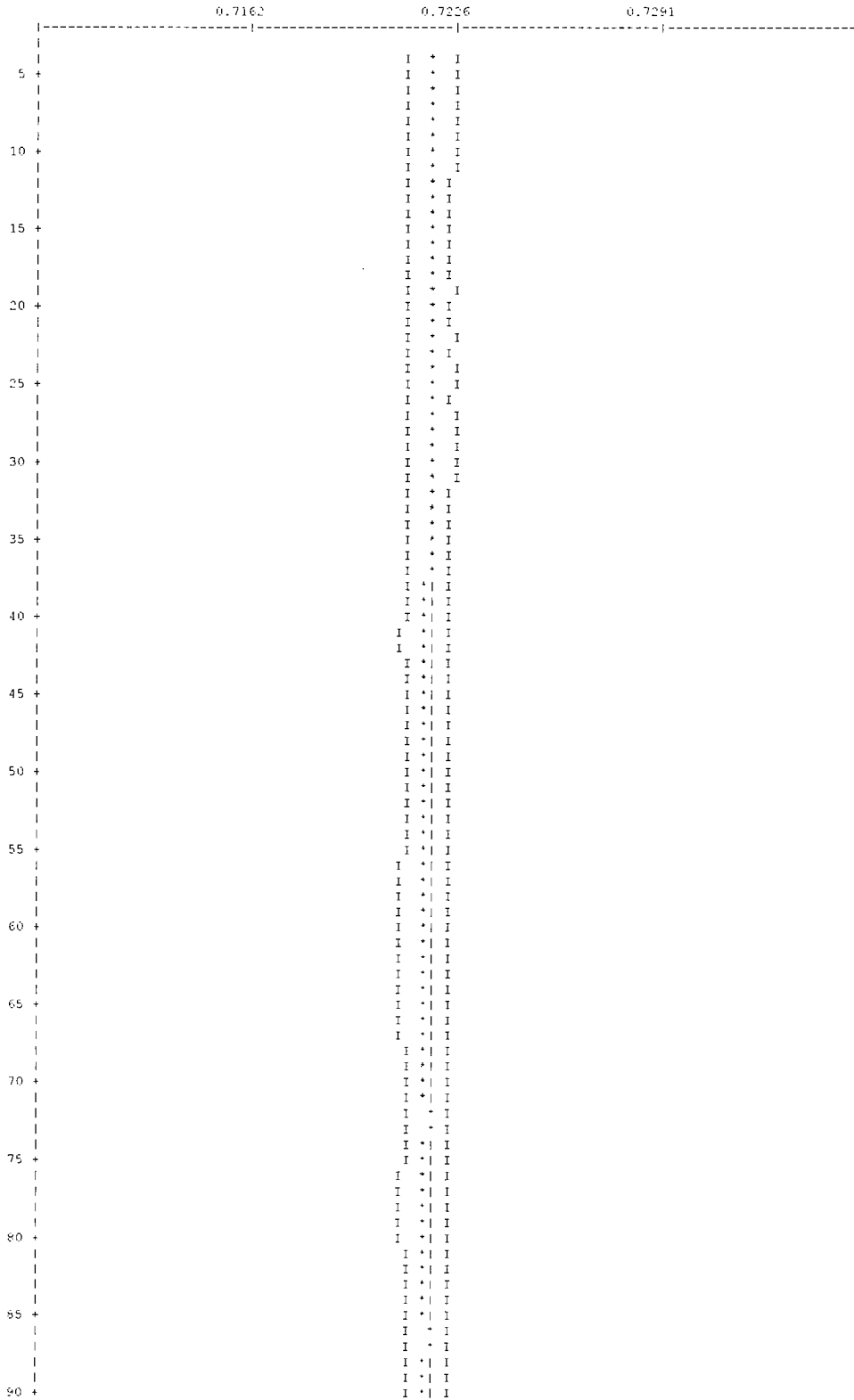
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	I * I
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235 +	I * I
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	I * II
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	I * II
	I * II
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	I * I
	I * I
705 +	I * I
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	I * I
	I * I
710 +	I * I
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715 +	I * I
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	I * I



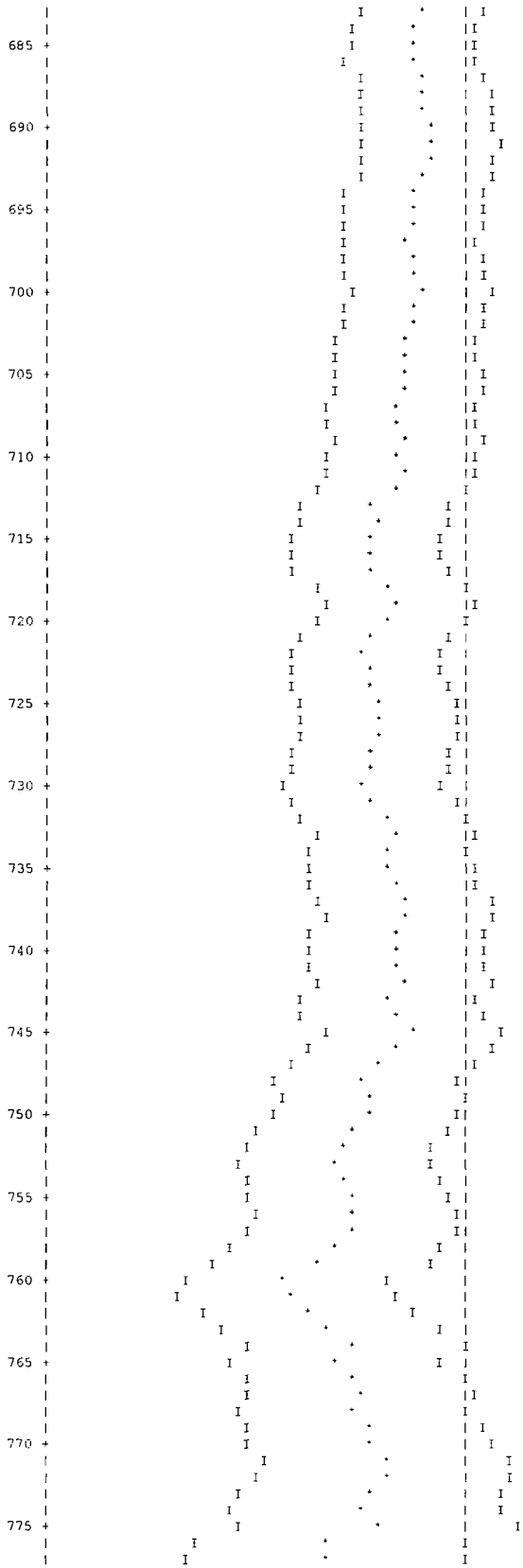


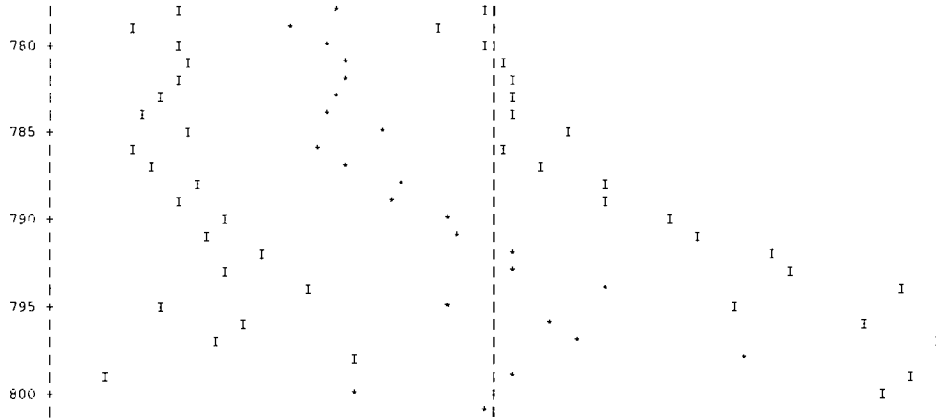
LWT WITH GA IFM

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS K-EFF = 0.7220 + OR - 0.0007 WHICH OCCURS FOR 3 GENERATIONS SKIPPED.









LWT WITH GA IFM										
GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	SKIPPING	3 GENERATIONS
									PERCENT DEVIATION	PERCENT DEVIATION
1	0.0006			4.00192E-04	1.2672	1.27462E-03	0.9486	0.00000E+00	0.0000	
2	0.0022			1.59620E-03	0.4160	3.02760E-03	0.3251	0.00000E+00	0.0000	
3	0.0025			1.82061E-03	0.3354	1.55179E-03	0.2726	0.00000E+00	0.0000	
4	0.0012			8.62742E-04	0.3730	8.32470E-04	0.2807	0.00000E+00	0.0000	
5	0.0009			6.76402E-04	0.2862	1.74872E-03	0.2795	0.00000E+00	0.0000	
6	0.0013			9.13395E-04	0.2168	7.38533E-03	0.2572	0.00000E+00	0.0000	
7	0.0015			1.08146E-03	0.1791	1.48384E-02	0.2389	0.00000E+00	0.0000	
8	0.0016			1.14697E-03	0.1791	1.20744E-02	0.2599	0.00000E+00	0.0000	
9	0.0022			1.58067E-03	0.1807	1.21250E-02	0.2548	0.00000E+00	0.0000	
10	0.0047			3.42751E-03	0.1860	3.03179E-02	0.2487	0.00000E+00	0.0000	
11	0.0104			7.47447E-03	0.1748	4.07010E-02	0.2030	0.00000E+00	0.0000	
12	0.0146			1.05204E-02	0.1891	3.32275E-02	0.1821	0.00000E+00	0.0000	
13	0.0142			1.02616E-02	0.1907	4.31473E-02	0.1706	0.00000E+00	0.0000	
14	0.0117			8.45094E-03	0.1787	5.28353E-02	0.2124	0.00000E+00	0.0000	
15	0.0022			1.56657E-03	0.2617	2.40140E-02	0.3384	0.00000E+00	0.0000	
16	0.0015			1.05366E-03	0.3224	1.32672E-02	0.3664	0.00000E+00	0.0000	
17	0.0023			1.64657E-03	0.4663	6.76399E-03	0.3719	0.00000E+00	0.0000	
18	0.0031			2.25149E-03	0.4738	6.20648E-03	0.3773	0.00000E+00	0.0000	
19	0.0038			2.70772E-03	0.3751	1.06971E-02	0.3856	0.00000E+00	0.0000	
20	0.0158			1.13935E-02	0.2345	3.32724E-02	0.3217	0.00000E+00	0.0000	
21	0.0089			6.40846E-03	0.3567	1.18196E-02	0.3676	0.00000E+00	0.0000	
22	0.0221			1.59248E-02	0.2701	2.38316E-02	0.3046	0.00000E+00	0.0000	
23	0.0871			6.28656E-02	0.1617	8.17318E-02	0.1725	0.00000E+00	0.0000	
24	0.2046			1.47719E-01	0.1240	1.59106E-01	0.1190	0.00000E+00	0.0000	
25	0.1939			1.40005E-01	0.1273	1.37342E-01	0.1176	0.00000E+00	0.0000	
26	0.2695			1.94597E-01	0.1268	1.74117E-01	0.1224	0.00000E+00	0.0000	
27	0.1158			8.36149E-02	0.1690	6.46415E-02	0.1785	0.00000E+00	0.0000	
SYSTEM TOTAL =				7.21987E-01	0.0942	1.00190E+00	0.0315	0.00000E+00	0.0000	
ELAPSED TIME 8.97750 MINUTES										
RANDOM NUMBER= 23A12AE52FEC										

LWT WITH GA IFM

```
FREQUENCY FOR GENERATIONS 4 TO 803
0.6657 TO 0.6687 **
0.6687 TO 0.6717
0.6717 TO 0.6747 ****
0.6747 TO 0.6778 *
0.6778 TO 0.6808
0.6808 TO 0.6838 *****
0.6838 TO 0.6868 *****
0.6868 TO 0.6899 *****
0.6899 TO 0.6929 *****
0.6929 TO 0.6959 *****
0.6959 TO 0.6990 *****
0.6990 TO 0.7020 *****
0.7020 TO 0.7050 *****
0.7050 TO 0.7080 *****
0.7080 TO 0.7111 *****
0.7111 TO 0.7141 *****
0.7141 TO 0.7171 *****
0.7171 TO 0.7201 *****
0.7201 TO 0.7232 *****
0.7232 TO 0.7262 *****
0.7262 TO 0.7292 *****
0.7292 TO 0.7322 *****
0.7322 TO 0.7353 *****
0.7353 TO 0.7383 *****
0.7383 TO 0.7413 *****
0.7413 TO 0.7444 *****
0.7444 TO 0.7474 *****
0.7474 TO 0.7504 *****
0.7504 TO 0.7534 *****
0.7534 TO 0.7565 *****
0.7565 TO 0.7595 *****
0.7595 TO 0.7625 ***
0.7625 TO 0.7655 *****
0.7655 TO 0.7686 *****
0.7686 TO 0.7716 *****
0.7716 TO 0.7746 *
0.7746 TO 0.7776 *
```

LWT WITH GA IFM

FREQUENCY FOR GENERATIONS 204 TO 803

```
0.6657 TO 0.6687 **
0.6687 TO 0.6717
0.6717 TO 0.6747 ****
0.6747 TO 0.6778 *
0.6778 TO 0.6808
0.6808 TO 0.6838 *****
0.6838 TO 0.6868 *****
0.6868 TO 0.6898 *****
0.6898 TO 0.6929 *****
0.6929 TO 0.6959 *****
0.6959 TO 0.6990 *****
0.6990 TO 0.7020 *****
0.7020 TO 0.7050 *****
0.7050 TO 0.7080 *****
0.7080 TO 0.7111 *****
0.7111 TO 0.7141 *****
0.7141 TO 0.7171 *****
0.7171 TO 0.7201 *****
0.7201 TO 0.7232 *****
0.7232 TO 0.7262 *****
0.7262 TO 0.7292 *****
0.7292 TO 0.7322 *****
0.7322 TO 0.7353 *****
0.7353 TO 0.7383 *****
0.7383 TO 0.7413 *****
0.7413 TO 0.7444 *****
0.7444 TO 0.7474 *****
0.7474 TO 0.7504 *****
0.7504 TO 0.7534 *****
0.7534 TO 0.7565 *****
0.7565 TO 0.7595 *****
0.7595 TO 0.7625 **
0.7625 TO 0.7655 ***
0.7655 TO 0.7686 *****
0.7686 TO 0.7716 *****
0.7716 TO 0.7746 *
0.7746 TO 0.7776 *
```



LWT WITH GA IFM

FREQUENCY FOR GENERATIONS 404 TO 803

```
0.6657 TO 0.6687 **
0.6687 TO 0.6717 **
0.6717 TO 0.6747 **
0.6747 TO 0.6778
0.6778 TO 0.6808
0.6808 TO 0.6838 **
0.6838 TO 0.6868 *****
0.6868 TO 0.6899 *****
0.6899 TO 0.6929 *****
0.6929 TO 0.6959 *****
0.6959 TO 0.6990 *****
0.6990 TO 0.7020 *****
0.7020 TO 0.7050 *****
0.7050 TO 0.7080 *****
0.7080 TO 0.7111 *****
0.7111 TO 0.7141 *****
0.7141 TO 0.7171 *****
0.7171 TO 0.7201 *****
0.7201 TO 0.7232 *****
0.7232 TO 0.7262 *****
0.7262 TO 0.7292 *****
0.7292 TO 0.7322 *****
0.7322 TO 0.7353 *****
0.7353 TO 0.7383 *****
0.7383 TO 0.7413 *****
0.7413 TO 0.7444 *****
0.7444 TO 0.7474 *****
0.7474 TO 0.7504 *****
0.7504 TO 0.7534 *****
0.7534 TO 0.7565 ***
0.7565 TO 0.7595 *****
0.7595 TO 0.7625 **
0.7625 TO 0.7655 **
0.7655 TO 0.7686 ***
0.7686 TO 0.7716 **
0.7716 TO 0.7746 *
0.7746 TO 0.7776 *
```

LWT WITH GA IFM

FREQUENCY FOR GENERATIONS 604 TO 803

```
0.6657 TO 0.6687 **
0.6687 TO 0.6717
0.6717 TO 0.6747
0.6747 TO 0.6778
0.6778 TO 0.6808
0.6808 TO 0.6838 *
0.6838 TO 0.6868 *****
0.6868 TO 0.6899 ***
0.6899 TO 0.6929 ****
0.6929 TO 0.6959 *****
0.6959 TO 0.6990 *****
0.6990 TO 0.7020 ****
0.7020 TO 0.7050 *****
0.7050 TO 0.7080 *****
0.7080 TO 0.7111 *****
0.7111 TO 0.7141 *****
0.7141 TO 0.7171 *****
0.7171 TO 0.7201 *****
0.7201 TO 0.7232 *****
0.7232 TO 0.7262 *****
0.7262 TO 0.7292 *****
0.7292 TO 0.7322 *****
0.7322 TO 0.7353 *****
0.7353 TO 0.7383 *****
0.7383 TO 0.7413 *****
0.7413 TO 0.7444 *****
0.7444 TO 0.7474 *****
0.7474 TO 0.7504 *****
0.7504 TO 0.7534 *****
0.7534 TO 0.7565 **
0.7565 TO 0.7595 ***
0.7595 TO 0.7625 **
0.7625 TO 0.7655
0.7655 TO 0.7686
0.7686 TO 0.7716 *
0.7716 TO 0.7746
0.7746 TO 0.7776
```

.....  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 8.97750 MINUTES  
.....

**6.6.10 Damaged Fuel Rods in a Rod Holder**

This section contains a sample output file from the evaluation of 25 fuel rods in a rod holder in which up to 14 of the fuel rods are classified as damaged. The output file is shown in Figure 6.6.10-1.

Figure 6.6.10-1 Damaged BWR Rods in a Rod Holder

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET
Z7GROUPHDF4 LATTICECELL
UO2      1 0.95 293.0 92235 5.0 92238 95.0 END
H2O      2 1.0000 293.0 END
ZIPCALLOY 3 1.0000 293.0 END
H2O      4 1.0000 293.0 END
H2O      5 0.0001 293.0 END
PB       6 1.0000 293.0 END
H2O      7 0.0001 293.0 END
SS304    8 1.0000 293.0 END
END COMP
TRIANGPITCH 2.15289 0.7968 1 4 END
NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET
READ PARAM RUN=YES PLT=NO TME=5000 GEN=803 NPC=1000 TRA=5 END PARAM
READ GEOM
UNIT 1
COM='LWR FUEL ROD-NO CLAD'
CYLINDER 1 1 0.3984 2P10.0000
CYLINDER 4 1 0.4049 2P10.0000
GLOBAL UNIT 2
CYLINDER 4 1 9.0166 2P10.0000
HOLE 1 0.0000 0.0000 0.0000
HOLE 1 2.1529 0.0000 0.0000
HOLE 1 1.0764 1.8645 0.0000
HOLE 1 -1.0764 1.8645 0.0000
HOLE 1 -2.1529 0.0000 0.0000
HOLE 1 -1.0764 -1.8645 0.0000
HOLE 1 1.0764 -1.8645 0.0000
HOLE 1 3.2293 -1.8645 0.0000
HOLE 1 4.3058 0.0000 0.0000
HOLE 1 3.2293 1.8645 0.0000
HOLE 1 2.1529 3.7289 0.0000
HOLE 1 0.0000 3.7289 0.0000
HOLE 1 -2.1529 3.7289 0.0000
HOLE 1 -3.2293 1.8645 0.0000
HOLE 1 -4.3058 0.0000 0.0000
HOLE 1 -3.2293 -1.8645 0.0000
HOLE 1 -2.1529 -3.7289 0.0000
HOLE 1 0.0000 -3.7289 0.0000
HOLE 1 2.1529 -3.7289 0.0000
HOLE 1 4.3058 -3.7289 0.0000
HOLE 1 5.3822 1.8645 0.0000
HOLE 1 1.0764 5.5934 0.0000
HOLE 1 -4.3058 3.7289 0.0000
HOLE 1 -5.3822 -1.8645 0.0000
HOLE 1 -1.0764 -5.5934 0.0000
HOLE 1 1.0764 -5.5934 0.0000
HOLE 1 4.3058 3.7289 0.0000
HOLE 1 3.2293 5.5934 0.0000
HOLE 1 -1.0764 5.5934 0.0000
HOLE 1 -4.3058 -3.7289 0.0000
HOLE 1 -3.2293 -5.5934 0.0000
HOLE 1 3.2293 -5.5934 0.0000
HOLE 1 5.3822 -1.8645 0.0000
HOLE 1 -3.2293 5.5934 0.0000
HOLE 1 -5.3822 1.8645 0.0000
HOLE 1 6.4587 0.0000 0.0000
HOLE 1 -6.4587 0.0000 0.0000
HOLE 1 0.0000 -7.4578 0.0000
HOLE 1 2.1529 -7.4578 0.0000
HOLE 1 4.3058 -7.4578 0.0000
HOLE 1 5.3822 -5.5934 0.0000
HOLE 1 6.4587 -3.7289 0.0000
HOLE 1 7.5351 -1.8645 0.0000
HOLE 1 8.6116 0.0000 0.0000
HOLE 1 7.5351 1.8645 0.0000
HOLE 1 6.4587 3.7289 0.0000
HOLE 1 5.3822 5.5934 0.0000
HOLE 1 4.3058 7.4578 0.0000
HOLE 1 2.1529 7.4578 0.0000
HOLE 1 0.0000 7.4578 0.0000
HOLE 1 -2.1529 7.4578 0.0000
HOLE 1 -4.3058 7.4578 0.0000
HOLE 1 -5.3822 5.5934 0.0000
HOLE 1 -6.4587 3.7289 0.0000
HOLE 1 -7.5351 1.8645 0.0000
HOLE 1 -8.6116 0.0000 0.0000
HOLE 1 -7.5351 -1.8645 0.0000
HOLE 1 -6.4587 -3.7289 0.0000
HOLE 1 -5.3822 -5.5934 0.0000
HOLE 1 -4.3058 -7.4578 0.0000
HOLE 1 -2.1529 -7.4578 0.0000
CYLINDER 5 1 16.9663 2P10.0000
CYLINDER 8 1 18.8976 2P10.0000
CYLINDER 6 1 33.5026 2P10.0000
CYLINDER 8 1 36.5506 2P10.0000
CYLINDER 7 1 49.2443 2P10.0000
CYLINDER 8 1 42.8221 2P10.0000
```





MX 3 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 6.5600 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
40302 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 0.0001 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC PE STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE  
END

SC H2O STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 0.0001 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE  
END

SC SS304 STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%  
END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

CTP TPIANGPITCH CELL TYPE  
PITCH 2.1529 CM CENTER TO CENTER SPACING  
FUELOD 0.7905 CM FUEL DIAMETER OF SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 4 MIXTURE NO. OF MODERATOR

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL  
ZONE 2 IS MOD

```

.....
***
***                               NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET
***
.....
***                               ***** DATA LIBRARY INFORMATION *****
***
***                               UNIT NUMBER          DATA SET NAME          VOLUME
***                               -----          -
***                               UNIT FUNCTION
***
***                               89      M:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***                               82      M:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***                               11      D:\zjr\Lwt\Rods\Crit\DEFSZ61\bwr_dpsz_100i_00  SHORT CROSS SECTION LIBRARY
***                               90      D:\zjr\Lwt\Rods\Crit\DEFSZ61\bwr_dpsz_100i_00  INPUT DATA DIRECT ACCESS
***
.....
***
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER : 89
***
***                               DATASET NAME : M:\scale43\DATALIB\FT89F001
***
***                               LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY
***                               637 STANDARD COMPOSITIONS, 490 NUCLIDES
***                               90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***
***                               CREATION DATE: 6/30/95
***
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER : 82
***
***                               DATASET NAME : M:\scale43\DATALIB\FT82F001
***
***                               LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***                               BASED ON ENDF-B VERSION 4 DATA
***                               COMPILED FOR NRC 1/27/69
***                               LAST UPDATED 08/12/94
***                               L.M.PETRIE - OPNL
***
.....

```

```

..... 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 55 *****
..... 0 IO'S WERE USED WRITING THE KENO V - CSAS DATA .....
..... 0 IO'S WERE USED PROCESSING CSAS INPUT DATA .....

```

CONTROL MODULE CSAS05 IS COMPLETE.



```

BBBBBBBBBBB 0000000000 NN NN AAAAAAAA MM MM IIIIIIIIIIII 2222222222
BBBBBBBBBBB 000000000000 NNN NN AAAAAAAA MMM MMM IIIIIIIIIIII 2222222222
BB BB 00 00 NNNN NN AA AA MMM MMM II 22
BB BB 00 00 NN NN NN AA AA MM MM MM II 22
BB BB 00 00 NN NN NN AA AA MM MM MM II 22
BBBBBBBBBBB 00 00 NN NN NN ----- AAAAAAAA MM MMM MM II 22
BBBBBBBBBBB 00 00 NN NN NN ----- AAAAAAAA MM M MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BB BB 00 00 NN NN NN AA AA MM MM II 22
BBBBBBBBBBB 000000000000 NN NNN AAAAAAAA MM MM IIIIIIIIIIII 2222222222
BBBBBBBBBBB 000000000000 NN NN AAAAAAAA MM MM IIIIIIIIIIII 2222222222
    
```

```

SSSSSSSSSS CCCCCCCCCC AAAAAAAA LL EEEEEEEEEEE PPPPPPPPPP CCCCCCCCCC
SSSSSSSSSS CCCCCCCCCC AAAAAAAA LL EEEEEEEEEEE PPPPPPPPPP CCCCCCCCCC
SS SS CC CC AA AA LL EE EE PP PF CC CC
SS CC CC AA AA LL EE EE PP PF CC CC
SSSSSSSSSS CC AAAAAAAA LL EEEEEEE ----- PPPPPPPPPP CC
SSSSSSSSSS CC AAAAAAAA LL EEEEEEE ----- PPPPPPPPPP CC
SS CC AA LL EE PP CC
SS SS CC AA AA LL EE PP CC
SS SS CC CC AA AA LL EE PP CC
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLLL EEEEEEEEEEE PP CCCCCCCCCC
SSSSSSSSSS CCCCCCCCCC AA AA LLLLLLLLLLLL EEEEEEEEEEE EP CCCCCCCCCC
    
```

```

0000000 11 // 222222222 999999999 // 0000000 333333333
00000000 111 // 22222222222 99999999999 // 000000000 33333333333
00 00 1111 // 22 22 99 99 // 00 00 33 33
00 00 11 // 22 22 99 99 // 00 00 00 33
00 00 11 // 22 22 99 99 // 00 00 00 33
00 00 11 // 22 22 999999999 // 00 00 00 333
00 00 11 // 22 22 999999999 // 00 00 00 333
00 00 11 // 22 22 99 99 // 00 00 00 33
00 00 11 // 22 22 99 99 // 00 00 00 33
00 00 11 // 22 22 99 99 // 00 00 00 33
00000000 1111111 // 22222222222 99999999999 // 000000000 33333333333
0000000 1111111 // 22222222222 99999999999 // 0000000 333333333
    
```

```

11 11 0000000 222222222 222222222 44
111 111 000000000 22222222222 22222222222 444
1111 1111 00 00 22 22 ::: 22 22 4444
11 11 00 00 22 22 ::: 22 22 44 44
11 11 00 00 22 22 ::: 22 22 44 44
11 11 00 00 22 22 ::: 22 22 44 44
11 11 00 00 22 22 ::: 22 22 44 44
11 11 00 00 22 22 ::: 22 22 4444444444
11 11 00 00 22 22 ::: 22 22 444444444444
11111111 11111111 00000000 22222222222 22222222222 44
11111111 11111111 00000000 22222222222 22222222222 44
    
```

```

SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SS          SS  CC          CC  AA          AA  LL  EE          EE  PP          PP  CC          CC
SS          CC          AA          AA  LL  EE          EE  PP          PP  CC          CC
SS          CC          AA          AA  LL  EE          EE  PP          PP  CC          CC
SSSSSSSSSS  CC          AAAAAAAAAA  LL  EEEEEEEEE  PPPPPPPPPP  CC
SSSSSSSSSS  CC          AAAAAAAAAA  LL  EEEEEEEEE  PPPPPPPPPP  CC
          SS  CC          AA          AA  LL  EE          PP          CC
          SS  CC          AA          AA  LL  EE          PP          CC
SS          SS  CC          CC  AA          AA  LL  EE          PP          CC          CC
SSSSSSSSSS  CCCCCCCCCC  AA          AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP          CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA          AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP          CCCCCCCCCC
    
```

```

.....
.....
*****
*****
*****          PROGRAM VERIFICATION INFORMATION          *****
*****
*****          CODE SYSTEM:  SCALE-PC VERSION:  4.3          *****
*****
*****
*****
*****          PROGRAM:  000008          *****
*****
*****          CREATION DATE:  09/15/95          *****
*****
*****          VOLUME:  Eng          *****
*****
*****          LIBRARY:  M:\SCALE43\WIN_NT\EXE          *****
*****
*****          PRODUCTION CODE:  BONAMI          *****
*****
*****          VERSION:  3.0          *****
*****
*****          JOBNAME:  SCALE-PC          *****
*****
*****          DATE OF EXECUTION:  01/29/03          *****
*****
*****          TIME OF EXECUTION:  11:02:24          *****
*****
*****
*****
.....
.....
    
```

LOGICAL ASSIGNMENTS

```

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

PROBLEM DESCRIPTION

```

IGR--GEOMETRY (0/1/2/3--INF MED/SLAB/CYL/SPHERE)          2
ICM--NUMBER OF ZONES OR MATERIAL REGIONS                  8
MS--MIXING TABLE LENGTH                                  17
IBL--SHIELDED CROSS SECTION EDIT OPTION (0/1--NO/YES)    0
IEP--BONDARENKO FACTOR EDIT OPTION (0/1--NO/YES)         0
ISSOPT--DANC OFF FACTOR OPTION                            0
CONVERGENCE CRITERION  1.00000E-03
GEOMETRY CORRECTION FACTOR FOR WIGNER RATIONAL APPROXIMATION  1.350E+00
    3Q ARRAY HAS      17 ENTRIES.
    4Q ARRAY HAS      17 ENTRIES.
    5Q ARRAY HAS      17 ENTRIES.
    6Q ARRAY HAS       8 ENTRIES.
    7Q ARRAY HAS       8 ENTRIES.
    8Q ARRAY HAS       9 ENTRIES.
    9Q ARRAY HAS       8 ENTRIES.
   10Q ARRAY HAS     17 ENTRIES.
    
```

110 ARRAY HAS 8 ENTRIES.

MIXING TABLE

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	1.17578E-03	1092235
2	1	92238	2.20577E-02	1092238
3	1	8016	4.64669E-02	1008016
4	2	8016	3.33846E-02	2008016
5	4	8016	3.33846E-02	4008016
6	5	8016	3.33846E-06	5008016
7	7	8016	3.33846E-06	7008016
8	2	1001	6.67692E-02	2001001
9	4	1001	6.67692E-02	4001001
10	5	1001	6.67692E-06	5001001
11	7	1001	6.67692E-06	7001001
12	3	40302	4.33078E-02	3040302
13	6	82000	3.29690E-02	6082000
14	8	24304	1.74286E-02	8024304
15	8	25055	1.73633E-03	8025055
16	8	26304	5.93579E-02	8026304
17	8	28304	7.72070E-03	8028304

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	3.98400E-01	2.93000E+02	1.83118E+00	0
2	4	1.13035E+00	2.93000E+02	0.00000E+00	0
3	2	6.13035E+00	2.93000E+02	0.00000E+00	0
4	3	1.11303E+01	2.93000E+02	0.00000E+00	0
5	5	1.61303E+01	2.93000E+02	0.00000E+00	0
6	6	2.11303E+01	2.93000E+02	0.00000E+00	0
7	7	2.61303E+01	2.93000E+02	0.00000E+00	0
8	8	3.11303E+01	2.93000E+02	0.00000E+00	0

3698 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

SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89  
LAST UPDATED

08/12/94

L.M.PETRIE - ORNL			
TAPE ID	4321	NUMBER OF NUCLIDES	17
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 08/12/94	ID 2001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 4001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 5001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 7001001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 1008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 2008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 4008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 5008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 7008016
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8024304
MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	ID 8025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8028304
ZIRCALLOY	ENDF/B-IV MAT 1284	UPDATED 08/12/94	ID 3040302
PB 1288 218NGF 042375 P-3 293K		UPDATED 08/12/94	ID 6082000
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	ID 1092235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 1092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.11 SECONDS





2	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	4001001	
3	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	5001001	
4	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	7001001	
5	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	1008016	
6	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	2008016	
7	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	4008016	
8	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	5008016	
9	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	7008016	
10	CP 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	8024304	
11	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	8025055	
12	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	8026304	
13	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	8028304	
14	ZIRCALLOY	ENDF/B-IV MAT 1284	UPDATED 08/12/94	3040302	
15	PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	6082000	
16	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	1092235	
17	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	1092238	

HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	2001001	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	4001001	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	5001001	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	7001001	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	1008016	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	2008016	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	4008016	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	5008016	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	7008016	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	8024304	TEMPERATURE=	293.00
		PROCESS NUMBER 1007 IS AT		TEMPERATURE=	293.00
MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	8025055	TEMPERATURE=	293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A)	=	54.466	TEMPERATURE (KELVIN)	=	293.000
POTENTIAL SCATTER SIGMA	=	2.590	LUMPED NUCLEAR DENSITY	=	1.7363295E-03
SPIN FACTOR (G)	=	14.448	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	=	55.845	SIGMA (PER ABSORBER ATOM)	=	3.4663022E+02
---------------------	---	--------	---------------------------	---	---------------

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2	=	55.925	SIGMA (PER ABSORBER ATOM)	=	1.2557598E+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
8	-5.518788E-04	0.000000E+00	-3.944190E-01
9	-2.797993E-03	0.000000E+00	-2.293471E+00
10	-3.291452E-01	0.000000E+00	-3.820862E+01
11	-2.680562E+00	0.000000E+00	-1.159996E+02

EXCESS RESONANCE INTEGRALS

	RESOLVED	
ABSORPTION	3.33719E+00	
FISSION	0.00000E+00	
		PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED 08/12/94	8026304 TEMPERATURE= 293.00
	PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'	UPDATED 08/12/94	8028304 TEMPERATURE= 293.00
	PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00

ZIRCALLOY ENDF/B-IV MAT 1284 UPDATED 08/12/94 3040302 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 90.436 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 6.385 LUMPED NUCLEAR DENSITY = 4.3307818E-02  
SPIN FACTOR (G) = 1.079 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.

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	-2.531564E-03	0.000000E+00	-2.069429E+00
9	-7.143981E-02	0.000000E+00	-3.266492E+00
10	-7.703653E-02	0.000000E+00	-1.746459E+00
11	-1.954898E-01	0.000000E+00	-8.103043E-01

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 1.75363E-01  
FISSION 0.00000E+00

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

PB 1288 218NGP 042375 P-3 293K

UPDATED 08/12/94 6082000 TEMPERATURE= 293.00  
PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261

UPDATED 08/12/94 1092235 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 233.025 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 11.500 LUMPED NUCLEAR DENSITY = 1.1757837E-03  
SPIN FACTOR (G) = 15171.100 LUMP DIMENSION (A-BAR) = 3.9840001E-01  
INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 2.8592249E-02

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 15.991 SIGMA (PER ABSORBER ATOM) = 1.5361255E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 238.051 SIGMA (PER ABSORBER ATOM) = 2.3124234E+02

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-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	-3.622922E+00	-2.226327E+00	-8.995620E-02
13	-1.149924E+01	-5.618038E+00	-2.515655E-01
14	-8.514027E+00	-5.049669E+00	-5.936050E-02
15	-4.509439E-04	-3.428886E-04	3.897996E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.00620E+02  
FISSION 1.20254E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262

UPDATED 08/12/94 1092238 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 238.006 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 10.599 LUMPED NUCLEAR DENSITY = 2.2057688E-02  
SPIN FACTOR (G) = 656.527 LUMP DIMENSION (A-BAR) = 3.9840001E-01  
INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 2.8592249E-02

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 15.991 SIGMA (PER ABSORBER ATOM) = 8.1883087E+00

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

**NAC-LWT Cask SAR  
Revision 43**

January 2015

MASS OF MODERATOR-2 = 235.044 SIGMA(PER ABSORBER ATOM)= 6.3446152E-01

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-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	-4.049280E-02	0.000000E+00	-4.083463E-01
10	-1.062502E+00	-1.945288E-05	-6.511882E+00
11	-9.720816E+00	0.000000E+00	-2.674516E+01
12	-4.265190E+01	0.000000E+00	-4.960673E+01
13	-5.341822E+01	0.000000E+00	-1.754942E+01
14	-1.033681E+02	0.000000E+00	-6.023543E+00
15	-5.894847E-07	0.000000E+00	1.142021E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.10256E+01  
FISSION 5.02353E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

THIS XSDRN WORKING TAPE WAS CREATED 01/29/03 AT 11:02:25  
THE TITLE OF THE PARENT CASE IS AS FOLLOWS  
SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89

TAPE ID	4321	NUMBER OF NUCLIDES	17
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 08/12/94	ID 2001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 4001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 5001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 7001001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 1008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 2008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 4008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 5008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 7008016
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8024304
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID 8025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8026304
NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94	ID 8028304
ZIRCALLOY ENDF/B-IV MAT 1284		UPDATED 08/12/94	ID 3040302
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 6082000
URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID 1092235
URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	ID 1092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.05 SECONDS





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SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL  EEEEEEEEEEEE  PPPPPPPPPPP  CCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL  EE  PP      PP  CC      CC
SS      CC  CC      AA  AA      AA  LL  EE  PP      PP  CC      CC
SS      CC  CC      AA  AA      AA  LL  EE  PP      PP  CC      CC
SSSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEEE  -----  PPPPPPPPPPP  CC
SSSSSSSSSS  CC  AAAAAAAAAA  LL  EEEEEEEE  -----  PPPPPPPPPPP  CC
SS      SS  CC      AA  AA  LL  EE  PP      CC
SS      SS  CC      CC  AA  AA  LL  EE  PP      CC      CC
SSSSSSSSSS  CCCCCCCCCC  AA  AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP  CCCCCCCCCC
SSSSSSSSSS  CCCCCCCCCC  AA  AA  LLLLLLLLLLLL  EEEEEEEEEEEE  PP  CCCCCCCCCC
    
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.....
PROGRAM VERIFICATION INFORMATION
.....
CODE SYSTEM:  SCALE-PC VERSION:  4.3
.....
.....
PROGRAM:  00009
.....
CREATION DATE:  03/08/96
.....
VOLUME:  Eng
.....
LIBRARY:  M:\SCALE43\WIN_NT\EXE
.....
.....
PRODUCTION CODE:  KENOVA
.....
VERSION:  3.1
.....
JOBNAME:  SCALE-PC
.....
DATE OF EXECUTION:  01/29/03
.....
TIME OF EXECUTION:  11:02:27
.....
.....
    
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.....
NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET
.....
*****  NUMERIC PARAMETERS  *****
.....
TME  MAXIMUM PROBLEM TIME (MIN)  *****
.....
TBA  TIME PER GENERATION (MIN)  5.00
.....
GEN  NUMBER OF GENERATIONS  803
.....
NPG  NUMBER PER GENERATION  1000
.....
NSK  NUMBER OF GENERATIONS TO BE SKIPPED  3
.....
BEG  BEGINNING GENERATION NUMBER  1
.....
RES  GENERATIONS BETWEEN CHECKPOINTS  0
.....
X1D  NUMBER OF EXTRA 1-D CROSS SECTIONS  1
.....
NBK  NEUTRON BANK SIZE  1025
.....
XNB  EXTRA POSITIONS IN NEUTRON BANK  0
.....
NFB  FISSION BANK SIZE  1000
.....
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  BB827100001
.....
NB#  NUMBER OF D.A. BLOCKS ON UNIT  8  200
.....
NLS  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
.....
    
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MIXTURE =	6	DENSITY (G/CC) =	11.344						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE				
6082000	3.28690E-02	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K				UPDATED
08/12/94									
MIXTURE =	7	DENSITY (G/CC) =	0.99817E-04						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE				
7001001	6.67692E-06	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002				UPDATED
08/12/94									
7008016	3.33846E-06	8.88074E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276				UPDATED
08/12/94									
MIXTURE =	8	DENSITY (G/CC) =	7.9200						
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE				
8024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'				UPDATED
08/12/94									
8025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55 ENDF/B-IV MAT 1197				UPDATED
08/12/94									
8026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'				UPDATED
08/12/94									
8028304	7.72070E-03	9.50001E-02	28000	58.6972	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'				UPDATED
08/12/94									

2001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
4001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
5001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
7001001	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
1008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
2008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
4008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
5008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
7008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
8024304	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
8025055	MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94
8026304	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
8028304	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
3040302	ZIRCALLOY ENDF/B-IV MAT 1284		UPDATED 08/12/94
6082000	PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94
1092235	URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94
1092238	URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      2 WERE CORRECTED FOR BAD MOMENTS.

KENO MESSAGE NUMBER K5-222      1 TRANSFERS FOR MIXTURE      4 WERE CORRECTED FOR BAD MOMENTS.

KENO MESSAGE NUMBER K5-222      2 TRANSFERS FOR MIXTURE      5 WERE CORRECTED FOR BAD MOMENTS.

KENO MESSAGE NUMBER K5-222      2 TRANSFERS FOR MIXTURE      7 WERE CORRECTED FOR BAD MOMENTS.

..... 0 IO'S WERE USED MIXING CROSS-SECTIONS .....

1-D CROSS SECTION ARRAY ID NUMBERS  
1 2002 1452 27 18 1018

..... 0 IO'S WERE USED PREPARING THE CROSS SECTIONS .....

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***
*** NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET ***
***
***** ADDITIONAL INFORMATION *****
***
*** NUMBER OF ENERGY GROUPS            27      USE LATTICE GEOMETRY                    NO ***
***
*** NO. OF FISSION SPECTRUM SOURCE GROUP   1      GLOBAL APRAY NUMBER                    0 ***
***
*** NO. OF SCATTERING ANGLES IN XSECS     2      NUMBER OF UNITS IN THE GLOBAL X DIR.   0 ***
***
*** ENTRIES/NEUTRON IN THE NEUTRON BANK   17     NUMBER OF UNITS IN THE GLOBAL Y DIR.   0 ***
***
*** ENTRIES/NEUTRON IN THE FISSION BANK   10     NUMBER OF UNITS IN THE GLOBAL Z DIR.   0 ***
***
*** NUMBER OF MIXTURES USED               6      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                        61 ***
***
*** TOTAL INPUT GEOMETRY REGIONS         10     MAXIMUM HOLE NESTING LEVEL            1 ***
***
*** NUMBER OF GEOMETRY REGIONS USED      10     USE NESTED ARRAYS                      NO ***
***
*** LARGEST GEOMETRY UNIT NUMBER         2      NUMBER OF ARRAYS USED                 0 ***
***
*** LARGEST APRAY NUMBER                  1      MAXIMUM ARRAY NESTING LEVEL           0 ***
***
***
*** +X BOUNDARY CONDITION                MIR     -X BOUNDARY CONDITION                MIR ***
***
*** +Y BOUNDARY CONDITION                MIR     -Y BOUNDARY CONDITION                MIR ***

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\*\*\*  
\*\*\* +Z BOUNDARY CONDITION                      MIR                      -Z BOUNDARY CONDITION                      MIR \*\*\*  
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NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
				UNIT	1			
LWR FUEL ROD-NO CLAD								
1	CYLINDER	1	1	RADIUS = 0.39840	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
2	CYLINDER	4	1	RADIUS = 0.40490	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET								

REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
				GLOBAL UNIT	2			
1	CYLINDER	4	1	RADIUS = 9.0166	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
	HOLE NUMBER	1		AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	2		AT X = 2.1529	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	3		AT X = 1.0764	Y = 1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	4		AT X = -1.0764	Y = 1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	5		AT X = -2.1529	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	6		AT X = -1.0764	Y = -1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	7		AT X = 1.0764	Y = -1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	8		AT X = 3.2293	Y = -1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	9		AT X = 4.3058	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	10		AT X = 3.2293	Y = 1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	11		AT X = 2.1529	Y = 3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	12		AT X = 0.00000	Y = 3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	13		AT X = -2.1529	Y = 3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	14		AT X = -3.2293	Y = 1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	15		AT X = -4.3058	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	16		AT X = -3.2293	Y = -1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	17		AT X = -2.1529	Y = -3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	18		AT X = 0.00000	Y = -3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	19		AT X = 2.1529	Y = -3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	20		AT X = 4.3058	Y = -3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	21		AT X = 5.3822	Y = 1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	22		AT X = 1.0764	Y = 5.5934	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	23		AT X = -4.3058	Y = 3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	24		AT X = -5.3822	Y = -1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	25		AT X = -1.0764	Y = -5.5934	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	26		AT X = 1.0764	Y = -5.5934	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	27		AT X = 4.3058	Y = 3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	28		AT X = 3.2293	Y = 5.5934	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	29		AT X = -1.0764	Y = 5.5934	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	30		AT X = -4.3058	Y = -3.7289	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	31		AT X = -3.2293	Y = -5.5934	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	32		AT X = 3.2293	Y = -5.5934	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	33		AT X = 5.3822	Y = -1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	34		AT X = -3.2293	Y = 5.5934	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	35		AT X = -5.3822	Y = 1.8645	Z = 0.00000	IS UNIT NUMBER	1
	HOLE NUMBER	36		AT X = 6.4587	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1

HOLE NUMBER	37	AT X = -6.4587	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	38	AT X = 0.00000	Y = -7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	39	AT X = 2.1529	Y = -7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	40	AT X = 4.3058	Y = -7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	41	AT X = 5.3822	Y = -5.5934	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	42	AT X = 6.4587	Y = -3.7289	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	43	AT X = 7.5351	Y = -1.8645	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	44	AT X = 8.6116	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	45	AT X = 7.5351	Y = 1.8645	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	46	AT X = 6.4587	Y = 3.7289	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	47	AT X = 5.3822	Y = 5.5934	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	48	AT X = 4.3058	Y = 7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	49	AT X = 2.1529	Y = 7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	50	AT X = 0.00000	Y = 7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	51	AT X = -2.1529	Y = 7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	52	AT X = -4.3058	Y = 7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	53	AT X = -5.3822	Y = 5.5934	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	54	AT X = -6.4587	Y = 3.7289	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	55	AT X = -7.5351	Y = 1.8645	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	56	AT X = -8.6116	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	57	AT X = -7.5351	Y = -1.8645	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	58	AT X = -6.4587	Y = -3.7289	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	59	AT X = -5.3822	Y = -5.5934	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	60	AT X = -4.3058	Y = -7.4578	Z = 0.00000	IS UNIT NUMBER	1
HOLE NUMBER	61	AT X = -2.1529	Y = -7.4578	Z = 0.00000	IS UNIT NUMBER	1
2 CYLINDER	5 1	RADIUS = 16.986	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	8 1	RADIUS = 18.898	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4 CYLINDER	6 1	RADIUS = 33.503	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5 CYLINDER	8 1	RADIUS = 36.551	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
6 CYLINDER	7 1	RADIUS = 49.244	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
7 CYLINDER	8 1	RADIUS = 49.822	+Z = 10.000	-Z = -10.000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
8 CUBOID	5 1	+X = 49.822	-X = -49.822	+Y = 49.822	-Y = -49.822	+Z = 10.000 -Z = -10.000

NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET  
VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	9.97283E+00 CM**3	9.97283E+00 CM**3
	2	2	3.28074E-01 CM**3	1.03009E+01 CM**3
2	1	3	4.47982E+03 CM**3	5.10817E+03 CM**3
	2	4	1.30210E+04 CM**3	1.81291E+04 CM**3
	3	5	4.30932E+03 CM**3	2.24385E+04 CM**3
	4	6	4.80855E+04 CM**3	7.05240E+04 CM**3
	5	7	1.34160E+04 CM**3	8.39400E+04 CM**3
	6	8	6.84274E+04 CM**3	1.52367E+05 CM**3
	7	9	3.59652E+03 CM**3	1.55964E+05 CM**3
	8	10	4.26155E+04 CM**3	1.98579E+05 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	61	1	1	6.08343E+02 CM**3
		2	4	2.00125E+01 CM**3
2	1	1	4	4.47982E+03 CM**3
		2	5	1.30210E+04 CM**3
		3	8	4.30932E+03 CM**3
		4	6	4.80855E+04 CM**3
		5	8	1.34160E+04 CM**3
		6	7	6.84274E+04 CM**3



7 8 3.59652E+03 CM\*\*3  
8 5 4.26155E+04 CM\*\*3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS(G)
1	6.08343E+02 CM**3	6.33405E+03
4	4.49984E+03 CM**3	4.49161E+03
5	5.56365E+04 CM**3	5.55347E+00
6	4.80855E+04 CM**3	5.45482E+05
7	6.84274E+04 CM**3	6.83022E+00
8	2.13218E+04 CM**3	1.68869E+05

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*****
***
***          BIASING INFORMATION          ***
***
***  A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S.  ***
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*****

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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....

..... 0.00450 MINUTES WERE USED PROCESSING DATA. ....

VOLUME FRACTION OF FISSIONABLE MATERIAL IN THE CORE= 3.06347E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED UNIFORMLY THROUGHOUT THE ENTIRE VOLUME DEFINED BY THE OUTERMOST GEOMETRY CARD.  
THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

KENO MESSAGE NUMBER K5-105 \*\*\*\*\* WARNING, ONLY 481 INDEPENDENT STARTING POSITIONS WERE GENERATED. \*\*\*\*\*

519 ADDITIONAL STARTING POINTS WERE PICKED FROM THE INITIAL DISTRIBUTION.

4.49650 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 4.50133 MINUTES.

NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET

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	908 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00	0.00000E+00
1	8.45376E-01	4.52667E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING...ONLY	897 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00	0.00000E+00
2	8.37583E-01	4.55700E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	WARNING...ONLY	555 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00	0.00000E+00
3	8.80673E-01	4.58617E+00	8.80673E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	8.86922E-01	4.61650E+00	8.83798E-01	3.12465E-03	0.00000E+00	0.00000E+00
5	8.45497E-01	4.64667E+00	8.71031E-01	1.28937E-02	0.00000E+00	0.00000E+00
6	8.83555E-01	4.67683E+00	8.74162E-01	9.63994E-03	0.00000E+00	0.00000E+00
7	9.28339E-01	4.70800E+00	8.84997E-01	1.31591E-02	0.00000E+00	0.00000E+00
8	8.58053E-01	4.73817E+00	8.80507E-01	1.16450E-02	0.00000E+00	0.00000E+00
9	8.74480E-01	4.76833E+00	8.79646E-01	9.87945E-03	0.00000E+00	0.00000E+00
10	8.70549E-01	4.79767E+00	8.78509E-01	8.63108E-03	0.00000E+00	0.00000E+00
11	8.33818E-01	4.82883E+00	8.73543E-01	9.08838E-03	0.00000E+00	0.00000E+00
12	9.03332E-01	4.85817E+00	8.76522E-01	8.65753E-03	0.00000E+00	0.00000E+00
13	9.06360E-01	4.88733E+00	8.79234E-01	8.28752E-03	0.00000E+00	0.00000E+00
14	8.74883E-01	4.91767E+00	8.79872E-01	7.57412E-03	0.00000E+00	0.00000E+00
15	8.60739E-01	4.94783E+00	8.77477E-01	7.10543E-03	0.00000E+00	0.00000E+00
16	8.56786E-01	4.97800E+00	8.75999E-01	6.74233E-03	0.00000E+00	0.00000E+00
17	8.46416E-01	5.00817E+00	8.74027E-01	6.57931E-03	0.00000E+00	0.00000E+00
18	8.79714E-01	5.03750E+00	8.74382E-01	6.16463E-03	0.00000E+00	0.00000E+00
19	8.77155E-01	5.06867E+00	8.74545E-01	5.79296E-03	0.00000E+00	0.00000E+00
20	8.90755E-01	5.09883E+00	8.75446E-01	5.53540E-03	0.00000E+00	0.00000E+00
21	8.41781E-01	5.12900E+00	8.73674E-01	5.52762E-03	0.00000E+00	0.00000E+00
22	8.74472E-01	5.15833E+00	8.73714E-01	5.24411E-03	0.00000E+00	0.00000E+00
23	8.71497E-01	5.18850E+00	8.73608E-01	4.98926E-03	0.00000E+00	0.00000E+00
24	8.52134E-01	5.21883E+00	8.72632E-01	4.85619E-03	0.00000E+00	0.00000E+00
25	8.74281E-01	5.24983E+00	8.72704E-01	4.64080E-03	0.00000E+00	0.00000E+00
26	8.85942E-01	5.28017E+00	8.73256E-01	4.47733E-03	0.00000E+00	0.00000E+00
27	8.85020E-01	5.30933E+00	8.73726E-01	4.32021E-03	0.00000E+00	0.00000E+00
28	8.79802E-01	5.34600E+00	8.73960E-01	4.15730E-03	0.00000E+00	0.00000E+00
29	9.00154E-01	5.37433E+00	8.74930E-01	4.11632E-03	0.00000E+00	0.00000E+00
30	8.77230E-01	5.40467E+00	8.75012E-01	3.96744E-03	0.00000E+00	0.00000E+00
31	8.74788E-01	5.43483E+00	8.75004E-01	3.82820E-03	0.00000E+00	0.00000E+00
32	8.66097E-01	5.46500E+00	8.74707E-01	3.71029E-03	0.00000E+00	0.00000E+00
33	9.01664E-01	5.49617E+00	8.75577E-01	3.69246E-03	0.00000E+00	0.00000E+00
34	8.85437E-01	5.52633E+00	8.75885E-01	3.58846E-03	0.00000E+00	0.00000E+00
35	9.13722E-01	5.55750E+00	8.77032E-01	3.66213E-03	0.00000E+00	0.00000E+00
36	8.81820E-01	5.58950E+00	8.77173E-01	3.55558E-03	0.00000E+00	0.00000E+00
37	8.77272E-01	5.62067E+00	8.77175E-01	3.45250E-03	0.00000E+00	0.00000E+00
38	9.67048E-01	5.65083E+00	8.76894E-01	3.36700E-03	0.00000E+00	0.00000E+00
39	8.51994E-01	5.68200E+00	8.76221E-01	3.34317E-03	0.00000E+00	0.00000E+00
40	9.11647E-01	5.71133E+00	8.77153E-01	3.38492E-03	0.00000E+00	0.00000E+00
41	8.45714E-01	5.74233E+00	8.76347E-01	3.39410E-03	0.00000E+00	0.00000E+00
42	9.01285E-01	5.77350E+00	8.76971E-01	3.36640E-03	0.00000E+00	0.00000E+00
43	8.62713E-01	5.80367E+00	8.76623E-01	3.30163E-03	0.00000E+00	0.00000E+00
44	8.57230E-01	5.83483E+00	8.76161E-01	3.25498E-03	0.00000E+00	0.00000E+00
45	9.20496E-01	5.86500E+00	8.77192E-01	3.34143E-03	0.00000E+00	0.00000E+00
46	9.16825E-01	5.89533E+00	8.78093E-01	3.38659E-03	0.00000E+00	0.00000E+00
47	8.94214E-01	5.92550E+00	8.78451E-01	3.32981E-03	0.00000E+00	0.00000E+00
48	8.80536E-01	5.95567E+00	8.78497E-01	3.25693E-03	0.00000E+00	0.00000E+00

49	9.20884E-01	5.98583E+00	8.79398E-01	3.31203E-03	0.00000E+00	0.00000E+00
50	8.65345E-01	6.01700E+00	8.79106E-01	3.25549E-03	0.00000E+00	0.00000E+00
51	8.61374E-01	6.04717E+00	8.78744E-01	3.20893E-03	0.00000E+00	0.00000E+00
52	9.03797E-01	6.07750E+00	8.79245E-01	3.18367E-03	0.00000E+00	0.00000E+00
53	8.88499E-01	6.10767E+00	8.79426E-01	3.12590E-03	0.00000E+00	0.00000E+00
54	8.80169E-01	6.13783E+00	8.79441E-01	3.06523E-03	0.00000E+00	0.00000E+00
55	8.39095E-01	6.16817E+00	8.78679E-01	3.10179E-03	0.00000E+00	0.00000E+00
56	8.04921E-01	6.19733E+00	8.79165E-01	3.08227E-03	0.00000E+00	0.00000E+00
57	8.69452E-01	6.22767E+00	8.78998E-01	3.03086E-03	0.00000E+00	0.00000E+00
58	8.66438E-01	6.25783E+00	8.78765E-01	2.98467E-03	0.00000E+00	0.00000E+00
59	8.71472E-01	6.29800E+00	8.78627E-01	2.93463E-03	0.00000E+00	0.00000E+00
60	8.70936E-01	6.31817E+00	8.78504E-01	2.88665E-03	0.00000E+00	0.00000E+00
61	8.59501E-01	6.35300E+00	8.78182E-01	2.85552E-03	0.00000E+00	0.00000E+00
62	8.79164E-01	6.38233E+00	8.78198E-01	2.80757E-03	0.00000E+00	0.00000E+00
63	8.97505E-01	6.41350E+00	8.78515E-01	2.77924E-03	0.00000E+00	0.00000E+00
64	8.66248E-01	6.44367E+00	8.78317E-01	2.74120E-03	0.00000E+00	0.00000E+00
65	8.85619E-01	6.47383E+00	8.78433E-01	2.69983E-03	0.00000E+00	0.00000E+00
66	8.67912E-01	6.50400E+00	8.78268E-01	2.66239E-03	0.00000E+00	0.00000E+00
67	9.00522E-01	6.53433E+00	8.78611E-01	2.64337E-03	0.00000E+00	0.00000E+00
68	8.17615E-01	6.56350E+00	8.79202E-01	2.66926E-03	0.00000E+00	0.00000E+00
69	8.36897E-01	6.59383E+00	8.78570E-01	2.70387E-03	0.00000E+00	0.00000E+00
70	8.83156E-01	6.62400E+00	8.78638E-01	2.66467E-03	0.00000E+00	0.00000E+00
71	8.40439E-01	6.65333E+00	8.78084E-01	2.68349E-03	0.00000E+00	0.00000E+00
72	8.57176E-01	6.68350E+00	8.77785E-01	2.66169E-03	0.00000E+00	0.00000E+00
73	9.00485E-01	6.71367E+00	8.78105E-01	2.64334E-03	0.00000E+00	0.00000E+00

761	8.95618E-01	2.74152E+01	8.84167E-01	8.22052E-04	0.00000E+00	0.00000E+00
762	9.04177E-01	2.74443E+01	8.84194E-01	8.21392E-04	0.00000E+00	0.00000E+00
763	8.59740E-01	2.74747E+01	8.84161E-01	8.20941E-04	0.00000E+00	0.00000E+00
764	8.96777E-01	2.75048E+01	8.84178E-01	8.20030E-04	0.00000E+00	0.00000E+00
765	8.62650E-01	2.75350E+01	8.84150E-01	8.19441E-04	0.00000E+00	0.00000E+00
766	8.74845E-01	2.75662E+01	8.84138E-01	8.18458E-04	0.00000E+00	0.00000E+00
767	9.18491E-01	2.75955E+01	8.84183E-01	8.18620E-04	0.00000E+00	0.00000E+00
768	8.79583E-01	2.76265E+01	8.84177E-01	8.17573E-04	0.00000E+00	0.00000E+00
769	8.77626E-01	2.76568E+01	8.84168E-01	8.16551E-04	0.00000E+00	0.00000E+00
770	8.90662E-01	2.76870E+01	8.84176E-01	8.15531E-04	0.00000E+00	0.00000E+00
771	8.44109E-01	2.77163E+01	8.84124E-01	8.16134E-04	0.00000E+00	0.00000E+00
772	9.07444E-01	2.77465E+01	8.84155E-01	8.15636E-04	0.00000E+00	0.00000E+00
773	8.93137E-01	2.77767E+01	8.84166E-01	8.14661E-04	0.00000E+00	0.00000E+00
774	8.72167E-01	2.78069E+01	8.84151E-01	8.13754E-04	0.00000E+00	0.00000E+00
775	8.45577E-01	2.78362E+01	8.84101E-01	8.14231E-04	0.00000E+00	0.00000E+00
776	8.58480E-01	2.78655E+01	8.84068E-01	8.13851E-04	0.00000E+00	0.00000E+00
777	8.86107E-01	2.78967E+01	8.84073E-01	8.12817E-04	0.00000E+00	0.00000E+00
778	8.34017E-01	2.79269E+01	8.84008E-01	8.14328E-04	0.00000E+00	0.00000E+00
779	8.79187E-01	2.79570E+01	8.84002E-01	8.13303E-04	0.00000E+00	0.00000E+00
790	8.97408E-01	2.79863E+01	8.84019E-01	8.12440E-04	0.00000E+00	0.00000E+00
781	8.97252E-01	2.80165E+01	8.84036E-01	8.11574E-04	0.00000E+00	0.00000E+00
782	8.57075E-01	2.80467E+01	8.84002E-01	8.11270E-04	0.00000E+00	0.00000E+00
783	8.38060E-01	2.80760E+01	8.83943E-01	8.12363E-04	0.00000E+00	0.00000E+00
784	8.60428E-01	2.81053E+01	8.83913E-01	8.11880E-04	0.00000E+00	0.00000E+00
785	8.86224E-01	2.81365E+01	8.83916E-01	8.10848E-04	0.00000E+00	0.00000E+00
786	8.86131E-01	2.81657E+01	8.83919E-01	8.09818E-04	0.00000E+00	0.00000E+00
787	9.04482E-01	2.81950E+01	8.83945E-01	8.09210E-04	0.00000E+00	0.00000E+00
788	8.67352E-01	2.82262E+01	8.83924E-01	8.08456E-04	0.00000E+00	0.00000E+00
789	8.77743E-01	2.82555E+01	8.83916E-01	8.07466E-04	0.00000E+00	0.00000E+00
790	8.79401E-01	2.82857E+01	8.83910E-01	8.06461E-04	0.00000E+00	0.00000E+00
791	8.92073E-01	2.83150E+01	8.83921E-01	8.05504E-04	0.00000E+00	0.00000E+00
792	8.42610E-01	2.83533E+01	8.83868E-01	8.06182E-04	0.00000E+00	0.00000E+00
793	9.08908E-01	2.83845E+01	8.83900E-01	8.05784E-04	0.00000E+00	0.00000E+00
794	9.13945E-01	2.84147E+01	8.83938E-01	8.05660E-04	0.00000E+00	0.00000E+00
795	8.71704E-01	2.84450E+01	8.83922E-01	8.04791E-04	0.00000E+00	0.00000E+00
796	8.87139E-01	2.84752E+01	8.83927E-01	8.03787E-04	0.00000E+00	0.00000E+00
797	9.24523E-01	2.85063E+01	8.83978E-01	8.04398E-04	0.00000E+00	0.00000E+00
798	9.03145E-01	2.85365E+01	8.84002E-01	8.03747E-04	0.00000E+00	0.00000E+00
799	8.61744E-01	2.85667E+01	8.83974E-01	8.03224E-04	0.00000E+00	0.00000E+00
800	8.82639E-01	2.85978E+01	8.83972E-01	8.02218E-04	0.00000E+00	0.00000E+00
801	8.97474E-01	2.86280E+01	8.83989E-01	8.01392E-04	0.00000E+00	0.00000E+00
802	9.02853E-01	2.86582E+01	8.84013E-01	8.00737E-04	0.00000E+00	0.00000E+00
803	8.68867E-01	2.86893E+01	8.83994E-01	7.99960E-04	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

NAC-LWT, BWP, DAMAGED-SMALLER PIN SIZE, NO BASKET

LIFETIME = 1.15441E-04 + OR - 1.79468E-07      GENERATION TIME = 6.46672E-05 + OR - 9.48936E-08  
 NU BAR = 2.42733E+00 + OR - 3.91487E-05      AVERAGE FISSION GROUP = 2.36688E+01 + OR - 2.79417E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 6.78645E-02 + OR - 1.70118E-04

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	0.88400	+ OR - 0.00090	0.88320 TO 0.88480	0.88240 TO 0.88560	0.88159 TO 0.88640	800000
4	0.88399	+ OR - 0.00090	0.88319 TO 0.88480	0.88239 TO 0.88560	0.88159 TO 0.88640	799000
5	0.88404	+ OR - 0.00080	0.88324 TO 0.88484	0.88244 TO 0.88565	0.88164 TO 0.88645	798000
6	0.88404	+ OR - 0.00080	0.88324 TO 0.88485	0.88244 TO 0.88565	0.88164 TO 0.88645	797000
7	0.88399	+ OR - 0.00080	0.88319 TO 0.88479	0.88238 TO 0.88559	0.88158 TO 0.88639	796000

8	0.88402	+ OR - 0.00080	0.88322 TO 0.88482	0.88242 TO 0.88562	0.88161 TO 0.88643	795000
9	0.88403	+ OR - 0.00080	0.88323 TO 0.88483	0.88243 TO 0.88564	0.88162 TO 0.88644	794000
10	0.88405	+ OR - 0.00080	0.88325 TO 0.88485	0.88244 TO 0.88566	0.88164 TO 0.88646	793000
11	0.88411	+ OR - 0.00080	0.88331 TO 0.88491	0.88251 TO 0.88572	0.88171 TO 0.88652	792000
12	0.88409	+ OR - 0.00080	0.88329 TO 0.88489	0.88248 TO 0.88569	0.88168 TO 0.88650	791000
17	0.88418	+ OR - 0.00080	0.88338 TO 0.88498	0.88257 TO 0.88579	0.88177 TO 0.88660	786000
22	0.88426	+ OR - 0.00081	0.88345 TO 0.88506	0.88264 TO 0.88587	0.88183 TO 0.88668	781000
27	0.88432	+ OR - 0.00081	0.88351 TO 0.88514	0.88270 TO 0.88595	0.88189 TO 0.88676	776000
32	0.88435	+ OR - 0.00082	0.88354 TO 0.88517	0.88272 TO 0.88599	0.88191 TO 0.88680	771000
37	0.88431	+ OR - 0.00082	0.88349 TO 0.88513	0.88266 TO 0.88595	0.88184 TO 0.88677	766000
42	0.88436	+ OR - 0.00082	0.88354 TO 0.88518	0.88272 TO 0.88601	0.88190 TO 0.88683	761000
47	0.88432	+ OR - 0.00082	0.88350 TO 0.88515	0.88268 TO 0.88597	0.88185 TO 0.88679	756000
52	0.88431	+ OR - 0.00083	0.88348 TO 0.88514	0.88266 TO 0.88596	0.88183 TO 0.88679	751000
57	0.88436	+ OR - 0.00083	0.88353 TO 0.88519	0.88271 TO 0.88602	0.88188 TO 0.88685	746000
62	0.88446	+ OR - 0.00083	0.88363 TO 0.88530	0.88280 TO 0.88613	0.88197 TO 0.88696	741000
67	0.88447	+ OR - 0.00084	0.88363 TO 0.88531	0.88280 TO 0.88614	0.88196 TO 0.88698	736000
72	0.88459	+ OR - 0.00084	0.88375 TO 0.88542	0.88292 TO 0.88626	0.88208 TO 0.88710	731000
77	0.88456	+ OR - 0.00084	0.88372 TO 0.88540	0.88289 TO 0.88624	0.88205 TO 0.88707	726000
82	0.88454	+ OR - 0.00084	0.88370 TO 0.88538	0.88286 TO 0.88622	0.88202 TO 0.88706	721000
87	0.88460	+ OR - 0.00085	0.88375 TO 0.88545	0.88291 TO 0.88629	0.88206 TO 0.88714	716000
92	0.88455	+ OR - 0.00085	0.88370 TO 0.88539	0.88285 TO 0.88624	0.88201 TO 0.88708	711000

NAC-LWT, BWR, DAMAGED-SMALLER FIN SIZE, NO BASKET

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	0.88453	+ OR - 0.00085	0.88368 TO 0.88538	0.88283 TO 0.88623	0.88198 TO 0.88707	706000			
102	0.88458	+ OR - 0.00085	0.88373 TO 0.88544	0.88288 TO 0.88629	0.88202 TO 0.88714	701000			
107	0.88454	+ OR - 0.00086	0.88368 TO 0.88539	0.88282 TO 0.88625	0.88196 TO 0.88711	696000			
112	0.88448	+ OR - 0.00086	0.88362 TO 0.88534	0.88276 TO 0.88620	0.88190 TO 0.88706	691000			
117	0.88453	+ OR - 0.00086	0.88367 TO 0.88539	0.88280 TO 0.88626	0.88194 TO 0.88712	686000			
122	0.88440	+ OR - 0.00087	0.88354 TO 0.88527	0.88267 TO 0.88613	0.88180 TO 0.88700	681000			
127	0.88446	+ OR - 0.00087	0.88359 TO 0.88533	0.88272 TO 0.88620	0.88185 TO 0.88707	676000			
132	0.88446	+ OR - 0.00087	0.88359 TO 0.88534	0.88271 TO 0.88621	0.88184 TO 0.88708	671000			
137	0.88452	+ OR - 0.00088	0.88364 TO 0.88540	0.88277 TO 0.88628	0.88189 TO 0.88716	666000			
142	0.88450	+ OR - 0.00088	0.88362 TO 0.88538	0.88274 TO 0.88626	0.88186 TO 0.88714	661000			
147	0.88442	+ OR - 0.00088	0.88354 TO 0.88531	0.88265 TO 0.88619	0.88177 TO 0.88708	656000			
642	0.88538	+ OR - 0.00178	0.88360 TO 0.88716	0.88182 TO 0.88994	0.88004 TO 0.89072	161000			
647	0.88504	+ OR - 0.00181	0.88323 TO 0.88685	0.88143 TO 0.88866	0.87962 TO 0.89047	156000			
652	0.88545	+ OR - 0.00182	0.88363 TO 0.88727	0.88180 TO 0.88909	0.87998 TO 0.89092	151000			
657	0.88593	+ OR - 0.00185	0.88408 TO 0.88778	0.88223 TO 0.88963	0.88038 TO 0.89149	146000			
662	0.88551	+ OR - 0.00187	0.88364 TO 0.88737	0.88178 TO 0.88924	0.87991 TO 0.89110	141000			
667	0.88551	+ OR - 0.00192	0.88358 TO 0.88743	0.88166 TO 0.88936	0.87974 TO 0.89128	136000			
672	0.88579	+ OR - 0.00197	0.88382 TO 0.88777	0.88185 TO 0.88974	0.87986 TO 0.89171	131000			
677	0.88515	+ OR - 0.00200	0.88316 TO 0.88715	0.88116 TO 0.88914	0.87916 TO 0.89114	126000			
682	0.88487	+ OR - 0.00206	0.88281 TO 0.88693	0.88075 TO 0.88898	0.87870 TO 0.89104	121000			
687	0.88419	+ OR - 0.00212	0.88207 TO 0.88631	0.87995 TO 0.88842	0.87783 TO 0.89054	116000			
692	0.88499	+ OR - 0.00217	0.88282 TO 0.88717	0.88065 TO 0.88934	0.87847 TO 0.89152	111000			
697	0.88424	+ OR - 0.00225	0.88199 TO 0.88649	0.87974 TO 0.88874	0.87749 TO 0.89099	106000			
702	0.88430	+ OR - 0.00231	0.88199 TO 0.88660	0.87968 TO 0.88891	0.87738 TO 0.89121	101000			

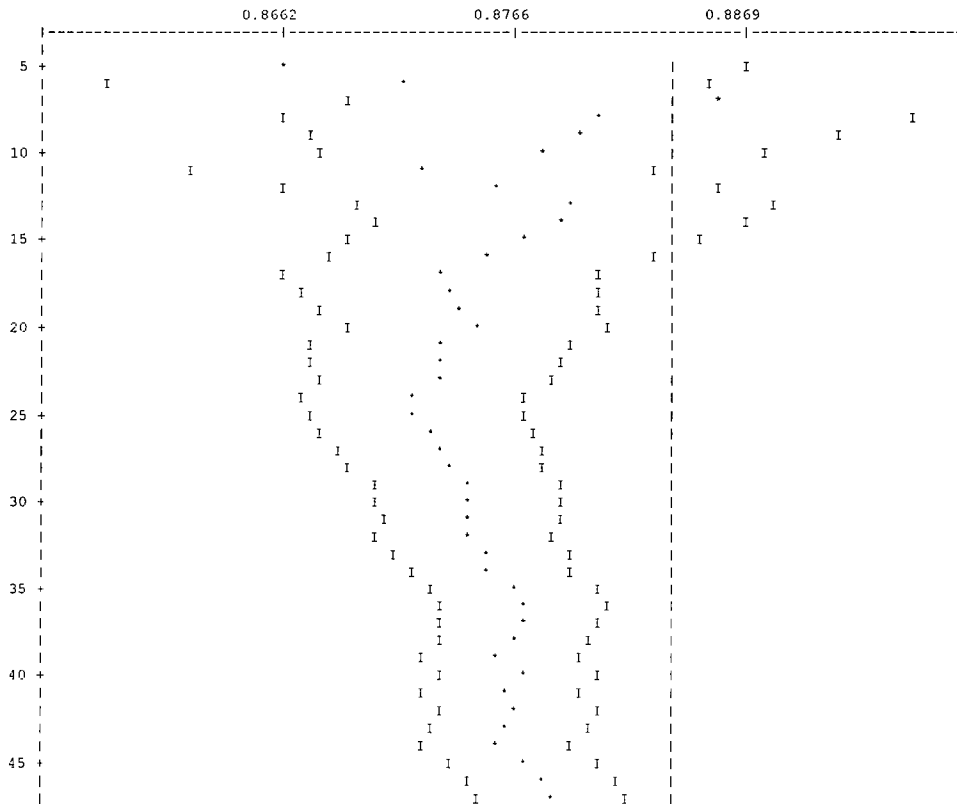
707	0.88423	+ OR - 0.00240	0.88183 TO 0.88663	0.87943 TO 0.88902	0.87704 TO 0.89142	96000
712	0.88351	+ OR - 0.00246	0.88105 TO 0.88597	0.87860 TO 0.88843	0.87614 TO 0.89088	91000
717	0.88344	+ OR - 0.00255	0.88089 TO 0.88600	0.87833 TO 0.88855	0.87578 TO 0.89110	86000
722	0.88327	+ OR - 0.00255	0.88072 TO 0.88583	0.87817 TO 0.88838	0.87561 TO 0.89094	81000
727	0.88329	+ OR - 0.00256	0.88073 TO 0.88585	0.87816 TO 0.88841	0.87560 TO 0.89098	76000
732	0.88370	+ OR - 0.00265	0.88104 TO 0.88635	0.87839 TO 0.88901	0.87573 TO 0.89166	71000
737	0.88308	+ OR - 0.00272	0.88036 TO 0.88580	0.87764 TO 0.88852	0.87492 TO 0.89125	66000
742	0.88201	+ OR - 0.00276	0.87925 TO 0.88477	0.87649 TO 0.88752	0.87373 TO 0.89028	61000
747	0.88043	+ OR - 0.00289	0.87754 TO 0.88333	0.87464 TO 0.88622	0.87175 TO 0.88912	56000
752	0.87991	+ OR - 0.00314	0.87677 TO 0.88305	0.87363 TO 0.88619	0.87050 TO 0.88932	51000
757	0.88013	+ OR - 0.00333	0.87680 TO 0.88346	0.87348 TO 0.88678	0.87015 TO 0.89011	46000
762	0.88029	+ OR - 0.00352	0.87677 TO 0.88380	0.87325 TO 0.88732	0.86973 TO 0.89084	41000
767	0.87998	+ OR - 0.00376	0.87622 TO 0.88374	0.87246 TO 0.88750	0.86871 TO 0.89125	36000

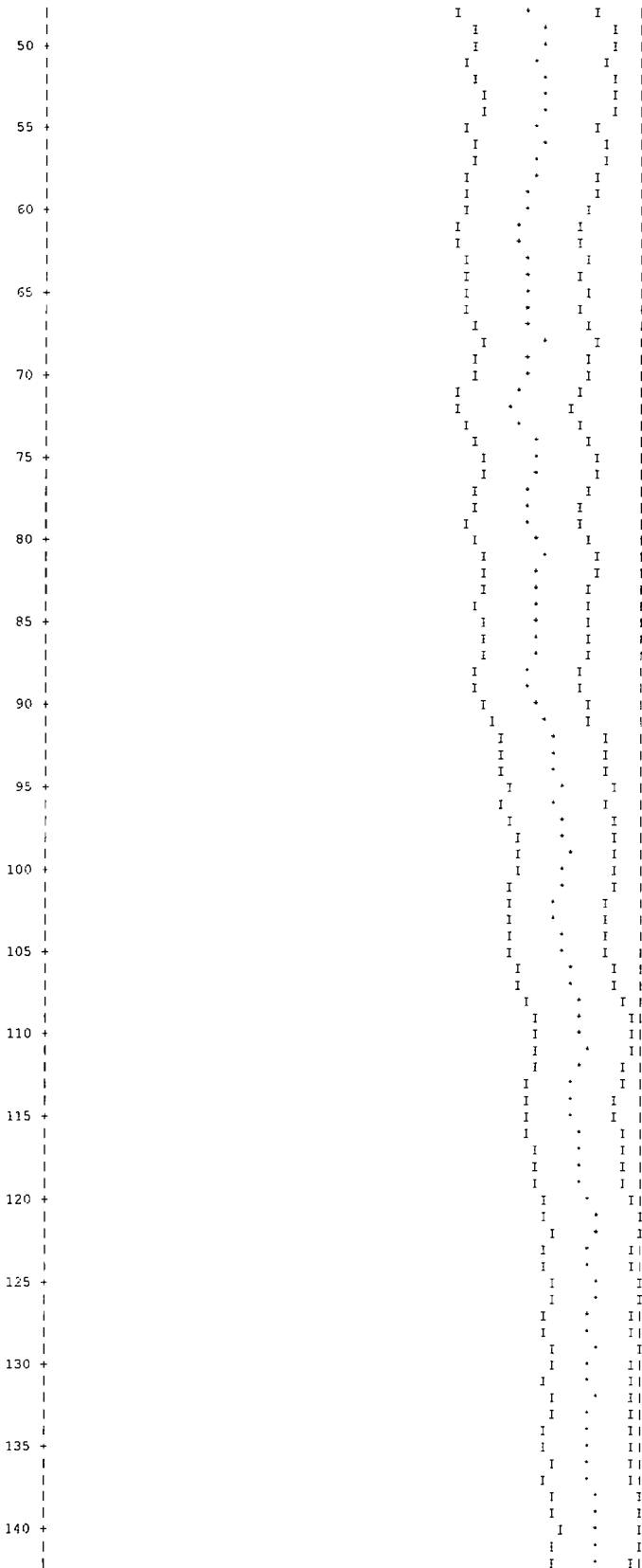
NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET

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
772	0.88000	+ OR - 0.00410	0.87590 TO 0.88410	0.87180 TO 0.88820	0.86770 TO 0.89230	31000
777	0.88163	+ OR - 0.00458	0.87705 TO 0.88621	0.87248 TO 0.89078	0.86790 TO 0.89536	26000
782	0.88369	+ OR - 0.00492	0.87877 TO 0.88861	0.87385 TO 0.89352	0.86893 TO 0.89844	21000
787	0.88638	+ OR - 0.00539	0.88099 TO 0.89177	0.87560 TO 0.89716	0.87021 TO 0.90256	16000
792	0.89299	+ OR - 0.00608	0.88692 TO 0.89907	0.88084 TO 0.90515	0.87477 TO 0.91122	11000
797	0.88612	+ OR - 0.00731	0.87881 TO 0.89343	0.87150 TO 0.90074	0.86419 TO 0.90805	6000

NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET

PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS K-EFF = 0.8840 + OR - 0.0008 WHICH OCCURS FOR 803 GENERATIONS RUN.



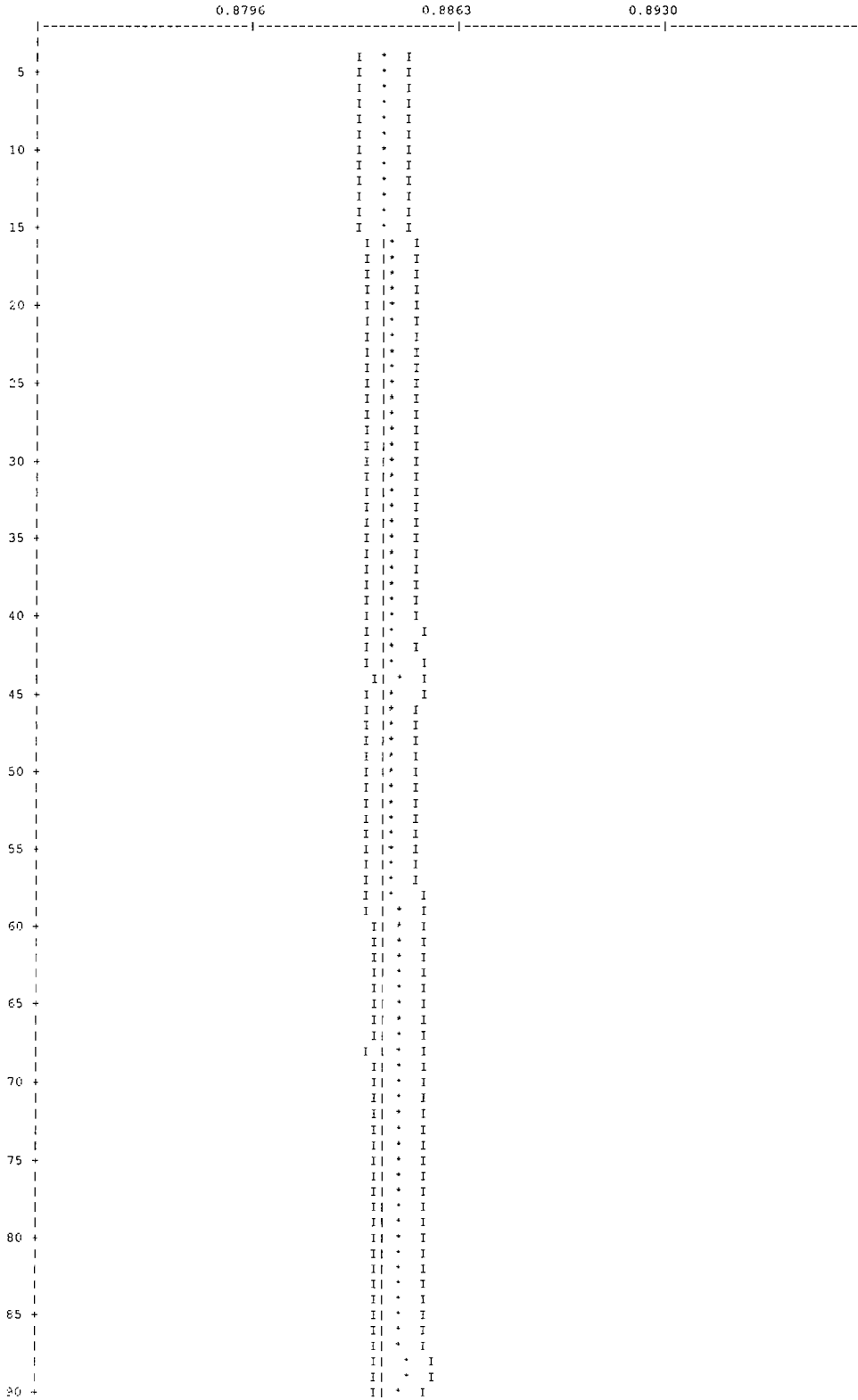






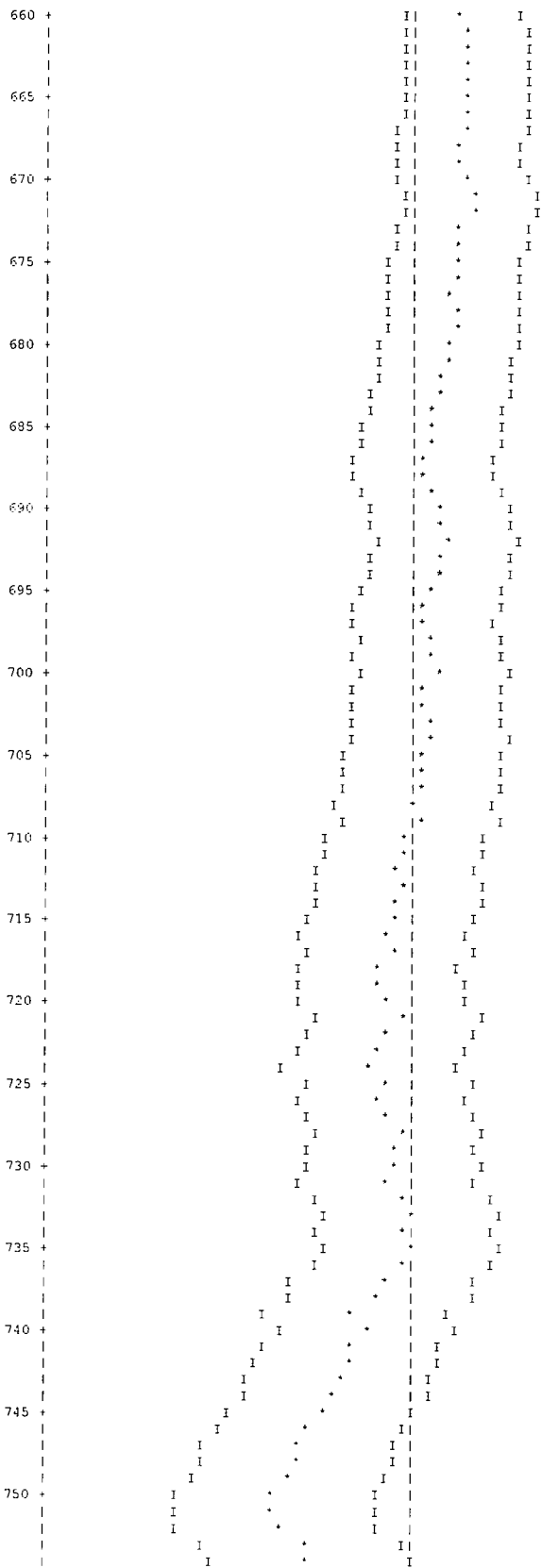
NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET

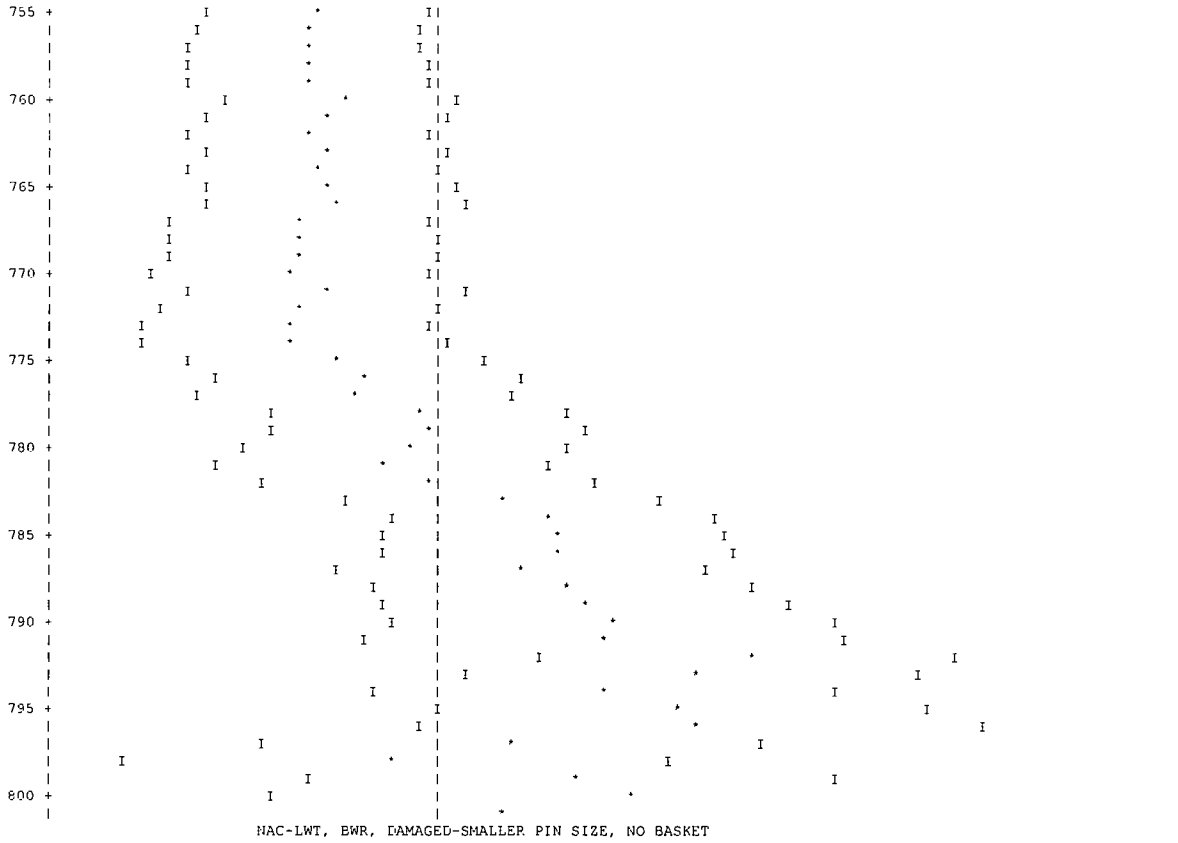
PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS  $K-EFF = 0.8840 \pm 0.0008$  WHICH OCCURS FOR 3 GENERATIONS SKIPPED.











SKIPPING 3 GENERATIONS

GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0022			1.96658E-03	1.7589	1.58278E-03	1.0608	0.00000E+00	0.0000
2	0.0090			7.96142E-03	0.5398	5.30037E-03	0.3750	0.00000E+00	0.0000
3	0.0096			8.52892E-03	0.5386	3.98226E-03	0.4683	0.00000E+00	0.0000
4	0.0040			3.49285E-03	0.6101	1.92198E-03	0.5162	0.00000E+00	0.0000
5	0.0014			1.21726E-03	0.4944	2.01274E-03	0.3204	0.00000E+00	0.0000
6	0.0013			1.12736E-03	0.4022	6.53290E-03	0.2624	0.00000E+00	0.0000
7	0.0013			1.11593E-03	0.3686	1.20121E-02	0.2564	0.00000E+00	0.0000
8	0.0012			1.06475E-03	0.4426	1.03186E-02	0.2874	0.00000E+00	0.0000
9	0.0016			1.45123E-03	0.4863	1.10415E-02	0.2762	0.00000E+00	0.0000
10	0.0036			3.16924E-03	0.4918	2.52182E-02	0.2730	0.00000E+00	0.0000
11	0.0078			6.85543E-03	0.5029	3.20578E-02	0.2575	0.00000E+00	0.0000
12	0.0104			9.21294E-03	0.5644	2.77887E-02	0.3086	0.00000E+00	0.0000
13	0.0100			8.67556E-03	0.5948	3.26728E-02	0.2939	0.00000E+00	0.0000
14	0.0082			7.23419E-03	0.5289	4.57709E-02	0.2864	0.00000E+00	0.0000
15	0.0018			1.57602E-03	0.9421	1.92787E-02	0.3773	0.00000E+00	0.0000
16	0.0012			1.08857E-03	1.2149	1.07028E-02	0.4169	0.00000E+00	0.0000
17	0.0019			1.64785E-03	1.5877	5.63296E-03	0.4683	0.00000E+00	0.0000
18	0.0025			2.21153E-03	1.6749	5.19957E-03	0.5349	0.00000E+00	0.0000
19	0.0032			2.60070E-03	1.3072	8.96525E-03	0.4679	0.00000E+00	0.0000
20	0.0131			1.15860E-02	0.7014	2.84619E-02	0.3722	0.00000E+00	0.0000
21	0.0072			6.40408E-03	1.1817	1.04813E-02	0.5451	0.00000E+00	0.0000

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22	0.0185	1.63857E-02	0.7540	2.17849E-02	0.4255	0.00000E+00	0.0000
23	0.0909	8.03774E-02	0.3495	8.51048E-02	0.2295	0.00000E+00	0.0000
24	0.2335	2.06453E-01	0.2134	1.82086E-01	0.1451	0.00000E+00	0.0000
25	0.2127	1.88054E-01	0.2450	1.57630E-01	0.1659	0.00000E+00	0.0000
26	0.2613	2.30964E-01	0.2164	1.90054E-01	0.1541	0.00000E+00	0.0000
27	0.0805	7.11557E-02	0.4296	5.86644E-02	0.3103	0.00000E+00	0.0000
SYSTEM TOTAL =		8.83998E-01	0.0906	1.00226E+00	0.0275	0.00000E+00	0.0000
ELAPSED TIME	28.69033 MINUTES						
RANDOM NUMBER=	5C3FF945F3						

NAC-LWT, BWR, DAMAGED-SMALLER FIN SIZE, NO BASKET

FREQUENCY FOR GENERATIONS 4 TO 803

0.8018	TO	0.8054	*
0.8054	TO	0.8090	*
0.8090	TO	0.8126	*
0.8126	TO	0.8161	*
0.8161	TO	0.8197	*
0.8197	TO	0.8233	**
0.8233	TO	0.8269	*
0.8269	TO	0.8304	*
0.8304	TO	0.8340	****
0.8340	TO	0.8376	*****
0.8376	TO	0.8412	*****
0.8412	TO	0.8447	*****
0.8447	TO	0.8483	*****
0.8483	TO	0.8519	*****
0.8519	TO	0.8555	*****
0.8555	TO	0.8590	*****
0.8590	TO	0.8626	*****
0.8626	TO	0.8662	*****
0.8662	TO	0.8698	*****
0.8698	TO	0.8733	*****
0.8733	TO	0.8769	*****
0.8769	TO	0.8805	*****
0.8805	TO	0.8841	*****
0.8841	TO	0.8876	*****
0.8876	TO	0.8912	*****
0.8912	TO	0.8948	*****
0.8948	TO	0.8984	*****
0.8984	TO	0.9020	*****
0.9020	TO	0.9055	*****
0.9055	TO	0.9091	*****
0.9091	TO	0.9127	*****
0.9127	TO	0.9163	*****
0.9163	TO	0.9198	*****
0.9198	TO	0.9234	*****
0.9234	TO	0.9270	*****
0.9270	TO	0.9306	*****
0.9306	TO	0.9341	****
0.9341	TO	0.9377	**
0.9377	TO	0.9413	*
0.9413	TO	0.9449	**
0.9449	TO	0.9484	*
0.9484	TO	0.9520	*

NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET

FREQUENCY FOR GENERATIONS 804 TO 803

```
0.8018 TO 0.8054 *
0.8054 TO 0.8090 *
0.8090 TO 0.8126 *
0.8126 TO 0.8161 *
0.8161 TO 0.8197 *
0.8197 TO 0.8233 **
0.8233 TO 0.8269 *
0.8269 TO 0.8304 *
0.8304 TO 0.8340 ***
0.8340 TO 0.8376 *****
0.8376 TO 0.8412 *****
0.8412 TO 0.8447 *****
0.8447 TO 0.8483 *****
0.8483 TO 0.8519 *****
0.8519 TO 0.8555 *****
0.8555 TO 0.8590 *****
0.8590 TO 0.8626 *****
0.8626 TO 0.8662 *****
0.8662 TO 0.8698 *****
0.8698 TO 0.8732 *****
0.8732 TO 0.8769 *****
0.8769 TO 0.8805 *****
0.8805 TO 0.8841 *****
0.8841 TO 0.8876 *****
0.8876 TO 0.8912 *****
0.8912 TO 0.8948 *****
0.8948 TO 0.8984 *****
0.8984 TO 0.9020 *****
0.9020 TO 0.9055 *****
0.9055 TO 0.9091 *****
0.9091 TO 0.9127 *****
0.9127 TO 0.9163 *****
0.9163 TO 0.9198 *****
0.9198 TO 0.9234 *****
0.9234 TO 0.9270 ****
0.9270 TO 0.9306 ****
0.9306 TO 0.9341 ***
0.9341 TO 0.9377 *
0.9377 TO 0.9413 *
0.9413 TO 0.9449 **
0.9449 TO 0.9484 *
0.9484 TO 0.9520 *
```

NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET

FREQUENCY FOR GENERATIONS 404 TO 803

```
0.8018 TO 0.8054
0.8054 TO 0.8090 *
0.8090 TO 0.8126
0.8126 TO 0.8161
0.8161 TO 0.8197
0.8197 TO 0.8233 **
0.8233 TO 0.8269
0.8269 TO 0.8304 *
0.8304 TO 0.8340 **
0.8340 TO 0.8376 ***
0.8376 TO 0.8412 ****
0.8412 TO 0.8447 *****
0.8447 TO 0.8483 ***
0.8483 TO 0.8519 ****
0.8519 TO 0.8555 *****
0.8555 TO 0.8590 *****
0.8590 TO 0.8626 *****
0.8626 TO 0.8662 *****
0.8662 TO 0.8698 *****
0.8698 TO 0.8733 *****
0.8733 TO 0.8769 *****
0.8769 TO 0.8805 *****
0.8805 TO 0.8841 *****
0.8841 TO 0.8876 *****
0.8876 TO 0.8912 *****
0.8912 TO 0.8948 *****
0.8948 TO 0.8984 *****
0.8984 TO 0.9020 *****
0.9020 TO 0.9055 *****
0.9055 TO 0.9091 *****
0.9091 TO 0.9127 *****
0.9127 TO 0.9163 *****
0.9163 TO 0.9198 *****
0.9198 TO 0.9234 *****
0.9234 TO 0.9270 *****
0.9270 TO 0.9306 *****
0.9306 TO 0.9341 *****
0.9341 TO 0.9377 *****
0.9377 TO 0.9413 *****
0.9413 TO 0.9449 *****
0.9449 TO 0.9484 *****
0.9484 TO 0.9520
```

NAC-LWT, BWR, DAMAGED-SMALLER PIN SIZE, NO BASKET

FREQUENCY FOR GENERATIONS 604 TO 803

```
0.8018 TO 0.8054
0.8054 TO 0.8090
0.8090 TO 0.8126
0.8126 TO 0.8161
0.8161 TO 0.8197
0.8197 TO 0.8233 *
0.8233 TO 0.8269
0.8269 TO 0.8304 *
0.8304 TO 0.8340 *
0.8340 TO 0.8376 **
0.8376 TO 0.8412 ***
0.8412 TO 0.8447 ***
0.8447 TO 0.8483 **
0.8483 TO 0.8519 ****
0.8519 TO 0.8555 ****
0.8555 TO 0.8590 *****
0.8590 TO 0.8626 *****
0.8626 TO 0.8662 *****
0.8662 TO 0.8698 *****
0.8698 TO 0.8733 *****
0.8733 TO 0.8769 *****
0.8769 TO 0.8805 *****
0.8805 TO 0.8841 *****
0.8841 TO 0.8876 *****
0.8876 TO 0.8912 *****
0.8912 TO 0.8948 *****
0.8948 TO 0.8984 *****
0.8984 TO 0.9020 *****
0.9020 TO 0.9055 *****
0.9055 TO 0.9091 *****
0.9091 TO 0.9127 *****
0.9127 TO 0.9163 *****
0.9163 TO 0.9198 *****
0.9198 TO 0.9234 *****
0.9234 TO 0.9270 *****
0.9270 TO 0.9306 *****
0.9306 TO 0.9341 *****
0.9341 TO 0.9377 *****
0.9377 TO 0.9413 *****
0.9413 TO 0.9449 *****
0.9449 TO 0.9484 *****
0.9484 TO 0.9520
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CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 28.69033 MINUTES

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**6.6.11      PULSTAR Fuel Elements in the LWT Cask**

This section contains a sample output file from the evaluation of PULSTAR fuel elements in the LWT cask. The output file is shown in Figure 6.6.11-1.

Figure 6.6.11-1 Maximum Reactivity PULSTAR Configuration

```
PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
NAC-LWT INPUT FOR HOMOGENIZED PULSTAR ELEMENTS IN CAN & INTACT ASSEMBLIES
'MIN BASKET PLATE THICKNESS & OPENING
'33 GRAMS U-235 PER ELEMENT
'AXIAL ALTERNATING SHIFT
'24.1-INCH ACTIVE FUEL HEIGHT
27GROUPDEF4 LATTICECELL
UO2 1 DEN=10.38 1.0 293.0 92235 6.5 92238 93.5 END
ZIRCALLOY 2 1.0 293.0 END
H2O 3 1.E-20 293.0 END
AL 4 1.0 293.0 END
SS304 5 1.0 293.0 END
PB 6 1.0 293.0 END
H2O 7 1.E-20 293.0 END
H2O 8 1.E-20 293.0 END
H2O 9 1.0 293.0 END
H2O 10 1.0 293.0 END
UO2 11 DEN=10.38 0.2592 293.0 92235 6.5 92238 93.5 END
ZIRCALLOY 11 0.0484 293.0 END
H2O 11 0.6924 293.0 END
END COMP
SQUAPEPITCH 1.54178 1.07442 1 3 1.1938 2 1.09982 9 END
READ PARAM TBA=5 RUN=YES PLT=NO GEN=803 NPG=1000 END PARAM
READ GEOM
UNIT 1
COM='PULSTAR FUEL ELEMENT'
CYLINDER 1 1 0.5372 63.8810 2.6670
CYLINDER 9 1 0.5499 63.8810 2.6670
CYLINDER 2 1 0.5969 66.5480 0.0000
CUBOID 3 1 2P0.7709 2P0.6668 66.5480 0.0000
UNIT 5
COM='DIVIDER CENTER STACK'
CUBOID 5 1 2P4.2926 0.7112 0.0000 110.49 0
UNIT 6
COM='DIVIDER OUTSIDE STACK'
CUBOID 5 1 2P4.2926 0.6096 0.0000 110.49 0
'TOP BASKET (CANNED ELEMENTS)
UNIT 10
COM='HOMOGENIZED PULSTAR FUEL - TOP OPENING'
CUBOID 11 1 2P4.1910 2P4.1910 76.2000 0.0000
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 11
COM='HOMOGENIZED PULSTAR FUEL - BOTTOM OPENING'
CUBOID 11 1 2P4.1910 2P4.1910 76.2000 0.0000
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 12
COM='HOMOGENIZED PULSTAR FUEL - BOTTOM RIGHT'
CUBOID 11 1 2P4.1910 2P4.1910 76.2000 0.0000
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 13
COM='HOMOGENIZED PULSTAR FUEL - TOP RIGHT'
CUBOID 11 1 2P4.1910 2P4.1910 76.2000 0.0000
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 14
COM='HOMOGENIZED PULSTAR FUEL - BOTTOM LEFT'
CUBOID 11 1 2P4.1910 2P4.1910 76.2000 0.0000
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 15
COM='HOMOGENIZED PULSTAR FUEL - TOP LEFT'
CUBOID 11 1 2P4.1910 2P4.1910 76.2000 0.0000
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 16
COM='HOMOGENIZED PULSTAR FUEL - CENTER OPENING'
CUBOID 11 1 2P4.1910 2P4.1910 76.2000 0.0000
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 20
COM='CENTER COLUMN OF THREE OPENINGS'
ARRAY 2 -4.2926 -13.5890 0.0000
REPLICATE 5 1 4R0.7112 2R0.0 1
UNIT 21
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 4 -4.2926 -8.8900 0.0000
REPLICATE 5 1 0.0000 0.3048 2R0.3048 2R0.0 1
UNIT 22
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 3 -4.2926 -8.8900 0.0000
REPLICATE 5 1 0.3048 0.0000 2R0.3048 2R0.0 1
UNIT 30
COM='MTR 7-ASSY BASKET'
CYLINDER 3 1 17.0500 110.4900 0.0000
HOLE 20 0.0000 0.0000 0.0000
HOLE 21 -9.2974 0.0000 0.0000
HOLE 22 9.2974 0.0000 0.0000
CYLINDER 5 1 18.8913 110.4900 -1.2700
CYLINDER 6 1 33.4963 110.4900 -1.2700
CYLINDER 5 1 36.5443 110.4900 -1.2700
CYLINDER 7 1 49.2443 110.4900 -1.2700
CYLINDER 5 1 49.8539 110.4900 -1.2700
CUBOID 8 1 4P49.8539 110.4900 -1.2700
'TOP MIDDLE BASKET (INTACT ASSEMBLIES)
```

UNIT 110  
COM='PULSTAR ASSEMBLY - TOP OPENING'  
ARRAY 1 -3.8545 -3.3338 43.9420  
CUBOID 2 1 2P4.0069 2P3.4862 110.4900 43.9420  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 111  
COM='PULSTAR ASSEMBLY - BOTTOM OPENING'  
ARRAY 1 -3.8545 -3.3338 43.9420  
CUBOID 2 1 2P4.0069 2P3.4862 110.4900 43.9420  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 112  
COM='PULSTAR ASSEMBLY - BOTTOM RIGHT'  
ARRAY 1 -3.8545 -3.3338 43.9420  
CUBOID 2 1 2P4.0069 2P3.4862 110.4900 43.9420  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 113  
COM='PULSTAR ASSEMBLY - TOP RIGHT'  
ARRAY 1 -3.8545 -3.3338 43.9420  
CUBOID 2 1 2P4.0069 2P3.4862 110.4900 43.9420  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 114  
COM='PULSTAR ASSEMBLY - BOTTOM LEFT'  
ARRAY 1 -3.8545 -3.3338 43.9420  
CUBOID 2 1 2P4.0069 2P3.4862 110.4900 43.9420  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 115  
COM='PULSTAR ASSEMBLY - TOP LEFT'  
ARRAY 1 -3.8545 -3.3338 43.9420  
CUBOID 2 1 2P4.0069 2P3.4862 110.4900 43.9420  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 116  
COM='PULSTAR ASSEMBLY - CENTER OPENING'  
ARRAY 1 -3.8545 -3.3338 43.9420  
CUBOID 2 1 2P4.0069 2P3.4862 110.4900 43.9420  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 120  
COM='CENTER COLUMN OF THREE OPENINGS'  
ARRAY 12 -4.2926 -13.5890 0.0000  
REPLICATE 5 1 4R0.7112 2R0.0 1  
UNIT 121  
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS'  
ARRAY 14 -4.2926 -8.8900 0.0000  
REPLICATE 5 1 0.0000 0.3048 2R0.3048 2R0.0 1  
UNIT 122  
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS'  
ARRAY 13 -4.2926 -8.8900 0.0000  
REPLICATE 5 1 0.3048 0.0000 2R0.3048 2R0.0 1  
UNIT 130  
COM='MTR 7-ASSY BASKET'  
CYLINDER 3 1 17.0500 110.4900 0.0000  
HOLE 120 0.0000 0.0000 0.0000  
HOLE 121 -9.2974 0.0000 0.0000  
HOLE 122 9.2974 0.0000 0.0000  
CYLINDER 5 1 18.8913 110.4900 -1.2700  
CYLINDER 6 1 33.4863 110.4900 -1.2700  
CYLINDER 5 1 36.5443 110.4900 -1.2700  
CYLINDER 7 1 49.2443 110.4900 -1.2700  
CYLINDER 5 1 49.8538 110.4900 -1.2700  
CUBOID 8 1 4P49.8538 110.4900 -1.2700  
'BOTTOM MIDDLE BASKET (INTACT ASSEMBLIES)  
UNIT 210  
COM='PULSTAR ASSEMBLY - TOP OPENING'  
ARRAY 1 -3.8545 -3.3338 0.0000  
CUBOID 2 1 2P4.0069 2P3.4862 66.5480 0.0000  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 211  
COM='PULSTAR ASSEMBLY - BOTTOM OPENING'  
ARRAY 1 -3.8545 -3.3338 0.0000  
CUBOID 2 1 2P4.0069 2P3.4862 66.5480 0.0000  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 212  
COM='PULSTAR ASSEMBLY - BOTTOM RIGHT'  
ARRAY 1 -3.8545 -3.3338 0.0000  
CUBOID 2 1 2P4.0069 2P3.4862 66.5480 0.0000  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 213  
COM='PULSTAR ASSEMBLY - TOP RIGHT'  
ARRAY 1 -3.8545 -3.3338 0.0000  
CUBOID 2 1 2P4.0069 2P3.4862 66.5480 0.0000  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 214  
COM='PULSTAR ASSEMBLY - BOTTOM LEFT'  
ARRAY 1 -3.8545 -3.3338 0.0000  
CUBOID 2 1 2P4.0069 2P3.4862 66.5480 0.0000  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 215  
COM='PULSTAR ASSEMBLY - TOP LEFT'  
ARRAY 1 -3.8545 -3.3338 0.0000  
CUBOID 2 1 2P4.0069 2P3.4862 66.5480 0.0000  
CUBOID 3 1 4P4.2926 110.4900 0.0000  
UNIT 216  
COM='PULSTAR ASSEMBLY - CENTER OPENING'  
ARRAY 1 -3.8545 -3.3338 0.0000  
CUBOID 2 1 2P4.0069 2P3.4862 66.5480 0.0000  
CUBOID 3 1 4P4.2926 110.4900 0.0000

```
UNIT 220
COM='CENTER COLUMN OF THREE OPENINGS'
ARRAY 22 -4.2926 -13.5890 0.0000
REPLICATE 5 1 4R0.7112 2R0.0 1
UNIT 221
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 24 -4.2926 -8.8900 0.0000
REPLICATE 5 1 0.0000 0.3048 2R0.3048 2R0.0 1
UNIT 222
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 23 -4.2926 -8.8900 0.0000
REPLICATE 5 1 0.3048 0.0000 2R0.3048 2R0.0 1
UNIT 230
COM='MTR 7-ASSY BASKET'
CYLINDER 3 1 17.0500 110.4900 0.0000
HOLE 220 0.0000 0.0000 0.0000
HOLE 221 -9.2974 0.0000 0.0000
HOLE 222 9.2974 0.0000 0.0000
CYLINDER 5 1 18.8913 110.4900 -1.2700
CYLINDER 6 1 33.4963 110.4900 -1.2700
CYLINDER 5 1 36.5443 110.4900 -1.2700
CYLINDER 7 1 49.2443 110.4900 -1.2700
CYLINDER 5 1 49.8539 110.4900 -1.2700
CUBOID 8 1 4P49.8539 110.4900 -1.2700
'BOTTOM BASKET (CANNED ELEMENTS)
UNIT 310
COM='HOMOGENIZED PULSTAR FUEL - TOP OPENING'
CUBOID 11 1 2P4.1910 2P4.1910 110.4900 34.2900
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 311
COM='HOMOGENIZED PULSTAR FUEL - BOTTOM OPENING'
CUBOID 11 1 2P4.1910 2P4.1910 110.4900 34.2900
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 312
COM='HOMOGENIZED PULSTAR FUEL - BOTTOM RIGHT'
CUBOID 11 1 2P4.1910 2P4.1910 110.4900 34.2900
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 313
COM='HOMOGENIZED PULSTAR FUEL - TOP RIGHT'
CUBOID 11 1 2P4.1910 2P4.1910 110.4900 34.2900
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 314
COM='HOMOGENIZED PULSTAR FUEL - BOTTOM LEFT'
CUBOID 11 1 2P4.1910 2P4.1910 110.4900 34.2900
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 315
COM='HOMOGENIZED PULSTAR FUEL - TOP LEFT'
CUBOID 11 1 2P4.1910 2P4.1910 110.4900 34.2900
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 316
COM='HOMOGENIZED PULSTAR FUEL - CENTER OPENING'
CUBOID 11 1 2P4.1910 2P4.1910 110.4900 34.2900
CUBOID 3 1 4P4.2926 110.4900 0.0000
UNIT 320
COM='CENTER COLUMN OF THREE OPENINGS'
ARRAY 32 -4.2926 -13.5890 0.0000
REPLICATE 5 1 4R0.7112 2R0.0 1
UNIT 321
COM='LEFT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 34 -4.2926 -8.8900 0.0000
REPLICATE 5 1 0.0000 0.3048 2R0.3048 2R0.0 1
UNIT 322
COM='RIGHT OUTSIDE COLUMN OF TWO OPENINGS'
ARRAY 33 -4.2926 -8.8900 0.0000
REPLICATE 5 1 0.3048 0.0000 2R0.3048 2R0.0 1
UNIT 330
COM='MTR 7-ASSY BASKET'
CYLINDER 3 1 17.0500 110.4900 0.0000
HOLE 320 0.0000 0.0000 0.0000
HOLE 321 -9.2974 0.0000 0.0000
HOLE 322 9.2974 0.0000 0.0000
CYLINDER 5 1 18.8913 110.4900 -1.2700
CYLINDER 6 1 33.4963 110.4900 -1.2700
CYLINDER 5 1 36.5443 110.4900 -1.2700
CYLINDER 7 1 49.2443 110.4900 -1.2700
CYLINDER 5 1 49.8539 110.4900 -1.2700
CUBOID 8 1 4P49.8539 110.4900 -1.2700
UNIT 40
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 5 1 36.5188 13.6775 -14.1351
CYLINDER 8 1 49.8539 13.6775 -14.1351
CUBOID 8 1 4P49.8539 13.6775 -14.1351
UNIT 41
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 6 1 26.3525 2P3.81
CYLINDER 5 1 36.6188 +13.36 -12.7
CYLINDER 8 1 49.8539 +13.36 -12.7
CUBOID 8 1 4P49.8539 +13.36 -12.7
UNIT 42
COM='THIN TOP AND BOTTOM SHELL OF NEUTRON SHIELD - SUBTRACTED FROM LID MODEL'
CYLINDER 5 1 49.8539 0.61 0.0
CUBOID 8 1 4P49.8539 0.61 0.0
UNIT 70
COM='STACK OF 4 BASKETS IN CASK WITH LID AND BOTTOM'
ARRAY 10 -49.8539 -49.8539 0.0
```

```
GLOBAL UNIT 80
COM='3 CASKS IN TRIANGULAR PITCH'
CUBOID 8 1 4P101.0 500.2 0.0
HOLE 70 0.0 50.0 0.0
HOLE 70 -50.0 -50.0 0.0
HOLE 70 50.0 -50.0 0.0
END GEOM
READ ARRAY
ARA=1 NUX=5 NUY=5 NUZ=1 FILL 25R1 END FILL
ARA=2 NUX=1 NUY=5 NUZ=1 FILL 11 5 16 5 10 END FILL
ARA=3 NUX=1 NUY=3 NUZ=1 FILL 12 6 13 END FILL
ARA=4 NUX=1 NUY=3 NUZ=1 FILL 14 6 15 END FILL
ARA=12 NUX=1 NUY=5 NUZ=1 FILL 111 5 116 5 110 END FILL
ARA=13 NUX=1 NUY=3 NUZ=1 FILL 112 6 113 END FILL
ARA=14 NUX=1 NUY=3 NUZ=1 FILL 114 6 115 END FILL
ARA=22 NUX=1 NUY=5 NUZ=1 FILL 211 5 216 5 210 END FILL
ARA=23 NUX=1 NUY=3 NUZ=1 FILL 212 6 213 END FILL
ARA=24 NUX=1 NUY=3 NUZ=1 FILL 214 6 215 END FILL
ARA=32 NUX=1 NUY=5 NUZ=1 FILL 311 5 316 5 310 END FILL
ARA=33 NUX=1 NUY=3 NUZ=1 FILL 312 6 313 END FILL
ARA=34 NUX=1 NUY=3 NUZ=1 FILL 314 6 315 END FILL
ARA=10 NUX=1 NUY=1 NUZ=8 FILL 41 42 330 230 130 30 42 40 END FILL
END ARRAY
READ BOUNDS ALL=H2O END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CENTER ELEMENT - FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-5.0 YUL=5.0 ZUL=100.0
XLR=5.0 YLR=-5.0 ZLR=100.0 END
TTL='X-Y PLOT OF BASKET - FUEL ELEVATION'
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-17.0 YUL=17.0 ZUL=100.0
XLR=17.0 YLR=-17.0 ZLR=100.0 END
TTL='X-Y PLOT OF CASK - FUEL ELEVATION'
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-65.0 YUL=65.0 ZUL=100.0
XLR=65.0 YLR=-65.0 ZLR=100.0 END
TTL='Y-Z (X=0) PLOT OF BOTTOM BASKET - CENTER SECTION'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=55.0
XLR=0.0 YLR=5.0 ZLR=50.0 END
TTL='Y-Z (X=0) PLOT OF BOTTOM BASKET - CENTER FUEL ELEMENT'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=176.1
XLR=0.0 YLR=5.0 ZLR=26.6 END
TTL='Y-Z (X=-2) PLOT OF BOTTOM BASKET'
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-15.0 ZUL=176.1
XLR=-2.0 YLR=15.0 ZLR=26.6 END
TTL='Y-Z (X=-2) PLOT OF CASK - R=17.0'
LPI=5 NAX=1000
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-17.0 ZUL=502.0
XLR=-2.0 YLR=17.0 ZLR=-1.0 END
TTL='Y-Z (X=-2) PLOT OF CASK - R=51.0'
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-51.0 ZUL=502.0
XLR=-2.0 YLR=51.0 ZLR=-1.0 END
END PLOT
END DATA
```

```
SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.77 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 4.77 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 307.04 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 314.94 (SECONDS).
```





```

25055      2.000 WT%
26304      69.500 WT%
28304      9.500 WT%

END
SC FB      STANDARD COMPOSITION
MX         6 MIXTURE NO.
VF         1.0000 VOLUME FRACTION
ROTH      11.3440 THEORETICAL DENSITY
NEL        1 NO. ELEMENTS
ICP        1 0/1 MIXTURE/COMPOUND
TEMP      293.0 DEG KELVIN
          92000      1.00 ATOM/MOLECULE
END

SC H2O     STANDARD COMPOSITION
MX         7 MIXTURE NO.
VF         0.0000 VOLUME FRACTION
ROTH      0.9982 THEORETICAL DENSITY
NEL        2 NO. ELEMENTS
ICP        1 0/1 MIXTURE/COMPOUND
TEMP      293.0 DEG KELVIN
          1001      2.00 ATOMS/MOLECULE
          8016      1.00 ATOM/MOLECULE
END

SC H2O     STANDARD COMPOSITION
MX         8 MIXTURE NO.
VF         0.0000 VOLUME FRACTION
ROTH      0.9982 THEORETICAL DENSITY
NEL        2 NO. ELEMENTS
ICP        1 0/1 MIXTURE/COMPOUND
TEMP      293.0 DEG KELVIN
          1001      2.00 ATOMS/MOLECULE
          8016      1.00 ATOM/MOLECULE
END

SC H2O     STANDARD COMPOSITION
MX         9 MIXTURE NO.
VF         1.0000 VOLUME FRACTION
ROTH      0.9982 THEORETICAL DENSITY
NEL        2 NO. ELEMENTS
ICP        1 0/1 MIXTURE/COMPOUND
TEMP      293.0 DEG KELVIN
          1001      2.00 ATOMS/MOLECULE
          8016      1.00 ATOM/MOLECULE
END

SC H2O     STANDARD COMPOSITION
MX        10 MIXTURE NO.
VF         1.0000 VOLUME FRACTION
ROTH      0.9982 THEORETICAL DENSITY
NEL        2 NO. ELEMENTS
ICP        1 0/1 MIXTURE/COMPOUND
TEMP      293.0 DEG KELVIN
          1001      2.00 ATOMS/MOLECULE
          8016      1.00 ATOM/MOLECULE
END

SC UO2     STANDARD COMPOSITION
MX        11 MIXTURE NO.
VF         0.2592 VOLUME FRACTION
ROTH     10.3800 SPECIFIED DENSITY
NEL        2 NO. ELEMENTS
ICP        1 0/1 MIXTURE/COMPOUND
TEMP      293.0 DEG KELVIN
          92000      1.00 ATOM/MOLECULE
                   92235      6.500 WT%
                   92238      93.500 WT%
          8016      2.00 ATOMS/MOLECULE
END

SC ZIRCALLOY STANDARD COMPOSITION
MX        11 MIXTURE NO.
VF         0.0484 VOLUME FRACTION
ROTH     6.5600 THEORETICAL DENSITY
NEL        1 NO. ELEMENTS
ICP        1 0/1 MIXTURE/COMPOUND
TEMP      293.0 DEG KELVIN
          40302      1.00 ATOM/MOLECULE
END

SC H2O     STANDARD COMPOSITION
MX        11 MIXTURE NO.
VF         0.6924 VOLUME FRACTION
ROTH     0.9982 THEORETICAL DENSITY
NEL        2 NO. ELEMENTS
ICP        1 0/1 MIXTURE/COMPOUND
TEMP      293.0 DEG KELVIN
          1001      2.00 ATOMS/MOLECULE
          8016      1.00 ATOM/MOLECULE
END

**** PROBLEM GEOMETRY ****
CTP SQUAREPITCH CELL TYPE
PITCH      1.5418 CM CENTER TO CENTER SPACING

```



FUELOD 1.0744 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 3 MIXTURE NO. OF MODERATOR  
CLADOD 1.1938 CM CLAD OUTER DIAMETER  
MCLAD 2 MIXTURE NO. OF CLAD  
GAPOD 1.0998 CM GAP OUTER DIAMETER  
MGAP 9 MIXTURE NO. OF GAP  
ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL  
ZONE 2 IS GAP  
ZONE 3 IS CLAD  
ZONE 4 IS MOD

```

.....
***
***                               NAC-LWT INPUT FOR HOMOGENIZED PULSTAR ELEMENTS IN CAN & INTACT ASSEMBLIES
***
.....
***                               ***** DATA LIBRARY INFORMATION *****
***
***                               UNIT NUMBER          DATA SET NAME          VOLUME          UNIT FUNCTION
***                               -----          -
***                               89      M:\scale43\DATALIB\FT89F001          STANDARD COMPOSITION LIBRARY
***                               82      M:\scale43\DATALIB\FT82F001          CROSS SECTION LIBRARY
***                               11      W:\zjr\Lwt\Pulstar\KENOVA\Aych\lwtAych2_x1_r          SHORT CROSS SECTION LIBRARY
***                               90      W:\zjr\Lwt\Pulstar\KENOVA\Aych\lwtAych2_x1_r          INPUT DATA DIRECT ACCESS
***
.....
***                               STANDARD COMPOSITION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER      : 89
***                               DATASET NAME      : M:\scale43\DATALIB\FT89F001
***                               LIBRARY TITLE     : SCALE-4 STANDARD COMPOSITION LIBRARY
***                               637 STANDARD COMPOSITIONS, 490 NUCLIDES
***                               90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.
***                               CREATION DATE     : 6/30/95
***
***                               CROSS SECTION LIBRARY DATA
***                               -----
***
***                               UNIT NUMBER      : 82
***                               DATASET NAME      : M:\scale43\DATALIB\FT82F001
***                               LIBRARY TITLE     : SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY
***                               BASED ON ENDF-B VERSION 4 DATA
***                               COMPILED FOR NRC   1/27/89
***                               LAST UPDATED     08/12/94
***                               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 .....

```

'TOP BASKET (CANNED ELEMENTS)  
'TOP MIDDLE BASKET (INTACT ASSEMBLIES)  
'BOTTOM MIDDLE BASKET (INTACT ASSEMBLIES)  
'BOTTOM BASKET (CANNED ELEMENTS)

```

***** 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.



```

.....
.....
.....
PROGRAM VERIFICATION INFORMATION
.....
CODE SYSTEM: SCALE-PC VERSION: 4.3
.....
.....
PROGRAM: 000008
.....
CREATION DATE: 09/16/95
.....
VOLUME: Eng
.....
LIBRARY: M:\SCALE43\WIN_MTXEXE
.....
THIS IS NOT A SCALE-PC CONFIGURATION CONTROLLED CODE
.....
JOBNAME: SCALE-PC
.....
DATE OF EXECUTION: 09/14/04
.....
TIME OF EXECUTION: 15:51:56
.....
.....
.....

```

```

-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) 2
IZM--NUMBER OF ZONES OR MATERIAL REGIONS 11
MS--MIXING TABLE LENGTH 25
IBL--SHIELDED CROSS SECTION EDIT OPTION (0/1--NO/YES) 0
IBR--BONDARENKO FACTOR EDIT OPTION (0/1--NO/YES) 0
ISSOPT--DANC OFF FACTOR OPTION 0
CONVERGENCE CRITERION 1.00000E-03
GEOMETRY CORRECTION FACTOR FOR WIGNER RATIONAL APPROXIMATION 1.350E+00

```

```

3Q ARRAY HAS 25 ENTRIES.
4Q ARRAY HAS 25 ENTRIES.
5Q ARRAY HAS 25 ENTRIES.
6Q ARRAY HAS 11 ENTRIES.
7Q ARRAY HAS 11 ENTRIES.
8Q ARRAY HAS 11 ENTRIES.
9Q ARRAY HAS 11 ENTRIES.
10Q ARRAY HAS 25 ENTRIES.
11Q ARRAY HAS 11 ENTRIES.

```

M I X I N G T A B L E

ENTPY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	1.52378E-03	1092235
2	11	92235	3.94965E-04	11092235
3	1	92238	2.16422E-02	1092238
4	11	92238	5.60966E-03	11092238
5	1	8016	4.63320E-02	1008016
6	3	8016	3.33846E-22	3008016
7	7	8016	3.33846E-22	7008016
8	8	8016	3.33846E-22	8008016

9	9	8016	3.33846E-02	9008016
10	10	8016	3.33846E-02	10008016
11	11	8016	3.51247E-02	11008016
12	2	40302	4.33078E-02	2040302
13	11	40302	2.09610E-03	11040302
14	3	1001	6.67692E-22	3001001
15	7	1001	6.67692E-22	7001001
16	8	1001	6.67692E-22	8001001
17	9	1001	6.67692E-22	9001001
18	10	1001	6.67692E-22	10001001
19	11	1001	4.62310E-02	11001001
20	4	13027	6.03066E-02	4013027
21	5	24304	1.74286E-02	5024304
22	5	25055	1.73633E-03	5025055
23	5	26304	5.93579E-02	5026304
24	5	28304	7.72070E-03	5028304
25	6	82000	3.29690E-02	6082000

GEOMETRY AND MATERIAL DESCRIPTION

ZONE	MIXTURE	OUTER DIMENSION	TEMPERATURE	EXTRA XS	TYPE (0/1--FUEL/MOD)
1	1	5.37210E-01	2.93000E+02	3.24169E-02	0
2	9	5.49910E-01	2.93000E+02	0.00000E+00	0
3	2	5.96900E-01	2.93000E+02	2.51346E+00	0
4	3	8.69856E-01	2.93000E+02	0.00000E+00	0
5	4	5.86986E+00	2.93000E+02	0.00000E+00	0
6	5	1.08699E+01	2.93000E+02	0.00000E+00	0
7	6	1.58699E+01	2.93000E+02	0.00000E+00	0
8	7	2.08699E+01	2.93000E+02	0.00000E+00	0
9	8	2.58699E+01	2.93000E+02	0.00000E+00	0
10	10	3.08699E+01	2.93000E+02	0.00000E+00	0
11	11	3.58699E+01	2.93000E+02	0.00000E+00	0

4509 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	1001	HYDROGEN	FROM LOG 18 TO LOG 1	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	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	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	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	13027	AL-27 1193 218 G	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	40302	ZIRCALLOY	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	40302	ZIRCALLOY	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	40302	ZIRCALLOY	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	82000	PE 1288 218HGP	FROM LOG 11 TO LOG 1	BONDARENKO TRIGGER 0
COPY	92235	URANIUM-235	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	92235	URANIUM-235	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	92235	URANIUM-235	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	92238	URANIUM-238	FROM LOG 11 TO LOG 18	BONDARENKO TRIGGER 0
COPY	92238	URANIUM-238	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0
COPY	92238	URANIUM-238	FROM LOG 18 TO LOG 1	BONDARENKO TRIGGER 0

SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
 BASED ON ENDF-B VERSION 4 DATA  
 COMPILED FOR HRC 1/27/89  
 LAST UPDATED 08/12/94  
 L.M.PETRIE - ORNL

TAPE ID 4321 NUMBER OF NUCLIDES 25  
 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 08/12/94	ID 2001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 7001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 8001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 9001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 10001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 11001001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 1008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 7008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 8008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 9008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 1008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 1108016
AL-27	1193 218 GP 040375(5)	UPDATED 08/12/94	ID 4013027
CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 5024304
MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	ID 5025055
FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 5026304
NI 1190 WT SS-304 (1/EST) P-3 293K SF=5+4(42375)'		UPDATED 08/12/94	ID 5028304
ZIRCALLOY	ENDF/B-IV MAT 1284	UPDATED 08/12/94	ID 2040302
ZIRCALLOY	ENDF/B-IV MAT 1284	UPDATED 08/12/94	ID 11040302
PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 6082000
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	ID 1092235
URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	ID 11092235
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 1092238
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 11092238

TAPE COPY USED 0 I/O'S, AND TOOK 0.17 SECONDS

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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              AAAAAAAAAAAAAA   WW      W      WW      LL
NN NN   NN      II              TT              AAAAAAAAAAAAAA   WW      WWW     WW      LL
NN NN   NN      II              TT              AA      AA      WW      WW      WW      LL
NN NN   NN      II              TT              AA      AA      WW      WW      WW      LL
NN NN   NN      II              TT              AA      AA      WWW     WWW     WW      LL
NN NN   NN      IIIIIIIIIIII      TT              AA      AA      WWW     WWW     LLLLLLLLLLLLLL
NN NN   NN      IIIIIIIIIIII      TT              AA      AA      WW      WW     LLLLLLLLLLLLLL
    
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SS      SS      CC      AA      AA      LL      EE      PP      CC      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC
SS      CC      AA      AA      LL      EE      PP      PP      CC
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SSSSSSSSSSSS      CC      AAAAAAAAAAAAAA LL      EEEEEEEEEE      PPPPPPPPPPPPPP CC
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SS      SS      CC      AA      AA      LL      EE      PP      CC
SS      SS      CC      AA      AA      LL      EE      PP      CC
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11      55      :::      55      11      :::      55      66
11      55      :::      55      11      :::      55      66
11      555555555555      555555555555      11      555555555555      666666666666
11      555555555555      555555555555      11      555555555555      666666666666
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11111111 555555555555      555555555555      11111111      555555555555      666666666666
    
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10	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	8008016	
11	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	9008016	
12	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	1008016	
13	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	11008016	
14	AL-27	1193 218 GP 040375(5)	UPDATED 08/12/94	4013027	
15	CR 1191	WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED 08/12/94	5024304	
16	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94	5025055	
17	FE 1192	WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED 08/12/94	5026304	
18	NI 1190	WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED 08/12/94	5028304	
19	ZIRCALLOY	ENDF/B-IV MAT 1284	UPDATED 08/12/94	2040302	
20	ZIRCALLOY	ENDF/B-IV MAT 1284	UPDATED 08/12/94	11040302	
21	PB 1288	218NGP 042375 P-3 293K	UPDATED 08/12/94	6082000	
22	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	1092235	
23	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94	11092235	
24	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	1092238	
25	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	11092238	
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	3001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	7001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	8001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	9001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	10001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	11001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	1008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	3008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	7008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	8008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	9008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	10008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	11008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
AL-27	1193 218 GP 040375(5)		UPDATED 08/12/94	4013027	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
CR 1191	WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	5024304	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
MANGANESE-55	ENDF/B-IV MAT 1197		UPDATED 08/12/94	5025055	TEMPERATURE= 293.00
GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00					
RESONANCE DATA FOR THIS NUCLIDE					
MASS NUMBER (A)	=	54.466	TEMPERATURE (KELVIN)	=	293.000
POTENTIAL SCATTER SIGMA	=	2.590	LUMPED NUCLEAR DENSITY	=	1.7363295E-02
SPIN FACTOR (G)	=	14.448	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	=	55.845	SIGMA (PER ABSORBER ATOM)	=	3.4663022E+02
MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.					
MASS OF MODERATOR-2	=	55.925	SIGMA (PER ABSORBER ATOM)	=	1.2557598E+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		
8	-5.518785E-04	0.000000E+00	-3.944190E-01		
9	-2.797993E-03	0.000000E+00	-2.293471E+00		
10	-3.291452E-01	0.000000E+00	-3.820862E+01		
11	-2.680562E+00	0.000000E+00	-1.159996E+02		



EXCESS RESONANCE INTEGRALS

RESOLVED  
 ABSORPTION 3.33719E+00  
 FISSION 0.00000E+00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00  
 FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 5026304 TEMPERATURE= 293.00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00  
 NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)' UPDATED 08/12/94 5028304 TEMPERATURE= 293.00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00  
 ZIRCALLOY ENDF/B-IV MAT 1284 UPDATED 08/12/94 2040302 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 90.436 TEMPERATURE (KELVIN) = 293.000  
 POTENTIAL SCATTER SIGMA = 6.385 LUMPED NUCLEAR DENSITY = 4.3307818E-02  
 SPIN FACTOR (G) = 1.079 LUMP DIMENSION (A-BAR) = 5.9689999E-01  
 INNER RADIUS = 5.4991001E-01 DANCOFF CORRECTION (C) = 7.8146917E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-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	-5.981358E-04	0.000000E+00	-4.731437E-01
9	-3.409349E-02	0.000000E+00	-1.425288E+00
10	-3.610238E-02	0.000000E+00	-8.147648E-01
11	-1.129208E-01	0.000000E+00	-5.208245E-01

EXCESS RESONANCE INTEGRALS

RESOLVED  
 ABSORPTION 4.65199E-01  
 FISSION 0.00000E+00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00  
 ZIRCALLOY ENDF/B-IV MAT 1284 UPDATED 08/12/94 11040302 TEMPERATURE= 293.00

GEOMETRY HAS BEEN SET TO HOMOGENEOUS AS LBAR IS 0.0000E+00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 90.436 TEMPERATURE (KELVIN) = 293.000  
 POTENTIAL SCATTER SIGMA = 6.385 LUMPED NUCLEAR DENSITY = 2.0960984E-03  
 SPIN FACTOR (G) = 1.079 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) = 4.4951505E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 24.072 SIGMA (PER ABSORBER ATOM) = 1.0036559E+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
8	-8.728580E-05	0.000000E+00	-6.961700E-02
9	-8.536950E-03	0.000000E+00	-3.447169E-01
10	-7.519929E-03	0.000000E+00	-1.797771E-01
11	-3.148421E-02	0.000000E+00	-1.579333E-01

EXCESS RESONANCE INTEGRALS

RESOLVED  
 ABSORPTION 6.97865E-01  
 FISSION 0.00000E+00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00  
 FE 1288 218GFP 042375 P-3 293K UPDATED 08/12/94 6082000 TEMPERATURE= 293.00  
 PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00  
 UPLANIUM-235 ENDF/B-IV MAT 1261 UPDATED 08/12/94 1092235 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 233.025 TEMPERATURE (KELVIN) = 293.000  
 POTENTIAL SCATTER SIGMA = 11.500 LUMPED NUCLEAR DENSITY = 1.5237845E-03

SPIN FACTOR (G) = 15171.100 LUMP DIMENSION (A-BAR) = 5.3720999E-01  
INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 9.6557754E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 15.991 SIGMA(PER ABSORBER ATOM)= 1.1818631E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 238.051 SIGMA(PER ABSORBER ATOM)= 1.7507033E+02

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-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	-1.955963E+01	-9.675939E+00	-2.151408E-01
13	-3.600886E+01	-1.766607E+01	-4.584523E-01
14	-2.840306E+01	-1.602412E+01	-2.987270E-02
15	-4.645758E-03	-3.516320E-03	5.461928E-05

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 1.28067E+02  
FISSION 8.02641E+01

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261 UPDATED 08/12/94 11092235 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 = 3.9496494E-04  
SPIN FACTOR (G) = 15171.100 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)= 2.3855984E+03

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 24.751 SIGMA(PER ABSORBER ATOM)= 5.5561206E+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	-2.393958E+00	-1.469064E+00	-6.167160E-02
13	-7.766139E+00	-3.800209E+00	-1.755016E-01
14	-5.629828E+00	-3.356100E+00	-4.021226E-02
15	-2.967298E-04	-2.254224E-04	2.470951E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.09811E+02  
FISSION 1.25281E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 1092238 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 238.006 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 10.599 LUMPED NUCLEAR DENSITY = 2.1642193E-02  
SPIN FACTOR (G) = 656.527 LUMP DIMENSION (A-BAR) = 5.3720999E-01  
INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 9.6557754E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 15.991 SIGMA(PER ABSORBER ATOM)= 8.3212671E+00

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 235.044 SIGMA(PER ABSORBER ATOM)= 8.3803099E-01

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-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	-8.077708E-02	0.000000E+00	-7.508340E-01
10	-1.511387E+00	-6.826579E-05	-8.800206E+00
11	-1.072418E+01	0.000000E+00	-3.896896E+01
12	-4.483370E+01	0.000000E+00	-5.115822E+01
13	-5.540449E+01	0.000000E+00	-1.743188E+01
14	-1.076379E+02	0.000000E+00	-5.433709E+00
15	-8.253445E-05	0.000000E+00	1.604975E-04

EXCESS RESONANCE INTEGRALS  
RESOLVED

ABSORPTION 6.64320E+00  
FISSION 4.16267E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 11092238 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	=	5.6096567E-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) = 1.6796532E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 17.862 SIGMA(PER ABSORBER ATOM) = 2.7631227E+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	-2.448317E-02	0.000000E+00	-2.558519E-01
10	-7.653835E-01	-9.584553E-06	-4.906636E+00
11	-8.693248E+00	0.000000E+00	-2.447922E+01
12	-4.042473E+01	0.000000E+00	-4.730249E+01
13	-5.096239E+01	0.000000E+00	-1.676821E+01
14	-9.847737E+01	0.000000E+00	-5.734400E+00
15	-3.066651E-07	0.000000E+00	5.920313E-07

EXCESS RESONANCE INTEGRALS  
RESOLVED

ABSORPTION 3.42804E+01  
FISSION 5.17445E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

THIS XSDRN WORKING TAPE WAS CREATED 09/14/04 AT 15:51:57  
THE TITLE OF THE PARENT CASE IS AS FOLLOWS  
SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
BASED ON ENDF-B VERSION 4 DATA  
COMPILED FOR NRC 1/27/89

TAPE ID	4321	NUMBER OF NUCLIDES	25
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 08/12/94	ID 3001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 7001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 8001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 9001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 10001001
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	ID 11001001
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 1008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 3008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 7008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 8008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 9008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 10008016
OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	ID 11008016
AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	ID 4013027
CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 5024304
MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	ID 5025055
FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 5026304
NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	ID 5028304
ZIRCALLOY ENDF/B-IV MAT 1284		UPDATED 08/12/94	ID 2040302
ZIRCALLOY ENDF/B-IV MAT 1284		UPDATED 08/12/94	ID 11040302
PE 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	ID 6082000
URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID 1092235
URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	ID 11092235

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URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 1092238
URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94	ID 11092238
TAPE COPY USED	0 I/O'S, AND TOOK	0.11 SECONDS	

```
KK      KK  EEEEEEEEEEE  NN      NN  OOOOOOOOOO      VV      VV
KK      KK  EEEEEEEEEEE  NNN     NN  OOOOOOOOOOOO     VV      VV
KK      KK  EE          NNNN    NN  OO      OO      VV      VV
KK      KK  EE          NN  NN  OO      OO      VV      VV
KK      KK  EE          NN  NN  OO      OO      VV      VV
KKKKKKK  EEEEEEEEE  NN  NN  NN  OO      OO      VV      VV
KKKKKKK  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  NN  NN  OO      OO      VV      VV
KK      KK  EEEEEEEEEEE  NN      NN  OOOOOOOOOOOO     VVV
KK      KK  EEEEEEEEEEE  NN      NN  OOOOOOOOOOOO      V
```

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SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSSS  CCCCCCCCCCCC  AAAAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPPP  CCCCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SSSSSSSSSSS  CC      AA      AA  LL      EE          P-----P  P-----P  CC
SSSSSSSSSSS  CC      AA      AA  LL      EE          P-----P  P-----P  CC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SSSSSSSSSSS  CCCCCCCCCCCC  AA      AA  LL      EE          PP      PP  CC      CC
SSSSSSSSSSS  CCCCCCCCCC   AA      AA  LL      EE          PP      PP  CC      CC
```

```
0000000  9999999999  //      11      44      //
000000000  999999999999  //      111     444     //
00      00  99      99  //      1111    4444   //
00      00  99      99  //      11      44 44   //
00      00  99      99  //      11      44 44   //
00      00  999999999999  //      11      44 44   //
00      00  999999999999  //      11      44 44   //
00      00  99      99  //      11      44 44   //
00      00  99      99  //      11      44 44   //
00      00  99      99  //      11      44 44   //
00      00  99      99  //      11      44 44   //
000000000  999999999999  //      1111111  44      //
0000000    99999999999  //      1111111  44      //
```

```
11      55555555555  55555555555  2222222222  0000000  11
111     55555555555  55555555555  22222222222  000000000  111
1111    55          :::  55          22      22      :::  00      00      1111
11      55          :::  55          22      22      :::  00      00      11
11      55          :::  55          22      22      :::  00      00      11
11      55555555555  55555555555  22          00      00      11
11      55555555555  55555555555  22          00      00      11
11      55          55  :::  55          22      22      :::  00      00      11
11      55          55  :::  55          22      22      :::  00      00      11
11      55          55  :::  55          22      22      :::  00      00      11
11111111  55555555555  55555555555  22222222222  000000000  11111111
11111111  5555555555  5555555555  22222222222  0000000    11111111
```

```
SSSSSSSSSS  CCCCCCCCCC  AAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPP  CCCCCCCCCC
SSSSSSSSSSS  CCCCCCCCCCCC  AAAAAAAAAAAA  LL      EEEEEEEEEEE  PPPPPPPPPPPP  CCCCCCCCCCCC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SSSSSSSSSSS  CC      AA      AA  LL      EE          P-----P  P-----P  CC
SSSSSSSSSSS  CC      AA      AA  LL      EE          P-----P  P-----P  CC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SS      SS  CC      CC  AA      AA  LL      EE          PP      PP  CC      CC
SSSSSSSSSSS  CCCCCCCCCCCC  AA      AA  LL      EE          PP      PP  CC      CC
SSSSSSSSSSS  CCCCCCCCCC   AA      AA  LL      EE          PP      PP  CC      CC
```

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.....
PROGRAM VERIFICATION INFORMATION
.....
CODE SYSTEM: SCALE-PC VERSION: 4.3
.....
PROGRAM: 000009
CREATION DATE: 03/08/96
VOLUME: Eng
LIBRARY: M:\SCALE43\WIN_NT\EXE
.....
PRODUCTION CODE: KENOVA
VERSION: 3.1
JOBNAME: SCALE-PC
DATE OF EXECUTION: 09/14/04
TIME OF EXECUTION: 15:52:01
.....

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.....
***** NUMERIC PARAMETERS *****
.....
TME      MAXIMUM PROBLEM TIME (MIN)      30.00
TBA      TIME PER GENERATION (MIN)       5.00
GEN      NUMBER OF GENERATIONS          803
NPG      NUMBER PER GENERATION          1000
NSK      NUMBER OF GENERATIONS TO BE SKIPPED 3
BEG      BEGINNING GENERATION NUMBER     1
RES      GENERATIONS BETWEEN CHECKPOINTS 0
X1D      NUMBER OF EXTRA 1-D CROSS SECTIONS 1
NBK      NEUTRON BANK SIZE              1025
XNB      EXTRA POSITIONS IN NEUTRON BANK  0
NFB      FISSION BANK SIZE              1000
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 POULETTE 0.3333
RND      STARTING RANDOM NUMBER          BB827100001
HBE      NUMBER OF D.A. BLOCKS ON UNIT 8  200
NLB      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
.....

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.....
.....
***** LOGICAL PARAMETERS *****
.....
RUN EXECUTE PROBLEM AFTER CHECKING DATA YES PLT PLOT PICTURE MAP(S) NO
FLX COMPUTE FLUX NO FDW COMPUTE FISSION DENSITIES NO
SMU COMPUTE AVG UNIT SELF-MULTIPLICATION NO NUB COMPUTE NU-BAR & AVG FISSION GROUP YES
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 FISSION PROD MATRIX BY UNIT NUMBER NO FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO
XS2 PRINT 2-D MIXTURE X-SECTIONS NO PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO
XAP PRINT MIXTURE ANGLES & PROBABILITIES NO PWT PRINT WEIGHT AVERAGE ARRAY NO
PKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO
PID PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO
TRK PRINT TRACKING INFORMATION NO
.....

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PARAMETER INPUT COMPLETED

..... 0 IO'S WERE USED READING THE PARAMETER DATA .....

\*\*\*\*\* DATA READING COMPLETED \*\*\*\*\*

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.....
.....
UNIT          DATA SET NAME          VOLUME          UNIT FUNCTION
NUMBER        -----          NAME          -----
-----
XSC 14        W:\2jr\Lwt\Pulstar\KENOVA\Aych\lwtAych2_x1_r        MIXED CROSS SECTIONS
ALB 79        M:\scale43\DATA LIB\FT79F001                        INPUT ALBEDOS
WTS 80        M:\scale43\DATA LIB\FT80F001                        INPUT WEIGHTS
SKT 16        UNKNOWN                                              WRITE SCRATCH DATA
BIN 95        W:\2jr\Lwt\Pulstar\KENOVA\Aych\lwtAych2_x1_r        BINARY INPUT DATA
EST 95        W:\2jr\Lwt\Pulstar\KENOVA\Aych\lwtAych2_x1_r        READ RESTART DATA
LIB 4         W:\2jr\Lwt\Pulstar\KENOVA\Aych\lwtAych2_x1_r        INPUT AMPX WORKING LIBRARY
           8         W:\2jr\Lwt\Pulstar\KENOVA\Aych\lwtAych2_x1_r        INPUT DATA DIRECT ACCESS
           9         UNKNOWN                                              SUPER GROUPED DIRECT ACCESS
           10        UNKNOWN                                              XSEC MIXING DIRECT ACCESS
.....

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..... 0 IO'S WERE USED PREPARING INPUT DATA .....

CROSS SECTIONS READ FROM THE AMPX WORKING LIBRARY ON UNIT 4

MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD = 3.0E-05



MIXTURE #	NUCLIDE	ATOM-DENS.	DENSITY (G/CC)	WGT. FRAC.	ZA	AWT	NUCLIDE TITLE	STATUS
1	1008016	4.63320E-02	10.380	1.18520E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
	1092235	1.52378E-03		5.72962E-02	92235	235.0441	URANIUM-235 ENDF/B-IV MAT 1261	UPDATED
	1092238	2.16422E-02		8.24184E-01	92238	238.0510	URANIUM-238 ENDF/B-IV MAT 1262	UPDATED
2	2040302	4.33078E-02	6.5600	1.00000E+00	40000	91.2196	ZIRCALLOY ENDF/B-IV MAT 1284	UPDATED
	3001001	6.67692E-22		1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
	3008016	3.33846E-22		8.88073E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
3	4013027	6.03066E-02	2.7020	1.00000E+00	13027	26.9818	AL-27 1193 218 GP 040375(5)	UPDATED
	5024304	1.74286E-02		1.90000E-01	24000	51.9957	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED
	5025055	1.72633E-03		1.99999E-02	25055	54.9379	MANGANESE-55 ENDF/B-IV MAT 1197	UPDATED
4	5026304	5.93579E-02	7.9200	6.95000E-01	26000	55.8447	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED
	5028304	7.72070E-03		9.50001E-02	26000	58.6872	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'	UPDATED
	6082000	3.29690E-02		1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K	UPDATED
5	7001001	6.67692E-22	0.99817E-20	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
	7008016	3.33846E-22		8.88073E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
	8001001	6.67692E-22		1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
6	8008016	3.33846E-22	0.99817E-20	8.88073E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
	9001001	6.67692E-02		1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
	9008016	3.33846E-02		8.88074E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
7	10001001	6.67692E-02	0.99817	1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
	10008016	3.33846E-02		8.88074E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
	10001001	6.67692E-02		1.11927E-01	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
8	11001001	4.62310E-02	3.6991	2.09120E-02	1001	1.0077	HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED
	11008016	3.51247E-02		2.52128E-01	8016	15.9904	OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED
	11040302	2.09610E-03		8.58321E-02	40000	91.2196	ZIRCALLOY ENDF/B-IV MAT 1284	UPDATED
9	11092235	3.94965E-04	0.99817	4.16733E-02	92235	235.0441	URANIUM-235 ENDF/B-IV MAT 1261	UPDATED
	11092238	5.60966E-03		5.99454E-01	92238	238.0510	URANIUM-238 ENDF/B-IV MAT 1262	UPDATED
	3001001							HYDROGEN ENDF/B-IV MAT 1269/THRM1002
	7001001						HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
	8001001						HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
	9001001						HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
	10001001						HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
	11001001						HYDROGEN ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94
	1008016						OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED 08/12/94
	3008016						OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED 08/12/94
	7008016						OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED 08/12/94
	8008016						OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED 08/12/94
	9008016						OXYGEN-16 ENDF/B-IV MAT 1276	UPDATED 08/12/94

10008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
11008016	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94
4013027	AL-27 1193 218 GP 040375 (5)		UPDATED 08/12/94
5024304	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
5025055	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED 08/12/94
5026304	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
5028304	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED 08/12/94
2040302	ZIRCALLOY	ENDF/B-IV MAT 1284	UPDATED 08/12/94
11040302	ZIRCALLOY	ENDF/B-IV MAT 1284	UPDATED 08/12/94
6082000	PB 1268 218NGP 042375 P-3 293K		UPDATED 08/12/94
1092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
11092235	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED 08/12/94
1092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94
11092238	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED 08/12/94

KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 11 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 3 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 7 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 8 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 9 WERE CORRECTED FOR BAD MOMENTS.  
 KENO MESSAGE NUMBER K5-222 1 TRANSFERS FOR MIXTURE 10 WERE CORRECTED FOR BAD MOMENTS.

..... 0 IO'S WERE USED MIXING CROSS-SECTIONS .....

1-D CROSS SECTION ARRAY ID NUMBERS  
 1 2000 1452 27 18 1018

..... 0 IO'S WERE USED PREPARING THE CROSS SECTIONS .....

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***** ADDITIONAL INFORMATION *****
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***
*** NUMBER OF ENERGY GROUPS          27      USE LATTICE GEOMETRY          YES ***
*** 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 28      NUMBER OF UNITS IN THE GLOBAL Y DIR. 0 ***
*** ENTRIES/NEUTRON IN THE FISSION BANK 21      NUMBER OF UNITS IN THE GLOBAL Z DIR. 0 ***
*** NUMBER OF MIXTURES USED              9      USE A GLOBAL REFLECTOR          YES ***
*** NUMBER OF BIAS ID'S USED             1      USE NESTED HOLES                YES ***
*** NUMBER OF DIFFERENTIAL ALBEDOS USED  1      NUMBER OF HOLES                 15 ***
*** TOTAL INPUT GEOMETRY REGIONS         139     MAXIMUM HOLE NESTING LEVEL      2 ***
*** NUMBER OF GEOMETRY REGIONS USED      139     USE NESTED ARRAYS              YES ***
*** LARGEST GEOMETRY UNIT NUMBER         330     NUMBER OF ARRAYS USED          14 ***
*** LARGEST ARRAY NUMBER                  34      MAXIMUM ARRAY NESTING LEVEL     3 ***
***
*** +X BOUNDARY CONDITION                 H2O     -X BOUNDARY CONDITION           H2O ***
*** +Y BOUNDARY CONDITION                 H2O     -Y BOUNDARY CONDITION           H2O ***
*** +Z BOUNDARY CONDITION                 H2O     -Z BOUNDARY CONDITION           H2O ***
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***** SPACE AND SUPERGROUP INFORMATION *****
***
*** 100000 WORDS IS THE TOTAL SPACE AVAILABLE.
***
*** 58243 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.
***
*** 41757 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.
***
*** 99308 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.
***
*** 41696 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.
***
*** 1640 WORDS ARE NEEDED FOR THE LARGEST GROUP.
***
*** 60126 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.
***
*** 76294 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.
***
*** 76448 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.
***

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***
*** SUPERGROUP          STARTING  ENDING  XSEC  ALBEDO  TOTAL
***   1                GROUP    GROUP  LENGTH LENGTH LENGTH
***                   1         27    3081   544    18122
***
***          0 IO'S WERE USED IN SUPERGROUPING
***
**  ARRAY  UNITS IN  UNITS IN  UNITS IN  NESTING  **
**  NUMBER  X DIR.   Y DIR.   Z DIR.   LEVEL   **
**  1       5       5       1       3       **
**  2       1       5       1       2       **
**  3       1       3       1       2       **
**  4       1       3       1       2       **
**  10      1       1       8       1       **
**  12      1       5       1       2       **
**  13      1       3       1       2       **
**  14      1       3       1       2       **
**  22      1       5       1       2       **
**  23      1       3       1       2       **
**  24      1       3       1       2       **
**  32      1       5       1       2       **
**  33      1       3       1       2       **
**  34      1       3       1       2       **
***
***          0 IO'S WERE USED LOADING THE DATA
***

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REGION          MEDIA BIAS  GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM
                NUM   ID
                ----- UNIT 1 -----
PULSTAR FUEL ELEMENT
1 CYLINDER      1 1 RADIUS = 0.53720 +Z = 63.981 -Z = 2.6670 CENTERLINE IS AT X = 0.00000 Y = 0.00000
2 CYLINDER      9 1 RADIUS = 0.54990 +Z = 63.881 -Z = 2.6670 CENTERLINE IS AT X = 0.00000 Y = 0.00000
3 CYLINDER      2 1 RADIUS = 0.59690 +Z = 66.548 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000
4 CUBOID        3 1 +X = 0.77090 -X = -0.77090 +Y = 0.66680 -Y = -0.66680 +Z = 66.548 -Z = 0.00000
                ----- UNIT 5 -----
DIVIDER CENTER STACK
1 CUBOID        5 1 +X = 4.2926 -X = -4.2926 +Y = 0.71120 -Y = 0.00000 +Z = 110.49 -Z = 0.00000
                ----- UNIT 6 -----
DIVIDER OUTSIDE STACK
1 CUBOID        5 1 +X = 4.2926 -X = -4.2926 +Y = 0.60960 -Y = 0.00000 +Z = 110.49 -Z = 0.00000
                ----- UNIT 10 -----
HOMOGENIZED PULSTAR FUEL - TOP OPENING
1 CUBOID        11 1 +X = 4.1910 -X = -4.1910 +Y = 4.1910 -Y = -4.1910 +Z = 76.200 -Z = 0.00000
2 CUBOID        3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000
                ----- UNIT 11 -----
HOMOGENIZED PULSTAR FUEL - BOTTOM OPENING
1 CUBOID        11 1 +X = 4.1910 -X = -4.1910 +Y = 4.1910 -Y = -4.1910 +Z = 76.200 -Z = 0.00000
2 CUBOID        3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000
                ----- UNIT 12 -----
HOMOGENIZED PULSTAR FUEL - BOTTOM RIGHT
1 CUBOID        11 1 +X = 4.1910 -X = -4.1910 +Y = 4.1910 -Y = -4.1910 +Z = 76.200 -Z = 0.00000
2 CUBOID        3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

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REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 13 -----								
HOMOGENIZED PULSTAR FUEL - TOP RIGHT								
1	CUBOID	11 1	+X = 4.1910	-X = -4.1910	+Y = 4.1910	-Y = -4.1910	+Z = 76.200	-Z = 0.00000
2	CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000
----- UNIT 14 -----								
HOMOGENIZED PULSTAR FUEL - BOTTOM LEFT								
1	CUBOID	11 1	+X = 4.1910	-X = -4.1910	+Y = 4.1910	-Y = -4.1910	+Z = 76.200	-Z = 0.00000
2	CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000
----- UNIT 15 -----								
HOMOGENIZED PULSTAR FUEL - TOP LEFT								
1	CUBOID	11 1	+X = 4.1910	-X = -4.1910	+Y = 4.1910	-Y = -4.1910	+Z = 76.200	-Z = 0.00000
2	CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000
----- UNIT 16 -----								
HOMOGENIZED PULSTAR FUEL - CENTER OPENING								
1	CUBOID	11 1	+X = 4.1910	-X = -4.1910	+Y = 4.1910	-Y = -4.1910	+Z = 76.200	-Z = 0.00000
2	CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000
----- UNIT 20 EXTERNAL TO LATTICE 2 -----								
CENTER COLUMN OF THREE OPENINGS								
1	ARRAY NUMBER	2	+X = 4.2926	-X = -4.2926	+Y = 13.589	-Y = -13.589	+Z = 110.49	-Z = 0.00000
2	CUBOID	5 1	+X = 5.0038	-X = -5.0038	+Y = 14.300	-Y = -14.300	+Z = 110.49	-Z = 0.00000
----- UNIT 21 EXTERNAL TO LATTICE 4 -----								
LEFT OUTSIDE COLUMN OF TWO OPENINGS								
1	ARRAY NUMBER	4	+X = 4.2926	-X = -4.2926	+Y = 8.8900	-Y = -8.8900	+Z = 110.49	-Z = 0.00000
2	CUBOID	5 1	+X = 4.2926	-X = -4.5974	+Y = 9.1948	-Y = -9.1948	+Z = 110.49	-Z = 0.00000
----- UNIT 22 EXTERNAL TO LATTICE 3 -----								
RIGHT OUTSIDE COLUMN OF TWO OPENINGS								
1	ARRAY NUMBER	3	+X = 4.2926	-X = -4.2926	+Y = 8.8900	-Y = -8.8900	+Z = 110.49	-Z = 0.00000
2	CUBOID	5 1	+X = 4.5974	-X = -4.2926	+Y = 9.1948	-Y = -9.1948	+Z = 110.49	-Z = 0.00000
----- UNIT 30 -----								
MTR 7-ASSY BASKET								
1	CYLINDER	3 1	RADIUS = 17.050	+Z = 110.49	-Z = 0.00000	CENTERLINE IS AT Y = 0.00000	Y = 0.00000	
	HOLE NUMBER	1	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 20		
	HOLE NUMBER	2	AT X = -9.2974	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 21		
	HOLE NUMBER	3	AT X = 9.2974	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 22		
2	CYLINDER	5 1	RADIUS = 18.891	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
3	CYLINDER	6 1	RADIUS = 33.496	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
4	CYLINDER	5 1	RADIUS = 36.544	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
5	CYLINDER	7 1	RADIUS = 49.244	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
6	CYLINDER	5 1	RADIUS = 49.854	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000	
7	CUBOID	8 1	+X = 49.854	-X = -49.854	+Y = 49.854	-Y = -49.854	+Z = 110.49	-Z = -1.2700

----- UNIT 40 -----  
SIMPLIFIED LID STRUCTURE NAC-LWT  
1 CYLINDER 5 1 RADIUS = 36.519 +Z = 13.677 -Z = -14.135 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
2 CYLINDER 8 1 RADIUS = 49.854 +Z = 13.677 -Z = -14.135 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
3 CUBOID 8 1 +X = 49.854 -X = -49.854 +Y = 49.854 -Y = -49.854 +Z = 13.677 -Z = -14.135

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 41 -----  
SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT  
1 CYLINDER 6 1 RADIUS = 26.353 +Z = 3.8100 -Z = -3.8100 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
2 CYLINDER 5 1 RADIUS = 36.619 +Z = 13.360 -Z = -12.700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
3 CYLINDER 8 1 RADIUS = 49.854 +Z = 13.360 -Z = -12.700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
4 CUBOID 8 1 +X = 49.854 -X = -49.854 +Y = 49.854 -Y = -49.854 +Z = 13.360 -Z = -12.700

----- UNIT 42 -----  
THIN TOP AND BOTTOM SHELL OF NEUTRON SHIELD - SUBTRACTED FROM LID MODEL  
1 CYLINDER 5 1 RADIUS = 49.854 +Z = 0.61000 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
2 CUBOID 8 1 +X = 49.854 -X = -49.854 +Y = 49.854 -Y = -49.854 +Z = 0.61000 -Z = 0.00000

----- UNIT 70 EXTERNAL TO LATTICE 10 -----  
STACK OF 4 BASKETS IN CASK WITH LID AND BOTTOM  
1 ARRAY NUMBER 10 +X = 49.854 -X = -49.854 +Y = 49.854 -Y = -49.854 +Z = 502.13 -Z = 0.00000

\*\*\*\*\* GLOBAL \*\*\*\*\*  
----- UNIT 80 -----  
3 CASKS IN TRIANGULAR PITCH  
1 CUBOID 8 1 +X = 101.00 -X = -101.00 +Y = 101.00 -Y = -101.00 +Z = 502.20 -Z = 0.00000  
HOLE NUMBER 13 AT X = 0.00000 Y = 50.000 Z = 0.00000 IS UNIT NUMBER 70  
HOLE NUMBER 14 AT X = -50.000 Y = -50.000 Z = 0.00000 IS UNIT NUMBER 70  
HOLE NUMBER 15 AT X = 50.000 Y = -50.000 Z = 0.00000 IS UNIT NUMBER 70

----- UNIT 110 EXTERNAL TO LATTICE 1 -----  
PULSTAR ASSEMBLY - TOP OPENING  
1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 110.49 -Z = 43.942  
2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 110.49 -Z = 43.942  
3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 111 EXTERNAL TO LATTICE 1 -----  
PULSTAR ASSEMBLY - BOTTOM OPENING  
1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 110.49 -Z = 43.942  
2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 110.49 -Z = 43.942  
3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

----- UNIT 112 EXTERNAL TO LATTICE 1 -----  
PULSTAR ASSEMBLY - BOTTOM RIGHT  
1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 110.49 -Z = 43.942  
2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 110.49 -Z = 43.942  
3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

----- UNIT 113 EXTERNAL TO LATTICE 1 -----  
PULSTAR ASSEMBLY - TOP RIGHT

1 ARRAY NUMBER	1	+X = 3.8545	-X = -3.8545	+Y = 3.3342	-Y = -3.3338	+Z = 110.49	-Z = 43.942
2 CUBOID	2 1	+X = 4.0069	-X = -4.0069	+Y = 3.4862	-Y = -3.4862	+Z = 110.49	-Z = 43.942
3 CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000

----- UNIT 114 EXTERNAL TO LATTICE 1 -----

PULSTAR ASSEMBLY - BOTTOM LEFT

1 ARRAY NUMBER	1	+X = 3.8545	-X = -3.8545	+Y = 3.3342	-Y = -3.3338	+Z = 110.49	-Z = 43.942
2 CUBOID	2 1	+X = 4.0069	-X = -4.0069	+Y = 3.4862	-Y = -3.4862	+Z = 110.49	-Z = 43.942
3 CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000

----- UNIT 115 EXTERNAL TO LATTICE 1 -----

PULSTAR ASSEMBLY - TOP LEFT

1 ARRAY NUMBER	1	+X = 3.8545	-X = -3.8545	+Y = 3.3342	-Y = -3.3338	+Z = 110.49	-Z = 43.942
2 CUBOID	2 1	+X = 4.0069	-X = -4.0069	+Y = 3.4862	-Y = -3.4862	+Z = 110.49	-Z = 43.942
3 CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 116 EXTERNAL TO LATTICE 1 -----

PULSTAR ASSEMBLY - CENTER OPENING

1 ARRAY NUMBER	1	+X = 3.8545	-X = -3.8545	+Y = 3.3342	-Y = -3.3338	+Z = 110.49	-Z = 43.942
2 CUBOID	2 1	+X = 4.0069	-X = -4.0069	+Y = 3.4862	-Y = -3.4862	+Z = 110.49	-Z = 43.942
3 CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000

----- UNIT 120 EXTERNAL TO LATTICE 12 -----

CENTER COLUMN OF THREE OPENINGS

1 ARRAY NUMBER	12	+X = 4.2926	-X = -4.2926	+Y = 13.589	-Y = -13.589	+Z = 110.49	-Z = 0.00000
2 CUBOID	5 1	+X = 5.0038	-X = -5.0038	+Y = 14.300	-Y = -14.300	+Z = 110.49	-Z = 0.00000

----- UNIT 121 EXTERNAL TO LATTICE 14 -----

LEFT OUTSIDE COLUMN OF TWO OPENINGS

1 ARRAY NUMBER	14	+X = 4.2926	-X = -4.2926	+Y = 8.8900	-Y = -8.8900	+Z = 110.49	-Z = 0.00000
2 CUBOID	5 1	+X = 4.2926	-X = -4.5974	+Y = 9.1948	-Y = -9.1948	+Z = 110.49	-Z = 0.00000

----- UNIT 122 EXTERNAL TO LATTICE 13 -----

RIGHT OUTSIDE COLUMN OF TWO OPENINGS

1 ARRAY NUMBER	13	+X = 4.2926	-X = -4.2926	+Y = 8.8900	-Y = -8.8900	+Z = 110.49	-Z = 0.00000
2 CUBOID	5 1	+X = 4.5974	-X = -4.2926	+Y = 9.1948	-Y = -9.1948	+Z = 110.49	-Z = 0.00000

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 130 -----

MTR 7-ASSY BASKET

1 CYLINDER	3 1	RADIUS = 17.050	+Z = 110.49	-Z = 0.00000	CENTERLINE IS AT X = 0.00000	Y = 0.00000
HOLE NUMBER	4	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	120
HOLE NUMBER	5	AT X = -9.2974	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	121
HOLE NUMBER	6	AT X = 9.2974	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER	122
2 CYLINDER	5 1	RADIUS = 18.891	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000
3 CYLINDER	6 1	RADIUS = 33.496	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000
4 CYLINDER	5 1	RADIUS = 36.544	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000
5 CYLINDER	7 1	RADIUS = 49.244	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000
6 CYLINDER	5 1	RADIUS = 49.854	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000	Y = 0.00000

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7 CUBOID            8 1            +X = 49.854            -X = -49.854            +Y = 49.854            -Y = -49.854            +Z = 110.49            -Z = -1.2700



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----- UNIT 210 EXTERNAL TO LATTICE 1 -----
PULSTAR ASSEMBLY - TOP OPENING
 1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 66.548 -Z = 0.00000
 2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 66.548 -Z = 0.00000
 3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

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----- UNIT 211 EXTERNAL TO LATTICE 1 -----
PULSTAR ASSEMBLY - BOTTOM OPENING
 1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 66.548 -Z = 0.00000
 2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 66.548 -Z = 0.00000
 3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

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REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

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----- UNIT 212 EXTERNAL TO LATTICE 1 -----
PULSTAR ASSEMBLY - BOTTOM RIGHT
 1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 66.548 -Z = 0.00000
 2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 66.548 -Z = 0.00000
 3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

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----- UNIT 213 EXTERNAL TO LATTICE 1 -----
PULSTAR ASSEMBLY - TOP RIGHT
 1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 66.548 -Z = 0.00000
 2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 66.548 -Z = 0.00000
 3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

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----- UNIT 214 EXTERNAL TO LATTICE 1 -----
PULSTAR ASSEMBLY - BOTTOM LEFT
 1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 66.548 -Z = 0.00000
 2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 66.548 -Z = 0.00000
 3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

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----- UNIT 215 EXTERNAL TO LATTICE 1 -----
PULSTAR ASSEMBLY - TOP LEFT
 1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 66.548 -Z = 0.00000
 2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 66.548 -Z = 0.00000
 3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

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----- UNIT 216 EXTERNAL TO LATTICE 1 -----
PULSTAR ASSEMBLY - CENTER OPENING
 1 ARRAY NUMBER 1 +X = 3.8545 -X = -3.8545 +Y = 3.3342 -Y = -3.3338 +Z = 66.548 -Z = 0.00000
 2 CUBOID 2 1 +X = 4.0069 -X = -4.0069 +Y = 3.4862 -Y = -3.4862 +Z = 66.548 -Z = 0.00000
 3 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

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REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 220 EXTERNAL TO LATTICE 22 -----								
CENTER COLUMN OF THREE OPENINGS								
1	ARRAY NUMBER	22	+X = 4.2926	-X = -4.2926	+Y = 13.589	-Y = -13.589	+Z = 110.49	-Z = 0.00000
2	CUBOID	5 1	+X = 5.0038	-X = -5.0038	+Y = 14.300	-Y = -14.300	+Z = 110.49	-Z = 0.00000
----- UNIT 221 EXTERNAL TO LATTICE 24 -----								
LEFT OUTSIDE COLUMN OF TWO OPENINGS								
1	ARRAY NUMBER	24	+X = 4.2926	-X = -4.2926	+Y = 8.8900	-Y = -8.8900	+Z = 110.49	-Z = 0.00000
2	CUBOID	5 1	+X = 4.2926	-X = -4.5974	+Y = 9.1948	-Y = -9.1948	+Z = 110.49	-Z = 0.00000
----- UNIT 222 EXTERNAL TO LATTICE 23 -----								
RIGHT OUTSIDE COLUMN OF TWO OPENINGS								
1	ARRAY NUMBER	23	+X = 4.2926	-X = -4.2926	+Y = 8.8900	-Y = -8.8900	+Z = 110.49	-Z = 0.00000
2	CUBOID	5 1	+X = 4.5974	-X = -4.2926	+Y = 9.1948	-Y = -9.1948	+Z = 110.49	-Z = 0.00000
----- UNIT 230 -----								
MTR. 7-ASSY BASKET								
1	CYLINDER	3 1	RADIUS = 17.050	+Z = 110.49	-Z = 0.00000	CENTERLINE IS AT X = 0.00000		Y = 0.00000
	HOLE NUMBER	7	AT X = 0.00000	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 220		
	HOLE NUMBER	8	AT X = -9.2974	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 221		
	HOLE NUMBER	9	AT X = 9.2974	Y = 0.00000	Z = 0.00000	IS UNIT NUMBER 222		
2	CYLINDER	5 1	RADIUS = 16.591	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000		Y = 0.00000
3	CYLINDER	6 1	RADIUS = 33.496	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000		Y = 0.00000
4	CYLINDER	5 1	RADIUS = 36.544	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000		Y = 0.00000
5	CYLINDER	7 1	RADIUS = 49.244	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000		Y = 0.00000
6	CYLINDER	5 1	RADIUS = 49.854	+Z = 110.49	-Z = -1.2700	CENTERLINE IS AT X = 0.00000		Y = 0.00000
7	CUBOID	8 1	+X = 49.854	-X = -49.854	+Y = 49.854	-Y = -49.854	+Z = 110.49	-Z = -1.2700
REGION	MEDIA NUM	BIAS ID	GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
----- UNIT 310 -----								
HOMOGENIZED PULSTAR FUEL - TOP OPENING								
1	CUBOID	11 1	+X = 4.1910	-X = -4.1910	+Y = 4.1910	-Y = -4.1910	+Z = 110.49	-Z = 34.290
2	CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000
----- UNIT 311 -----								
HOMOGENIZED PULSTAR FUEL - BOTTOM OPENING								
1	CUBOID	11 1	+X = 4.1910	-X = -4.1910	+Y = 4.1910	-Y = -4.1910	+Z = 110.49	-Z = 34.290
2	CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000
----- UNIT 312 -----								
HOMOGENIZED PULSTAR FUEL - BOTTOM RIGHT								
1	CUBOID	11 1	+X = 4.1910	-X = -4.1910	+Y = 4.1910	-Y = -4.1910	+Z = 110.49	-Z = 34.290
2	CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000
----- UNIT 313 -----								
HOMOGENIZED PULSTAR FUEL - TOP RIGHT								
1	CUBOID	11 1	+X = 4.1910	-X = -4.1910	+Y = 4.1910	-Y = -4.1910	+Z = 110.49	-Z = 34.290
2	CUBOID	3 1	+X = 4.2926	-X = -4.2926	+Y = 4.2926	-Y = -4.2926	+Z = 110.49	-Z = 0.00000

----- UNIT 314 -----  
HOMOGENIZED PULSTAR FUEL - BOTTOM LEFT  
1 CUBOID 11 1 +X = 4.1910 -X = -4.1910 +Y = 4.1910 -Y = -4.1910 +Z = 110.49 -Z = 34.290  
2 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

----- UNIT 315 -----  
HOMOGENIZED PULSTAR FUEL - TOP LEFT  
1 CUBOID 11 1 +X = 4.1910 -X = -4.1910 +Y = 4.1910 -Y = -4.1910 +Z = 110.49 -Z = 34.290  
2 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 316 -----  
HOMOGENIZED PULSTAR FUEL - CENTER OPENING  
1 CUBOID 11 1 +X = 4.1910 -X = -4.1910 +Y = 4.1910 -Y = -4.1910 +Z = 110.49 -Z = 34.290  
2 CUBOID 3 1 +X = 4.2926 -X = -4.2926 +Y = 4.2926 -Y = -4.2926 +Z = 110.49 -Z = 0.00000

----- UNIT 320 EXTERNAL TO LATTICE 32 -----  
CENTER COLUMN OF THREE OPENINGS  
1 ARRAY NUMBER 32 +X = 4.2926 -X = -4.2926 +Y = 13.589 -Y = -13.589 +Z = 110.49 -Z = 0.00000  
2 CUBOID 5 1 +X = 5.0038 -X = -5.0038 +Y = 14.300 -Y = -14.300 +Z = 110.49 -Z = 0.00000

----- UNIT 321 EXTERNAL TO LATTICE 34 -----  
LEFT OUTSIDE COLUMN OF TWO OPENINGS  
1 ARRAY NUMBER 34 +X = 4.2926 -X = -4.2926 +Y = 8.8900 -Y = -8.8900 +Z = 110.49 -Z = 0.00000  
2 CUBOID 5 1 +X = 4.2926 -X = -4.5974 +Y = 9.1948 -Y = -9.1948 +Z = 110.49 -Z = 0.00000

----- UNIT 322 EXTERNAL TO LATTICE 33 -----  
RIGHT OUTSIDE COLUMN OF TWO OPENINGS  
1 ARRAY NUMBER 33 +X = 4.2926 -X = -4.2926 +Y = 8.8900 -Y = -8.8900 +Z = 110.49 -Z = 0.00000  
2 CUBOID 5 1 +X = 4.5974 -X = -4.2926 +Y = 9.1948 -Y = -9.1948 +Z = 110.49 -Z = 0.00000

REGION MEDIA BIAS GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM  
NUM ID

----- UNIT 330 -----  
MTR 7-ASSY BASKET  
1 CYLINDER 3 1 RADIUS = 17.050 +Z = 110.49 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
HOLE NUMBER 10 AT X = 0.00000 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 320  
HOLE NUMBER 11 AT X = -9.2974 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 321  
HOLE NUMBER 12 AT X = 9.2974 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 322  
2 CYLINDER 5 1 RADIUS = 18.891 +Z = 110.49 -Z = -1.2700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
3 CYLINDER 6 1 RADIUS = 33.496 +Z = 110.49 -Z = -1.2700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
4 CYLINDER 5 1 RADIUS = 36.544 +Z = 110.49 -Z = -1.2700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
5 CYLINDER 7 1 RADIUS = 49.244 +Z = 110.49 -Z = -1.2700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
6 CYLINDER 5 1 RADIUS = 49.854 +Z = 110.49 -Z = -1.2700 CENTERLINE IS AT X = 0.00000 Y = 0.00000  
7 CUBOID 8 1 +X = 49.854 -X = -49.854 +Y = 49.854 -Y = -49.854 +Z = 110.49 -Z = -1.2700

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----  
2 LAYER 1, X COLUMN 1 TO 5 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP  
1 1 1 1 1  
1 1 1 1 1  
1 1 1 1 1

```
1 1 1 1 1
1 1 1 1 1
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 2 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP
10
5
16
5
11
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 3 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP
13
6
12
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 4 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP
15
6
14
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 10 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
41
Z LAYER 2, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
42
Z LAYER 3, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
330
Z LAYER 4, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
230
Z LAYER 5, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
130
Z LAYER 6, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
30
Z LAYER 7, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
42
Z LAYER 8, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 1 BOTTOM TO TOP
40
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 12 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP
110
5
116
5
111
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 13 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP
113
6
112
----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 14 -----
Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP
```

115

6

114

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 22 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

210

5

216

5

211

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 23 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

213

6

212

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 24 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

215

6

214

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 32 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 5 BOTTOM TO TOP

310

5

316

5

311

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 33 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

313

6

312

----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 34 -----

Z LAYER 1, X COLUMN 1 TO 1 LEFT TO RIGHT Y ROW 1 TO 3 BOTTOM TO TOP

315

6

314

VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM					
UNIT	REGION	GEOMETRY		VOLUME	CUMULATIVE VOLUME
		REGION	REGION		
1	1	1	1	5.54974E+01 CM**3	5.54974E+01 CM**3
		2	2	2.65506E+00 CM**3	5.81525E+01 CM**3
		3	3	1.63358E+01 CM**3	7.44883E+01 CM**3
		4	4	6.23440E+01 CM**3	1.36832E+02 CM**3
5	1	5	6.74629E+02 CM**3	6.74629E+02 CM**3	
6	1	6	5.78254E+02 CM**3	5.78254E+02 CM**3	
10	1	7	7	5.35365E+03 CM**3	5.35365E+03 CM**3
		8	8	2.79009E+03 CM**3	8.14374E+03 CM**3
11	1	9	9	5.35365E+03 CM**3	5.35365E+03 CM**3
		10	10	2.79009E+03 CM**3	8.14374E+03 CM**3
12	1	11	11	5.35365E+03 CM**3	5.35365E+03 CM**3
		12	12	2.79009E+03 CM**3	8.14374E+03 CM**3
13	1	13	13	5.35365E+03 CM**3	5.35365E+03 CM**3
		14	14	2.79009E+03 CM**3	8.14374E+03 CM**3
14	1	15	5.35365E+03 CM**3	5.35365E+03 CM**3	

	2	16	2.79009E+03 CM**3	8.14374E+03 CM**3
15	1	17	5.35365E+03 CM**3	5.35365E+03 CM**3
	2	18	2.79009E+03 CM**3	8.14374E+03 CM**3
16	1	19	5.35365E+03 CM**3	5.35365E+03 CM**3
	2	20	2.79009E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 21 IS AN ARRAY PLACEMENT BOUNDARY REGION				
20	1	21	2.57805E+04 CM**3	2.57805E+04 CM**3
	2	22	5.84413E+03 CM**3	3.16246E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 23 IS AN ARRAY PLACEMENT BOUNDARY REGION				
21	1	23	1.68657E+04 CM**3	1.68657E+04 CM**3
	2	24	1.19757E+03 CM**3	1.80633E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 25 IS AN ARRAY PLACEMENT BOUNDARY REGION				
22	1	25	1.68657E+04 CM**3	1.68657E+04 CM**3
	2	26	1.19757E+03 CM**3	1.80633E+04 CM**3
30	1	27	3.31559E+04 CM**3	1.00907E+05 CM**3
	2	28	2.43955E+04 CM**3	1.25303E+05 CM**3
	3	29	2.68637E+05 CM**3	3.93940E+05 CM**3
	4	30	7.49551E+04 CM**3	4.68895E+05 CM**3
	5	31	3.82534E+05 CM**3	8.51429E+05 CM**3
	6	32	2.12103E+04 CM**3	8.72639E+05 CM**3
	7	33	2.38439E+05 CM**3	1.11108E+06 CM**3
40	1	129	1.16526E+05 CM**3	1.16526E+05 CM**3
	2	130	1.00639E+05 CM**3	2.17165E+05 CM**3
	3	131	5.93381E+04 CM**3	2.76503E+05 CM**3
41	1	132	1.66245E+04 CM**3	1.66245E+04 CM**3
	2	133	9.31579E+04 CM**3	1.09782E+05 CM**3
	3	134	9.36980E+04 CM**3	2.03480E+05 CM**3
	4	135	5.55989E+04 CM**3	2.59079E+05 CM**3
42	1	136	4.76297E+03 CM**3	4.76297E+03 CM**3
	2	137	1.30143E+03 CM**3	6.06440E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 138 IS AN ARRAY PLACEMENT BOUNDARY REGION				
70	1	138	4.99202E+06 CM**3	4.99202E+06 CM**3
80	1	139	5.51570E+06 CM**3	2.04918E+07 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 34 IS AN ARRAY PLACEMENT BOUNDARY REGION				
110	1	34	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	35	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	36	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 37 IS AN ARRAY PLACEMENT BOUNDARY REGION				
111	1	37	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	38	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	39	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 40 IS AN ARRAY PLACEMENT BOUNDARY REGION				
112	1	40	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	41	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	42	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 43 IS AN ARRAY PLACEMENT BOUNDARY REGION				
113	1	43	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	44	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	45	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 46 IS AN ARRAY PLACEMENT BOUNDARY REGION				
114	1	46	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	47	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	48	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 49 IS AN ARRAY PLACEMENT BOUNDARY REGION				
115	1	49	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	50	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	51	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 52 IS AN ARRAY PLACEMENT BOUNDARY REGION				
116	1	52	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	53	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	54	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 55 IS AN ARRAY PLACEMENT BOUNDARY REGION				
120	1	55	2.57805E+04 CM**3	2.57805E+04 CM**3
	2	56	5.84413E+03 CM**3	3.16246E+04 CM**3

SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	57 IS AN ARRAY PLACEMENT BOUNDARY REGION
121	1	57	1.68657E+04 CM**3	1.68657E+04 CM**3
	2	58	1.19757E+03 CM**3	1.80633E+04 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	59 IS AN ARRAY PLACEMENT BOUNDARY REGION
122	1	59	1.68657E+04 CM**3	1.68657E+04 CM**3
	2	60	1.19757E+03 CM**3	1.80633E+04 CM**3
130	1	61	3.31559E+04 CM**3	1.00907E+05 CM**3
	2	62	2.43955E+04 CM**3	1.25303E+05 CM**3
	3	63	2.68637E+05 CM**3	3.93940E+05 CM**3
	4	64	7.49551E+04 CM**3	4.68895E+05 CM**3
	5	65	3.82534E+05 CM**3	8.51429E+05 CM**3
	6	66	2.12103E+04 CM**3	8.72639E+05 CM**3
	7	67	2.38439E+05 CM**3	1.11108E+06 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	68 IS AN ARRAY PLACEMENT BOUNDARY REGION
210	1	68	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	69	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	70	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	71 IS AN ARRAY PLACEMENT BOUNDARY REGION
211	1	71	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	72	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	73	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	74 IS AN ARRAY PLACEMENT BOUNDARY REGION
212	1	74	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	75	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	76	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	77 IS AN ARRAY PLACEMENT BOUNDARY REGION
213	1	77	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	78	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	79	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	80 IS AN ARRAY PLACEMENT BOUNDARY REGION
214	1	80	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	81	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	82	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	83 IS AN ARRAY PLACEMENT BOUNDARY REGION
215	1	83	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	84	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	85	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	86 IS AN ARRAY PLACEMENT BOUNDARY REGION
216	1	86	3.42081E+03 CM**3	3.42081E+03 CM**3
	2	87	2.97590E+02 CM**3	3.71840E+03 CM**3
	3	88	4.42534E+03 CM**3	8.14374E+03 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	89 IS AN ARRAY PLACEMENT BOUNDARY REGION
220	1	89	2.57805E+04 CM**3	2.57805E+04 CM**3
	2	90	5.84413E+03 CM**3	3.16246E+04 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	91 IS AN ARRAY PLACEMENT BOUNDARY REGION
221	1	91	1.68657E+04 CM**3	1.68657E+04 CM**3
	2	92	1.19757E+03 CM**3	1.80633E+04 CM**3
SURROUNDING	GEOMETRY	VOLUMES	GEOMETRY REGION	93 IS AN ARRAY PLACEMENT BOUNDARY REGION
222	1	93	1.68657E+04 CM**3	1.68657E+04 CM**3
	2	94	1.19757E+03 CM**3	1.80633E+04 CM**3
230	1	95	3.31559E+04 CM**3	1.00907E+05 CM**3
	2	96	2.43955E+04 CM**3	1.25303E+05 CM**3
	3	97	2.68637E+05 CM**3	3.93940E+05 CM**3
	4	98	7.49551E+04 CM**3	4.68895E+05 CM**3
	5	99	3.82534E+05 CM**3	8.51429E+05 CM**3
	6	100	2.12103E+04 CM**3	8.72639E+05 CM**3
	7	101	2.38439E+05 CM**3	1.11108E+06 CM**3
310	1	102	5.35365E+03 CM**3	5.35365E+03 CM**3
	2	103	2.79009E+03 CM**3	8.14374E+03 CM**3
311	1	104	5.35365E+03 CM**3	5.35365E+03 CM**3
	2	105	2.79009E+03 CM**3	8.14374E+03 CM**3
312	1	106	5.35365E+03 CM**3	5.35365E+03 CM**3
	2	107	2.79009E+03 CM**3	8.14374E+03 CM**3
313	1	108	5.35365E+03 CM**3	5.35365E+03 CM**3
	2	109	2.79009E+03 CM**3	8.14374E+03 CM**3
314	1	110	5.35365E+03 CM**3	5.35365E+03 CM**3

	2	111	2.79009E+03 CM**3	8.14374E+03 CM**3
315	1	112	5.35365E+03 CM**3	5.35365E+03 CM**3
	2	113	2.79009E+03 CM**3	8.14374E+03 CM**3
316	1	114	5.35365E+03 CM**3	5.35365E+03 CM**3
	2	115	2.79009E+03 CM**3	8.14374E+03 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 116 IS AN ARRAY PLACEMENT BOUNDARY REGION				
320	1	116	2.57805E+04 CM**3	2.57805E+04 CM**3
	2	117	5.84413E+03 CM**3	3.16246E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 118 IS AN ARRAY PLACEMENT BOUNDARY REGION				
321	1	118	1.68657E+04 CM**3	1.68657E+04 CM**3
	2	119	1.19757E+03 CM**3	1.80633E+04 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 120 IS AN ARRAY PLACEMENT BOUNDARY REGION				
322	1	120	1.68657E+04 CM**3	1.68657E+04 CM**3
	2	121	1.19757E+03 CM**3	1.80633E+04 CM**3
330	1	122	3.31559E+04 CM**3	1.00907E+05 CM**3
	2	123	2.43955E+04 CM**3	1.25303E+05 CM**3
	3	124	2.68637E+05 CM**3	3.93940E+05 CM**3
	4	125	7.49551E+04 CM**3	4.68895E+05 CM**3
	5	126	3.82534E+05 CM**3	8.51429E+05 CM**3
	6	127	2.12103E+04 CM**3	8.72639E+05 CM**3
	7	128	2.38439E+05 CM**3	1.11108E+06 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	1050	1	1	5.82723E+04 CM**3
		2	9	2.78782E+03 CM**3
		3	2	1.71526E+04 CM**3
		4	3	6.54612E+04 CM**3
5	24	1	5	1.61911E+04 CM**3
6	24	1	5	1.38781E+04 CM**3
10	3	1	11	1.60610E+04 CM**3
		2	3	8.37026E+03 CM**3
11	3	1	11	1.60610E+04 CM**3
		2	3	8.37026E+03 CM**3
12	3	1	11	1.60610E+04 CM**3
		2	3	8.37026E+03 CM**3
13	3	1	11	1.60610E+04 CM**3
		2	3	8.37026E+03 CM**3
14	3	1	11	1.60610E+04 CM**3
		2	3	8.37026E+03 CM**3
15	3	1	11	1.60610E+04 CM**3
		2	3	8.37026E+03 CM**3
16	3	1	11	1.60610E+04 CM**3
		2	3	8.37026E+03 CM**3
20	3	1		7.73414E+04 CM**3
		2	5	1.75324E+04 CM**3
21	3	1		5.05972E+04 CM**3
		2	5	3.59271E+03 CM**3
22	3	1		5.05972E+04 CM**3
		2	5	3.59271E+03 CM**3
30	3	1	3	9.94676E+04 CM**3
		2	5	7.31865E+04 CM**3
		3	6	8.05912E+05 CM**2
		4	5	2.24865E+05 CM**3
		5	7	1.14760E+06 CM**3
		6	5	6.36308E+04 CM**3
		7	8	7.15318E+05 CM**3
40	3	1	5	3.49579E+05 CM**3
		2	8	3.01916E+05 CM**3
		3	8	1.78014E+05 CM**3
41	3	1	6	4.98735E+04 CM**3
		2	5	2.79474E+05 CM**3
		3	8	2.81094E+05 CM**3
		4	8	1.66797E+05 CM**3
42	6	1	5	2.85778E+04 CM**3
		2	8	7.80859E+03 CM**3
70	3	1	1.49761E+07 CM**3	
80	1	1	8	5.51570E+06 CM**3
110	3	1		1.02624E+04 CM**3
		2	2	8.22769E+02 CM**3



			3	3	1.32760E+04 CM**3
111	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
112	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
113	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
114	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
115	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
116	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
120	3	1			7.73414E+04 CM**3
		2	5		1.75324E+04 CM**3
121	3	1			5.05972E+04 CM**3
		2	5		3.59271E+03 CM**3
122	3	1			5.05972E+04 CM**3
		2	5		3.59271E+03 CM**3
130	3	1	3		9.94676E+04 CM**3
		2	5		7.31865E+04 CM**3
		3	6		8.05912E+05 CM**3
		4	5		2.24865E+05 CM**3
		5	7		1.14760E+06 CM**3
		6	5		6.36308E+04 CM**3
		7	8		7.15318E+05 CM**3
210	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
211	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
212	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
213	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
214	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
215	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
216	3	1			1.02624E+04 CM**3
		2	2		8.92769E+02 CM**3
		3	3		1.32760E+04 CM**3
220	3	1			7.73414E+04 CM**3
		2	5		1.75324E+04 CM**3
221	3	1			5.05972E+04 CM**3
		2	5		3.59271E+03 CM**3
222	3	1			5.05972E+04 CM**3
		2	5		3.59271E+03 CM**3
230	3	1	3		9.94676E+04 CM**3
		2	5		7.31865E+04 CM**3
		3	6		8.05912E+05 CM**3
		4	5		2.24865E+05 CM**3
		5	7		1.14760E+06 CM**3
		6	5		6.36308E+04 CM**3
		7	8		7.15318E+05 CM**3
310	3	1	11		1.60610E+04 CM**3
		2	3		8.37026E+03 CM**3
311	3	1	11		1.60610E+04 CM**3
		2	3		8.37026E+03 CM**3
312	3	1	11		1.60610E+04 CM**3

		2	3	8.37026E+03	CM**3
313	3	1	11	1.60610E+04	CM**3
		2	3	8.37026E+03	CM**3
314	3	1	11	1.60610E+04	CM**3
		2	3	8.37026E+03	CM**3
315	3	1	11	1.60610E+04	CM**3
		2	3	8.37026E+03	CM**3
316	3	1	11	1.60610E+04	CM**3
		2	3	8.37026E+03	CM**3
320	3	1		7.73414E+04	CM**3
		2	5	1.75324E+04	CM**3
321	3	1		5.05972E+04	CM**3
		2	5	3.59271E+03	CM**3
322	3	1		5.05972E+04	CM**3
		2	5	3.59271E+03	CM**3
330	3	1	3	9.94676E+04	CM**3
		2	5	7.31865E+04	CM**3
		3	6	8.05912E+05	CM**3
		4	5	2.24865E+05	CM**3
		5	7	1.14760E+06	CM**3
		6	5	6.36308E+04	CM**3
		7	8	7.15318E+05	CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	5.82723E+04 CM**3	6.04865E+05
2	2.96514E+04 CM**3	1.94513E+05
3	7.66380E+05 CM**3	7.64978E-15
5	2.23330E+06 CM**3	1.76878E+07
6	3.27352E+06 CM**3	3.71348E+07
7	4.59040E+06 CM**3	4.58201E-14
8	9.31260E+06 CM**3	9.29557E-14
9	2.78782E+03 CM**3	2.78272E+03
11	2.24853E+05 CM**3	8.31762E+05

\*\*\* BIASING INFORMATION \*\*\*  
 \*\*\* A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S. \*\*\*  
 ..... 0 JO'S WERE USED IN KENO-V BEFORE TRACKING .....  
 ..... 0.01293 MINUTES WERE USED PROCESSING DATA. ....

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 1.89052E-02  
 START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:  
 +X= 1.01000E+02 -X=-1.01000E+02 +Y= 1.01000E+02 -Y=-1.01000E+02 +Z= 5.02200E+02 -Z= 0.00000E+00  
 THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

2.18000 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 2.18667 MINUTES.

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	1	7.20764E-01	809 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	2	8.23482E-01	942 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	3	8.55166E-01	951 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	4	8.75370E-01	983 INDEPENDENT	FISSION POINTS WERE GENERATED	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132	5	8.34339E-01	8.54959E-01	1.18453E-02	0.00000E+00	0.00000E+00
	6	8.47771E-01	8.53162E-01	8.56641E-03	0.00000E+00	0.00000E+00
	7	8.45447E-01	8.51619E-01	6.81253E-03	0.00000E+00	0.00000E+00
	8	8.70304E-01	8.54733E-01	6.37486E-03	0.00000E+00	0.00000E+00
	9	8.45910E-01	8.53473E-01	5.53321E-03	0.00000E+00	0.00000E+00
	10	8.40482E-01	8.51849E-01	5.05958E-03	0.00000E+00	0.00000E+00
	11	8.87736E-01	8.55836E-01	5.98416E-03	0.00000E+00	0.00000E+00
	12	8.51713E-01	8.55424E-01	5.36825E-03	0.00000E+00	0.00000E+00
	13	9.21948E-01	8.61472E-01	7.75578E-03	0.00000E+00	0.00000E+00
	14	8.45112E-01	8.60108E-01	7.21009E-03	0.00000E+00	0.00000E+00
	15	8.62149E-01	8.60265E-01	6.63417E-03	0.00000E+00	0.00000E+00
	16	8.53052E-01	8.59750E-01	6.16362E-03	0.00000E+00	0.00000E+00
	17	8.67530E-01	8.60269E-01	5.76141E-03	0.00000E+00	0.00000E+00
	18	8.56833E-01	8.60054E-01	5.39358E-03	0.00000E+00	0.00000E+00
	19	8.87107E-01	8.61645E-01	5.31043E-03	0.00000E+00	0.00000E+00
	20	8.84104E-01	8.62893E-01	5.15985E-03	0.00000E+00	0.00000E+00
	21	9.03339E-01	8.65022E-01	5.32477E-03	0.00000E+00	0.00000E+00
	22	8.55583E-01	8.64550E-01	5.07352E-03	0.00000E+00	0.00000E+00
	23	8.45629E-01	8.63649E-01	4.90926E-03	0.00000E+00	0.00000E+00
	24	8.56385E-01	8.63319E-01	4.69243E-03	0.00000E+00	0.00000E+00
	25	8.71259E-01	8.63664E-01	4.49704E-03	0.00000E+00	0.00000E+00
	26	9.12685E-01	8.65706E-01	4.76551E-03	0.00000E+00	0.00000E+00
	27	8.43542E-01	8.64820E-01	4.65610E-03	0.00000E+00	0.00000E+00
	28	8.84859E-01	8.65591E-01	4.53935E-03	0.00000E+00	0.00000E+00
	29	8.96228E-01	8.66725E-01	4.51297E-03	0.00000E+00	0.00000E+00
	30	8.47332E-01	8.66033E-01	4.40362E-03	0.00000E+00	0.00000E+00

31	8.89415E-01	2.30417E+00	8.66839E-01	4.32498E-03	0.00000E+00	0.00000E+00
32	8.36875E-01	2.30700E+00	8.65840E-01	4.29595E-03	0.00000E+00	0.00000E+00
33	8.53170E-01	2.31150E+00	8.65431E-01	4.17512E-03	0.00000E+00	0.00000E+00
34	8.40621E-01	2.31433E+00	8.64656E-01	4.11622E-03	0.00000E+00	0.00000E+00
35	8.82549E-01	2.31900E+00	8.65198E-01	4.02621E-03	0.00000E+00	0.00000E+00
36	8.36297E-01	2.32150E+00	8.64348E-01	3.99742E-03	0.00000E+00	0.00000E+00
37	9.41271E-01	2.32517E+00	8.66546E-01	4.46056E-03	0.00000E+00	0.00000E+00
38	8.54531E-01	2.32983E+00	8.66212E-01	4.34772E-03	0.00000E+00	0.00000E+00
39	8.79939E-01	2.33250E+00	8.66583E-01	4.24482E-03	0.00000E+00	0.00000E+00
40	8.51472E-01	2.33617E+00	8.66186E-01	4.15070E-03	0.00000E+00	0.00000E+00
41	8.91896E-01	2.33983E+00	8.66845E-01	4.09627E-03	0.00000E+00	0.00000E+00
42	9.07719E-01	2.34350E+00	8.67867E-01	4.12124E-03	0.00000E+00	0.00000E+00
43	8.88803E-01	2.34717E+00	8.68377E-01	4.05177E-03	0.00000E+00	0.00000E+00
44	8.97750E-01	2.35083E+00	8.69077E-01	4.01549E-03	0.00000E+00	0.00000E+00
45	8.85392E-01	2.35450E+00	8.69456E-01	3.93931E-03	0.00000E+00	0.00000E+00
46	8.69511E-01	2.35733E+00	8.69435E-01	3.84880E-03	0.00000E+00	0.00000E+00
47	8.36269E-01	2.36100E+00	8.68698E-01	3.83381E-03	0.00000E+00	0.00000E+00
48	8.64056E-01	2.36467E+00	8.68597E-01	3.75090E-03	0.00000E+00	0.00000E+00
49	8.78176E-01	2.36833E+00	8.68801E-01	3.67588E-03	0.00000E+00	0.00000E+00
50	8.51390E-01	2.37200E+00	8.68438E-01	3.61672E-03	0.00000E+00	0.00000E+00
51	8.93813E-01	2.37650E+00	8.68956E-01	3.57979E-03	0.00000E+00	0.00000E+00
52	8.59953E-01	2.38117E+00	8.68776E-01	3.51209E-03	0.00000E+00	0.00000E+00
53	8.79682E-01	2.38467E+00	8.68990E-01	3.44917E-03	0.00000E+00	0.00000E+00
54	8.78173E-01	2.38933E+00	8.69166E-01	3.38680E-03	0.00000E+00	0.00000E+00
55	8.79294E-01	2.39300E+00	8.69357E-01	3.32777E-03	0.00000E+00	0.00000E+00
56	8.87232E-01	2.39750E+00	8.69688E-01	3.28230E-03	0.00000E+00	0.00000E+00
57	8.98351E-01	2.40217E+00	8.70209E-01	3.26394E-03	0.00000E+00	0.00000E+00
58	9.00600E-01	2.40667E+00	8.70752E-01	3.25074E-03	0.00000E+00	0.00000E+00
59	8.46073E-01	2.41033E+00	8.70319E-01	3.22242E-03	0.00000E+00	0.00000E+00
60	8.74956E-01	2.41400E+00	8.70399E-01	3.16739E-03	0.00000E+00	0.00000E+00
61	8.72670E-01	2.41767E+00	8.70438E-01	3.11348E-03	0.00000E+00	0.00000E+00
62	8.67262E-01	2.42133E+00	8.70385E-01	3.06160E-03	0.00000E+00	0.00000E+00
63	9.12934E-01	2.42500E+00	8.71082E-01	3.09074E-03	0.00000E+00	0.00000E+00
64	8.30858E-01	2.42867E+00	8.70433E-01	3.10892E-03	0.00000E+00	0.00000E+00
65	8.70281E-01	2.43233E+00	8.70431E-01	3.05918E-03	0.00000E+00	0.00000E+00
66	8.64499E-01	2.43600E+00	8.70338E-01	3.01243E-03	0.00000E+00	0.00000E+00
67	8.83555E-01	2.43967E+00	8.70542E-01	2.97268E-03	0.00000E+00	0.00000E+00
68	8.73341E-01	2.44333E+00	8.70584E-01	2.92760E-03	0.00000E+00	0.00000E+00
69	8.56942E-01	2.44700E+00	8.70380E-01	2.89075E-03	0.00000E+00	0.00000E+00
70	8.51362E-01	2.44967E+00	8.70101E-01	2.86163E-03	0.00000E+00	0.00000E+00
71	8.44781E-01	2.45433E+00	8.69734E-01	2.84362E-03	0.00000E+00	0.00000E+00
72	8.59084E-01	2.45800E+00	8.69582E-01	2.80683E-03	0.00000E+00	0.00000E+00
73	9.18005E-01	2.46167E+00	8.70264E-01	2.84933E-03	0.00000E+00	0.00000E+00
761	8.61197E-01	4.95717E+00	8.69380E-01	8.25227E-04	0.00000E+00	0.00000E+00
762	8.92065E-01	4.96083E+00	8.69410E-01	8.24681E-04	0.00000E+00	0.00000E+00
763	8.50692E-01	4.96433E+00	8.69385E-01	8.23964E-04	0.00000E+00	0.00000E+00
764	8.85868E-01	4.96717E+00	8.69407E-01	8.23166E-04	0.00000E+00	0.00000E+00
765	8.42081E-01	4.97083E+00	8.69371E-01	8.22866E-04	0.00000E+00	0.00000E+00
766	8.58699E-01	4.97450E+00	8.69357E-01	8.21907E-04	0.00000E+00	0.00000E+00
767	9.05490E-01	4.97817E+00	8.69404E-01	8.22190E-04	0.00000E+00	0.00000E+00
768	8.64580E-01	4.98267E+00	8.69398E-01	8.21140E-04	0.00000E+00	0.00000E+00
769	8.68360E-01	4.98550E+00	8.69396E-01	8.20070E-04	0.00000E+00	0.00000E+00
770	8.65633E-01	4.98917E+00	8.69392E-01	8.19016E-04	0.00000E+00	0.00000E+00
771	8.65426E-01	4.99283E+00	8.69386E-01	8.17967E-04	0.00000E+00	0.00000E+00
772	8.73557E-01	4.99650E+00	8.69392E-01	8.16922E-04	0.00000E+00	0.00000E+00
773	8.85453E-01	4.99917E+00	8.69413E-01	8.16127E-04	0.00000E+00	0.00000E+00
774	8.40495E-01	5.00283E+00	8.69375E-01	8.15930E-04	0.00000E+00	0.00000E+00
775	9.19942E-01	5.00650E+00	8.69441E-01	8.17495E-04	0.00000E+00	0.00000E+00
776	8.19185E-01	5.01017E+00	8.69376E-01	8.19016E-04	0.00000E+00	0.00000E+00
777	8.72182E-01	5.01383E+00	8.69379E-01	8.17966E-04	0.00000E+00	0.00000E+00
778	8.94099E-01	5.01667E+00	8.69411E-01	8.17532E-04	0.00000E+00	0.00000E+00
779	8.76642E-01	5.02033E+00	8.69420E-01	8.16533E-04	0.00000E+00	0.00000E+00
780	8.80966E-01	5.02483E+00	8.69435E-01	8.15617E-04	0.00000E+00	0.00000E+00
781	8.74986E-01	5.02850E+00	8.69442E-01	8.14601E-04	0.00000E+00	0.00000E+00
782	9.05142E-01	5.03217E+00	8.69488E-01	8.14842E-04	0.00000E+00	0.00000E+00
783	8.82577E-01	5.03583E+00	8.69505E-01	8.13971E-04	0.00000E+00	0.00000E+00
784	9.01262E-01	5.03950E+00	8.69546E-01	8.13943E-04	0.00000E+00	0.00000E+00
785	8.39892E-01	5.04217E+00	8.69508E-01	8.13784E-04	0.00000E+00	0.00000E+00
786	8.25676E-01	5.04583E+00	8.69452E-01	8.14666E-04	0.00000E+00	0.00000E+00
787	8.74663E-01	5.04950E+00	8.69458E-01	8.13655E-04	0.00000E+00	0.00000E+00
788	8.53603E-01	5.05317E+00	8.69438E-01	8.12870E-04	0.00000E+00	0.00000E+00
789	8.95869E-01	5.05683E+00	8.69472E-01	8.12530E-04	0.00000E+00	0.00000E+00
790	8.54885E-01	5.06050E+00	8.69453E-01	8.11710E-04	0.00000E+00	0.00000E+00
791	9.17470E-01	5.06417E+00	8.69514E-01	8.12961E-04	0.00000E+00	0.00000E+00
792	9.05597E-01	5.06783E+00	8.69560E-01	8.13215E-04	0.00000E+00	0.00000E+00
793	8.71160E-01	5.07150E+00	8.69562E-01	8.12189E-04	0.00000E+00	0.00000E+00
794	8.92208E-01	5.07517E+00	8.69591E-01	8.11667E-04	0.00000E+00	0.00000E+00
795	8.83034E-01	5.07883E+00	8.69607E-01	8.10820E-04	0.00000E+00	0.00000E+00
796	8.68376E-01	5.08250E+00	8.69606E-01	8.09800E-04	0.00000E+00	0.00000E+00
797	8.56340E-01	5.08617E+00	8.69595E-01	8.08952E-04	0.00000E+00	0.00000E+00
798	8.99654E-01	5.08983E+00	8.69627E-01	8.08818E-04	0.00000E+00	0.00000E+00
799	8.46349E-01	5.09350E+00	8.69598E-01	8.08330E-04	0.00000E+00	0.00000E+00
800	9.03032E-01	5.09717E+00	8.69640E-01	8.08403E-04	0.00000E+00	0.00000E+00
801	8.43871E-01	5.10083E+00	8.69607E-01	8.08035E-04	0.00000E+00	0.00000E+00
802	8.52464E-01	5.10450E+00	8.69586E-01	8.07308E-04	0.00000E+00	0.00000E+00
803	8.76863E-01	5.10817E+00	8.69595E-01	8.06351E-04	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

LIFETIME = 2.24743E+04 + OR - 9.75418E-07      GENERATION TIME = 1.91383E+05 + OR - 3.66801E-08  
 NU BAR = 2.43406E+00 + OR - 4.19565E-05      AVERAGE FISSION GROUP = 2.16647E+01 + OR - 3.35227E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 2.57117E-01 + OR - 6.83592E-04

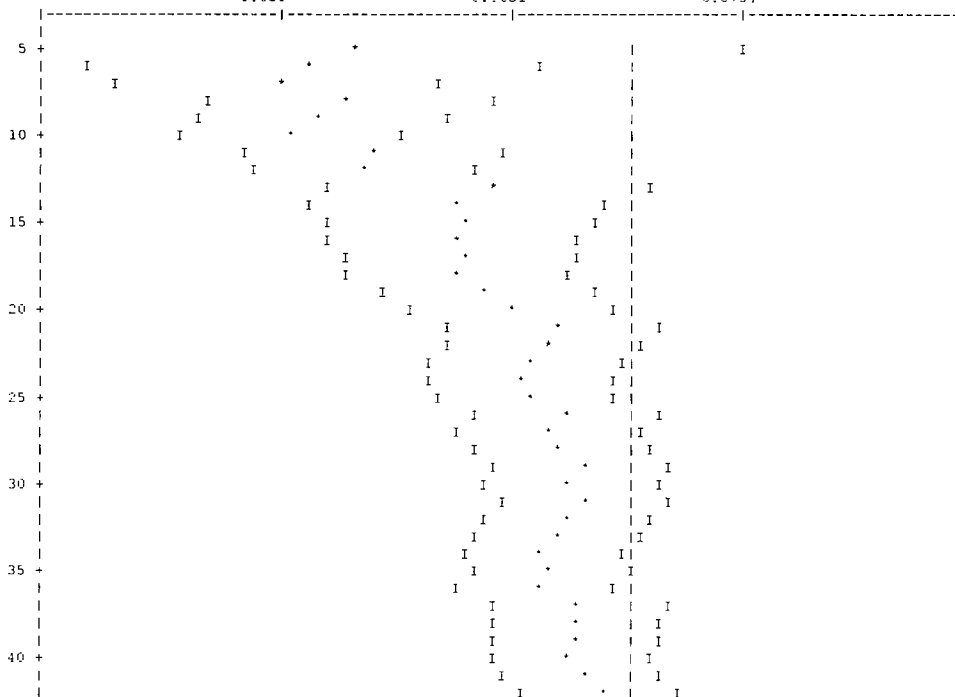
NO. OF INITIAL

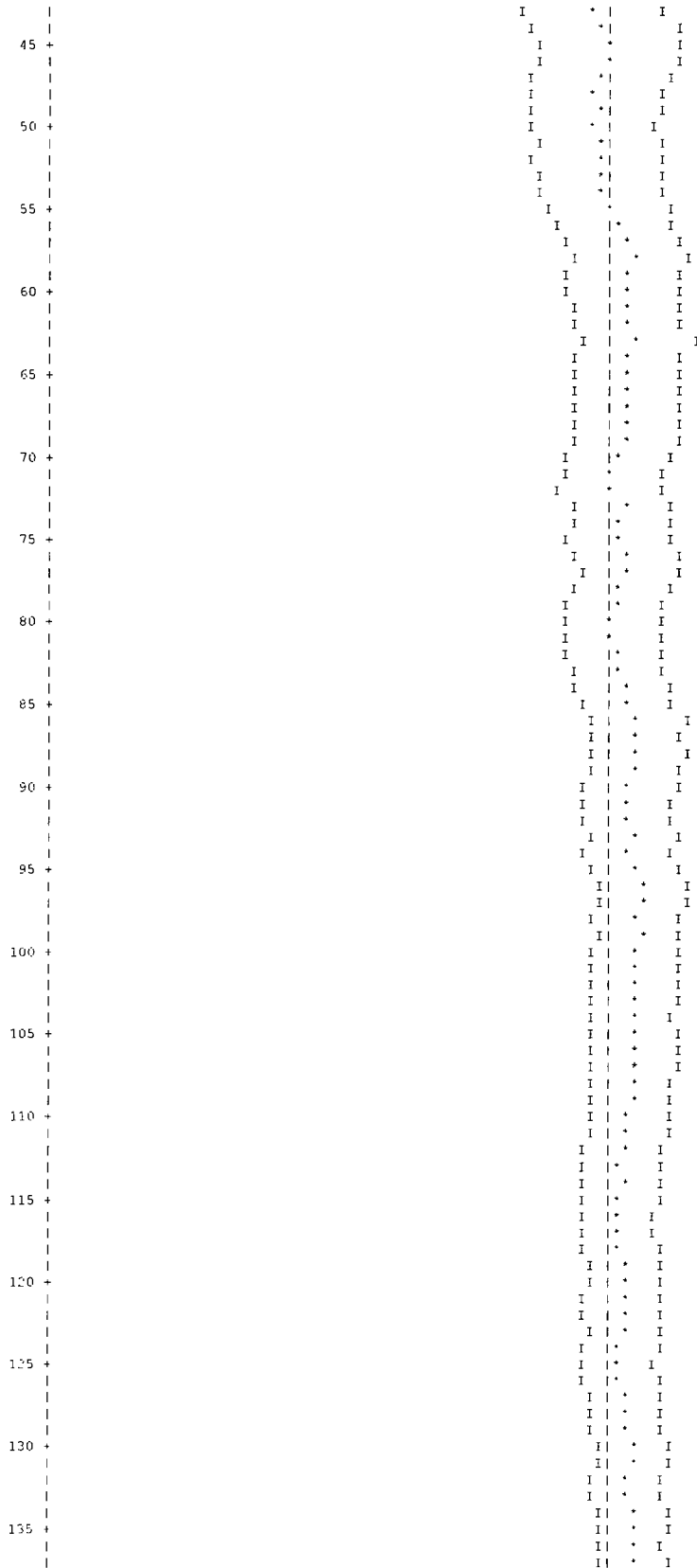
GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
3	0.86561	+ OR - 0.00081	0.86881 TO 0.87042	0.86800 TO 0.87123	0.86719 TO 0.87203	800000
4	0.86561	+ OR - 0.00081	0.86890 TO 0.87041	0.86799 TO 0.87122	0.86718 TO 0.87203	799000
5	0.86565	+ OR - 0.00081	0.86884 TO 0.87046	0.86803 TO 0.87127	0.86723 TO 0.87207	798000
6	0.86568	+ OR - 0.00081	0.86887 TO 0.87049	0.86806 TO 0.87129	0.86725 TO 0.87210	797000
7	0.86571	+ OR - 0.00081	0.86890 TO 0.87052	0.86809 TO 0.87133	0.86728 TO 0.87213	796000
8	0.86571	+ OR - 0.00081	0.86890 TO 0.87052	0.86809 TO 0.87133	0.86728 TO 0.87214	795000
9	0.86574	+ OR - 0.00081	0.86893 TO 0.87055	0.86812 TO 0.87136	0.86731 TO 0.87217	794000
10	0.86577	+ OR - 0.00081	0.86896 TO 0.87058	0.86815 TO 0.87140	0.86734 TO 0.87221	793000
11	0.86575	+ OR - 0.00081	0.86894 TO 0.87056	0.86813 TO 0.87137	0.86732 TO 0.87219	792000
12	0.86577	+ OR - 0.00081	0.86896 TO 0.87059	0.86815 TO 0.87140	0.86734 TO 0.87221	791000
17	0.86577	+ OR - 0.00081	0.86896 TO 0.87059	0.86815 TO 0.87140	0.86733 TO 0.87221	786000
22	0.86572	+ OR - 0.00082	0.86891 TO 0.87054	0.86809 TO 0.87136	0.86727 TO 0.87217	781000
27	0.86575	+ OR - 0.00082	0.86893 TO 0.87057	0.86811 TO 0.87139	0.86729 TO 0.87220	776000
32	0.86574	+ OR - 0.00082	0.86892 TO 0.87056	0.86810 TO 0.87138	0.86728 TO 0.87220	771000
37	0.86573	+ OR - 0.00082	0.86892 TO 0.87055	0.86810 TO 0.87137	0.86728 TO 0.87219	766000
42	0.86569	+ OR - 0.00082	0.86886 TO 0.87051	0.86804 TO 0.87133	0.86722 TO 0.87215	761000
47	0.86565	+ OR - 0.00082	0.86882 TO 0.87047	0.86800 TO 0.87130	0.86718 TO 0.87212	756000
52	0.86565	+ OR - 0.00083	0.86882 TO 0.87048	0.86799 TO 0.87131	0.86716 TO 0.87213	751000
57	0.86555	+ OR - 0.00083	0.86872 TO 0.87038	0.86789 TO 0.87121	0.86705 TO 0.87205	746000
62	0.86553	+ OR - 0.00084	0.86869 TO 0.87037	0.86786 TO 0.87120	0.86702 TO 0.87204	741000
67	0.86551	+ OR - 0.00084	0.86867 TO 0.87035	0.86784 TO 0.87119	0.86700 TO 0.87203	736000
72	0.86560	+ OR - 0.00084	0.86875 TO 0.87044	0.86791 TO 0.87128	0.86707 TO 0.87212	731000
77	0.86549	+ OR - 0.00084	0.86865 TO 0.87034	0.86781 TO 0.87118	0.86696 TO 0.87203	726000
82	0.86556	+ OR - 0.00085	0.86872 TO 0.87041	0.86787 TO 0.87126	0.86702 TO 0.87211	721000
87	0.86543	+ OR - 0.00085	0.86858 TO 0.87028	0.86773 TO 0.87113	0.86688 TO 0.87198	716000
92	0.86550	+ OR - 0.00085	0.86864 TO 0.87035	0.86779 TO 0.87120	0.86694 TO 0.87206	711000
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	0.86534	+ OR - 0.00085	0.86849 TO 0.87020	0.86764 TO 0.87105	0.86678 TO 0.87190	706000
102	0.86537	+ OR - 0.00086	0.86851 TO 0.87023	0.86766 TO 0.87109	0.86680 TO 0.87195	701000
107	0.86537	+ OR - 0.00086	0.86851 TO 0.87024	0.86765 TO 0.87110	0.86678 TO 0.87196	696000
112	0.86545	+ OR - 0.00087	0.86859 TO 0.87032	0.86772 TO 0.87119	0.86685 TO 0.87206	691000
117	0.86551	+ OR - 0.00087	0.86864 TO 0.87038	0.86777 TO 0.87125	0.86689 TO 0.87212	686000
122	0.86545	+ OR - 0.00087	0.86857 TO 0.87032	0.86770 TO 0.87119	0.86682 TO 0.87207	681000
127	0.86544	+ OR - 0.00088	0.86856 TO 0.87031	0.86768 TO 0.87119	0.86680 TO 0.87207	676000
132	0.86537	+ OR - 0.00088	0.86849 TO 0.87025	0.86761 TO 0.87114	0.86673 TO 0.87202	671000
137	0.86533	+ OR - 0.00089	0.86844 TO 0.87021	0.86755 TO 0.87110	0.86666 TO 0.87199	666000
142	0.86527	+ OR - 0.00089	0.86838 TO 0.87016	0.86749 TO 0.87105	0.86659 TO 0.87194	661000
147	0.86523	+ OR - 0.00090	0.86834 TO 0.87013	0.86744 TO 0.87103	0.86655 TO 0.87192	656000
642	0.87123	+ OR - 0.00178	0.86945 TO 0.87300	0.86768 TO 0.87478	0.86590 TO 0.87656	161000
647	0.87152	+ OR - 0.00181	0.86970 TO 0.87333	0.86789 TO 0.87514	0.86607 TO 0.87696	156000
652	0.87096	+ OR - 0.00185	0.86910 TO 0.87281	0.86725 TO 0.87466	0.86540 TO 0.87652	151000
657	0.87098	+ OR - 0.00190	0.86909 TO 0.87288	0.86719 TO 0.87478	0.86529 TO 0.87668	146000
662	0.87127	+ OR - 0.00193	0.86934 TO 0.87321	0.86741 TO 0.87514	0.86548 TO 0.87707	141000
667	0.87187	+ OR - 0.00197	0.86990 TO 0.87384	0.86793 TO 0.87581	0.86596 TO 0.87779	136000
672	0.87189	+ OR - 0.00198	0.86991 TO 0.87389	0.86792 TO 0.87586	0.86594 TO 0.87784	131000
677	0.87221	+ OR - 0.00205	0.87017 TO 0.87426	0.86812 TO 0.87631	0.86608 TO 0.87935	126000

682	0.87159	+ OR - 0.00202	0.86957 TO 0.87360	0.86755 TO 0.87562	0.86554 TO 0.87763	121000
687	0.87202	+ OR - 0.00206	0.86996 TO 0.87408	0.86790 TO 0.87614	0.86584 TO 0.87821	116000
692	0.87282	+ OR - 0.00212	0.87071 TO 0.87494	0.86859 TO 0.87706	0.86647 TO 0.87918	111000
697	0.87318	+ OR - 0.00219	0.87099 TO 0.87536	0.86881 TO 0.87755	0.86662 TO 0.87974	106000
702	0.87338	+ OR - 0.00226	0.87112 TO 0.87564	0.86886 TO 0.87790	0.86659 TO 0.88016	101000
707	0.87352	+ OR - 0.00235	0.87117 TO 0.87586	0.86882 TO 0.87821	0.86648 TO 0.88056	96000
712	0.87273	+ OR - 0.00243	0.87030 TO 0.87517	0.86787 TO 0.87760	0.86544 TO 0.88003	91000
717	0.87386	+ OR - 0.00242	0.87144 TO 0.87628	0.86902 TO 0.87870	0.86660 TO 0.88112	86000
722	0.87397	+ OR - 0.00254	0.87143 TO 0.87651	0.86889 TO 0.87905	0.86635 TO 0.88158	81000
727	0.87331	+ OR - 0.00267	0.87064 TO 0.87598	0.86796 TO 0.87866	0.86529 TO 0.88133	76000
732	0.87344	+ OR - 0.00281	0.87063 TO 0.87626	0.86781 TO 0.87907	0.86500 TO 0.88189	71000
737	0.87254	+ OR - 0.00281	0.86973 TO 0.87534	0.86693 TO 0.87815	0.86412 TO 0.88095	66000
742	0.87197	+ OR - 0.00302	0.86895 TO 0.87499	0.86593 TO 0.87801	0.86291 TO 0.88103	61000
747	0.87207	+ OR - 0.00326	0.86880 TO 0.87533	0.86554 TO 0.87859	0.86228 TO 0.88185	56000
752	0.87366	+ OR - 0.00342	0.87024 TO 0.87708	0.86682 TO 0.88050	0.86339 TO 0.88393	51000
757	0.87403	+ OR - 0.00369	0.87034 TO 0.87772	0.86665 TO 0.88141	0.86297 TO 0.88510	46000
762	0.87303	+ OR - 0.00381	0.86922 TO 0.87684	0.86541 TO 0.88066	0.86160 TO 0.88447	41000
767	0.87365	+ OR - 0.00408	0.86958 TO 0.87773	0.86550 TO 0.88181	0.86142 TO 0.88588	36000

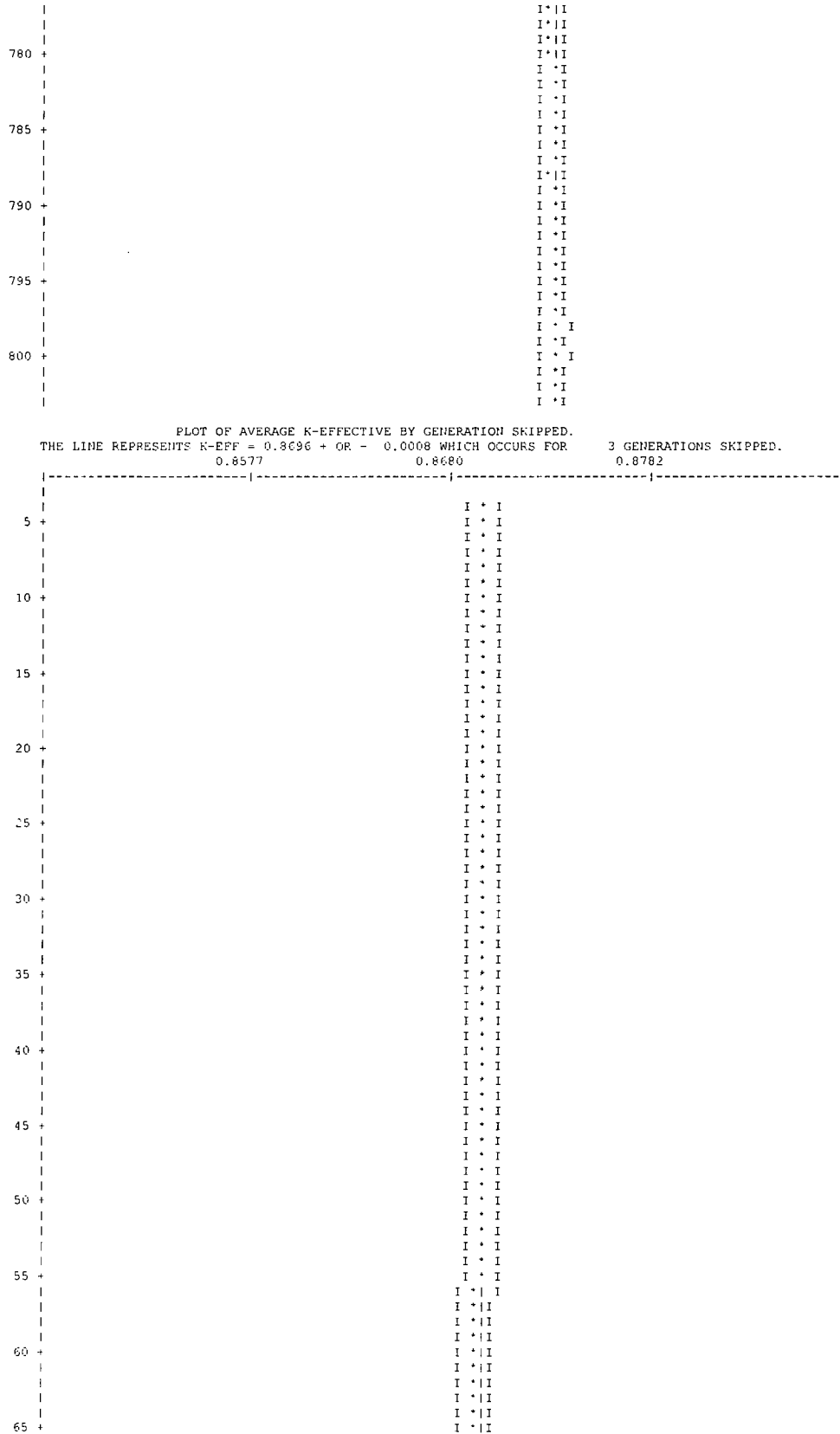
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
772	0.87464	+ OR - 0.00471	0.86993 TO 0.87936	0.86522 TO 0.88407	0.86050 TO 0.88878	31000
777	0.87603	+ OR - 0.00467	0.87135 TO 0.88070	0.86668 TO 0.88537	0.86201 TO 0.89005	26000
782	0.87356	+ OR - 0.00554	0.86803 TO 0.87910	0.86249 TO 0.88464	0.85696 TO 0.89017	21000
787	0.87630	+ OR - 0.00594	0.87036 TO 0.88224	0.86441 TO 0.88818	0.85847 TO 0.89412	16000
792	0.87212	+ OR - 0.00630	0.86582 TO 0.87843	0.85952 TO 0.88473	0.85321 TO 0.89103	11000
797	0.87037	+ OR - 0.01090	0.85947 TO 0.88128	0.84857 TO 0.89218	0.83766 TO 0.90308	6000

THE LINE REPRESENTS PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
K-EFF = 0.8696 + OR - 0.0008 WHICH OCCURS FOR 803 GENERATIONS RUN.  
0.8507                      0.8631                      0.8754



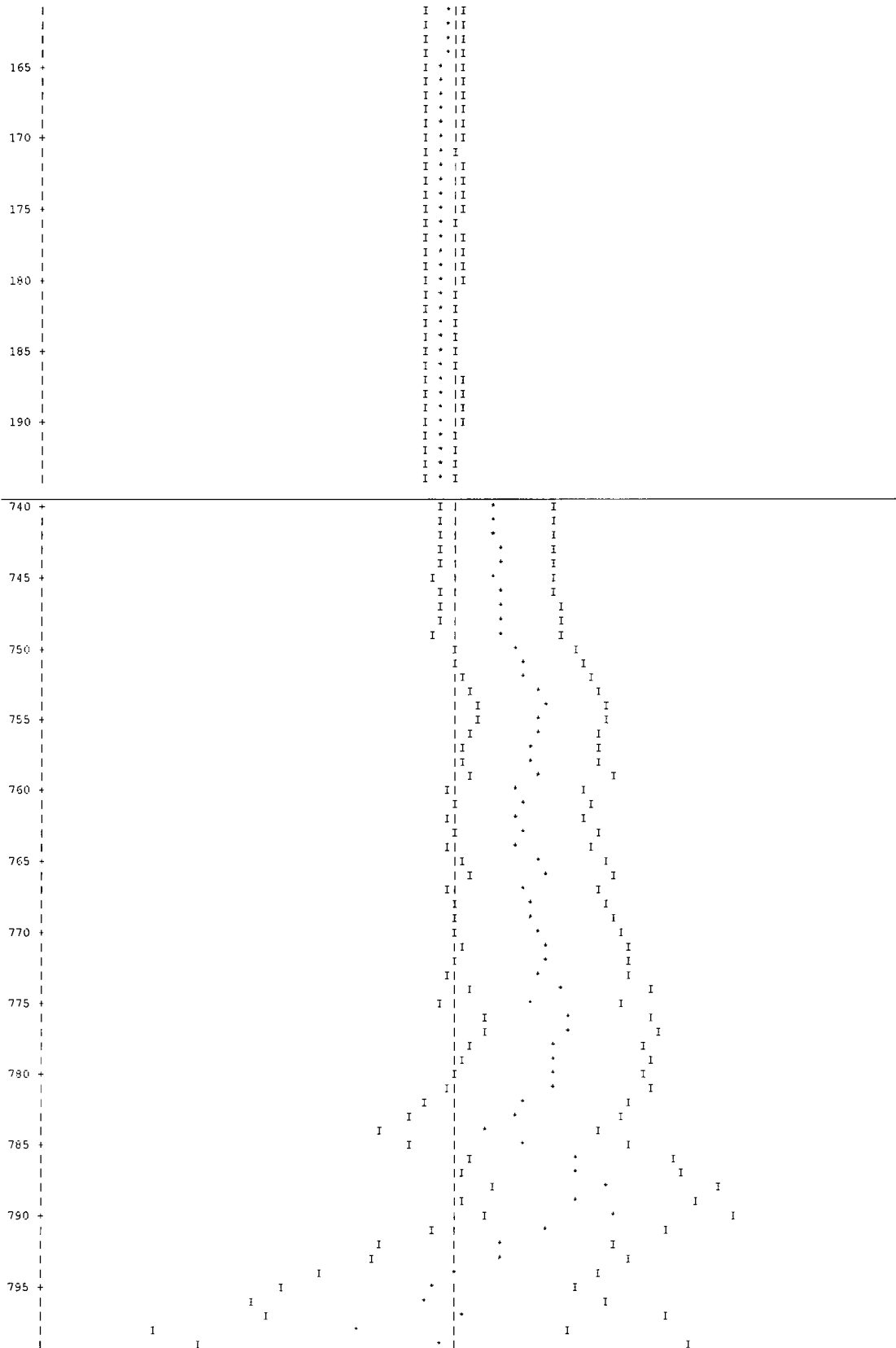












GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION
1	0.0036			3.16101E-03	1.0708	2.07689E-03	0.9611	0.00000E+00	0.0000
2	0.0149			1.29140E-02	0.3253	7.41767E-03	0.2988	0.00000E+00	0.0000
3	0.0171			1.48700E-02	0.2519	6.55451E-03	0.2380	0.00000E+00	0.0000
4	0.0075			6.50931E-03	0.2913	3.24606E-03	0.2726	0.00000E+00	0.0000
5	0.0032			2.79252E-03	0.2354	2.80208E-03	0.2136	0.00000E+00	0.0000
6	0.0037			3.25030E-03	0.2309	5.61286E-03	0.2124	0.00000E+00	0.0000
7	0.0042			3.62493E-03	0.2597	6.91825E-03	0.2376	0.00000E+00	0.0000
8	0.0042			3.67098E-03	0.2411	8.70636E-03	0.2327	0.00000E+00	0.0000
9	0.0056			4.87620E-03	0.2244	1.27518E-02	0.2084	0.00000E+00	0.0000
10	0.0121			1.04961E-02	0.2204	2.37704E-02	0.1808	0.00000E+00	0.0000
11	0.0243			2.10948E-02	0.1815	4.05073E-02	0.1513	0.00000E+00	0.0000
12	0.0311			2.70160E-02	0.1737	4.56024E-02	0.1538	0.00000E+00	0.0000
13	0.0284			2.46836E-02	0.1721	4.52290E-02	0.1578	0.00000E+00	0.0000
14	0.0218			1.89165E-02	0.1629	6.16347E-02	0.1515	0.00000E+00	0.0000
15	0.0043			3.76369E-03	0.2554	1.01315E-02	0.3870	0.00000E+00	0.0000
16	0.0029			2.53896E-03	0.3287	5.95737E-03	0.4673	0.00000E+00	0.0000
17	0.0045			3.89405E-03	0.4239	4.40758E-03	0.4139	0.00000E+00	0.0000
18	0.0061			5.28540E-03	0.4146	4.62657E-03	0.3853	0.00000E+00	0.0000
19	0.0073			6.35321E-03	0.3296	6.83232E-03	0.3807	0.00000E+00	0.0000
20	0.0304			2.64104E-02	0.2043	2.61778E-02	0.2538	0.00000E+00	0.0000
21	0.0165			1.43336E-02	0.3200	1.19840E-02	0.3077	0.00000E+00	0.0000
22	0.0386			3.35259E-02	0.2289	2.66332E-02	0.2288	0.00000E+00	0.0000
23	0.1140			9.91690E-02	0.1555	7.58186E-02	0.1542	0.00000E+00	0.0000
24	0.1886			1.63996E-01	0.1480	1.15808E-01	0.1356	0.00000E+00	0.0000
25	0.1514			1.31646E-01	0.1596	9.03125E-02	0.1474	0.00000E+00	0.0000
26	0.1832			1.59314E-01	0.1740	1.11489E-01	0.1635	0.00000E+00	0.0000
27	0.0707			6.14960E-02	0.2729	6.97655E-02	0.2298	0.00000E+00	0.0000
SYSTEM TOTAL =				8.69613E-01	0.0928	8.32776E-01	0.0524	0.00000E+00	0.0000

THE WEIGHT LOST IN THE ALBEDO PORTION OF THE PROBLEM = 1.6990E-01 + OR - 0.0003

ELAPSED TIME 5.10900 MINUTES  
RANDOM NUMBER= 74DA6F694404

FREQUENCY FOR GENERATIONS 4 TO 803

```

0.7930 TO 0.7967 *
0.7967 TO 0.8004 *
0.8004 TO 0.8040 *
0.8040 TO 0.8077 *
0.8077 TO 0.8114 ***
0.8114 TO 0.8151 **
0.8151 TO 0.8187 **
0.8187 TO 0.8224 *****
0.8224 TO 0.8261 *****
0.8261 TO 0.8298 *****
0.8298 TO 0.8334 *****
0.8334 TO 0.8371 *****
0.8371 TO 0.8408 *****
0.8408 TO 0.8445 *****
0.8445 TO 0.8481 *****
0.8481 TO 0.8518 *****
0.8518 TO 0.8555 *****
0.8555 TO 0.8592 *****
0.8592 TO 0.8628 *****
0.8628 TO 0.8665 *****
0.8665 TO 0.8702 *****
0.8702 TO 0.8739 *****
0.8739 TO 0.8775 *****
0.8775 TO 0.8812 *****
0.8812 TO 0.8849 *****
0.8849 TO 0.8886 *****
0.8886 TO 0.8922 *****
0.8922 TO 0.8959 *****
0.8959 TO 0.8996 *****
0.8996 TO 0.9033 *****
0.9033 TO 0.9069 *****
0.9069 TO 0.9106 *****
0.9106 TO 0.9143 *****
0.9143 TO 0.9179 *****
0.9179 TO 0.9216 ****
0.9216 TO 0.9253 *
0.9253 TO 0.9290 **
0.9290 TO 0.9326 *
0.9326 TO 0.9363 *
0.9363 TO 0.9400 **
0.9400 TO 0.9437 *

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FREQUENCY FOR GENERATIONS 204 TO 803

```

0.7930 TO 0.7967 *
0.7967 TO 0.8004 *
0.8004 TO 0.8040 *
0.8040 TO 0.8077 *
0.8077 TO 0.8114 *
0.8114 TO 0.8151 ***

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0.8151 TO 0.8197 **
0.8187 TO 0.8224 *****
0.8224 TO 0.8261 *****
0.8261 TO 0.8298 *****
0.8298 TO 0.8334 *****
0.8334 TO 0.8371 *****
0.8371 TO 0.8408 *****
0.8408 TO 0.8445 *****
0.8445 TO 0.8481 *****
0.8481 TO 0.8518 *****
0.8518 TO 0.8555 *****
0.8555 TO 0.8592 *****
0.8592 TO 0.8628 *****
0.8628 TO 0.8665 *****
0.8665 TO 0.8702 *****
0.8702 TO 0.8739 *****
0.8739 TO 0.8775 *****
0.8775 TO 0.8812 *****
0.8812 TO 0.8849 *****
0.8849 TO 0.8886 *****
0.8886 TO 0.8922 *****
0.8922 TO 0.8959 *****
0.8959 TO 0.8996 *****
0.8996 TO 0.9033 *****
0.9033 TO 0.9069 *****
0.9069 TO 0.9106 *****
0.9106 TO 0.9143 *****
0.9143 TO 0.9179 *****
0.9179 TO 0.9216 *
0.9216 TO 0.9253 *
0.9253 TO 0.9290 *
0.9290 TO 0.9326 *
0.9326 TO 0.9363 *
0.9363 TO 0.9400 **
0.9400 TO 0.9437 **
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FREQUENCY FOR GENERATIONS 404 TO 803

```
0.7930 TO 0.7967
0.7967 TO 0.8004
0.8004 TO 0.8040
0.8040 TO 0.8077
0.8077 TO 0.8114
0.8114 TO 0.8151 ***
0.8151 TO 0.8187 **
0.8187 TO 0.8224 ***
0.8224 TO 0.8261 ***
0.8261 TO 0.8298 *****
0.8298 TO 0.8334 *****
0.8334 TO 0.8371 *****
0.8371 TO 0.8408 *****
0.8408 TO 0.8445 *****
0.8445 TO 0.8481 *****
0.8481 TO 0.8518 *****
0.8518 TO 0.8555 *****
0.8555 TO 0.8592 *****
0.8592 TO 0.8628 *****
0.8628 TO 0.8665 *****
0.8665 TO 0.8702 *****
0.8702 TO 0.8739 *****
0.8739 TO 0.8775 *****
0.8775 TO 0.8812 *****
0.8812 TO 0.8849 *****
0.8849 TO 0.8886 *****
0.8886 TO 0.8922 *****
0.8922 TO 0.8959 *****
0.8959 TO 0.8996 *****
0.8996 TO 0.9033 *****
0.9033 TO 0.9069 *****
0.9069 TO 0.9106 *****
0.9106 TO 0.9143 *
0.9143 TO 0.9179 *****
0.9179 TO 0.9216 *
0.9216 TO 0.9253 *
0.9253 TO 0.9290 *
0.9290 TO 0.9326 *
0.9326 TO 0.9363 *
0.9363 TO 0.9400 **
0.9400 TO 0.9437 **
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FREQUENCY FOR GENERATIONS 604 TO 803

```
0.7930 TO 0.7967
0.7967 TO 0.8004
0.8004 TO 0.8040
0.8040 TO 0.8077
0.8077 TO 0.8114 *
0.8114 TO 0.8151 *
0.8151 TO 0.8187 *
0.8187 TO 0.8224 *
0.8224 TO 0.8261 **
0.8261 TO 0.8298 ***
0.8298 TO 0.8334 ***
0.8334 TO 0.8371 ***
0.8371 TO 0.8408 *****
0.8408 TO 0.8445 *****
0.8445 TO 0.8481 *****
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0.8481 TO 0.8518 \*\*\*\*\*  
0.8518 TO 0.8555 \*\*\*\*\*  
0.8555 TO 0.8592 \*\*\*\*\*  
0.8592 TO 0.8628 \*\*\*\*\*  
0.8628 TO 0.8665 \*\*\*\*\*  
0.8665 TO 0.8702 \*\*\*\*\*  
0.8702 TO 0.8739 \*\*\*\*\*  
0.8739 TO 0.8775 \*\*\*\*\*  
0.8775 TO 0.8812 \*\*\*\*\*  
0.8812 TO 0.8849 \*\*\*\*\*  
0.8849 TO 0.8886 \*\*\*\*\*  
0.8886 TO 0.8922 \*\*\*\*\*  
0.8922 TO 0.8959 \*\*\*\*\*  
0.8959 TO 0.8996 \*\*\*  
0.8996 TO 0.9033 \*\*\*\*\*  
0.9033 TO 0.9069 \*\*\*\*\*  
0.9069 TO 0.9106 \*\*\*  
0.9106 TO 0.9143 \*\*\*\*\*  
0.9143 TO 0.9179 \*\*\*  
0.9179 TO 0.9216 \*  
0.9216 TO 0.9253 \*\*\*\*\*  
0.9253 TO 0.9290 \*  
0.9290 TO 0.9326 \*  
0.9326 TO 0.9363 \*  
0.9363 TO 0.9400 \*  
0.9400 TO 0.9437 \*

.....  
CONGRATULATIONS! YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH KENO V IN 5.10900 MINUTES  
.....

**6.6.12      Spiral Fuel Assemblies in the LWT Cask**

This section contains a truncated sample output file from the evaluation of spiral fuel assemblies in the LWT cask. The output file is shown in Figure 6.6.12-1.

Figure 6.6.12-1 Maximum Reactivity Spiral Fuel Assembly Configuration

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PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT w/ HIFAR Mark III Fuel, Accident, Radial - In, Axial - Alternating
' Basket Configuration
' Fuel Tube Thick - Min Fuel Tube OD - Max
' Fuel Tube Height - Min Fuel Base Plate - Min
' Fuel Plate Configuration Fuel Plate Thickness - Min Fuel Plate Clad Thicknes
' Active Fuel Length - Min Fuel Element Height - Nominal
' Plate Location - H/U Ratio - Max
' Material Description
' U235 Fuel Mass - Max Uranium Weight Fraction - Max
27GROUPPDF4 LATTICECELL
'Material Description for LWT Analysis - DIL0 HIFAR Mark III Fuel
URANIUM 1 DEN=0.4084 1.0 293.0 92235 95.0 92238 15.0 END
AL 1 DEN=0.2957 1.0 293.0 END
AL 2 1.00 293.0 END
H2O 3 DEN=0.9998 1.00 293.0 END
AREMGLC 0.9437 3 0 1 0
6012 2 1001 6 8016 2
4 0.5840 END
H2O 4 0.4160 293.0 END
PB 5 1.00 293.0 END
SS304 6 1.00 293.0 END
AL 7 1.00 293.0 END
SS304 8 1.00 293.0 END
H2O 9 DEN=0.0001 1.00 293.0 END
END COMP
SYMSLABCELL 0.6342 0.1039 1 3 0.1239 2 END

READ PARAM TBA=5 TME=90 RUN=YES PLT=NO
GEN=1203 NPG=1000 END PARAM
READ START XSM=-16.85 XSP=16.85 YSM=16.85 YSP=-16.85
ZSM=26.67 ZSP=472.14 END START
READ GEOM
UNIT 1
COM='Fueled Annular Sections Tube 1 '
'Aluminum Inner
CYLINDER 3 1 2.9100 59.0750 0.0000
CYLINDER 2 1 2.911 59.0750 0.0000
'Fuel Annulus 1
CYLINDER 3 1 3.0994 59.0750 0.0000
CYLINDER 2 1 3.1094 59.0750 0.0000
CYLINDER 1 1 3.2133 59.0750 0.0000
CYLINDER 2 1 3.2233 59.0750 0.0000
'Fuel Annulus 2
CYLINDER 3 1 3.9218 59.0750 0.0000
CYLINDER 2 1 3.9318 59.0750 0.0000
CYLINDER 1 1 4.0357 59.0750 0.0000
CYLINDER 2 1 4.0457 59.0750 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.7442 59.0750 0.0000
CYLINDER 2 1 4.7542 59.0750 0.0000
CYLINDER 1 1 4.8581 59.0750 0.0000
CYLINDER 2 1 4.8681 59.0750 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 59.0750 0.0000
CYLINDER 2 1 5.0799 59.0750 0.0000
UNIT 2
COM='Axial Clad Sections Tube 1 '
'Aluminum Inner
CYLINDER 3 1 2.9100 0.0005 0.0000
CYLINDER 2 1 2.911 0.0005 0.0000
'Clad Axial End Piece 1
CYLINDER 3 1 3.0994 0.0005 0.0000
CYLINDER 2 1 3.2233 0.0005 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.9218 0.0005 0.0000
CYLINDER 2 1 4.0457 0.0005 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.7442 0.0005 0.0000
CYLINDER 2 1 4.8681 0.0005 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 0.0005 0.0000
CYLINDER 2 1 5.0799 0.0005 0.0000
UNIT 3
COM='Fuel Element Tube 1 '
CYLINDER 3 1 5.0800 59.0763 0.0000
HOLE 2 0.0000 0.0000 0.0000
HOLE 1 0.0000 0.0000 0.0006
HOLE 2 0.0000 0.0000 59.0757
UNIT 4
COM='Basket Fuel Tube - Fuel Down Radial Shifted toward 0 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 3 0.0000 0.0000 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 5
COM='Basket Fuel Tube - Fuel Up Radial Shifted toward 0 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 3 0.0000 0.0000 13.9484
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 6
COM='Fueled Annular Sections Tube 2 '

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'Aluminum Inner
CYLINDER 3 1 2.9100 59.0750 0.0000
CYLINDER 2 1 2.911 59.0750 0.0000
'Fuel Annulus 1
CYLINDER 3 1 3.0994 59.0750 0.0000
CYLINDER 2 1 3.1094 59.0750 0.0000
CYLINDER 1 1 3.2133 59.0750 0.0000
CYLINDER 2 1 3.2233 59.0750 0.0000
'Fuel Annulus 2
CYLINDER 3 1 3.9218 59.0750 0.0000
CYLINDER 2 1 3.9318 59.0750 0.0000
CYLINDER 1 1 4.0357 59.0750 0.0000
CYLINDER 2 1 4.0457 59.0750 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.7442 59.0750 0.0000
CYLINDER 2 1 4.7542 59.0750 0.0000
CYLINDER 1 1 4.8581 59.0750 0.0000
CYLINDER 2 1 4.8681 59.0750 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 59.0750 0.0000
CYLINDER 2 1 5.0799 59.0750 0.0000
UNIT 7
COM='Axial Clad Sections Tube 2 '
'Aluminum Inner
CYLINDER 3 1 2.9100 0.0005 0.0000
CYLINDER 2 1 2.911 0.0005 0.0000
'Clad Axial End Piece 1
CYLINDER 3 1 3.0994 0.0005 0.0000
CYLINDER 2 1 3.2233 0.0005 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.9218 0.0005 0.0000
CYLINDER 2 1 4.0457 0.0005 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.7442 0.0005 0.0000
CYLINDER 2 1 4.8681 0.0005 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 0.0005 0.0000
CYLINDER 2 1 5.0799 0.0005 0.0000
UNIT 8
COM='Fuel Element Tube 2 '
CYLINDER 3 1 5.0800 59.0763 0.0000
HOLE 7 0.0000 0.0000 0.0000
HOLE 6 0.0000 0.0000 0.0006
HOLE 7 0.0000 0.0000 59.0757
UNIT 9
COM='Basket Fuel Tube - Fuel Down Radial Shifted toward 190 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 8 -0.1777 0.0000 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 10
COM='Basket Fuel Tube - Fuel Up Radial Shifted toward 180 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 8 -0.1777 0.0000 13.9484
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 11
COM='Fueled Annular Sections Tube 3 '
'Aluminum Inner
CYLINDER 3 1 2.9100 59.0750 0.0000
CYLINDER 2 1 2.911 59.0750 0.0000
'Fuel Annulus 1
CYLINDER 3 1 3.0994 59.0750 0.0000
CYLINDER 2 1 3.1094 59.0750 0.0000
CYLINDER 1 1 3.2133 59.0750 0.0000
CYLINDER 2 1 3.2233 59.0750 0.0000
'Fuel Annulus 2
CYLINDER 3 1 3.9218 59.0750 0.0000
CYLINDER 2 1 3.9318 59.0750 0.0000
CYLINDER 1 1 4.0357 59.0750 0.0000
CYLINDER 2 1 4.0457 59.0750 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.7442 59.0750 0.0000
CYLINDER 2 1 4.7542 59.0750 0.0000
CYLINDER 1 1 4.8581 59.0750 0.0000
CYLINDER 2 1 4.8681 59.0750 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 59.0750 0.0000
CYLINDER 2 1 5.0799 59.0750 0.0000
UNIT 12
COM='Axial Clad Sections Tube 3 '
'Aluminum Inner
CYLINDER 3 1 2.9100 0.0005 0.0000
CYLINDER 2 1 2.911 0.0005 0.0000
'Clad Axial End Piece 1
CYLINDER 3 1 3.0994 0.0005 0.0000
CYLINDER 2 1 3.2233 0.0005 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.9218 0.0005 0.0000
CYLINDER 2 1 4.0457 0.0005 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.7442 0.0005 0.0000
CYLINDER 2 1 4.8681 0.0005 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 0.0005 0.0000
CYLINDER 2 1 5.0799 0.0005 0.0000
UNIT 13
COM='Fuel Element Tube 3 '

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CYLINDER 3 1 5.0800 59.0763 0.0000
HOLE 12 0.0000 0.0000 0.0000
HOLE 11 0.0000 0.0000 0.0006
HOLE 10 0.0000 0.0000 59.0757
UNIT 14
COM='Basket Fuel Tube - Fuel Down Radial Shifted toward 240 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 13 -0.0889 -0.1539 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 15
COM='Basket Fuel Tube - Fuel Up Radial Shifted toward 240 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 13 -0.0889 -0.1539 13.9484
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 16
COM='Fueled Annular Sections Tube 4 '
'Aluminum Inner
CYLINDER 3 1 2.9100 59.0750 0.0000
CYLINDER 2 1 2.911 59.0750 0.0000
'Fuel Annulus 1
CYLINDER 3 1 3.0994 59.0750 0.0000
CYLINDER 2 1 3.1094 59.0750 0.0000
CYLINDER 1 1 3.2133 59.0750 0.0000
CYLINDER 2 1 3.2233 59.0750 0.0000
'Fuel Annulus 2
CYLINDER 3 1 3.9218 59.0750 0.0000
CYLINDER 2 1 3.9318 59.0750 0.0000
CYLINDER 1 1 4.0357 59.0750 0.0000
CYLINDER 2 1 4.0457 59.0750 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.7442 59.0750 0.0000
CYLINDER 2 1 4.7542 59.0750 0.0000
CYLINDER 1 1 4.8581 59.0750 0.0000
CYLINDER 2 1 4.8681 59.0750 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 59.0750 0.0000
CYLINDER 2 1 5.0799 59.0750 0.0000
UNIT 17
COM='Axial Clad Sections Tube 4 '
'Aluminum Inner
CYLINDER 3 1 2.9100 0.0005 0.0000
CYLINDER 2 1 2.911 0.0005 0.0000
'Clad Axial End Piece 1
CYLINDER 3 1 3.0994 0.0005 0.0000
CYLINDER 2 1 3.2233 0.0005 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.9218 0.0005 0.0000
CYLINDER 2 1 4.0457 0.0005 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.7442 0.0005 0.0000
CYLINDER 2 1 4.8681 0.0005 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 0.0005 0.0000
CYLINDER 2 1 5.0799 0.0005 0.0000
UNIT 18
COM='Fuel Element Tube 4 '
CYLINDER 3 1 5.0800 59.0763 0.0000
HOLE 17 0.0000 0.0000 0.0000
HOLE 16 0.0000 0.0000 0.0006
HOLE 17 0.0000 0.0000 59.0757
UNIT 19
COM='Basket Fuel Tube - Fuel Down Radial Shifted toward 300 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 18 0.0889 -0.1539 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 20
COM='Basket Fuel Tube - Fuel Up Radial Shifted toward 300 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 18 0.0889 -0.1539 13.9484
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 21
COM='Fueled Annular Sections Tube 5 '
'Aluminum Inner
CYLINDER 3 1 2.9100 59.0750 0.0000
CYLINDER 2 1 2.911 59.0750 0.0000
'Fuel Annulus 1
CYLINDER 3 1 3.0994 59.0750 0.0000
CYLINDER 2 1 3.1094 59.0750 0.0000
CYLINDER 1 1 3.2133 59.0750 0.0000
CYLINDER 2 1 3.2233 59.0750 0.0000
'Fuel Annulus 2
CYLINDER 3 1 3.9218 59.0750 0.0000
CYLINDER 2 1 3.9318 59.0750 0.0000
CYLINDER 1 1 4.0357 59.0750 0.0000
CYLINDER 2 1 4.0457 59.0750 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.7442 59.0750 0.0000
CYLINDER 2 1 4.7542 59.0750 0.0000
CYLINDER 1 1 4.8581 59.0750 0.0000
CYLINDER 2 1 4.8681 59.0750 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 59.0750 0.0000
CYLINDER 2 1 5.0799 59.0750 0.0000
UNIT 22
COM='Axial Clad Sections Tube 5 '
'Aluminum Inner
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CYLINDER 3 1 2.9100 0.0005 0.0000
CYLINDER 2 1 2.911 0.0005 0.0000
'Clad Axial End Piece 1
CYLINDER 3 1 3.0994 0.0005 0.0000
CYLINDER 2 1 3.2233 0.0005 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.9218 0.0005 0.0000
CYLINDER 2 1 4.0457 0.0005 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.7442 0.0005 0.0000
CYLINDER 2 1 4.8681 0.0005 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 0.0005 0.0000
CYLINDER 2 1 5.0799 0.0005 0.0000
UNIT 23
COM='Fuel Element Tube 5'
CYLINDER 3 1 5.0800 59.0763 0.0000
HOLE 22 0.0000 0.0000 0.0000
HOLE 21 0.0000 0.0000 0.0006
HOLE 22 0.0000 0.0000 59.0757
UNIT 24
COM='Basket Fuel Tube - Fuel Down Radial Shifted toward 0 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 23 0.1777 0.0000 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 25
COM='Basket Fuel Tube - Fuel Up Radial Shifted toward 0 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 23 0.1777 0.0000 13.9484
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 26
COM='Fueled Annular Sections Tube 6 '
'Aluminum Inner
CYLINDER 3 1 2.9100 59.0750 0.0000
CYLINDER 2 1 2.911 59.0750 0.0000
'Fuel Annulus 1
CYLINDER 3 1 3.0994 59.0750 0.0000
CYLINDER 2 1 3.1094 59.0750 0.0000
CYLINDER 1 1 3.2133 59.0750 0.0000
CYLINDER 2 1 3.2233 59.0750 0.0000
'Fuel Annulus 2
CYLINDER 3 1 3.9218 59.0750 0.0000
CYLINDER 2 1 3.9318 59.0750 0.0000
CYLINDER 1 1 4.0357 59.0750 0.0000
CYLINDER 2 1 4.0457 59.0750 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.7442 59.0750 0.0000
CYLINDER 2 1 4.7542 59.0750 0.0000
CYLINDER 1 1 4.8581 59.0750 0.0000
CYLINDER 2 1 4.8681 59.0750 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 59.0750 0.0000
CYLINDER 2 1 5.0799 59.0750 0.0000
UNIT 27
COM='Axial Clad Sections Tube 6 '
'Aluminum Inner
CYLINDER 3 1 2.9100 0.0005 0.0000
CYLINDER 2 1 2.911 0.0005 0.0000
'Clad Axial End Piece 1
CYLINDER 3 1 3.0994 0.0005 0.0000
CYLINDER 2 1 3.2233 0.0005 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.9218 0.0005 0.0000
CYLINDER 2 1 4.0457 0.0005 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.7442 0.0005 0.0000
CYLINDER 2 1 4.8681 0.0005 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 0.0005 0.0000
CYLINDER 2 1 5.0799 0.0005 0.0000
UNIT 28
COM='Fuel Element Tube 6'
CYLINDER 3 1 5.0800 59.0763 0.0000
HOLE 27 0.0000 0.0000 0.0000
HOLE 26 0.0000 0.0000 0.0006
HOLE 27 0.0000 0.0000 59.0757
UNIT 29
COM='Basket Fuel Tube - Fuel Down Radial Shifted toward 60 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 28 0.0889 0.1539 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 30
COM='Basket Fuel Tube - Fuel Up Radial Shifted toward 60 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 28 0.0889 0.1539 13.9484
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 31
COM='Fueled Annular Sections Tube 7 '
'Aluminum Inner
CYLINDER 3 1 2.9100 59.0750 0.0000
CYLINDER 2 1 2.911 59.0750 0.0000
'Fuel Annulus 1
CYLINDER 3 1 3.0994 59.0750 0.0000
CYLINDER 2 1 3.1094 59.0750 0.0000
CYLINDER 1 1 3.2133 59.0750 0.0000
CYLINDER 2 1 3.2233 59.0750 0.0000

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'Fuel Annulus 2
CYLINDER 3 1 3.9218 59.0750 0.0000
CYLINDER 2 1 3.9318 59.0750 0.0000
CYLINDER 1 1 4.0357 59.0750 0.0000
CYLINDER 2 1 4.0457 59.0750 0.0000
'Fuel Annulus 3
CYLINDER 3 1 4.7442 59.0750 0.0000
CYLINDER 2 1 4.7542 59.0750 0.0000
CYLINDER 1 1 4.8581 59.0750 0.0000
CYLINDER 2 1 4.8681 59.0750 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 59.0750 0.0000
CYLINDER 2 1 5.0799 59.0750 0.0000
UNIT 32
COM='Axial Clad Sections Tube 7 '
'Aluminum Inner
CYLINDER 3 1 2.9100 0.0005 0.0000
CYLINDER 2 1 2.911 0.0005 0.0000
'Clad Axial End Piece 1
CYLINDER 3 1 3.0994 0.0005 0.0000
CYLINDER 2 1 3.2233 0.0005 0.0000
'Clad Axial End Piece 2
CYLINDER 3 1 3.9218 0.0005 0.0000
CYLINDER 2 1 4.0457 0.0005 0.0000
'Clad Axial End Piece 3
CYLINDER 3 1 4.7442 0.0005 0.0000
CYLINDER 2 1 4.8681 0.0005 0.0000
'Aluminum Outer
CYLINDER 3 1 5.0700 0.0005 0.0000
CYLINDER 2 1 5.0799 0.0005 0.0000
UNIT 33
COM='Fuel Element Tube 7'
CYLINDER 3 1 5.0800 59.0763 0.0000
HOLE 32 0.0000 0.0000 0.0000
HOLE 31 0.0000 0.0000 0.0006
HOLE 32 0.0000 0.0000 59.0757
UNIT 34
COM='Basket Fuel Tube - Fuel Down Radial Shifted toward 120 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 33 -0.0889 0.1539 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 35
COM='Basket Fuel Tube - Fuel Up Radial Shifted toward 120 Degrees'
CYLINDER 3 1 5.2578 73.0249 0.0000
HOLE 33 -0.0889 0.1539 13.9484
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 36
COM='Basket Bottom Plate Hole '
CYLINDER 3 1 1.27 1.2190 0.0000
UNIT 37
COM='Basket Bottom Plate '
CYLINDER 6 1 16.8466 1.2190 0.0000
HOLE 36 0.0000 0.0000 0.0000
HOLE 36 11.1506 0.0000 0.0000
HOLE 36 5.5753 9.6567 0.0000
HOLE 36 -5.5753 9.6567 0.0000
HOLE 36 -11.1506 0.0000 0.0000
HOLE 36 -5.5753 -9.6567 0.0000
HOLE 36 5.5753 -9.6567 0.0000
UNIT 38
COM='Basket Fuel Down'
CYLINDER 3 1 16.7260 73.0249 0.0000
HOLE 4 0.0000 0.0000 0.0000
HOLE 9 11.1506 0.0000 0.0000
HOLE 14 5.5753 9.6567 0.0000
HOLE 19 -5.5753 9.6567 0.0000
HOLE 24 -11.1506 0.0000 0.0000
HOLE 29 -5.5753 -9.6567 0.0000
HOLE 34 5.5753 -9.6567 0.0000
CYLINDER 3 1 16.8466 73.0249 0.0000
UNIT 39
COM='Basket Fuel Up'
CYLINDER 3 1 16.7260 73.0249 0.0000
HOLE 5 0.0000 0.0000 0.0000
HOLE 10 11.1506 0.0000 0.0000
HOLE 15 5.5753 9.6567 0.0000
HOLE 20 -5.5753 9.6567 0.0000
HOLE 25 -11.1506 0.0000 0.0000
HOLE 30 -5.5753 -9.6567 0.0000
HOLE 35 5.5753 -9.6567 0.0000
CYLINDER 3 1 16.8466 73.0249 0.0000
UNIT 40
COM='Cask Cavity '
CYLINDER 3 1 16.9863 445.4652 0.0000
HOLE 37 0.0000 0.0000 0.0001
HOLE 39 0.0000 0.0000 1.2192
HOLE 37 0.0000 0.0000 74.2443
HOLE 38 0.0000 0.0000 75.4634
HOLE 37 0.0000 0.0000 148.4885
HOLE 39 0.0000 0.0000 149.7076
HOLE 37 0.0000 0.0000 222.7327
HOLE 38 0.0000 0.0000 223.9518
HOLE 37 0.0000 0.0000 296.9769
HOLE 39 0.0000 0.0000 298.1960
HOLE 37 0.0000 0.0000 371.2211
HOLE 39 0.0000 0.0000 372.4402

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UNIT 41
COM='Cask Shield Radial Configuration '
CYLINDER 3 1 16.9863 445.4652 0.0000
HOLE 40 0.0000 0.0000 0.0000
CYLINDER 8 1 18.9103 445.4652 0.0000
CYLINDER 5 1 33.4645 445.4652 0.0000
CYLINDER 8 1 36.5189 445.4652 0.0000
CYLINDER 9 1 49.2189 445.4652 0.0000
CYLINDER 8 1 49.8183 445.4652 0.0000
CUBOID 9 1 4P49.8183 445.4652 0.0000
UNIT 42
COM='LWT Lid '
CYLINDER 8 1 36.5189 28.5750 0.5994
CYLINDER 9 1 49.8183 28.5750 0.5994
CYLINDER 8 1 49.8183 28.5750 0.0000
CUBOID 9 1 4P49.8183 28.5750 0.0000
UNIT 43
COM='LWT Bottom Weldment '
CYLINDER 5 1 26.3525 16.5100 8.8900
CYLINDER 8 1 36.5189 26.0706 0.0000
CYLINDER 9 1 49.8183 26.0706 0.0000
CYLINDER 8 1 49.8183 26.6700 0.0000
CUBOID 9 1 4P49.8183 26.6700 0.0000
GLOBAL UNIT 44
COM='LWT Cask '
ARRAY 1 -49.8183 -49.8183 0.0000
END GEOM
READ ARRAY
ARA=1 NUX=1 NUY=1 NUZ=3 FILL 43 41 42 END FILL
END ARRAY
READ BOUNDS ALL=MIRROR END BOUNDS
END DATA

```

\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

```

LIB 27GROUENDF4 LIBRARY
MXX 9 MIXTURES
MSC 11 COMPOSITION SPECIFICATIONS
IZM 3 MATERIAL ZONES
GE LATTICECELL GEOMETRY
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLN 0 FUEL SOLUTIONS

```

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

```

SC URANIUM STANDARD COMPOSITION
MX 1 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 0.4084 SPECIFIED DENSITY
NEL 1 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
TEMP 293.0 DEG KELVIN
          92000 1.00 ATOM/MOLECULE
                92235 85.000 WT%
                92238 15.000 WT%
END

```

```

SC AL STANDARD COMPOSITION
MX 1 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 0.2957 SPECIFIED DENSITY
NEL 1 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
TEMP 293.0 DEG KELVIN
          13027 1.00 ATOM/MOLECULE
END

```

```

SC AL STANDARD COMPOSITION
MX 2 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 2.7020 THEORETICAL DENSITY
NEL 1 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
TEMP 293.0 DEG KELVIN
          13027 1.00 ATOM/MOLECULE
END

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```

SC H2O STANDARD COMPOSITION
MX 3 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 0.9998 SPECIFIED DENSITY
NEL 2 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
TEMP 293.0 DEG KELVIN
          1001 2.00 ATOMS/MOLECULE
          6016 1.00 ATOM/MOLECULE
END

```

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SC ARBMGLC STANDARD COMPOSITION
MX 4 MIXTURE NO.
VF 0.5840 VOLUME FRACTION
ROTH 0.9437 SPECIFIED DENSITY
NEL 3 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
          6012 2.00 ATOMS/MOLECULE
END

```

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1001      6.00 ATOMS/MOLECULE
8016      2.00 ATOMS/MOLECULE

END

SC H2O      STANDARD COMPOSITION
MX          4 MIXTURE NO.
VF          0.4160 VOLUME FRACTION
ROTH        0.9982 THEORETICAL DENSITY
NEL         2 NO. ELEMENTS
ICP         1 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
            1001      2.00 ATOMS/MOLECULE
            8016      1.00 ATOM/MOLECULE

END

SC PB       STANDARD COMPOSITION
MX          5 MIXTURE NO.
VF          1.0000 VOLUME FRACTION
ROTH        11.3440 THEORETICAL DENSITY
NEL         1 NO. ELEMENTS
ICP         1 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
            82000     1.00 ATOM/MOLECULE

END

SC SS304    STANDARD COMPOSITION
MX          6 MIXTURE NO.
VF          1.0000 VOLUME FRACTION
ROTH        7.8200 THEORETICAL DENSITY
NEL         4 NO. ELEMENTS
ICP         0 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
            24304     19.000 WT%
            25055     2.000 WT%
            26304     69.500 WT%
            28304     9.500 WT%

END

SC AL       STANDARD COMPOSITION
MX          7 MIXTURE NO.
VF          1.0000 VOLUME FRACTION
ROTH        2.7020 THEORETICAL DENSITY
NEL         1 NO. ELEMENTS
ICP         1 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
            13027     1.00 ATOM/MOLECULE

END

SC SS304    STANDARD COMPOSITION
MX          8 MIXTURE NO.
VF          1.0000 VOLUME FRACTION
ROTH        7.8200 THEORETICAL DENSITY
NEL         4 NO. ELEMENTS
ICP         0 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
            24304     19.000 WT%
            25055     2.000 WT%
            26304     69.500 WT%
            28304     9.500 WT%

END

SC H2O      STANDARD COMPOSITION
MX          9 MIXTURE NO.
VF          1.0000 VOLUME FRACTION
ROTH        0.0001 SPECIFIED DENSITY
NEL         2 NO. ELEMENTS
ICP         1 0/1 MIXTURE/COMPOUND
TEMP        293.0 DEG KELVIN
            1001      2.00 ATOMS/MOLECULE
            8016      1.00 ATOM/MOLECULE

END

**** PROBLEM GEOMETRY ****

CTP SYMMSLABCELL CELL TYPE
PITCH      0.6342 CM CENTER TO CENTER SPACING
FUELOD     0.1039 CM FUEL DIAMETER OR SLAB THICKNESS
MFUEL      1 MIXTURE NO. OF FUEL
MMOD       3 MIXTURE NO. OF MODERATOR
CLADOD     0.1239 CM CLAD OUTER DIAMETER
MCLAD      2 MIXTURE NO. OF CLAD

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL
ZONE 2 IS CLAD
ZONE 3 IS MOD

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\*\*\* LWT W/ HIFAR MARK III FUEL, ACCIDENT, RADIAL - IN, AXIAL - ALTERNATING  
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.....

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

UNIT	VOLUME		
NUMBER	DATA SET NAME	NAME	UNIT FUNCTION
----	-----	----	-----
89	M:\scale43\DATA LIB\FT89F001		STANDARD COMPOSITION LIBRARY
92	M:\scale43\DATA LIB\FT82F001		CROSS SECTION LIBRARY
11	K:\HJP\LWT\ANSTO\Crit\HIFAR Mark III_v1.1\Ac		SHORT CROSS SECTION LIBRARY
90	K:\HJP\LWT\ANSTO\Crit\HIFAR Mark III_v1.1\Ac		INPUT DATA DIRECT ACCESS

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\*\*\*  
\*\*\* STANDARD COMPOSITION LIBRARY DATA  
\*\*\*  
\*\*\* -----  
\*\*\*  
\*\*\* UNIT NUMBER : 89  
\*\*\*  
\*\*\*  
\*\*\* DATASET NAME : M:\scale43\DATA LIB\FT89F001  
\*\*\*  
\*\*\*  
\*\*\* LIBRARY TITLE: SCALE-4 STANDARD COMPOSITION LIBRARY  
\*\*\*  
\*\*\* 637 STANDARD COMPOSITIONS, 490 NUCLIDES  
\*\*\*  
\*\*\* 90 ELEMENTS WITH VARIABLE ISOTOPIC DISTRIBUTIONS.  
\*\*\*  
\*\*\*  
\*\*\* CREATION DATE: 6/30/95  
\*\*\*  
\*\*\*  
\*\*\*

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\*\*\*  
\*\*\* CROSS SECTION LIBRARY DATA  
\*\*\*  
\*\*\* -----  
\*\*\*  
\*\*\* UNIT NUMBER : 92  
\*\*\*  
\*\*\*  
\*\*\* DATASET NAME : M:\scale43\DATA LIB\FT82F001  
\*\*\*  
\*\*\*  
\*\*\* LIBRARY TITLE: SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
\*\*\*  
\*\*\*



GENERATION	GENERATION K-EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K-EFFECTIVE	AVG K-EFF DEVIATION	MATRIX K-EFFECTIVE	MATRIX K-EFF DEVIATION
KEHO MESSAGE NUMBER K5-132	1	7.09889E-01	8.01833E-01	1.00000E+00	0.00000E+00	0.00000E+00
KEHO MESSAGE NUMBER K5-132	2	7.07974E-01	8.05500E-01	1.00000E+00	0.00000E+00	0.00000E+00
KEHO MESSAGE NUMBER K5-132	3	7.28123E-01	8.09167E-01	7.28123E-01	0.00000E+00	0.00000E+00
	4	6.99889E-01	8.12833E-01	7.14006E-01	1.41169E-02	0.00000E+00
	5	7.45916E-01	8.16500E-01	7.24642E-01	1.34002E-02	0.00000E+00
	6	7.24359E-01	8.20167E-01	7.24572E-01	9.47566E-03	0.00000E+00
	7	7.18195E-01	8.23833E-01	7.23296E-01	7.44978E-03	0.00000E+00
	8	7.14250E-01	8.27500E-01	7.21789E-01	6.26678E-03	0.00000E+00
	9	7.20630E-01	8.31167E-01	7.21623E-01	5.29899E-03	0.00000E+00
	10	7.14943E-01	8.34833E-01	7.20788E-01	4.66441E-03	0.00000E+00
	11	7.40037E-01	8.38500E-01	7.22927E-01	4.63641E-03	0.00000E+00
	12	7.51910E-01	8.42167E-01	7.25825E-01	5.05936E-03	0.00000E+00
	13	7.06498E-01	8.45833E-01	7.24068E-01	4.90206E-03	0.00000E+00
	14	7.52900E-01	8.49500E-01	7.26471E-01	5.07915E-03	0.00000E+00
	15	6.88658E-01	8.53167E-01	7.23562E-01	5.50359E-03	0.00000E+00
	16	7.37354E-01	8.56833E-01	7.24547E-01	5.18969E-03	0.00000E+00
	17	7.21124E-01	8.60500E-01	7.24319E-01	4.83673E-03	0.00000E+00
	18	7.52855E-01	8.63167E-01	7.26102E-01	4.86318E-03	0.00000E+00
	19	7.21886E-01	8.66833E-01	7.25854E-01	4.57489E-03	0.00000E+00
	20	7.15449E-01	8.70500E-01	7.25276E-01	4.35182E-03	0.00000E+00
	21	7.45817E-01	8.74167E-01	7.26357E-01	4.25600E-03	0.00000E+00
	22	6.94200E-01	8.77833E-01	7.25000E-01	4.25961E-03	0.00000E+00
	23	7.23050E-01	8.81500E-01	7.24907E-01	4.05295E-03	0.00000E+00
	24	7.03529E-01	8.85167E-01	7.23935E-01	3.98463E-03	0.00000E+00
	25	7.51812E-01	8.88833E-01	7.25147E-01	3.99570E-03	0.00000E+00
	26	6.72410E-01	8.92500E-01	7.22950E-01	4.41175E-03	0.00000E+00
	27	7.41152E-01	8.96167E-01	7.23678E-01	4.29379E-03	0.00000E+00
	28	6.84907E-01	8.99833E-01	7.22187E-01	4.38657E-03	0.00000E+00
	29	7.62803E-01	9.03500E-01	7.23691E-01	4.48103E-03	0.00000E+00
	30	7.34032E-01	9.07167E-01	7.24060E-01	4.33379E-03	0.00000E+00
	31	7.44923E-01	9.10833E-01	7.24780E-01	4.24311E-03	0.00000E+00
	32	7.49358E-01	9.13500E-01	7.25599E-01	4.18031E-03	0.00000E+00
	33	7.39990E-01	9.17167E-01	7.26063E-01	4.06978E-03	0.00000E+00
	34	7.15728E-01	9.20833E-01	7.25740E-01	3.95376E-03	0.00000E+00
	35	7.13413E-01	9.25500E-01	7.25367E-01	3.85024E-03	0.00000E+00
	36	7.58703E-01	9.28167E-01	7.26347E-01	3.86182E-03	0.00000E+00
	37	7.34892E-01	9.31833E-01	7.26591E-01	3.75780E-03	0.00000E+00
	38	7.94697E-01	9.35500E-01	7.28483E-01	4.11285E-03	0.00000E+00
	39	7.23480E-01	9.39167E-01	7.28348E-01	4.00243E-03	0.00000E+00
	40	7.30759E-01	9.42833E-01	7.28411E-01	3.89620E-03	0.00000E+00
	41	7.34901E-01	9.46500E-01	7.28578E-01	3.79863E-03	0.00000E+00
	42	7.39935E-01	9.49167E-01	7.28862E-01	3.71331E-03	0.00000E+00
	43	7.48204E-01	9.52833E-01	7.29336E-01	3.65253E-03	0.00000E+00
	44	7.17041E-01	9.56500E-01	7.29043E-01	3.57650E-03	0.00000E+00
	45	7.17662E-01	9.60167E-01	7.28778E-01	3.50235E-03	0.00000E+00
	46	7.25939E-01	9.63833E-01	7.28714E-01	3.42244E-03	0.00000E+00
	47	7.47779E-01	9.68500E-01	7.29138E-01	3.37224E-03	0.00000E+00
	48	7.16671E-01	9.71167E-01	7.28867E-01	3.30923E-03	0.00000E+00
	49	7.05373E-01	9.74833E-01	7.28367E-01	3.27641E-03	0.00000E+00
	50	6.93529E-01	9.78500E-01	7.27641E-01	3.28852E-03	0.00000E+00
	51	7.34459E-01	9.82167E-01	7.27781E-01	3.22375E-03	0.00000E+00
	52	7.09665E-01	9.85833E-01	7.27419E-01	3.17932E-03	0.00000E+00
	53	7.51152E-01	9.89500E-01	7.27884E-01	3.15091E-03	0.00000E+00
	54	7.31311E-01	9.93167E-01	7.27950E-01	3.09043E-03	0.00000E+00
	55	7.07805E-01	9.96833E-01	7.27570E-01	3.05529E-03	0.00000E+00
	1185	7.39458E-01	5.71767E+00	7.26398E-01	6.71494E-04	0.00000E+00
	1186	7.76993E-01	5.72233E+00	7.26441E-01	6.72286E-04	0.00000E+00
	1187	7.40277E-01	5.72683E+00	7.26455E-01	6.71852E-04	0.00000E+00
	1188	7.23662E-01	5.73233E+00	7.26452E-01	6.71289E-04	0.00000E+00
	1189	6.93317E-01	5.73600E+00	7.26424E-01	6.71304E-04	0.00000E+00
	1190	7.45434E-01	5.73967E+00	7.26440E-01	6.70929E-04	0.00000E+00
	1191	7.33420E-01	5.74600E+00	7.26446E-01	6.70391E-04	0.00000E+00
	1192	7.00802E-01	5.75067E+00	7.26425E-01	6.70174E-04	0.00000E+00
	1193	7.01500E-01	5.75800E+00	7.26404E-01	6.69538E-04	0.00000E+00
	1194	7.14325E-01	5.76167E+00	7.26394E-01	6.69452E-04	0.00000E+00
	1195	7.37681E-01	5.76617E+00	7.26403E-01	6.68957E-04	0.00000E+00
	1196	7.54176E-01	5.77167E+00	7.26426E-01	6.68802E-04	0.00000E+00
	1197	7.13691E-01	5.77533E+00	7.26416E-01	6.68327E-04	0.00000E+00
	1198	7.17434E-01	5.78000E+00	7.26408E-01	6.67810E-04	0.00000E+00
	1199	7.49003E-01	5.78333E+00	7.26427E-01	6.67519E-04	0.00000E+00
	1200	7.18163E-01	5.79000E+00	7.26418E-01	6.67016E-04	0.00000E+00
	1201	7.40547E-01	5.79467E+00	7.26430E-01	6.66564E-04	0.00000E+00
	1202	6.80678E-01	5.80017E+00	7.26392E-01	6.67099E-04	0.00000E+00
	1203	7.42750E-01	5.80550E+00	7.26406E-01	6.66682E-04	0.00000E+00

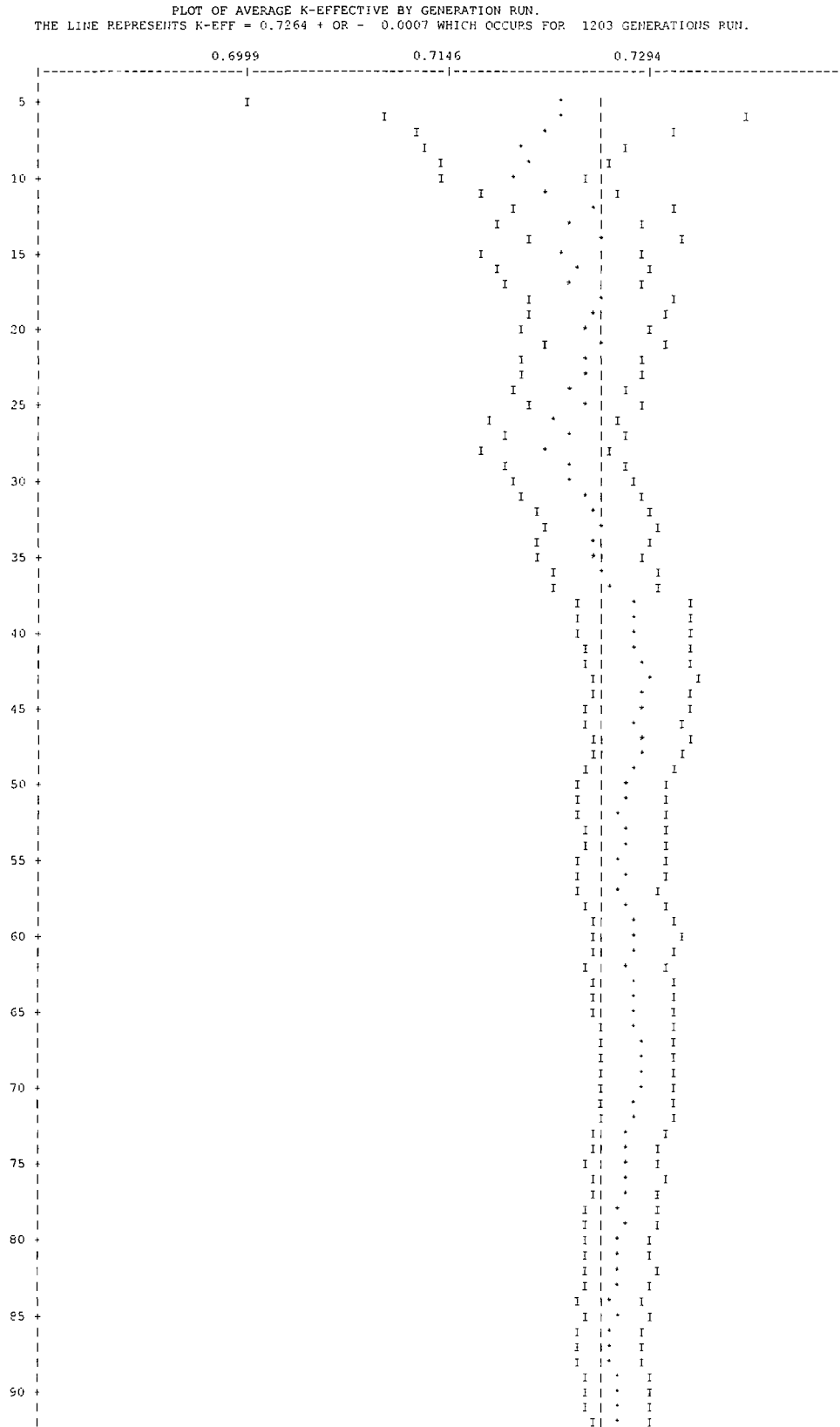
KEHO MESSAGE NUMBER K5-123 EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.



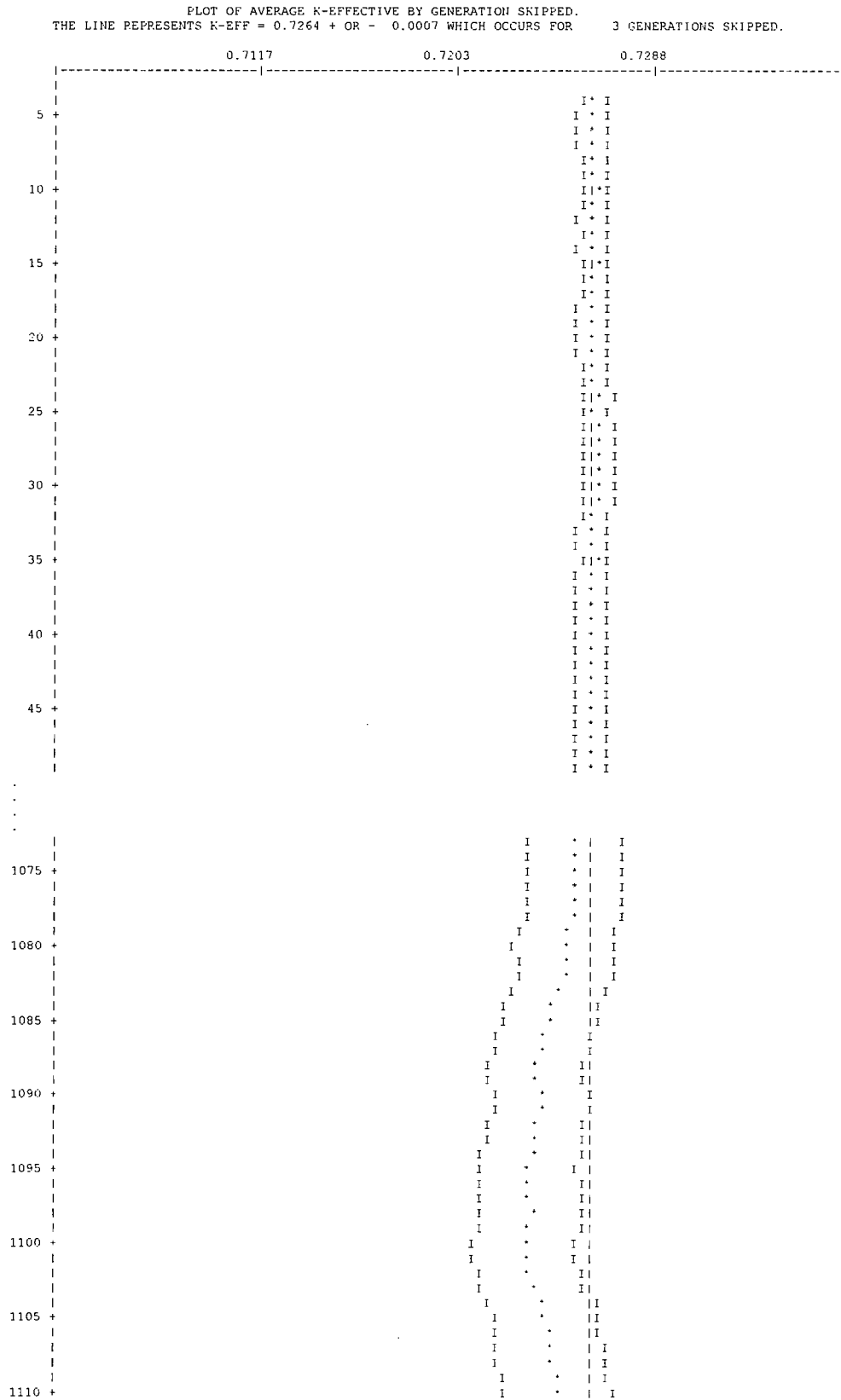
LIFETIME = 1.12919E-04 + OR - 1.14508E-07      GENERATION TIME = 8.97425E-05 + OR - 1.08694E-07  
 NU BAR = 2.41917E+00 + OR - 7.72772E-06      AVERAGE FISSION GROUP = 2.45962E+01 + OR - 2.74778E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 3.03848E-02 + OR - 7.72864E-05

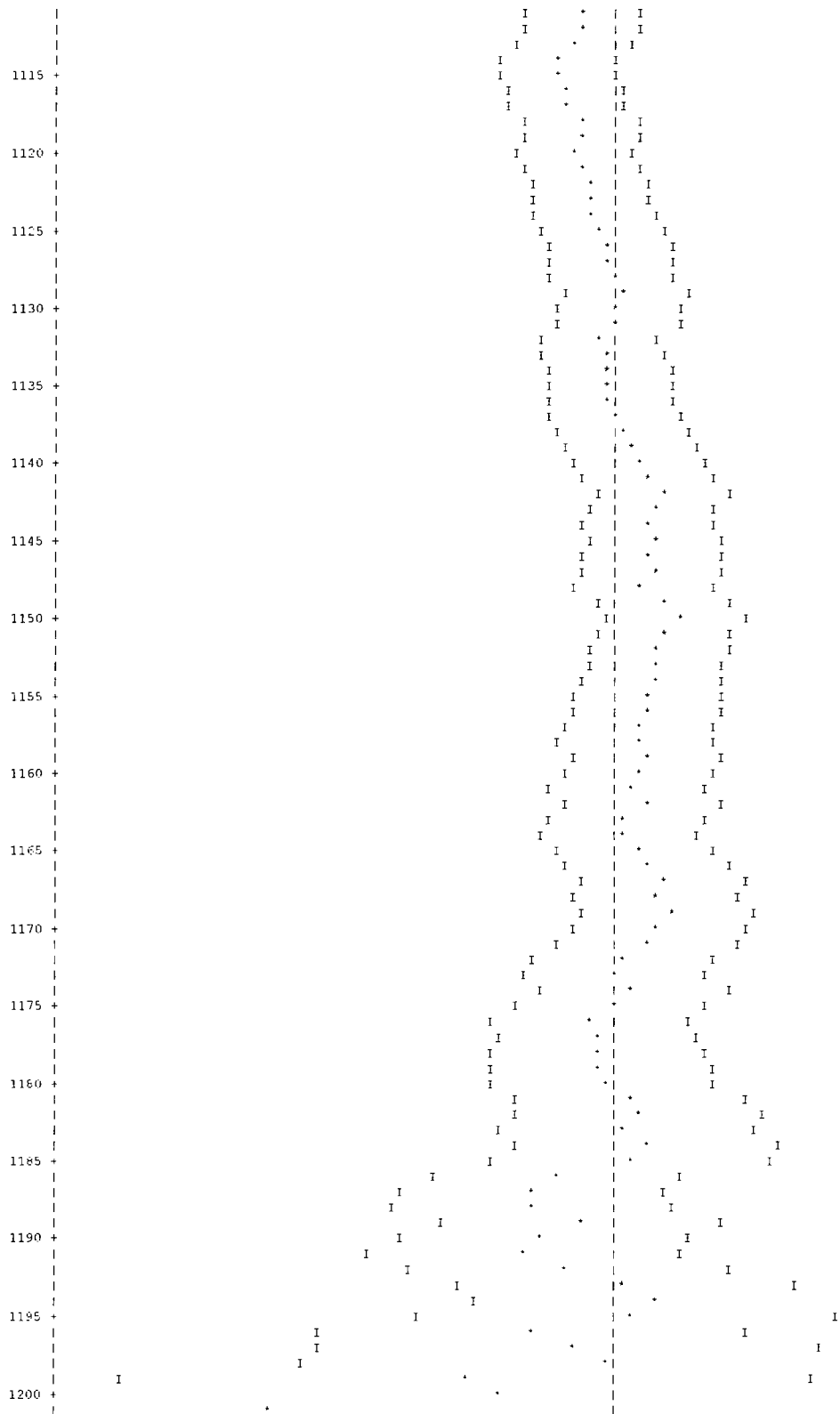
NO. OF INITIAL GENERATIONS OF SKIPPED HISTORIES	AVERAGE		67 PER CENT	95 PER CENT	99 PER CENT	NUMBER
	K-EFFECTIVE	DEVIATION	CONFIDENCE INTERVAL	CONFIDENCE INTERVAL	CONFIDENCE INTERVAL	
3	0.72640	+ OR - 0.00067	0.72574 TO 0.72707	0.72507 TO 0.72774	0.72440 TO 0.72841	120000
4	0.72643	+ OR - 0.00067	0.72576 TO 0.72709	0.72509 TO 0.72776	0.72442 TO 0.72843	1199000
5	0.72641	+ OR - 0.00067	0.72574 TO 0.72708	0.72507 TO 0.72775	0.72441 TO 0.72841	1198000
6	0.72641	+ OR - 0.00067	0.72574 TO 0.72708	0.72508 TO 0.72775	0.72441 TO 0.72842	1197000
7	0.72642	+ OR - 0.00067	0.72575 TO 0.72709	0.72508 TO 0.72776	0.72441 TO 0.72843	1196000
8	0.72643	+ OR - 0.00067	0.72576 TO 0.72710	0.72509 TO 0.72777	0.72442 TO 0.72844	1195000
9	0.72643	+ OR - 0.00067	0.72576 TO 0.72710	0.72509 TO 0.72777	0.72442 TO 0.72844	1194000
10	0.72644	+ OR - 0.00067	0.72577 TO 0.72711	0.72510 TO 0.72778	0.72443 TO 0.72845	1193000
11	0.72643	+ OR - 0.00067	0.72576 TO 0.72710	0.72509 TO 0.72777	0.72442 TO 0.72844	1192000
12	0.72641	+ OR - 0.00067	0.72574 TO 0.72708	0.72507 TO 0.72775	0.72440 TO 0.72842	1191000
17	0.72643	+ OR - 0.00067	0.72576 TO 0.72710	0.72509 TO 0.72778	0.72441 TO 0.72845	1186000
22	0.72643	+ OR - 0.00067	0.72576 TO 0.72710	0.72508 TO 0.72778	0.72441 TO 0.72845	1181000
27	0.72646	+ OR - 0.00067	0.72579 TO 0.72714	0.72511 TO 0.72781	0.72444 TO 0.72849	1176000
32	0.72643	+ OR - 0.00068	0.72575 TO 0.72710	0.72508 TO 0.72778	0.72440 TO 0.72845	1171000
37	0.72640	+ OR - 0.00068	0.72572 TO 0.72708	0.72504 TO 0.72776	0.72437 TO 0.72843	1166000
42	0.72632	+ OR - 0.00068	0.72564 TO 0.72700	0.72497 TO 0.72768	0.72429 TO 0.72835	1161000
47	0.72630	+ OR - 0.00068	0.72562 TO 0.72698	0.72494 TO 0.72766	0.72428 TO 0.72834	1156000
52	0.72636	+ OR - 0.00068	0.72568 TO 0.72704	0.72500 TO 0.72773	0.72432 TO 0.72841	1151000
57	0.72637	+ OR - 0.00068	0.72569 TO 0.72705	0.72500 TO 0.72774	0.72432 TO 0.72842	1146000
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.						
.						
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.						
1127	0.72607	+ OR - 0.00255	0.72352 TO 0.72862	0.72097 TO 0.73117	0.71842 TO 0.73372	76000
1132	0.72554	+ OR - 0.00252	0.72302 TO 0.72807	0.72050 TO 0.73059	0.71798 TO 0.73311	71000
1137	0.72634	+ OR - 0.00267	0.72368 TO 0.72901	0.72101 TO 0.73168	0.71834 TO 0.73434	66000
1142	0.72825	+ OR - 0.00270	0.72556 TO 0.73095	0.72286 TO 0.73364	0.72017 TO 0.73634	61000
1147	0.72781	+ OR - 0.00288	0.72493 TO 0.73069	0.72205 TO 0.73356	0.71917 TO 0.73644	56000
1152	0.72812	+ OR - 0.00281	0.72531 TO 0.73093	0.72250 TO 0.73374	0.71969 TO 0.73656	51000
1157	0.72726	+ OR - 0.00306	0.72420 TO 0.73033	0.72114 TO 0.73339	0.71807 TO 0.73645	46000
1162	0.72760	+ OR - 0.00327	0.72433 TO 0.73087	0.72106 TO 0.73415	0.71778 TO 0.73742	41000
1167	0.72819	+ OR - 0.00344	0.72473 TO 0.73162	0.72129 TO 0.73506	0.71784 TO 0.73851	36000
1172	0.72670	+ OR - 0.00377	0.72293 TO 0.73047	0.71917 TO 0.73423	0.71540 TO 0.73800	31000

NO. OF INITIAL GENERATIONS OF SKIPPED HISTORIES	AVERAGE		67 PER CENT	95 PER CENT	99 PER CENT	NUMBER
	K-EFFECTIVE	DEVIATION	CONFIDENCE INTERVAL	CONFIDENCE INTERVAL	CONFIDENCE INTERVAL	
1177	0.72557	+ OR - 0.00416	0.72142 TO 0.72973	0.71726 TO 0.73389	0.71310 TO 0.73805	26000
1182	0.72724	+ OR - 0.00502	0.72222 TO 0.73227	0.71719 TO 0.73729	0.71217 TO 0.74232	21000
1187	0.72279	+ OR - 0.00542	0.71737 TO 0.72620	0.71195 TO 0.73362	0.70654 TO 0.73903	16000
1192	0.72436	+ OR - 0.00676	0.71759 TO 0.73112	0.71083 TO 0.73789	0.70406 TO 0.74465	11000
1197	0.72443	+ OR - 0.01038	0.71405 TO 0.73481	0.70367 TO 0.74518	0.69330 TO 0.75556	6000









FREQUENCY FOR GENERATIONS 4 TO 1203

0.6386 TO 0.6415	*
0.6415 TO 0.6444	*
0.6444 TO 0.6472	*
0.6472 TO 0.6501	*
0.6501 TO 0.6530	*
0.6530 TO 0.6558	**
0.6558 TO 0.6587	**
0.6587 TO 0.6616	*
0.6616 TO 0.6644	*
0.6644 TO 0.6673	***
0.6673 TO 0.6702	****
0.6702 TO 0.6730	***
0.6730 TO 0.6759	*
0.6759 TO 0.6788	*****
0.6788 TO 0.6816	*****
0.6816 TO 0.6845	*****
0.6845 TO 0.6874	*****
0.6874 TO 0.6902	*****
0.6902 TO 0.6931	*****
0.6931 TO 0.6960	*****
0.6960 TO 0.6988	*****
0.6988 TO 0.7017	*****
0.7017 TO 0.7045	*****
0.7045 TO 0.7074	*****
0.7074 TO 0.7103	*****
0.7103 TO 0.7131	*****
0.7131 TO 0.7160	*****
0.7160 TO 0.7189	*****
0.7189 TO 0.7217	*****
0.7217 TO 0.7246	*****
0.7246 TO 0.7275	*****
0.7275 TO 0.7303	*****
0.7303 TO 0.7332	*****
0.7332 TO 0.7361	*****
0.7361 TO 0.7389	*****
0.7389 TO 0.7418	*****
0.7418 TO 0.7447	*****
0.7447 TO 0.7475	*****
0.7475 TO 0.7504	*****
0.7504 TO 0.7533	*****
0.7533 TO 0.7561	*****
0.7561 TO 0.7590	*****
0.7590 TO 0.7619	*****
0.7619 TO 0.7647	*****
0.7647 TO 0.7676	*****
0.7676 TO 0.7705	*****
0.7705 TO 0.7733	*****
0.7733 TO 0.7762	*****
0.7762 TO 0.7791	*****
0.7791 TO 0.7819	****
0.7819 TO 0.7848	*
0.7848 TO 0.7877	**
0.7877 TO 0.7905	**
0.7905 TO 0.7934	*
0.7934 TO 0.7963	*

FREQUENCY FOR GENERATIONS 304 TO 1203

0.6386 TO 0.6415	*
0.6415 TO 0.6444	
0.6444 TO 0.6472	
0.6472 TO 0.6501	
0.6501 TO 0.6530	
0.6530 TO 0.6558	**
0.6558 TO 0.6587	**
0.6587 TO 0.6616	
0.6616 TO 0.6644	*
0.6644 TO 0.6673	**
0.6673 TO 0.6702	***
0.6702 TO 0.6730	**
0.6730 TO 0.6759	*
0.6759 TO 0.6788	*****
0.6788 TO 0.6816	*****
0.6816 TO 0.6845	****
0.6845 TO 0.6874	*****
0.6874 TO 0.6902	*****
0.6902 TO 0.6931	*****
0.6931 TO 0.6960	*****
0.6960 TO 0.6988	*****
0.6988 TO 0.7017	*****
0.7017 TO 0.7045	*****
0.7045 TO 0.7074	*****
0.7074 TO 0.7103	*****
0.7103 TO 0.7131	*****
0.7131 TO 0.7160	*****
0.7160 TO 0.7189	*****
0.7189 TO 0.7217	*****
0.7217 TO 0.7246	*****
0.7246 TO 0.7275	*****
0.7275 TO 0.7303	*****
0.7303 TO 0.7332	*****
0.7332 TO 0.7361	*****
0.7361 TO 0.7389	*****
0.7389 TO 0.7418	*****
0.7418 TO 0.7447	*****
0.7447 TO 0.7475	*****
0.7475 TO 0.7504	*****
0.7504 TO 0.7533	*****
0.7533 TO 0.7561	*****
0.7561 TO 0.7590	*****
0.7590 TO 0.7619	*****
0.7619 TO 0.7647	*****
0.7647 TO 0.7676	*****
0.7676 TO 0.7705	*****
0.7705 TO 0.7733	*****
0.7733 TO 0.7762	*****
0.7762 TO 0.7791	*****
0.7791 TO 0.7819	**
0.7819 TO 0.7848	*
0.7848 TO 0.7877	**
0.7877 TO 0.7905	**
0.7905 TO 0.7934	*
0.7934 TO 0.7963	

FREQUENCY FOR GENERATIONS 604 TO 1203

0.6386 TO 0.6415 \*  
0.6415 TO 0.6444 \*  
0.6444 TO 0.6472 \*  
0.6472 TO 0.6501 \*  
0.6501 TO 0.6530 \*  
0.6530 TO 0.6558 \*  
0.6558 TO 0.6587 \*\*  
0.6587 TO 0.6616 \*\*  
0.6616 TO 0.6644 \*\*  
0.6644 TO 0.6673 \*\*  
0.6673 TO 0.6702 \*\*  
0.6702 TO 0.6730 \*  
0.6730 TO 0.6759 \*  
0.6759 TO 0.6788 \*\*\*\*  
0.6788 TO 0.6816 \*\*\*\*  
0.6816 TO 0.6845 \*  
0.6845 TO 0.6874 \*\*\*\*\*  
0.6874 TO 0.6902 \*\*\*\*\*  
0.6902 TO 0.6931 \*\*\*\*\*  
0.6931 TO 0.6960 \*\*\*\*\*  
0.6960 TO 0.6988 \*\*\*\*\*  
0.6988 TO 0.7017 \*\*\*\*\*  
0.7017 TO 0.7045 \*\*\*\*\*  
0.7045 TO 0.7074 \*\*\*\*\*  
0.7074 TO 0.7103 \*\*\*\*\*  
0.7103 TO 0.7131 \*\*\*\*\*  
0.7131 TO 0.7160 \*\*\*\*\*  
0.7160 TO 0.7189 \*\*\*\*\*  
0.7189 TO 0.7217 \*\*\*\*\*  
0.7217 TO 0.7246 \*\*\*\*\*  
0.7246 TO 0.7275 \*\*\*\*\*  
0.7275 TO 0.7303 \*\*\*\*\*  
0.7303 TO 0.7332 \*\*\*\*\*  
0.7332 TO 0.7361 \*\*\*\*\*  
0.7361 TO 0.7389 \*\*\*\*\*  
0.7389 TO 0.7418 \*\*\*\*\*  
0.7418 TO 0.7447 \*\*\*\*\*  
0.7447 TO 0.7475 \*\*\*\*\*  
0.7475 TO 0.7504 \*\*\*\*\*  
0.7504 TO 0.7533 \*\*\*\*\*  
0.7533 TO 0.7561 \*\*\*\*\*  
0.7561 TO 0.7590 \*\*\*\*\*  
0.7590 TO 0.7619 \*\*\*\*\*  
0.7619 TO 0.7647 \*\*\*\*\*  
0.7647 TO 0.7676 \*\*\*\*\*  
0.7676 TO 0.7705 \*\*\*  
0.7705 TO 0.7733 \*\*\*\*\*  
0.7733 TO 0.7762 \*\*\*\*\*  
0.7762 TO 0.7791 \*\*\*\*\*  
0.7791 TO 0.7819 \*  
0.7819 TO 0.7848 \*  
0.7848 TO 0.7877 \*\*\*  
0.7877 TO 0.7905 \*\*  
0.7905 TO 0.7934 \*  
0.7934 TO 0.7963 \*



FREQUENCY FOR GENERATIONS 904 TO 1203

0.6386	TO	0.6415	*
0.6415	TO	0.6444	
0.6444	TO	0.6472	
0.6472	TO	0.6501	
0.6501	TO	0.6530	
0.6530	TO	0.6558	
0.6558	TO	0.6587	**
0.6587	TO	0.6616	
0.6616	TO	0.6644	
0.6644	TO	0.6673	*
0.6673	TO	0.6702	**
0.6702	TO	0.6730	*
0.6730	TO	0.6759	
0.6759	TO	0.6788	***
0.6788	TO	0.6816	***
0.6816	TO	0.6845	*
0.6845	TO	0.6874	***
0.6874	TO	0.6902	****
0.6902	TO	0.6931	***
0.6931	TO	0.6960	*****
0.6960	TO	0.6988	****
0.6988	TO	0.7017	*****
0.7017	TO	0.7045	*****
0.7045	TO	0.7074	*****
0.7074	TO	0.7103	*****
0.7103	TO	0.7131	*****
0.7131	TO	0.7160	*****
0.7160	TO	0.7189	*****
0.7189	TO	0.7217	*****
0.7217	TO	0.7246	*****
0.7246	TO	0.7275	*****
0.7275	TO	0.7303	*****
0.7303	TO	0.7332	*****
0.7332	TO	0.7361	*****
0.7361	TO	0.7389	*****
0.7389	TO	0.7418	*****
0.7418	TO	0.7447	*****
0.7447	TO	0.7475	*****
0.7475	TO	0.7504	*****
0.7504	TO	0.7533	*****
0.7533	TO	0.7561	*****
0.7561	TO	0.7590	*****
0.7590	TO	0.7619	*****
0.7619	TO	0.7647	****
0.7647	TO	0.7676	****
0.7676	TO	0.7705	*
0.7705	TO	0.7733	***
0.7733	TO	0.7762	***
0.7762	TO	0.7791	***
0.7791	TO	0.7819	
0.7819	TO	0.7848	
0.7848	TO	0.7877	
0.7877	TO	0.7905	*
0.7905	TO	0.7934	*
0.7934	TO	0.7963	

**6.6.13 MOATA Plate Bundles in the LWT Cask**

This section contains a truncated sample output file from the evaluation of MOATA plate bundles in the LWT cask. The output file is shown in Figure 6.6.13-1.

Figure 6.6.13-1 Maximum Reactivity MOATA Plate Bundle Configuration

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT w/ MOATA Mark II Fuel, Accident, Radial - In, Axial - Alternating
' Basket Configuration
'   Fuel Tube OD - Nominal Fuel Tube Height - Min
'   Fuel Tube Thicl. - Min Fuel Base Plate - Min
' Fuel Plate Configuration
'   Fuel Plate Width - Max Fuel Plate Thickness - Nominal
'   Clad Thickness - Min
'   Active Fuel Width - Max Active Fuel Length - Nominal
'   Fuel Element Height - Min
' Spacer/Assembly
'   Plate Spacer Thickness- Max
'   Side Plate Thickness - Nominal Side Plate Width - Nominal
' Material Description
'   U-235 Fuel Mass - Max Uranium Weight Fraction - Max
27GROUPHDF4 LATTICECELL
'Material Description for LWT Analysis - MOATA Mark II Fuel
URANIUM 1 DEN=0.3093 1.0 293.0 92235 92.0 92238 08.0 END
AL 1 DEN=0.7718 1.0 293.0 END
AL 2 1.00 293.0 END
H2O 3 DEN=0.9998 1.00 293.0 END
APBMGLC 0.9437 3 0 1 0
6012 2 1001 6 8016 2
4 0.5840 END
H2O 4 0.4160 293.0 END
PB 5 1.00 293.0 END
SS304 6 1.00 293.0 END
AL 7 1.00 293.0 END
SS304 8 1.00 293.0 END
H2O 9 DEN=0.0001 1.00 293.0 END
END COMP
SYMMLABCELL 0.3832 0.1832 1 3 0.2032 2 END

READ PARAM TBA=5 TME=90 RUN=YES PLT=NO
GEN=1023 NPG=1000 END PARAM
READ START XSM=-16.85 XSP=16.85 YSM=16.85 YSP=-16.85
ZSM=26.67 ZSP=472.14 END START
READ GEOM
UNIT 1
COM='Fuel Plate'
CUBOID 1 1 2P0.0916 2P3.6608 58.4200 0.0000
CUBOID 2 1 2P0.1016 2P3.8291 58.4200 0.0000
CUBOID 3 1 2P0.1916 2P3.9334 58.4200 0.0000
UNIT 2
COM='Cavity Material Replacement - Side Plate'
CUBOID 3 1 2P0.3175 2P3.9334 58.4200 0.0000
UNIT 3
COM='Water Gap to Side Plate '
CUBOID 3 1 2P0.0450 2P3.9334 58.4200 0.0000
UNIT 4
COM='Plate Bundle'
ARRAY 11 -3.4074 -3.9334 0.0000
UNIT 5
COM='Fuel Plate'
CUBOID 1 1 2P3.6608 2P0.0916 58.4200 0.0000
CUBOID 2 1 2P3.8291 2P0.1016 58.4200 0.0000
CUBOID 3 1 2P3.9334 2P0.1916 58.4200 0.0000
UNIT 6
COM='Cavity Material Replacement - Side Plate'
CUBOID 3 1 2P3.9334 2P0.3175 58.4200 0.0000
UNIT 7
COM='Water Gap to Side Plate'
CUBOID 3 1 2P3.9334 2P0.0450 58.4200 0.0000
UNIT 8
COM='Plate Bundle'
ARRAY 12 -3.9334 -3.4074 0.0000
UNIT 9
COM='Tube 1 - Fuel Down Radial Shifted toward 0 '
CYLINDER 3 1 5.2388 73.0240 0.0000
HOLE 4 0.0000 0.0000 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 10
COM='Tube 1 - Fuel Up Radial Shifted toward 0 '
CYLINDER 3 1 5.2388 73.0240 0.0000
HOLE 4 0.0000 0.0000 14.6030
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 11
COM='Tube 2 - Fuel Down Radial Shifted toward 180 '
CYLINDER 3 1 5.2388 73.0240 0.0000
HOLE 4 -0.0508 0.0000 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 12
COM='Tube 2 - Fuel Up Radial Shifted toward 180 '
CYLINDER 3 1 5.2388 73.0240 0.0000
HOLE 4 -0.0508 0.0000 14.6030
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 13
COM='Tube 3 - Fuel Down Radial Shifted toward 240 '
CYLINDER 3 1 5.2388 73.0240 0.0000
HOLE 8 -0.0164 -0.0298 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 14

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```
COM='Tube 3 - Fuel Up           Radial Shifted toward   240  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 8 -0.0164 -0.0298 14.6030  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 15  
COM='Tube 4 - Fuel Down         Radial Shifted toward   300  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 8 0.0164 -0.0298 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 16  
COM='Tube 4 - Fuel Up           Radial Shifted toward   300  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 8 0.0164 -0.0298 14.6030  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 17  
COM='Tube 5 - Fuel Down         Radial Shifted toward    0  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 4 0.0508 0.0000 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 18  
COM='Tube 5 - Fuel Up           Radial Shifted toward    0  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 4 0.0508 0.0000 14.6030  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 19  
COM='Tube 6 - Fuel Down         Radial Shifted toward   60  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 8 0.0164 0.0298 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 20  
COM='Tube 6 - Fuel Up           Radial Shifted toward   60  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 8 0.0164 0.0298 14.6030  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 21  
COM='Tube 7 - Fuel Down         Radial Shifted toward  120  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 8 -0.0164 0.0298 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 22  
COM='Tube 7 - Fuel Up           Radial Shifted toward  120  '  
CYLINDER 3 1 5.2388 73.0240 0.0000  
HOLE 8 -0.0164 0.0298 14.6030  
CYLINDER 6 1 5.55525 73.0240 0.0000  
UNIT 23  
COM='Basket Bottom Plate Hole '  
CYLINDER 3 1 1.27 1.2172 0.0000  
UNIT 24  
COM='Basket Bottom Plate '  
CYLINDER 6 1 16.8466 1.2172 0.0000  
HOLE 23 0.0000 0.0000 0.0000  
HOLE 23 11.1125 0.0000 0.0000  
HOLE 23 5.5563 9.6237 0.0000  
HOLE 23 -5.5563 9.6237 0.0000  
HOLE 23 -11.1125 0.0000 0.0000  
HOLE 23 -5.5563 -9.6237 0.0000  
HOLE 23 5.5562 -9.6237 0.0000  
UNIT 25  
COM='Basket Fuel Down'  
CYLINDER 3 1 16.6698 73.0240 0.0000  
HOLE 9 0.0000 0.0000 0.0000  
HOLE 11 11.1125 0.0000 0.0000  
HOLE 13 5.5563 9.6237 0.0000  
HOLE 15 -5.5563 9.6237 0.0000  
HOLE 17 -11.1125 0.0000 0.0000  
HOLE 19 -5.5563 -9.6237 0.0000  
HOLE 21 5.5562 -9.6237 0.0000  
CYLINDER 3 1 16.8466 73.0240 0.0000  
UNIT 26  
COM='Basket Fuel Up'  
CYLINDER 3 1 16.6698 73.0240 0.0000  
HOLE 10 0.0000 0.0000 0.0000  
HOLE 12 11.1125 0.0000 0.0000  
HOLE 14 5.5563 9.6237 0.0000  
HOLE 16 -5.5563 9.6237 0.0000  
HOLE 18 -11.1125 0.0000 0.0000  
HOLE 20 -5.5563 -9.6237 0.0000  
HOLE 22 5.5562 -9.6237 0.0000  
CYLINDER 3 1 16.8466 73.0240 0.0000  
UNIT 27  
COM='Cask Cavity '  
CYLINDER 3 1 16.9863 445.4652 0.0000  
HOLE 24 0.0000 0.0000 0.0010  
HOLE 26 0.0000 0.0000 1.2192  
HOLE 24 0.0000 0.0000 74.2452  
HOLE 25 0.0000 0.0000 75.4634  
HOLE 24 0.0000 0.0000 148.4894  
HOLE 26 0.0000 0.0000 149.7076  
HOLE 24 0.0000 0.0000 222.7336  
HOLE 25 0.0000 0.0000 223.9518  
HOLE 24 0.0000 0.0000 296.9778  
HOLE 26 0.0000 0.0000 298.1960  
HOLE 24 0.0000 0.0000 371.2220  
HOLE 25 0.0000 0.0000 372.4402  
UNIT 28  
COM='Cask Shield Radial Configuration '  
CYLINDER 3 1 16.9863 445.4652 0.0000
```

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HOLE 27 0.0000 0.0000 0.0000
CYLINDER 8 1 18.9103 445.4652 0.0000
CYLINDER 5 1 33.4645 445.4652 0.0000
CYLINDER 8 1 36.5189 445.4652 0.0000
CYLINDER 9 1 49.2189 445.4652 0.0000
CYLINDER 8 1 49.8183 445.4652 0.0000
CUBOID 9 1 4P49.8183 445.4652 0.0000
UNIT 29
COM='LWT Lid '
CYLINDER 8 1 36.5189 28.5750 0.5994
CYLINDER 9 1 49.8183 28.5750 0.5994
CYLINDER 8 1 49.8183 28.5750 0.0000
CUBOID 9 1 4P49.8183 28.5750 0.0000
UNIT 30
COM='LWT Bottom Weldment '
CYLINDER 5 1 26.3525 16.5100 8.9900
CYLINDER 8 1 36.5189 26.0706 0.0000
CYLINDER 9 1 49.8183 26.0706 0.0000
CYLINDER 8 1 49.8183 26.6700 0.0000
CUBOID 9 1 4P49.8183 26.6700 0.0000
GLOBAL UNIT 31
COM='LWT Cask '
ARRAY 1 -49.8183 -49.8183 0.0000
END GEOM
READ ARRAY
ARA=1 NUX=1 NUY=1 NUZ=3 FILL 30 28 29 END FILL
ARA=11 NUX=18 NUY=1 NUZ=1 FILL 2 3 14R1 3 2 END FILL
ARA=12 NUX=1 NUY=18 NUZ=1 FILL 6 7 14R5 7 6 END FILL
END APRAY
READ BOUNDS ALL=MIRROR END BOUNDS
END DATA

```

```

' U-235 Fuel Mass - Max Uranium Weight Fraction - Max
'Material Description for LWT Analysis - MOATA Mark II Fuel
LWT W/ MOATA MARK II FUEL, ACCIDENT, RADIAL - IN, AXIAL - ALTERNATING

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\*\*\*\* PROBLEM PARAMETERS \*\*\*\*

```

LIB 27GROUPNDF4 LIBRARY
MX 9 MIXTURES
MSC 11 COMPOSITION SPECIFICATIONS
IZM 3 MATERIAL ZONES
GE LATTICECELL GEOMETRY
MORE 0 0/1 DO NOT READ/READ OPTIONAL PARAMETER DATA
MSLI 0 FUEL SOLUTIONS

```

\*\*\*\* PROBLEM COMPOSITION DESCRIPTION \*\*\*\*

```

SC URANIUM STANDARD COMPOSITION
MX 1 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 0.3093 SPECIFIED DENSITY
NEL 1 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
TEMP 293.0 DEG KELVIN
92000 1.00 ATOM/MOLECULE
92235 92.000 WT%
92238 8.000 WT%
END

```

```

SC AL STANDARD COMPOSITION
MX 1 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 0.7718 SPECIFIED DENSITY
NEL 1 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
TEMP 293.0 DEG KELVIN
13027 1.00 ATOM/MOLECULE
END

```

```

SC AL STANDARD COMPOSITION
MX 2 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 2.7020 THEORETICAL DENSITY
NEL 1 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
TEMP 293.0 DEG KELVIN
13027 1.00 ATOM/MOLECULE
END

```

```

SC H2O STANDARD COMPOSITION
MX 3 MIXTURE NO.
VF 1.0000 VOLUME FRACTION
ROTH 0.9998 SPECIFIED DENSITY
NEL 2 NO. ELEMENTS
ICP 1 0/1 MIXTURE/COMPOUND
TEMP 293.0 DEG KELVIN
1001 2.00 ATOMS/MOLECULE
9016 1.00 ATOM/MOLECULE
END

```

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SC ARBMGLC STANDARD COMPOSITION
MX 4 MIXTURE NO.
VF 0.5840 VOLUME FRACTION

```

ROTH 0.9437 SPECIFIED DENSITY  
NEL 3 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
6012 2.00 ATOMS/MOLECULE  
1001 6.00 ATOMS/MOLECULE  
8016 2.00 ATOMS/MOLECULE

END

SC H2O STANDARD COMPOSITION  
MX 4 MIXTURE NO.  
VF 0.4160 VOLUME FRACTION  
ROTH 0.9982 THEORETICAL DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

SC PB STANDARD COMPOSITION  
MX 5 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 11.3440 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
82000 1.00 ATOM/MOLECULE

END

SC SS304 STANDARD COMPOSITION  
MX 6 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

END

SC AL STANDARD COMPOSITION  
MX 7 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 2.7020 THEORETICAL DENSITY  
NEL 1 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
13027 1.00 ATOM/MOLECULE

END

SC SS304 STANDARD COMPOSITION  
MX 8 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 7.9200 THEORETICAL DENSITY  
NEL 4 NO. ELEMENTS  
ICP 0 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
24304 19.000 WT%  
25055 2.000 WT%  
26304 69.500 WT%  
28304 9.500 WT%

END

SC H2O STANDARD COMPOSITION  
MX 9 MIXTURE NO.  
VF 1.0000 VOLUME FRACTION  
ROTH 0.0001 SPECIFIED DENSITY  
NEL 2 NO. ELEMENTS  
ICP 1 0/1 MIXTURE/COMPOUND  
TEMP 293.0 DEG KELVIN  
1001 2.00 ATOMS/MOLECULE  
8016 1.00 ATOM/MOLECULE

END

\*\*\*\* PROBLEM GEOMETRY \*\*\*\*

CTP SYMMSLABCELL CELL TYPE  
PITCH 0.3832 CM CENTER TO CENTER SPACING  
FUELOD 0.1832 CM FUEL DIAMETER OR SLAB THICKNESS  
MFUEL 1 MIXTURE NO. OF FUEL  
MMOD 3 MIXTURE NO. OF MODERATOR  
CLADOD 0.2032 CM CLAD OUTER DIAMETER  
MCLAD 2 MIXTURE NO. OF CLAD

ZONE SPECIFICATIONS FOR LATTICECELL GEOMETRY

ZONE 1 IS FUEL  
ZONE 2 IS CLAD  
ZONE 3 IS MOD

MIXING TABLE

ENTRY	MIXTURE	ISOTOPE	NUMBER DENSITY	NEW IDENTIFIER
1	1	92235	7.29070E-04	1092235
2	1	92238	6.25966E-05	1092238
3	1	13027	1.72260E-02	1013027
4	2	13027	6.03066E-02	2013027
5	7	13027	6.03066E-02	7013027
6	3	1001	6.68762E-02	3001001
7	4	1001	5.98801E-02	4001001
8	9	1001	6.68896E-06	9001001
9	3	8016	3.34381E-02	3008016
10	4	8016	2.45894E-02	4008016
11	9	8016	3.34448E-06	9008016
12	4	6012	1.07014E-02	4006012
13	5	82000	3.29690E-02	5082000
14	6	24304	1.74286E-02	6024304
15	8	24304	1.74286E-02	8024304
16	6	25055	1.73633E-03	6025055
17	8	25055	1.73633E-03	8025055
18	6	26304	5.93579E-02	6026304
19	8	26304	5.93579E-02	8026304
20	6	28304	7.72070E-03	6028304
21	8	28304	7.72070E-03	8028304

VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 9.26928E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 1.68500E+01 -X=-1.68500E+01 +Y=-1.68500E+01 -Y= 1.68500E+01 +Z= 4.72140E+02 -Z= 2.66700E+01

THE FLAG TO START NEUTRONS IN THE REFLECTOR WAS TURNED OFF

0.31133 MINUTES WERE REQUIRED FOR STARTING. TOTAL ELAPSED TIME IS 0.37333 MINUTES.

GENERATION KENO MESSAGE NUMBER K5-132	GENERATION K-EFFECTIVE K5-132	ELAPSED TIME MINUTES WARNING... ONLY	AVERAGE K-EFFECTIVE 806 INDEPENDENT	AVG K-EFF DEVIATION FISSION POINTS WERE	MATRIX K-EFFECTIVE GENERATED	MATRIX K-EFF DEVIATION GENERATED
1	7.31623E-01	3.79000E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	6.87897E-01	3.82667E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	7.62074E-01	3.85500E-01	7.62074E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	7.55989E-01	3.89167E-01	7.55989E-01	3.04273E-03	0.00000E+00	0.00000E+00
5	7.68824E-01	3.92833E-01	7.62296E-01	3.70674E-03	0.00000E+00	0.00000E+00
6	7.66991E-01	3.96500E-01	7.63469E-01	2.87188E-03	0.00000E+00	0.00000E+00
7	7.59518E-01	4.00167E-01	7.62679E-01	2.36076E-03	0.00000E+00	0.00000E+00
8	7.90993E-01	4.02833E-01	7.67381E-01	5.08200E-03	0.00000E+00	0.00000E+00
9	7.29438E-01	4.06500E-01	7.61961E-01	6.91587E-03	0.00000E+00	0.00000E+00
10	7.25050E-01	4.10167E-01	7.57347E-01	7.56037E-03	0.00000E+00	0.00000E+00
11	7.08347E-01	4.13833E-01	7.51903E-01	8.69810E-03	0.00000E+00	0.00000E+00
12	7.33306E-01	4.17500E-01	7.50043E-01	7.92073E-03	0.00000E+00	0.00000E+00
13	7.41343E-01	4.21167E-01	7.49252E-01	7.20809E-03	0.00000E+00	0.00000E+00
14	7.64753E-01	4.24833E-01	7.50547E-01	6.70629E-03	0.00000E+00	0.00000E+00
15	7.94944E-01	4.27500E-01	7.53962E-01	7.05111E-03	0.00000E+00	0.00000E+00
16	7.52601E-01	4.31167E-01	7.53865E-01	6.52879E-03	0.00000E+00	0.00000E+00
17	7.48314E-01	4.34833E-01	7.53495E-01	6.08923E-03	0.00000E+00	0.00000E+00
18	7.30448E-01	4.38500E-01	7.52054E-01	5.87526E-03	0.00000E+00	0.00000E+00
19	7.60018E-01	4.42167E-01	7.52523E-01	5.53869E-03	0.00000E+00	0.00000E+00
20	7.76509E-01	4.45000E-01	7.53856E-01	5.38927E-03	0.00000E+00	0.00000E+00
21	7.56157E-01	4.48667E-01	7.53977E-01	5.09918E-03	0.00000E+00	0.00000E+00
22	7.48444E-01	4.52333E-01	7.53700E-01	4.84541E-03	0.00000E+00	0.00000E+00
23	7.54437E-01	4.56000E-01	7.53735E-01	4.60904E-03	0.00000E+00	0.00000E+00
24	7.45199E-01	4.59667E-01	7.53347E-01	4.41164E-03	0.00000E+00	0.00000E+00
25	7.03146E-01	4.62333E-01	7.51164E-01	4.74701E-03	0.00000E+00	0.00000E+00
26	7.75307E-01	4.66000E-01	7.52170E-01	4.65492E-03	0.00000E+00	0.00000E+00
27	6.97750E-01	4.69667E-01	7.49994E-01	4.96722E-03	0.00000E+00	0.00000E+00
28	7.50911E-01	4.73333E-01	7.50029E-01	4.77248E-03	0.00000E+00	0.00000E+00
29	7.58368E-01	4.76000E-01	7.50338E-01	4.60270E-03	0.00000E+00	0.00000E+00
30	7.75055E-01	4.79667E-01	7.51220E-01	4.52227E-03	0.00000E+00	0.00000E+00
31	7.59545E-01	4.83333E-01	7.51508E-01	4.37298E-03	0.00000E+00	0.00000E+00
32	7.87068E-01	4.87000E-01	7.52693E-01	4.38783E-03	0.00000E+00	0.00000E+00
33	7.59780E-01	4.90667E-01	7.52921E-01	4.25008E-03	0.00000E+00	0.00000E+00
34	7.30985E-01	4.94333E-01	7.52236E-01	4.17183E-03	0.00000E+00	0.00000E+00
35	7.86816E-01	4.97167E-01	7.53284E-01	4.17701E-03	0.00000E+00	0.00000E+00
36	6.89861E-01	5.00833E-01	7.51418E-01	4.46103E-03	0.00000E+00	0.00000E+00
37	7.51420E-01	5.04500E-01	7.51418E-01	4.33169E-03	0.00000E+00	0.00000E+00
38	7.41461E-01	5.08167E-01	7.51142E-01	4.21873E-03	0.00000E+00	0.00000E+00
39	7.52616E-01	5.11833E-01	7.51182E-01	4.10332E-03	0.00000E+00	0.00000E+00
40	7.87241E-01	5.15500E-01	7.52131E-01	4.10506E-03	0.00000E+00	0.00000E+00
41	7.44746E-01	5.19167E-01	7.51941E-01	4.00290E-03	0.00000E+00	0.00000E+00
42	7.71586E-01	5.21833E-01	7.52432E-01	3.93233E-03	0.00000E+00	0.00000E+00
43	7.13124E-01	5.25500E-01	7.51474E-01	3.95324E-03	0.00000E+00	0.00000E+00
44	7.45383E-01	5.29167E-01	7.51329E-01	3.86069E-03	0.00000E+00	0.00000E+00
45	7.63992E-01	5.32833E-01	7.51623E-01	3.78132E-03	0.00000E+00	0.00000E+00
46	7.50626E-01	5.35667E-01	7.51600E-01	3.69446E-03	0.00000E+00	0.00000E+00
47	7.07328E-01	5.39167E-01	7.50617E-01	3.74304E-03	0.00000E+00	0.00000E+00
48	7.26958E-01	5.42833E-01	7.50102E-01	3.69671E-03	0.00000E+00	0.00000E+00
49	7.42864E-01	5.46500E-01	7.49948E-01	3.62048E-03	0.00000E+00	0.00000E+00
50	7.79316E-01	5.50167E-01	7.50560E-01	3.59668E-03	0.00000E+00	0.00000E+00
51	7.38988E-01	5.53000E-01	7.50324E-01	3.53042E-03	0.00000E+00	0.00000E+00
52	7.57247E-01	5.56667E-01	7.50462E-01	3.46186E-03	0.00000E+00	0.00000E+00
53	7.73838E-01	5.60333E-01	7.50921E-01	3.42411E-03	0.00000E+00	0.00000E+00
54	7.65306E-01	5.64000E-01	7.51197E-01	3.36900E-03	0.00000E+00	0.00000E+00
55	6.97184E-01	5.67667E-01	7.50178E-01	3.45839E-03	0.00000E+00	0.00000E+00
56	7.39188E-01	5.70333E-01	7.49975E-01	3.39984E-03	0.00000E+00	0.00000E+00
57	7.70477E-01	5.74000E-01	7.50348E-01	3.35520E-03	0.00000E+00	0.00000E+00
58	7.52446E-01	5.77667E-01	7.50385E-01	3.29790E-03	0.00000E+00	0.00000E+00
59	7.33142E-01	5.81333E-01	7.50082E-01	3.25362E-03	0.00000E+00	0.00000E+00
60	7.68338E-01	5.84167E-01	7.50397E-01	3.21249E-03	0.00000E+00	0.00000E+00
61	7.65693E-01	5.87833E-01	7.50656E-01	3.16819E-03	0.00000E+00	0.00000E+00
62	7.31627E-01	5.91500E-01	7.50339E-01	3.13105E-03	0.00000E+00	0.00000E+00
977	6.79375E-01	3.81467E+00	7.42792E-01	8.31736E-04	0.00000E+00	0.00000E+00
978	7.04463E-01	3.81833E+00	7.42753E-01	8.31811E-04	0.00000E+00	0.00000E+00
979	7.13813E-01	3.82200E+00	7.42732E-01	8.31486E-04	0.00000E+00	0.00000E+00
980	7.52117E-01	3.82567E+00	7.42733E-01	8.30691E-04	0.00000E+00	0.00000E+00
981	7.98334E-01	3.82933E+00	7.42789E-01	8.31784E-04	0.00000E+00	0.00000E+00
982	7.37944E-01	3.83200E+00	7.42784E-01	8.30949E-04	0.00000E+00	0.00000E+00
983	7.18047E-01	3.83567E+00	7.42759E-01	8.30485E-04	0.00000E+00	0.00000E+00
984	7.10727E-01	3.83933E+00	7.42727E-01	8.30279E-04	0.00000E+00	0.00000E+00
985	7.38439E-01	3.84217E+00	7.42722E-01	8.29446E-04	0.00000E+00	0.00000E+00
986	7.17007E-01	3.84583E+00	7.42696E-01	8.29015E-04	0.00000E+00	0.00000E+00
987	7.68514E-01	3.84950E+00	7.42722E-01	8.28587E-04	0.00000E+00	0.00000E+00
988	7.91476E-01	3.85317E+00	7.42772E-01	8.29222E-04	0.00000E+00	0.00000E+00
989	7.01679E-01	3.85667E+00	7.42730E-01	8.29427E-04	0.00000E+00	0.00000E+00
990	7.59538E-01	3.85950E+00	7.42747E-01	8.28762E-04	0.00000E+00	0.00000E+00
991	7.52235E-01	3.86317E+00	7.42757E-01	8.27979E-04	0.00000E+00	0.00000E+00
992	7.52039E-01	3.86683E+00	7.42766E-01	8.27195E-04	0.00000E+00	0.00000E+00
993	7.53727E-01	3.87050E+00	7.42777E-01	8.26434E-04	0.00000E+00	0.00000E+00
994	7.83910E-01	3.87417E+00	7.42819E-01	8.26641E-04	0.00000E+00	0.00000E+00
995	7.18682E-01	3.87783E+00	7.42794E-01	8.26166E-04	0.00000E+00	0.00000E+00
996	7.48482E-01	3.88050E+00	7.42800E-01	8.25354E-04	0.00000E+00	0.00000E+00
997	7.30613E-01	3.88417E+00	7.42788E-01	8.24615E-04	0.00000E+00	0.00000E+00
998	7.71883E-01	3.88783E+00	7.42817E-01	8.24305E-04	0.00000E+00	0.00000E+00
999	7.54841E-01	3.89150E+00	7.42829E-01	8.23566E-04	0.00000E+00	0.00000E+00



1000	7.30416E-01	3.89433E+00	7.42817E-01	8.22834E-04	0.00000E+00	0.00000E+00
1001	7.37220E-01	3.89800E+00	7.42811E-01	8.22029E-04	0.00000E+00	0.00000E+00
1002	7.71580E-01	3.90167E+00	7.42840E-01	8.21711E-04	0.00000E+00	0.00000E+00
1003	7.45144E-01	3.90533E+00	7.42842E-01	8.20892E-04	0.00000E+00	0.00000E+00
1004	7.55448E-01	3.90900E+00	7.42855E-01	8.20169E-04	0.00000E+00	0.00000E+00
1005	7.41935E-01	3.91167E+00	7.42854E-01	8.19352E-04	0.00000E+00	0.00000E+00
1006	7.23444E-01	3.91533E+00	7.42834E-01	8.18763E-04	0.00000E+00	0.00000E+00
1007	7.76276E-01	3.91900E+00	7.42868E-01	8.18625E-04	0.00000E+00	0.00000E+00
1008	7.75243E-01	3.92267E+00	7.42900E-01	8.18444E-04	0.00000E+00	0.00000E+00
1009	7.63803E-01	3.92533E+00	7.42911E-01	8.17894E-04	0.00000E+00	0.00000E+00
1010	7.56903E-01	3.92900E+00	7.42934E-01	8.17200E-04	0.00000E+00	0.00000E+00
1011	7.09754E-01	3.93267E+00	7.42902E-01	8.17052E-04	0.00000E+00	0.00000E+00
1012	7.80382E-01	3.93633E+00	7.42939E-01	8.17085E-04	0.00000E+00	0.00000E+00
1013	7.59572E-01	3.94000E+00	7.42955E-01	8.16443E-04	0.00000E+00	0.00000E+00
1014	7.02572E-01	3.94367E+00	7.42915E-01	8.16611E-04	0.00000E+00	0.00000E+00
1015	7.05531E-01	3.94733E+00	7.42878E-01	8.16639E-04	0.00000E+00	0.00000E+00
1016	7.59689E-01	3.95017E+00	7.42895E-01	8.16001E-04	0.00000E+00	0.00000E+00
1017	7.54767E-01	3.95383E+00	7.42907E-01	8.15281E-04	0.00000E+00	0.00000E+00
1018	7.52696E-01	3.95750E+00	7.42916E-01	8.14535E-04	0.00000E+00	0.00000E+00
1019	7.33079E-01	3.96117E+00	7.42907E-01	8.13791E-04	0.00000E+00	0.00000E+00
1020	7.23735E-01	3.96483E+00	7.42888E-01	8.13210E-04	0.00000E+00	0.00000E+00
1021	6.93952E-01	3.96850E+00	7.42840E-01	8.13829E-04	0.00000E+00	0.00000E+00
1022	7.26085E-01	3.97217E+00	7.42823E-01	8.13197E-04	0.00000E+00	0.00000E+00
1023	7.84354E-01	3.97583E+00	7.42864E-01	8.13418E-04	0.00000E+00	0.00000E+00

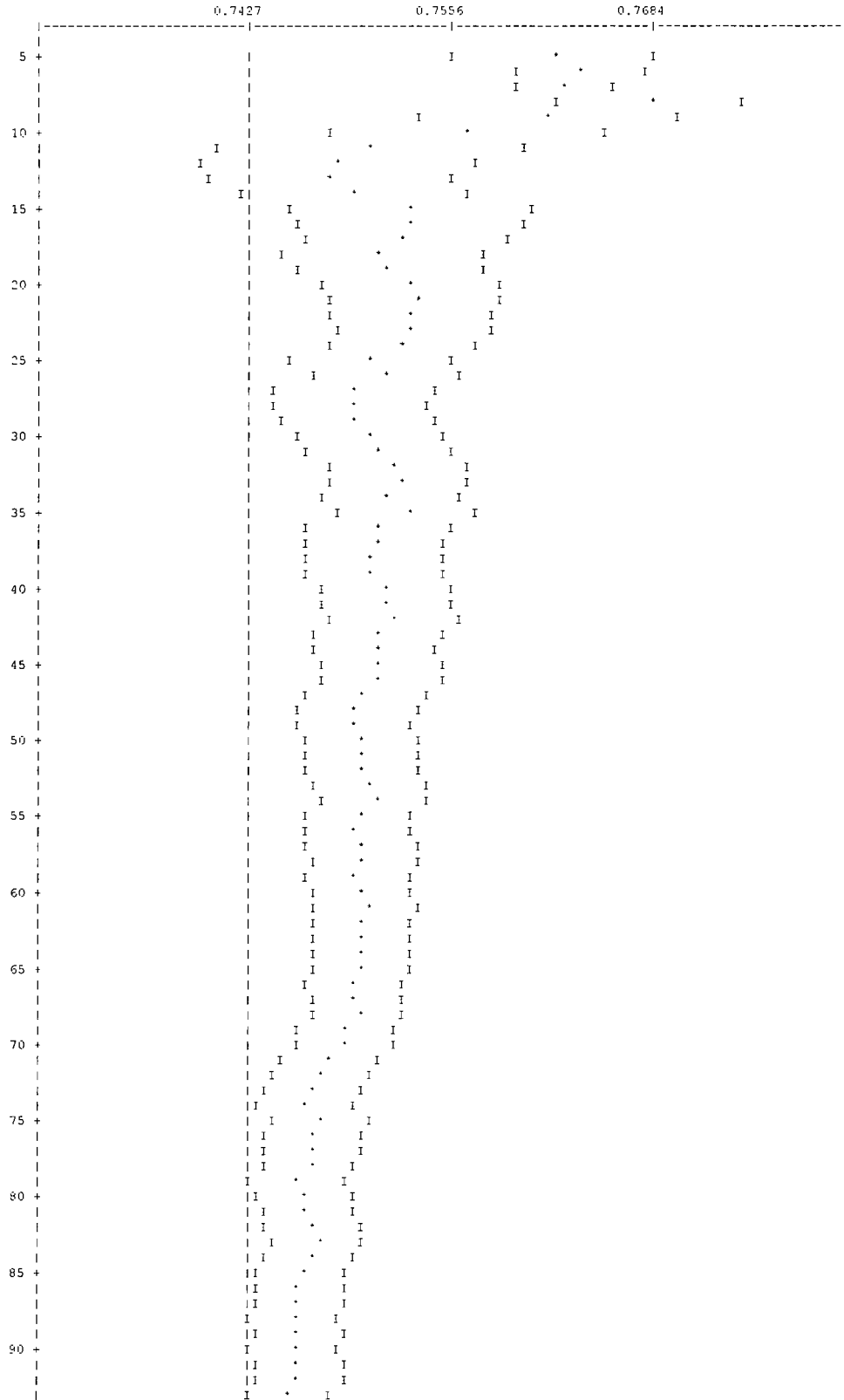
KENO MESSAGE NUMBER K5-123

EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

LIFETIME = 9.69309E-05 + OR - 1.11713E-07 GENERATION TIME = 6.01750E-05 + OR - 8.80249E-08  
 NU BAR = 2.42029E+00 + OR - 8.55604E-06 AVERAGE FISSION GROUP = 2.38131E+01 + OR - 3.65186E-03  
 ENERGY(EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 5.55885E-02 + OR - 1.61291E-04

NO. OF INITIAL GENERATIONS OF SKIPPED HISTORIES	AVERAGE		67 PER CENT		95 PER CENT		99 PER CENT		NUMBER
	K-EFFECTIVE	DEVIATION	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	
3	0.74285	+ OR - 0.00081	0.74203	TO 0.74366	0.74122	TO 0.74447	0.74040	TO 0.74529	1020000
4	0.74283	+ OR - 0.00081	0.74202	TO 0.74365	0.74120	TO 0.74446	0.74039	TO 0.74528	1019000
5	0.74281	+ OR - 0.00082	0.74199	TO 0.74362	0.74118	TO 0.74444	0.74036	TO 0.74525	1018000
6	0.74278	+ OR - 0.00082	0.74197	TO 0.74360	0.74115	TO 0.74441	0.74034	TO 0.74523	1017000
7	0.74277	+ OR - 0.00082	0.74195	TO 0.74358	0.74113	TO 0.74440	0.74032	TO 0.74521	1016000
8	0.74272	+ OR - 0.00082	0.74190	TO 0.74353	0.74109	TO 0.74435	0.74027	TO 0.74517	1015000
9	0.74273	+ OR - 0.00082	0.74192	TO 0.74355	0.74110	TO 0.74436	0.74028	TO 0.74518	1014000
10	0.74275	+ OR - 0.00082	0.74193	TO 0.74357	0.74112	TO 0.74438	0.74030	TO 0.74520	1013000
11	0.74278	+ OR - 0.00082	0.74197	TO 0.74360	0.74115	TO 0.74441	0.74033	TO 0.74523	1012000
12	0.74279	+ OR - 0.00082	0.74198	TO 0.74361	0.74116	TO 0.74443	0.74034	TO 0.74525	1011000
17	0.74271	+ OR - 0.00082	0.74189	TO 0.74353	0.74107	TO 0.74435	0.74025	TO 0.74516	1006000
22	0.74265	+ OR - 0.00082	0.74182	TO 0.74347	0.74100	TO 0.74429	0.74018	TO 0.74512	1001000
27	0.74269	+ OR - 0.00082	0.74186	TO 0.74351	0.74104	TO 0.74433	0.74021	TO 0.74516	996000
32	0.74257	+ OR - 0.00083	0.74174	TO 0.74339	0.74091	TO 0.74422	0.74009	TO 0.74504	991000
37	0.74256	+ OR - 0.00083	0.74173	TO 0.74339	0.74091	TO 0.74421	0.74008	TO 0.74504	986000
42	0.74247	+ OR - 0.00083	0.74164	TO 0.74330	0.74082	TO 0.74413	0.73999	TO 0.74496	981000
47	0.74251	+ OR - 0.00083	0.74167	TO 0.74334	0.74084	TO 0.74417	0.74001	TO 0.74500	976000
52	0.74247	+ OR - 0.00083	0.74164	TO 0.74331	0.74080	TO 0.74414	0.73997	TO 0.74498	971000
57	0.74244	+ OR - 0.00084	0.74160	TO 0.74327	0.74076	TO 0.74411	0.73993	TO 0.74495	966000
62	0.74240	+ OR - 0.00084	0.74156	TO 0.74324	0.74072	TO 0.74408	0.73988	TO 0.74492	961000
67	0.74238	+ OR - 0.00084	0.74153	TO 0.74322	0.74069	TO 0.74406	0.73984	TO 0.74491	956000
72	0.74250	+ OR - 0.00084	0.74166	TO 0.74334	0.74081	TO 0.74419	0.73997	TO 0.74503	951000
77	0.74252	+ OR - 0.00085	0.74168	TO 0.74337	0.74083	TO 0.74422	0.73999	TO 0.74506	946000
82	0.74249	+ OR - 0.00085	0.74165	TO 0.74334	0.74080	TO 0.74419	0.73995	TO 0.74503	941000
932	0.74135	+ OR - 0.00275	0.73860	TO 0.74410	0.73585	TO 0.74685	0.73310	TO 0.74960	91000
937	0.74132	+ OR - 0.00282	0.73850	TO 0.74414	0.73569	TO 0.74695	0.73287	TO 0.74977	86000
942	0.74064	+ OR - 0.00285	0.73778	TO 0.74349	0.73493	TO 0.74634	0.73208	TO 0.74920	81000
947	0.74235	+ OR - 0.00293	0.73942	TO 0.74528	0.73650	TO 0.74821	0.73357	TO 0.75113	76000
952	0.74183	+ OR - 0.00307	0.73876	TO 0.74490	0.73569	TO 0.74797	0.73262	TO 0.75103	71000
957	0.74267	+ OR - 0.00325	0.73942	TO 0.74592	0.73617	TO 0.74917	0.73291	TO 0.75243	66000
962	0.74310	+ OR - 0.00348	0.73963	TO 0.74658	0.73615	TO 0.75006	0.73267	TO 0.75354	61000
967	0.74237	+ OR - 0.00373	0.73864	TO 0.74610	0.73491	TO 0.74983	0.73118	TO 0.75356	56000
972	0.74114	+ OR - 0.00389	0.73725	TO 0.74503	0.73336	TO 0.74892	0.72947	TO 0.75281	51000
977	0.74439	+ OR - 0.00393	0.74046	TO 0.74832	0.73653	TO 0.75226	0.73260	TO 0.75619	46000
982	0.74477	+ OR - 0.00402	0.74075	TO 0.74879	0.73674	TO 0.75280	0.73272	TO 0.75681	41000
987	0.74674	+ OR - 0.00428	0.74246	TO 0.75102	0.73819	TO 0.75530	0.73391	TO 0.75957	36000
992	0.74599	+ OR - 0.00449	0.74150	TO 0.75049	0.73700	TO 0.75498	0.73251	TO 0.75947	31000
997	0.74578	+ OR - 0.00501	0.74077	TO 0.75079	0.73577	TO 0.75580	0.73076	TO 0.76080	26000
1002	0.74402	+ OR - 0.00587	0.73814	TO 0.74989	0.73227	TO 0.75577	0.72639	TO 0.76164	21000
1007	0.74263	+ OR - 0.00732	0.73531	TO 0.74995	0.72799	TO 0.75727	0.72067	TO 0.76459	16000
1012	0.73600	+ OR - 0.00861	0.72739	TO 0.74461	0.71878	TO 0.75323	0.71017	TO 0.76184	11000
1017	0.73565	+ OR - 0.01244	0.72321	TO 0.74809	0.71077	TO 0.76052	0.69833	TO 0.77297	6000

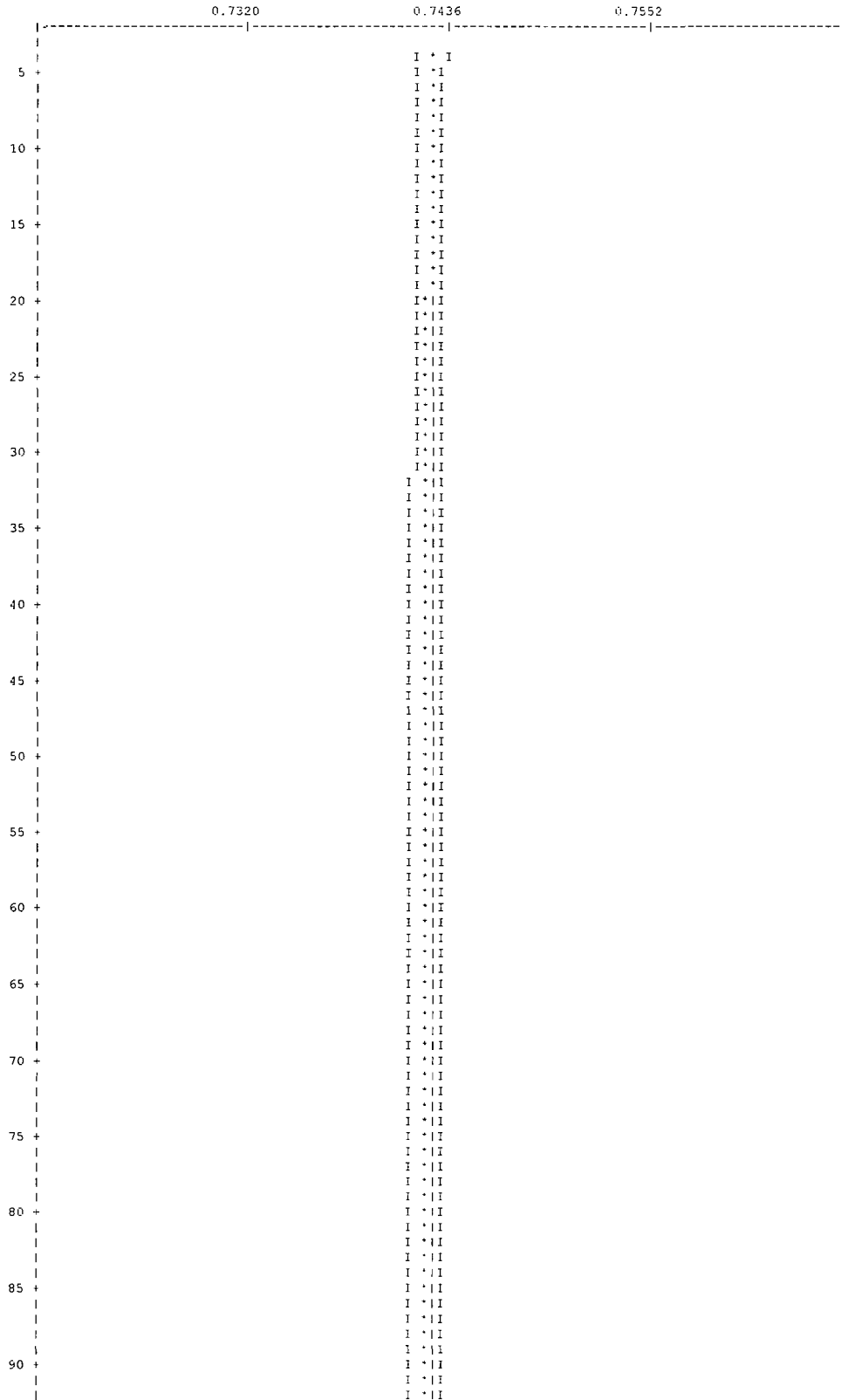
PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.  
THE LINE REPRESENTS K-EFF = 0.7428 ± OR - 0.0008 WHICH OCCURS FOR 1023 GENERATIONS RUN.







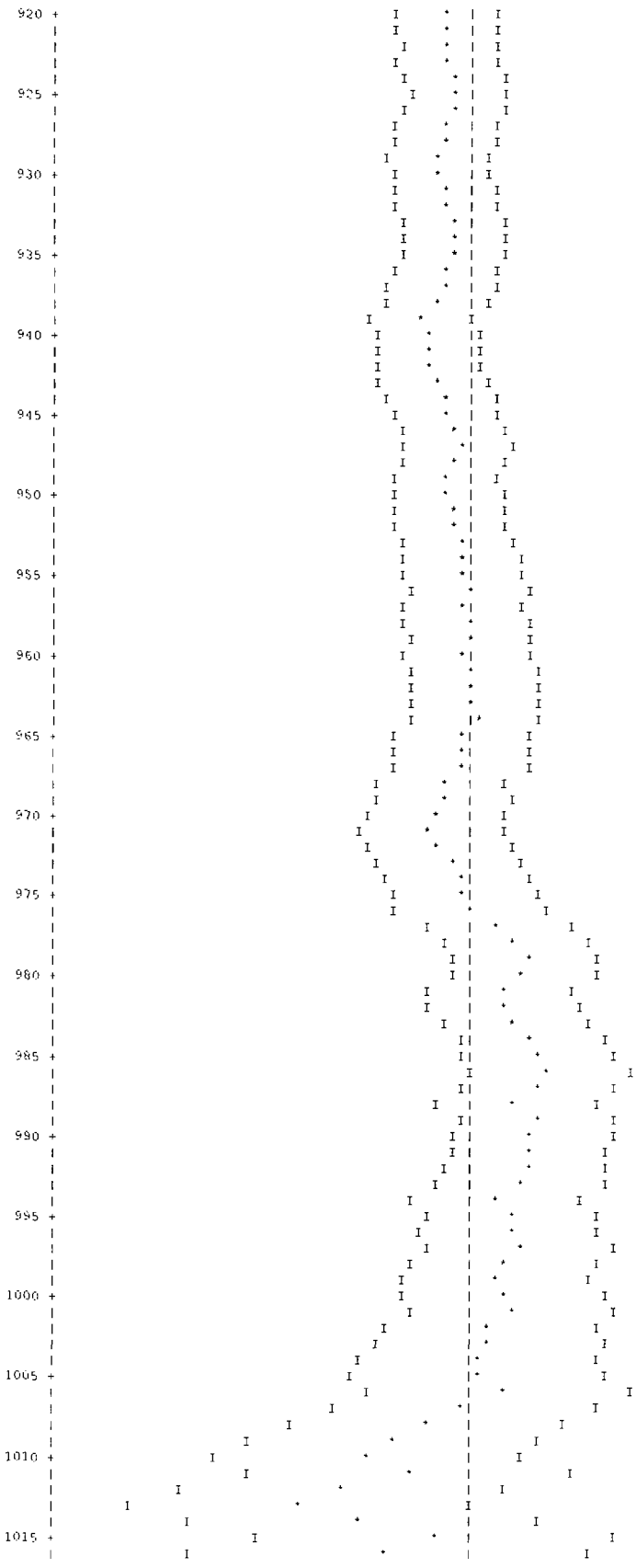
PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS K-EFF = 0.7428 + OR - 0.0008 WHICH OCCURS FOR 3 GENERATIONS SKIPPED.



95 +	I *II
	I *II
	I *II
	I *II
	I *II
	I *II
	I *II
100 +	I *II
	I *II
	I *II
	I *II
	I *II
105 +	I *II
	I *II
	I *II
	I *II
	I *II
110 +	I *II
	I *II
	I *II
	I *II
	I *II
115 +	I *II
	I *II
	I *II
	I *II
	I *II
120 +	I *II
	I *II
	I *II
	I *II
	I *II
125 +	I *II
	I *II
	I *II
	I *II
	I *II
130 +	I *II
	I *II
	I *II
	I *II
	I *II
135 +	I *II
	I *II
	I *II
	I *II
	I *II
140 +	I *II
	I *II
	I *II
	I *II
	I *II
145 +	I *II
	I *II
	I *II
	I *II
	I *II
150 +	I *II
	I *II
	I *II
	I *II
	I *II
155 +	I *II
	I *II
	I *II
	I *II
	I *II
160 +	I *II
	I *II
	I *II
	I *II
	I *II
165 +	I *II
	I *II
	I *II
	I *II
	I *II
170 +	I *II
	I *II
	I *II
	I *II
	I *II
175 +	I *II
	I *II
	I *II
	I *II
	I *II
180 +	I *II
	I *II
	I *II
	I *II
	I *II
185 +	I *II
	I *II
	I *II
	I *II
	I *II









GENERATIONS										SKIPPING
GROUP	FISSION FRACTION	UNIT	REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	PERCENT DEVIATION	3
1	0.0003			2.19740E-04	2.4717	1.31432E-03	0.8917	0.00000E+00	0.0000	
2	0.0015			1.09341E-03	0.7322	3.04811E-03	0.2835	0.00000E+00	0.0000	
3	0.0017			1.27237E-03	0.6133	9.33984E-04	0.3950	0.00000E+00	0.0000	
4	0.0010			7.40677E-04	0.7926	4.99404E-04	0.5404	0.00000E+00	0.0000	
5	0.0013			1.00055E-03	0.6716	9.52746E-04	0.3953	0.00000E+00	0.0000	
6	0.0017			1.26781E-03	0.5040	2.77494E-03	0.3459	0.00000E+00	0.0000	
7	0.0016			1.21258E-03	0.5687	4.91185E-03	0.3810	0.00000E+00	0.0000	
8	0.0016			1.19645E-03	0.8956	4.05080E-03	0.4096	0.00000E+00	0.0000	
9	0.0022			1.60512E-03	1.0841	4.23075E-03	0.4270	0.00000E+00	0.0000	
10	0.0046			3.40837E-03	0.9865	1.04716E-02	0.4109	0.00000E+00	0.0000	
11	0.0100			7.45951E-03	0.8650	1.44686E-02	0.4018	0.00000E+00	0.0000	
12	0.0133			9.91099E-03	0.9117	1.33269E-02	0.5005	0.00000E+00	0.0000	
13	0.0125			9.27553E-03	0.9477	1.64557E-02	0.4665	0.00000E+00	0.0000	
14	0.0109			8.08484E-03	0.9065	2.07470E-02	0.3954	0.00000E+00	0.0000	
15	0.0022			1.64837E-03	1.7851	1.03632E-02	0.4465	0.00000E+00	0.0000	
16	0.0016			1.15611E-03	2.3160	6.16176E-03	0.5040	0.00000E+00	0.0000	
17	0.0024			1.77984E-03	2.5360	3.62969E-03	0.8226	0.00000E+00	0.0000	
18	0.0032			2.38679E-03	2.3920	3.54809E-03	0.8982	0.00000E+00	0.0000	
19	0.0040			2.97879E-03	1.9978	5.90096E-03	0.6187	0.00000E+00	0.0000	
20	0.0173			1.28169E-02	1.0271	2.15421E-02	0.3959	0.00000E+00	0.0000	
21	0.0095			7.05344E-03	1.4434	8.85516E-03	0.6566	0.00000E+00	0.0000	
22	0.0236			1.75389E-02	0.9264	2.03161E-02	0.4664	0.00000E+00	0.0000	
23	0.0997			7.40734E-02	0.4269	9.33826E-02	0.2008	0.00000E+00	0.0000	
24	0.2310			1.71624E-01	0.2731	2.15314E-01	0.1242	0.00000E+00	0.0000	
25	0.2024			1.50360E-01	0.2927	1.90295E-01	0.1263	0.00000E+00	0.0000	
26	0.2502			1.85851E-01	0.2641	2.39684E-01	0.1202	0.00000E+00	0.0000	
27	0.0886			6.58290E-02	0.4449	8.46067E-02	0.2090	0.00000E+00	0.0000	
SYSTEM TOTAL =				7.42845E-01	0.1096	1.00179E+00	0.0220	0.00000E+00	0.0000	
ELAPSED TIME		3.98033 MINUTES								
RANDOM NUMBER=		2DAD49504B4B								

FREQUENCY FOR GENERATIONS 4 TO 1023

0.6577 TO 0.6612	*
0.6612 TO 0.6648	*
0.6648 TO 0.6683	*
0.6683 TO 0.6719	**
0.6719 TO 0.6754	**
0.6754 TO 0.6790	**
0.6790 TO 0.6825	**
0.6825 TO 0.6861	***
0.6861 TO 0.6896	*****
0.6896 TO 0.6931	*****
0.6931 TO 0.6967	*****
0.6967 TO 0.7002	*****
0.7002 TO 0.7038	*****
0.7038 TO 0.7073	*****
0.7073 TO 0.7109	*****
0.7109 TO 0.7144	*****
0.7144 TO 0.7180	*****
0.7180 TO 0.7215	*****
0.7215 TO 0.7251	*****
0.7251 TO 0.7286	*****
0.7286 TO 0.7322	*****
0.7322 TO 0.7357	*****
0.7357 TO 0.7393	*****
0.7393 TO 0.7428	*****
0.7428 TO 0.7464	*****
0.7464 TO 0.7499	*****
0.7499 TO 0.7534	*****
0.7534 TO 0.7570	*****
0.7570 TO 0.7605	*****
0.7605 TO 0.7641	*****
0.7641 TO 0.7676	*****
0.7676 TO 0.7712	*****
0.7712 TO 0.7747	*****
0.7747 TO 0.7783	*****
0.7783 TO 0.7818	*****
0.7818 TO 0.7854	*****
0.7854 TO 0.7889	*****
0.7889 TO 0.7925	*****
0.7925 TO 0.7960	*****
0.7960 TO 0.7996	*****
0.7996 TO 0.8031	*****
0.8031 TO 0.8067	*
0.8067 TO 0.8102	****
0.8102 TO 0.8137	*
0.8137 TO 0.8173	*
0.8173 TO 0.8208	*
0.8208 TO 0.8244	*
0.8244 TO 0.8279	*

```
FREQUENCY FOR GENERATIONS 259 TO 1023  
0.6577 TO 0.6612 *  
0.6612 TO 0.6648  
0.6648 TO 0.6683 **  
0.6683 TO 0.6719 ***  
0.6719 TO 0.6754 ****  
0.6754 TO 0.6790 *****  
0.6790 TO 0.6825 *  
0.6825 TO 0.6861 **  
0.6861 TO 0.6896 ***  
0.6896 TO 0.6931 ****  
0.6931 TO 0.6967 *****  
0.6967 TO 0.7002 *  
0.7002 TO 0.7038 **  
0.7038 TO 0.7073 ***  
0.7073 TO 0.7109 ****  
0.7109 TO 0.7144 *****  
0.7144 TO 0.7180 *  
0.7180 TO 0.7215 **  
0.7215 TO 0.7251 ***  
0.7251 TO 0.7286 ****  
0.7286 TO 0.7322 *****  
0.7322 TO 0.7357 *  
0.7357 TO 0.7393 **  
0.7393 TO 0.7428 ***  
0.7428 TO 0.7464 ****  
0.7464 TO 0.7499 *****  
0.7499 TO 0.7534 *  
0.7534 TO 0.7570 **  
0.7570 TO 0.7605 ***  
0.7605 TO 0.7641 ****  
0.7641 TO 0.7676 *****  
0.7676 TO 0.7712 *  
0.7712 TO 0.7747 **  
0.7747 TO 0.7783 ***  
0.7783 TO 0.7818 ****  
0.7818 TO 0.7854 *****  
0.7854 TO 0.7889 *  
0.7889 TO 0.7925 **  
0.7925 TO 0.7960 ***  
0.7960 TO 0.7996 ****  
0.7996 TO 0.8031 *****  
0.8031 TO 0.8067 *  
0.8067 TO 0.8102 **  
0.8102 TO 0.8137 *  
0.8137 TO 0.8173  
0.8173 TO 0.8208  
0.8208 TO 0.8244  
0.8244 TO 0.8279
```

FREQUENCY FOR GENERATIONS 514 TO 1023

```
0.6577 TO 0.6612
0.6612 TO 0.6648
0.6648 TO 0.6683
0.6683 TO 0.6719 **
0.6719 TO 0.6754 *
0.6754 TO 0.6790 *
0.6790 TO 0.6825 *
0.6825 TO 0.6861 ***
0.6861 TO 0.6896 ***
0.6896 TO 0.6931 ***
0.6931 TO 0.6967 *****
0.6967 TO 0.7002 *****
0.7002 TO 0.7038 *****
0.7038 TO 0.7073 *****
0.7073 TO 0.7109 *****
0.7109 TO 0.7144 *****
0.7144 TO 0.7180 *****
0.7180 TO 0.7215 *****
0.7215 TO 0.7251 *****
0.7251 TO 0.7286 *****
0.7286 TO 0.7322 *****
0.7322 TO 0.7357 *****
0.7357 TO 0.7393 *****
0.7393 TO 0.7428 *****
0.7428 TO 0.7464 *****
0.7464 TO 0.7499 *****
0.7499 TO 0.7534 *****
0.7534 TO 0.7570 *****
0.7570 TO 0.7605 *****
0.7605 TO 0.7641 *****
0.7641 TO 0.7676 *****
0.7676 TO 0.7712 *****
0.7712 TO 0.7747 *****
0.7747 TO 0.7783 *****
0.7783 TO 0.7818 *****
0.7818 TO 0.7854 *****
0.7854 TO 0.7889 ****
0.7889 TO 0.7925 **
0.7925 TO 0.7960 **
0.7960 TO 0.7996 *****
0.7996 TO 0.8031 *****
0.8031 TO 0.8067 *
0.8067 TO 0.8102 *
0.8102 TO 0.8137
0.8137 TO 0.8173
0.8173 TO 0.8208
0.8208 TO 0.8244
0.8244 TO 0.8279
```

FREQUENCY FOR GENERATIONS 769 TO 1023

0.6577 TO 0.6612	
0.6612 TO 0.6648	
0.6648 TO 0.6683	
0.6683 TO 0.6719	
0.6719 TO 0.6754	
0.6754 TO 0.6790	*
0.6790 TO 0.6825	*
0.6825 TO 0.6861	*
0.6861 TO 0.6896	***
0.6896 TO 0.6931	*
0.6931 TO 0.6967	**
0.6967 TO 0.7002	**
0.7002 TO 0.7038	***
0.7038 TO 0.7073	*****
0.7073 TO 0.7109	*****
0.7109 TO 0.7144	***
0.7144 TO 0.7180	*****
0.7180 TO 0.7215	*****
0.7215 TO 0.7251	*****
0.7251 TO 0.7286	*****
0.7286 TO 0.7322	*****
0.7322 TO 0.7357	*****
0.7357 TO 0.7393	*****
0.7393 TO 0.7428	*****
0.7428 TO 0.7464	*****
0.7464 TO 0.7499	*****
0.7499 TO 0.7534	*****
0.7534 TO 0.7570	*****
0.7570 TO 0.7605	*****
0.7605 TO 0.7641	*****
0.7641 TO 0.7676	*****
0.7676 TO 0.7712	*****
0.7712 TO 0.7747	*****
0.7747 TO 0.7783	*****
0.7783 TO 0.7818	*****
0.7818 TO 0.7854	*****
0.7854 TO 0.7889	***
0.7889 TO 0.7925	*
0.7925 TO 0.7960	
0.7960 TO 0.7996	***
0.7996 TO 0.8031	****
0.8031 TO 0.8067	
0.8067 TO 0.8102	*
0.8102 TO 0.8137	
0.8137 TO 0.8173	
0.8173 TO 0.8208	
0.8208 TO 0.8244	
0.8244 TO 0.8279	

**6.6.14      High Fissile Mass LEU (32 g <sup>235</sup>U per Plate) MTR Fuel Elements**

This section contains a sample input file for the evaluation of high fissile mass LEU MTR fuel elements. The file contains partially loaded top and bottom baskets containing the high fissile mass LEU MTR fuel elements and filled (seven elements) intermediate baskets containing maximum reactivity HEU MTR fuel elements.



Figure 6.6.14-1 High Fissile Mass LEU MTR Sample Input

```
=CSAS25
LWT MTR INPUT FOR CASK MODEL - PLATES IN CLOSE & PLATES @ FULL PITCH
'MIN BASKET PLATE - COMMENT CARD REFERS TO NOMINAL PLATE SIZE
' TYPE A FUEL - FULL BASKETS
'   23 PLATES - 20 GRAM U-235 PER PLATE
'   0.123 CM PLATE THICKNESS; 6.6 CM FUEL WIDTH; 56 CM FUEL HEIGHT
'   HEU FUEL COMPOSITION 30 WT%U - 94 WT%235U
' TYPE B FUEL - FULL/PARTIAL BASKETS
'   23 PLATES - 32 GRAM U-235 PER PLATE
'   0.115 CM PLATE THICKNESS; 7.3 CM FUEL WIDTH; 56 CM FUEL HEIGHT
'   LEU FUEL COMPOSITION 75 WT%U - 25 WT%235U
'FUEL SHIFT AXIAL ALTERNATING
27GROUPRDF4 LATTICECELL
' TYPE B FUEL - FULL/PARTIAL BASKET FUEL MATERIAL
URANIUM 1 DEN=19.05 0.21915 293 92235 25 92238 75 END
AL      1 DEN=2.702 0.51503 293 END
' CLAD, MODERATOR, AND CASK MATERIALS
AL      2 1.0 293.0 END
H2O     3 1 293.0 END
AL      4 1.0 293.0 END
SS304   5 1.0 293.0 END
PB       6 1.0 293.0 END
H2O     7 1.E-20 293.0 END
H2O     8 1.E-20 293.0 END
H2O     9 1.0 293.0 END
' TYPE A FUEL - FULL BASKET FUEL MATERIAL
URANIUM 10 DEN=19.05 0.0364 293 92235 94 92238 6 END
AL      10 DEN=2.702 0.59869 293 END
' SPACER MATERIAL
AL      11 1.0 293.0 END
END COMP
SYMSLABCELL 0.3917 0.075 1 3 0.115 2 END
' DANCOFF CORRECTION FACTOR FOR TYPE A FUEL- FULL BASKET FUEL DEFINITION
MORE DATA DAN(10)=0.5119 RES=10 SLAB 0.083 END MORE

READ PARAM TBA=10 RUN=YES PLT=NO GEN=803 NPG=1000 RND=ABCB1234 END PARAM
READ GEOM
'
' FUEL PLATE CELL UNITS - FULL BASKETS - TYPE A FUEL
'
UNIT 1
COM='MIDDLE FUEL PLATE CELL'
CUBOID 10 1 2P3.3000 2P0.0415 58 2
CUBOID 2 1 2P3.3000 2P0.0615 60 0.0
CUBOID 3 1 2P3.3000 2P0.1957 60 0.0
UNIT 2
COM='TOP FUEL PLATE CELL'
CUBOID 10 1 2P3.3000 2P0.0415 58 2
CUBOID 2 1 2P3.3000 2P0.0615 60 0.0
CUBOID 3 1 2P3.3000 0.0615 -0.1957 60 0.0
UNIT 3
COM='BOTTOM FUEL PLATE CELL'
CUBOID 10 1 2P3.3000 2P0.0415 58 2
CUBOID 2 1 2P3.3000 2P0.0615 60 0.0
CUBOID 3 1 2P3.3000 0.1957 -0.0615 60 0.0
UNIT 4
COM='SIDE PLATE'
CUBOID 2 1 2P0.2 2P3.75 60 0.0
'
' FUEL PLATE CELL UNITS - FULL/PARTIAL BASKET - TYPE B FUEL
'
UNIT 5
COM='MIDDLE FUEL PLATE CELL'
CUBOID 1 1 2P3.6500 2P0.0375 56.7 0.7
CUBOID 2 1 2P3.6500 2P0.0575 57.4 0.0
CUBOID 3 1 2P3.6500 2P0.19585 57.4 0.0
UNIT 6
COM='TOP FUEL PLATE CELL'
CUBOID 1 1 2P3.6500 2P0.0375 56.7 0.7
CUBOID 2 1 2P3.6500 2P0.0575 57.4 0.0
CUBOID 3 1 2P3.6500 0.0575 -0.19585 57.4 0.0
UNIT 7
COM='BOTTOM FUEL PLATE CELL'
CUBOID 1 1 2P3.6500 2P0.0375 56.7 0.7
CUBOID 2 1 2P3.6500 2P0.0575 57.4 0.0
CUBOID 3 1 2P3.6500 0.19585 -0.0575 57.4 0.0
'
UNIT 8
COM='SIDE PLATE'
CUBOID 2 1 2P0.2 2P3.75 57.4 0.0
'
' UNITS 10 TO 100 ELEMENTS SHIFTED DOWN IN BASKET
'
'
' BASKET CENTER ROW ARRAY ELEMENTS
'
UNIT 10
COM='FUEL PLATE ARRAY - PLATES IN 5/16 IN. WEB CENTER'
ARRAY 1 -3.3000 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
```

```
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 11
COM='FUEL ARRAY PLATES IN 5/16 IN. WEB RIGHT'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 12
COM='FUEL ARRAY PLATES IN 5/16 IN. WEB LEFT'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
'
' BASKET TOP ROW ARRAY ELEMENTS
'
UNIT 20
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - TOP STACK'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 21
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - TOP STACK'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' BASKET BOTTOM ROW ARRAY ELEMENTS
'
UNIT 30
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
ARRAY 1 -2.6314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 31
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 1 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 0.0
HOLE 4 4.1687 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' CONSTRUCTION OF BASKET ROWS
'
UNIT 40
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES'
ARRAY 2 -9.0428 -4.3688 0.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 41
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 3 -14.1738 -4.3688 0.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 42
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES'
ARRAY 4 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
'
' BASKET UNIT
'
UNIT 50
COM='7 MTR ELEMENTS IN THE LWT'
CYLINDER 3 1 17.0500 73.152 0.0
HOLE 40 0.0 +9.4489 0.0
HOLE 41 0.0 0.0 0.0
HOLE 42 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 73.152 -1.27
CYLINDER 6 1 33.4963 73.152 -1.27
CYLINDER 5 1 36.5443 73.152 -1.27
CYLINDER 7 1 49.2443 73.152 -1.27
CYLINDER 5 1 49.8539 73.152 -1.27
CUBOID 8 1 4P49.8539 73.152 -1.27
'
' UNITS 110 TO 150 ELEMENTS SHIFTED UP IN BASKET
'
' BASKET CENTER ROW ARRAY ELEMENTS
'
UNIT 110
COM='FUEL PLATE ARRAY - PLATES IN 5/16 IN. WEB CENTER'
ARRAY 1 -3.3000 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 111
COM='FUEL ARRAY PLATES IN 5/16 IN. WEB RIGHT'
ARRAY 1 -3.9686 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
```

```
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 112
COM='FUEL ARRAY PLATES IN 5/16 IN. WEB LEFT'
ARRAY 1 -2.6314 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 2R0.3556 4R0.0 1
'
' BASKET TOP ROW ARRAY ELEMENTS
'
UNIT 120
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - TOP STACK'
ARRAY 1 -2.6314 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 121
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - TOP STACK'
ARRAY 1 -3.9686 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' BASKET BOTTOM ROW ARRAY ELEMENTS
'
UNIT 130
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
ARRAY 1 -2.6314 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 131
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 1 -3.9686 -4.3688 13.152
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 4 -4.1687 0.0 13.152
HOLE 4 4.1687 0.0 13.152
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' CONSTRUCTION OF BASKET ROWS
'
UNIT 140
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES'
ARRAY 5 -9.0428 -4.3688 0.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 141
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 6 -14.1738 -4.3688 0.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 142
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES'
ARRAY 7 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
'
' BASKET UNIT
'
UNIT 150
COM='7 MTR. ELEMENTS IN THE LWT'
CYLINDER 3 1 17.0500 73.152 0.0
HOLE 140 0.0 +9.4489 0.0
HOLE 141 0.0 0.0 0.0
HOLE 142 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 73.152 -1.27
CYLINDER 6 1 33.4963 73.152 -1.27
CYLINDER 5 1 36.5443 73.152 -1.27
CYLINDER 7 1 49.2443 73.152 -1.27
CYLINDER 5 1 49.8539 73.152 -1.27
CUBOID 8 1 4P49.8539 73.152 -1.27
'
' UNITS 210 TO 250 ELEMENTS SHIFTED DOWN IN BASKET - NO FUEL IN CENTER ROW
'
' BASKET CENTER ROW ARRAY ELEMENTS
'
UNIT 210
COM='FUEL PLATE ARRAY - PLATES IN 5/16 IN. WEB CENTER'
CYLINDER 3 1 3.81 73.152 0.0
CYLINDER 11 1 4.1275 73.152 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 211
COM='FUEL ARRAY PLATES IN 5/16 IN. WEB RIGHT'
CYLINDER 3 1 3.81 73.152 0.0
CYLINDER 11 1 4.1275 73.152 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 212
COM='FUEL ARRAY PLATES IN 5/16 IN. WEB LEFT'
CYLINDER 3 1 3.81 73.152 0.0
CYLINDER 11 1 4.1275 73.152 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
'
' BASKET TOP ROW ARRAY ELEMENTS
```

```
UNIT 220
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - TOP STACK'
ARRAY 11 -3.3314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 8 -4.1687 0.0 0.0
HOLE 8 4.1687 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 221
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - TOP STACK'
ARRAY 11 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 8 -4.1687 0.0 0.0
HOLE 8 4.1687 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' BASKET BOTTOM ROW ARRAY ELEMENTS
'
UNIT 230
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
ARRAY 11 -3.3314 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 8 -4.1687 0.0 0.0
HOLE 8 4.1687 0.0 0.0
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 231
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 11 -3.9686 -4.3688 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 8 -4.1687 0.0 0.0
HOLE 8 4.1687 0.0 0.0
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' CONSTRUCTION OF BASKET ROWS
'
UNIT 240
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES'
ARRAY 12 -9.0428 -4.3688 0.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 241
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 13 -14.1738 -4.3688 0.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 242
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES'
ARRAY 14 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
'
' BASKET UNIT
'
UNIT 250
COM='7 MTR ELEMENTS IN THE LWT'
CYLINDER 3 1 17.0500 73.152 0.0
HOLE 240 0.0 +9.4489 0.0
HOLE 241 0.0 0.0 0.0
HOLE 242 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 73.152 -1.27
CYLINDER 6 1 33.4963 73.152 -1.27
CYLINDER 5 1 36.5443 73.152 -1.27
CYLINDER 7 1 49.2443 73.152 -1.27
CYLINDER 5 1 49.8539 73.152 -1.27
CUBOID 8 1 4P49.8539 73.152 -1.27
'
' UNITS 310 TO 350 ELEMENTS SHIFTED UP IN BASKET - NO FUEL IN CENTER ROW
'
' BASKET CENTER ROW ARRAY ELEMENTS
'
UNIT 310
COM='FUEL PLATE ARRAY - PLATES IN 5/16 IN. WEB CENTER'
CYLINDER 3 1 3.81 73.152 0.0
CYLINDER 11 1 4.1275 73.152 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 311
COM='FUEL ARRAY PLATES IN 5/16 IN. WEB RIGHT'
CYLINDER 3 1 3.81 73.152 0.0
CYLINDER 11 1 4.1275 73.152 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
UNIT 312
COM='FUEL ARRAY PLATES IN 5/16 IN. WEB LEFT'
CYLINDER 3 1 3.81 73.152 0.0
CYLINDER 11 1 4.1275 73.152 0.0
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
REPLICATE 5 1 2R0.3556 4R0.0 1
'
' BASKET TOP ROW ARRAY ELEMENTS
'
UNIT 320
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - TOP STACK'
ARRAY 11 -3.3314 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 8 -4.1687 0.0 15.752
HOLE 8 4.1687 0.0 15.752
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 321
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - TOP STACK'
```

```
ARRAY 11 -3.9686 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 8 -4.1687 0.0 15.752
HOLE 8 4.1687 0.0 15.752
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' BASKET BOTTOM ROW ARRAY ELEMENTS
'
UNIT 330
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON RIGHT - BOTTOM STACK'
ARRAY 11 -3.3314 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 8 -4.1687 0.0 15.752
HOLE 8 4.1687 0.0 15.752
REPLICATE 5 1 0.3048 5R0.0 1
UNIT 331
COM='FUEL ARRAY WITH HALF OF 1/4 IN. PLATE ON LEFT - BOTTOM STACK'
ARRAY 11 -3.9686 -4.3688 15.752
CUBOID 3 1 2P4.3688 2P4.3688 73.152 0.0
HOLE 8 -4.1687 0.0 15.752
HOLE 8 4.1687 0.0 15.752
REPLICATE 5 1 0.0 0.3048 4R0.0 1
'
' CONSTRUCTION OF BASKET ROWS
'
UNIT 340
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON TOP AND SIDES'
ARRAY 15 -9.0428 -4.3688 0.0
REPLICATE 5 1 3R0.3048 0.0 2R0.0 1
UNIT 341
COM='3 UNIT ARRAY WITH REST OF 5/16 WEB'
ARRAY 16 -14.1738 -4.3688 0.0
REPLICATE 5 1 2R0.3556 2R0.7112 2R0.0 1
UNIT 342
COM='2 UNIT ARRAY WITH 1/4 IN. PLATE ON BOTTOM AND SIDES'
ARRAY 17 -9.0428 -4.3688 0.0
REPLICATE 5 1 2R0.3048 0.0 0.3048 2R0.0 1
'
' BASKET UNIT
'
UNIT 350
COM='7 MTR ELEMENTS IN THE LWT'
CYLINDER 3 1 17.0500 73.152 0.0
HOLE 340 0.0 +9.4489 0.0
HOLE 341 0.0 0.0 0.0
HOLE 342 0.0 -9.4489 0.0
CYLINDER 5 1 18.8913 73.152 -1.27
CYLINDER 6 1 33.4963 73.152 -1.27
CYLINDER 5 1 36.5443 73.152 -1.27
CYLINDER 7 1 49.2443 73.152 -1.27
CYLINDER 5 1 49.8539 73.152 -1.27
CUBOID 8 1 4P49.8539 73.152 -1.27
'
' CASK LID AND BOTTOM STRUCTURE
'
UNIT 460
COM='SIMPLIFIED LID STRUCTURE NAC-LWT'
CYLINDER 5 1 36.5188 13.6775 -14.1351
CYLINDER 8 1 49.8539 13.6775 -14.1351
CUBOID 8 1 4P49.8539 13.6775 -14.1351
UNIT 461
COM='SIMPLIFIED CASK BOTTOM STRUCTURE NAC-LWT'
CYLINDER 6 1 26.3525 2P3.81
CYLINDER 5 1 36.6188 +13.36 -12.7
CYLINDER 8 1 49.8539 +13.36 -12.7
CUBOID 8 1 4P49.8539 +13.36 -12.7
UNIT 462
COM='THIN TOP AND BOTTOM SHELL OF NEUTRON SHIELD - SUBTRACTED FROM LID MODEL'
CYLINDER 5 1 49.8539 0.61 0.0
CUBOID 8 1 4P49.8539 0.61 0.0
'
' STACK OF BASKETS WITH CASK LID AND BOTTOM
'
GLOBAL UNIT 470
COM='STACK OF 6 BASKETS IN CASK WITH LID AND BOTTOM'
ARRAY 40 -49.8539 -49.8539 0.0
END GEOM
READ ARRAY
'
' ARRAYS FOR TYPE A BASKETS
'
' FUEL ELEMENT PLATE ARRAY
'
ARA=1 NUX=1 NUZ=23 NUZ=1 FILL 3 21R1 2 END FILL
'
' ARRAYS OF BASKET OPENINGS (TOP, MIDDLE, BOTTOM)
' PLATES AT BOTTOM OF OPENING
'
ARA=2 NUX=2 NUZ=1 NUZ=1 FILL 20 21 END FILL
ARA=3 NUX=3 NUZ=1 NUZ=1 FILL 12 10 11 END FILL
ARA=4 NUX=2 NUZ=1 NUZ=1 FILL 30 31 END FILL
'
' ARRAYS OF BASKET OPENINGS (TOP, MIDDLE, BOTTOM)
' PLATES AT TOP OF OPENING
'
ARA=5 NUX=2 NUZ=1 NUZ=1 FILL 120 121 END FILL
ARA=6 NUX=3 NUZ=1 NUZ=1 FILL 112 110 111 END FILL
```

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APA=7 NUX=2 NUY=1 NUZ=1 FILL 130 131 END FILL
'
' ARRAYS FOR TYPE B BASKETS
'
APA=11 NUX=1 NUY=23 NUZ=1 FILL 7 21R5 6 END FILL
'
' ARRAYS OF BASKET OPENINGS (TOP, MIDDLE, BOTTOM)
' PLATES AT BOTTOM OF OPENING
'
APA=12 NUX=2 NUY=1 NUZ=1 FILL 220 221 END FILL
APA=13 NUX=3 NUY=1 NUZ=1 FILL 212 210 211 END FILL
APA=14 NUX=2 NUY=1 NUZ=1 FILL 230 231 END FILL
'
' ARRAYS OF BASKET OPENINGS (TOP, MIDDLE, BOTTOM)
' PLATES AT TOP OF OPENING
'
APA=15 NUX=2 NUY=1 NUZ=1 FILL 320 321 END FILL
APA=16 NUX=3 NUY=1 NUZ=1 FILL 312 310 311 END FILL
APA=17 NUX=2 NUY=1 NUZ=1 FILL 330 331 END FILL
'
' ARRAY OF BASKETS WITH LID AND BOTTOM
'
ARA=40 NUX=1 NUY=1 NUZ=10 FILL 461 462 350 50 150 50 150 250 462 460 END FILL
END ARRAY
READ BOUNDS ALL=MIR END BOUNDS
READ START NST=0 XSM=-17 XSP=17 YSM=-17 YSP=17 ZSM=25 ZSP=475 END BOUNDS
READ PLOT
TTL='X-Y PLOT OF CENTER ELEMENT - FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-5.0 YUL=5.0 ZUL=150.0
XLR=5.0 YLR=-5.0 ZLR=150.0 END
TTL='X-Y PLOT OF BASKET - FUEL ELEVATION'
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-17.0 YUL=17.0 ZUL=50.0
XLR=17.0 YLR=-17.0 ZLR=50.0 END
TTL='X-Y PLOT OF BASKET - FUEL ELEVATION - MIDDLE BASKET'
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-17.0 YUL=17.0 ZUL=150.0
XLR=17.0 YLR=-17.0 ZLR=150.0 END
TTL='X-Y PLOT OF CASK - FUEL ELEVATION'
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-65.0 YUL=65.0 ZUL=150.0
XLR=65.0 YLR=-65.0 ZLR=150.0 END
TTL='Y-Z (X=0) PLOT OF MIDDLE BASKET - CENTER SECTION'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=155.0
XLR=0.0 YLR=5.0 ZLR=150.0 END
TTL='Y-Z (X=0) PLOT OF MIDDLE BASKET - CENTER FUEL ELEMENT'
VAX=1.0 WDN=-1.0
XUL=0.0 YUL=-5.0 ZUL=180.0
XLR=0.0 YLR=5.0 ZLR=100.0 END
TTL='Y-Z (X=-2) PLOT OF MIDDLE BASKET'
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-15.0 ZUL=180
XLR=-2.0 YLR=15.0 ZLR=100.00 END
TTL='Y-Z (X=-2) PLOT OF CASK - R=17.0'
LPI=5 NAX=1000
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-17.0 ZUL=500.0
XLR=-2.0 YLR=17.0 ZLR=-1.0 END
TTL='Y-Z (X=-2) PLOT OF CASK - R=51.0'
VAX=1.0 WDN=-1.0
XUL=-2.0 YUL=-51.0 ZUL=502.0
XLR=-2.0 YLR=51.0 ZLR=-1.0 END
END PLOT
END DATA
END
```

**6.6.15**      **PWR MOX Fuel Rods**

This section contains truncated sample output files from the evaluation of MOX fuel rods in the NAC-LWT cask. The output files are shown in Figure 6.6.15-1 (MOX Services fuel composition in a hexagonal pitch) and Figure 6.6.15-2 (hexagonal pitch <sup>241</sup>Pu fuel composition). Included as Figure 6.6.15-3 is the MOX Services fuel composition case containing a square pitch rod lattice (3.8 cm pitch).

Figure 6.6.15-1 Hexagonal Pitch MOX Rods – MOX Services Fuel Composition

```
Thread Name & Version = MCHP5_RSICC, 1.30

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lmcnp version 5 ld=06212004 10/25/07 21:05:56
name=MS_Acc_NACCoC_cl.00_g.00_e0.00_d0.01cm_HP_36mm.inp host=amdengl-itt1458
probid = 10/25/07 21:05:56

1- NAC-LWT Cask - MOX Experiments - Accident Transport Conditions
2- C
3- C EXCEL File Version: v2.00
4- C Run Version: v2.00
5- C
6- C Fissile Material Type: MOX Services
7- C Rod Interior Void Moderator Density: 0.9982 g/cc
8- C Canister Interior Moderator Density: 0.9982 g/cc
9- C Canister to Cask Gap Moderator Density: 0.0001 g/cc
10- C Cask Exterior Moderator Density: 0.0001 g/cc
11- C Boundary Condition / Distance: Reflected / 0.01 cm
12- C
13- C Fuel Rod Pitch: 3.6 cm
14- C Fuel Rod Pitch Configuration: Hexagonal
15- C Number of Rods: 16
16- C
17- C Base Fuel Parameters: NACCoC
18- C
19- c Cells - Fuel Rod - NACCoC
20- 1 1 -10.555 -1 u=3 $ Fuel
21- 2 2 -0.9982 -2 +1 u=3 $ Plenum + Fuel to Clad Gap
22- 3 3 -6.56 -3 +2 u=3 $ Clad + End Plugs
23- 4 4 -0.9982 +3 u=3 $ Outside Fuel Rod
24- C 16 Rods - Hexagonal Pitch
25- 10 4 -0.9982 -10
26- *trcl=( 0.9000 -1.5588 0.0000 )
27- lat=2 u=2 fill=-7:6 -5:5 0:0
28- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
29- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
30- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
31- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
32- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
33- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
34- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
35- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
36- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
37- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
38- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
39- c PWR Basket - Cells
40 4 -0.9982 -20 fill=2 u=1 $ Rod Array Container
41 5 -0.0001 +20 -21 u=1 $ Basket Cavity
42 7 -2.7020 -22 +21 u=1 $ Basket Body
43 5 -0.0001 +22 u=1 $ Outside
44- c Cells - LWT Cask Accident Conditions
45- 40 8 -11.344 -43 u=0 $ BotPb
46- 41 5 -0.0001 -42 fill=1 u=0 $ Cavity
47- 42 9 -7.9400 -41 +43 u=0 $ Bottom
48- 43 9 -7.9400 -40 +41 +45 +48 +42 u=0 $ OuterShell
49- 44 9 -7.9400 -44 +47 +42 u=0 $ InnerShellTaper
50- 45 9 -7.9400 -46 +42 u=0 $ InnerShell
51- 46 8 -11.344 -47 +46 u=0 $ Lead
52- 47 8 -11.344 -45 +44 +47 u=0 $ LeadTaper
53- 48 0 -48 +47 u=0 $ LeadGap
54- 49 6 -0.0001 -49 +40 u=0 $ Gap to Reflector
55- 50 0 +49 u=0 $ Boundary
56-
57- c Surfaces - Fuel Rod - NACCoC
58- 1 RCC 0.0000 0.0000 10.5207 0.0000 0.0000 389.8300 0.4781 $ Fuel pellet stack
59- 2 RCC 0.0000 0.0000 6.3990 0.0000 0.0000 409.4227 0.4876 $ Annulus + Plenum
60- 3 RCC 0.0000 0.0000 5.0800 0.0000 0.0000 411.8226 0.5588 $ Clad + End-Caps
61- c Surfaces - Pitch - NACCoC
62- 10 RHP 0.0000 0.0000 -1.0000 0.0000 0.0000 454.12 1.9000 0.0000 0.0000 $ Lattice
63- c PWR Basket - Surfaces
64- 20 1 RFP -7.4148 7.4148 -7.4148 7.4148 0.0000 452.1200 $ Array Container
65- 21 1 PFP -11.2713 11.2713 -11.2713 11.2713 0.0000 452.1200 $ Basket Opening
66- 22 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 452.1200 16.83512 $ Basket Outer Body
67- c Surfaces - LWT Cask Accident Conditions
68- 40 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 507.3650 36.5189 $ Lwt Body
69- 41 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 26.6700 36.5189 $ Bottom
70- 42 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 452.1200 16.9863 $ Cavity
```



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71- 43 RCC 0.0000 0.0000 -17.7800 0.0000 0.0000 7.6200 26.3525 $ Bottom gamma shield
72- 44 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 20.1740 $ Lead id - taper
73- 45 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 31.5976 $ Lead od - taper
74- 46 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 18.9103 $ Lead id
75- 47 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.3271 $ Lead od
76- 48 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.4645 $ Lead gap
77- *49 RPP -36.5289 36.5289 -36.5289 36.5289 -26.6800 480.7050 $ Container
78-
79- c
80- c Materials List
81- c
82- c MOX Material Composition Fuel
83- m1 92235 -5.6994E-03
84- 92238 -8.0851E-01
85- 94238 -3.3724E-05
86- 94239 -6.4076E-02
87- 94240 -3.0352E-03
88- 94241 -2.6980E-04
89- 94242 -3.3724E-05
90- 8016 -1.1835E-01
91- c Rod Interior Void Material
92- m2 1001 2
93- 8016 1
94- mt2 lwtr.01
95- c Clad Material
96- m3 26054 -7.063E-05 24050 -4.179E-05 7014 -4.980E-04
97- 26056 -1.149E-03 24052 -8.370E-04 7015 -1.981E-06
98- 26057 -2.702E-05 24053 -9.673E-05
99- 26058 -3.631E-06 24054 -2.448E-05
100- 40000 -9.823E-01 50000 -1.500E-02
101- c Canister Interior Non-Fuel Space
102- m4 1001 2
103- 8016 1
104- mt4 lwtr.01
105- c Canister to Cask Gap Material
106- m5 1001 2
107- 8016 1
108- mt5 lwtr.01
109- c Cask Exterior Material
110- m6 1001 2
111- 8016 1
112- mt6 lwtr.01
113- c Aluminum
114- m7 13027 -1.000E+00
115- c Water/Glycol
116- m10 1001 -1.03651E-01
warning. material 10 is not used in the problem.
117- 8016 -6.75619E-01
118- 6000 -2.20730E-01
119- mt10 lwtr.01
warning. material 10 is not used in the problem.
120- c Lead
121- m8 82206 -2.534E-01
122- 82207 -2.207E-01
123- 82208 -5.259E-01
124- c SS304
125- m9 24050 -7.939E-03 26054 -3.927E-02 28058 -6.384E-02
126- 24052 -1.590E-01 26056 -6.387E-01 28060 -2.543E-02
127- 24053 -1.838E-02 26057 -1.502E-02 28061 -1.124E-03
128- 24054 -4.652E-03 26058 -2.019E-03 28062 -3.639E-03
129- 28064 -9.623E-04
130- 25055 -2.000E-02
131- c Aluminum Honeycomb Impact Limiter
132- m11 13027 -1.0
warning. material 11 is not used in the problem.
133- c Mode
134- mode n
135- c Cell Importances
136- imp:n 1 18r 0
137- c
138- c Criticality Controls
139- kcode 1000 0.80 30 530
140- c
141- c Starting Source Definition
142- sdef cell=41:20:10:1
143- erg=d1
144- pos=0 0 10.5207
145- rad=d2
146- axs=0 0 1
147- ext=d3
148- sp1 -3
149- si2 0.0000 0.4781
150- sp2 -21 1
151- si3 0.0000 389.8900
152- sp3 0 1
153- c Print Control
154- print
155- c Random Number Generator
156- rand gen=2 seed=19073486328125 stride=152917 hist=1
157- c
158- c Rotation Matrix
159- *TR1 0.0 0.0 0.0 -30 60 90 -120 -30 90 90 90 0 $ z-rotation -30 degrees

```

!source

print table 10

values of defaulted or explicitly defined source variables

```

sur      0.0000E+00
tme      0.0000E+00
dir      isotropic
pos      0.0000E+00  0.0000E+00  1.0521E+01
x        0.0000E+00
y        0.0000E+00
z        0.0000E+00
axs      0.0000E+00  0.0000E+00  1.0000E+00
vec      0.0000E+00  0.0000E+00  0.0000E+00
ccc      0.0000E+00
nrm      1.0000E+00
ara      0.0000E+00
wgt      1.0000E+00
eff      1.0000E-02
par      0.0000E+00
tr       0.0000E+00
    
```

probability distribution 1 for source variable erg  
energy function 3: watt (fission) spectrum (endf law 10)

```

f(e)=c*exp(-e/a)*sinh(sqrt(b*e))
a = 9.6500E-01    b = 2.2900E+00    c = 4.5270E-01
    
```

the mean of source distribution 1 is 1.9806E+00

probability distribution 2 for source variable rad  
power law 21: f(x)=c\*abs(x)\*\*k k = 1.0000E+00

probability distribution 3 for source variable ext  
unbiased histogram distribution

source entry	source value	cumulative probability	probability of bin
1	0.00000E+00	0.000000E+00	0.000000E+00
2	3.89890E+02	1.000000E+00	1.000000E+00

the mean of source distribution 3 is 1.9494E+00

order of sampling source variables.  
cel axs rad ext pes erg tme

comment. total fission nubar data are being used.  
lmaterial composition

print table 40

the sum of the fractions of material 2 was 3.000000E+00  
the sum of the fractions of material 3 was 1.000050E+00  
the sum of the fractions of material 4 was 3.000000E+00  
the sum of the fractions of material 5 was 3.000000E+00  
the sum of the fractions of material 6 was 3.000000E+00  
the sum of the fractions of material 9 was 9.999753E-01

material number

material number	component nuclide, atom fraction				
1	92235, 2.18414E-03	92238, 3.05926E-01	94238, 1.27607E-05	94239, 2.41437E-02	
	94240, 1.13889E-03	94241, 1.00815E-04	94242, 1.25493E-05	8016, 6.66481E-01	
	1001, 6.66667E-01	8016, 3.23333E-01			
3	associated thermal s(a,b) data sets: lwtr.01t				
	26054, 1.19346E-04	24050, 7.62600E-05	7014, 3.24139E-03	26056, 1.87224E-03	
	24052, 1.46874E-03	7015, 1.20369E-05	26057, 4.32542E-05	24053, 1.66532E-04	
	26058, 5.71247E-06	24054, 4.13652E-05	40000, 9.81436E-01	50000, 1.15166E-02	
4	1001, 6.66667E-01	8016, 3.23333E-01			
	associated thermal s(a,b) data sets: lwtr.01t				
	5 1001, 6.66667E-01	9016, 3.33333E-01			
6	associated thermal s(a,b) data sets: lwtr.01t				
	6 1001, 6.66667E-01	8016, 3.23333E-01			
	associated thermal s(a,b) data sets: lwtr.01t				
7	13027, 1.00000E+00				
	8 82206, 1.54963E-01	82207, 1.20987E-01	82208, 5.24050E-01		
	24050, 8.79087E-03	26054, 4.02643E-02	28058, 6.08419E-02	24052, 1.69300E-01	
9	26056, 6.31511E-01	28060, 2.34673E-02	24053, 1.92010E-02	26057, 1.45900E-02	
	28061, 1.02022E-03	24054, 4.76985E-03	26058, 1.92741E-03	28062, 3.24982E-03	
	28064, 8.32505E-04	25055, 2.01337E-02			

lmaterial number

material number	component nuclide, mass fraction				
1	92235, 5.69936E-03	92238, 8.08594E-01	94238, 3.37237E-05	94239, 6.40755E-02	
	94240, 3.03518E-03	94241, 2.69798E-04	94242, 3.37237E-05	8016, 1.18349E-01	
2	1001, 1.11915E-01	8016, 8.88085E-01			
	26054, 7.06265E-05	24050, 4.17879E-05	7014, 4.97975E-04	26056, 1.14894E-03	
	24052, 8.36958E-04	7015, 1.98090E-06	26057, 2.70186E-05	24053, 9.67251E-05	
3	26058, 3.63082E-06	24054, 2.44788E-05	40000, 9.82251E-01	50000, 1.49992E-02	
	1001, 1.11915E-01	8016, 8.88085E-01			
	1001, 1.11915E-01	8016, 8.88085E-01			

print table 40

6	1001, 1.11915E-01	8016, 8.88085E-01			
7	13027, 1.00000E+00				
8	82206, 2.53400E-01	82207, 2.20700E-01	82208, 5.25900E-01		
9	24050, 7.93920E-03	26054, 3.92710E-02	28058, 6.38416E-02	24052, 1.59004E-01	
	26056, 6.38716E-01	28060, 2.54306E-02	24053, 1.83805E-02	26057, 1.50204E-02	
	28061, 1.12403E-03	24054, 4.65211E-03	26058, 2.01905E-03	28062, 3.63909E-03	
	28064, 9.62324E-04	25055, 2.00005E-02			

warning. 6 materials had unnormalized fractions. print table 40.  
1cell volumes and masses

print table 50

cell	atom density	gram density	input volume	calculated volume	mass	pieces	reason volume not calculated
1	1	7.05663E-02	1.05550E+01	0.00000E+00	2.79982E+02	2.95521E+03	1
2	2	1.00128E-01	9.98200E-01	0.00000E+00	2.58267E+01	2.57802E+01	1
3	3	4.33411E-02	6.56000E+00	0.00000E+00	9.81838E+01	6.44086E+02	1
4	4	1.00128E-01	9.98200E-01	0.00000E+00	0.00000E+00	0.00000E+00	0
5	10	1.00128E-01	9.98200E-01	0.00000E+00	5.09690E+03	5.08773E+03	0
6	20	1.00128E-01	9.98200E-01	0.00000E+00	9.94289E+04	9.92499E+04	0
7	21	1.00309E-05	1.00000E-04	0.00000E+00	1.30324E+05	1.30324E+01	0
8	22	6.03063E-02	2.70200E+00	0.00000E+00	0.00000E+00	0.00000E+00	0
9	23	1.00309E-05	1.00000E-04	0.00000E+00	0.00000E+00	0.00000E+00	0
10	40	3.29629E-02	1.13440E+01	0.00000E+00	1.66245E+04	1.88588E+05	1
11	41	1.00309E-05	1.00000E-04	0.00000E+00	4.09828E+05	4.09828E+01	1
12	42	8.64586E-02	7.94000E+00	0.00000E+00	9.51154E+04	7.55216E+05	1
13	43	8.64586E-02	7.94000E+00	0.00000E+00	4.53784E+05	6.0304E+06	1
14	44	8.64586E-02	7.94000E+00	0.00000E+00	1.02842E+04	8.16563E+04	2
15	45	8.64586E-02	7.94000E+00	0.00000E+00	9.04489E+04	7.18165E+05	1
16	46	3.29629E-02	1.13440E+01	0.00000E+00	9.86269E+05	1.11882E+07	1
17	47	3.29629E-02	1.13440E+01	0.00000E+00	5.13461E+04	5.82470E+05	2
18	48	0.00000E+00	0.00000E+00	0.00000E+00	1.20186E+04	0.00000E+00	1
19	49	1.00309E-05	1.00000E-04	0.00000E+00	0.00000E+00	0.00000E+00	0
20	50	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0

warning. 2 cells appear to consist of more than one piece.  
1surface areas

print table 50

surface	input area	calculated area	reason area not calculated
2	1.1	0.00000E+00	1.17123E+03
3	1.2	0.00000E+00	7.18104E-01
4	1.3	0.00000E+00	7.18104E-01
6	2.1	0.00000E+00	1.25434E+03
7	2.2	0.00000E+00	7.46925E-01
8	2.3	0.00000E+00	7.46925E-01
10	3.1	0.00000E+00	1.44593E+03
11	3.2	0.00000E+00	9.80986E-01
12	3.3	0.00000E+00	9.80986E-01
14	10.1	0.00000E+00	0.00000E+00
15	10.2	0.00000E+00	0.00000E+00
16	10.3	0.00000E+00	0.00000E+00
17	10.4	0.00000E+00	0.00000E+00
18	10.5	0.00000E+00	0.00000E+00
19	10.6	0.00000E+00	0.00000E+00
20	10.7	0.00000E+00	1.12237E+01
21	10.8	0.00000E+00	1.12237E+01
23	20.1	0.00000E+00	6.70476E+03
24	20.2	0.00000E+00	6.70476E+03
25	20.3	0.00000E+00	6.70476E+03
26	20.4	0.00000E+00	6.70476E+03
27	20.5	0.00000E+00	0.00000E+00
28	20.6	0.00000E+00	0.00000E+00
30	21.1	0.00000E+00	1.01920E+04
31	21.2	0.00000E+00	1.01920E+04
32	21.3	0.00000E+00	1.01920E+04
33	21.4	0.00000E+00	1.01920E+04
37	22.1	0.00000E+00	4.78244E+04
41	40.1	0.00000E+00	1.16417E+05
42	40.2	0.00000E+00	4.18972E+03
43	40.3	0.00000E+00	4.18972E+03
49	42.1	0.00000E+00	4.82539E+04
53	43.1	0.00000E+00	1.26170E+03
54	43.2	0.00000E+00	2.18169E+03
55	43.3	0.00000E+00	2.18169E+03
57	44.1	0.00000E+00	3.50295E+03
58	44.2	0.00000E+00	2.23013E+03
61	45.1	0.00000E+00	5.48652E+03
65	46.1	0.00000E+00	4.95306E+04
66	46.2	0.00000E+00	2.61173E+03
67	46.3	0.00000E+00	2.61173E+03
69	47.1	0.00000E+00	8.72916E+04
73	48.1	0.00000E+00	8.76515E+04
77	49.1	0.00000E+00	3.70684E+04
78	49.2	0.00000E+00	3.70684E+04
79	49.3	0.00000E+00	3.70684E+04
80	49.4	0.00000E+00	3.70684E+04
81	49.5	0.00000E+00	5.33744E+03
82	49.6	0.00000E+00	5.33744E+03
84	10010.1	0.00000E+00	9.43871E+02
85	10010.2	0.00000E+00	9.43871E+02
86	10010.3	0.00000E+00	9.43871E+02
87	10010.4	0.00000E+00	9.43871E+02
88	10010.5	0.00000E+00	9.43871E+02
89	10010.6	0.00000E+00	9.43871E+02

1cells

print table 60

cell	mat	atom density	gram density	volume	mass	pieces	neutron importance
1	1	7.05663E-02	1.05550E+01	2.79982E+02	2.95521E+03	1	1.0000E+00
2	2	1.00128E-01	9.98200E-01	2.58267E+01	2.57802E+01	1	1.0000E+00
3	3	4.33411E-02	6.56000E+00	9.81939E+01	6.44086E+02	1	1.0000E+00
4	4	1.00128E-01	9.98200E-01	0.00000E+00	0.00000E+00	0	1.0000E+00
5	10	4s 1.00128E-01	9.98200E-01	5.09690E+03	5.09773E+03	0	1.0000E+00
6	20	4s 1.00128E-01	9.98200E-01	9.94289E+04	9.92499E+04	0	1.0000E+00
7	21	5s 1.00309E-05	1.00000E-04	1.30324E+05	1.30324E+01	0	1.0000E+00
8	22	7 6.03053E-02	2.70200E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
9	23	5s 1.00309E-05	1.00000E-04	0.00000E+00	0.00000E+00	0	1.0000E+00
10	40	8 3.29629E-02	1.13440E+01	1.66245E+04	1.88588E+05	1	1.0000E+00
11	41	5s 1.00309E-05	1.00000E-04	4.09828E+05	4.09828E+01	1	1.0000E+00
12	42	9 8.64586E-02	7.94000E+00	9.51154E+04	7.55216E+05	1	1.0000E+00
13	43	9 8.64586E-02	7.94000E+00	4.53784E+05	3.60304E+06	1	1.0000E+00
14	44	9 8.64586E-02	7.94000E+00	1.02842E+04	8.16563E+04	2	1.0000E+00
15	45	9 8.64586E-02	7.94000E+00	9.04489E+04	7.18165E+05	1	1.0000E+00
16	46	8 3.29629E-02	1.13440E+01	9.86269E+05	1.11982E+07	1	1.0000E+00
17	47	8 3.29629E-02	1.13440E+01	5.13461E+04	5.82470E+05	2	1.0000E+00
18	48	0 0.00000E+00	0.00000E+00	1.20186E+04	0.00000E+00	1	1.0000E+00
19	49	6s 1.00309E-05	1.00000E-04	0.00000E+00	0.00000E+00	0	1.0000E+00
20	50	0 0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 2.36097E+06 1.72254E+07  
lsurfaces

print table 70

surface	trans	type	surface coefficients
1	1	rcc	
2	1.1	cz	4.7910000E-01
3	1.2	pz	4.0041070E+02
4	1.3	p	0.0000000E+00 -1.0000000E+00 -1.0520700E+01
5	2	rcc	
6	2.1	cz	4.8760000E-01
7	2.2	pz	4.1582170E+02
8	2.3	p	0.0000000E+00 0.0000000E+00 -1.0000000E+00 -6.3990000E+00
9	3	rcc	
10	3.1	cz	5.5880000E-01
11	3.2	pz	4.1690260E+02
12	3.3	p	0.0000000E+00 0.0000000E+00 -1.0000000E+00 -5.0800000E+00
13	10	rhp	
14	10.1	px	1.8000000E+00
15	10.2	p	-1.0000000E+00 0.0000000E+00 0.0000000E+00 1.8000000E+00
16	10.3	p	5.0000000E-01 8.6602540E-01 0.0000000E+00 1.8000000E+00
17	10.4	p	-5.0000000E-01 -8.6602540E-01 0.0000000E+00 1.8000000E+00
18	10.5	p	-5.0000000E-01 8.6602540E-01 0.0000000E+00 1.8000000E+00
19	10.6	p	5.0000000E-01 -8.6602540E-01 0.0000000E+00 1.8000000E+00
20	10.7	pz	4.5312000E+02
21	10.8	p	0.0000000E+00 0.0000000E+00 -1.0000000E+00 1.0000000E+00
22	20	rpp	
23	20.1	1 p	8.6602540E-01 5.0000000E-01 0.0000000E+00 7.4148000E+00
24	20.2	1 p	-8.6602540E-01 -5.0000000E-01 0.0000000E+00 7.4148000E+00
25	20.3	1 p	-5.0000000E-01 8.6602540E-01 0.0000000E+00 7.4148000E+00
26	20.4	1 p	5.0000000E-01 -8.6602540E-01 0.0000000E+00 7.4148000E+00
27	20.5	1 pz	4.5212000E+02
28	20.6	1 p	0.0000000E+00 0.0000000E+00 -1.0000000E+00 0.0000000E+00
29	21	rpp	
30	21.1	1 p	8.6602540E-01 5.0000000E-01 0.0000000E+00 1.1271300E+01
31	21.2	1 p	-8.6602540E-01 -5.0000000E-01 0.0000000E+00 1.1271300E+01
32	21.3	1 p	-5.0000000E-01 8.6602540E-01 0.0000000E+00 1.1271300E+01
33	21.4	1 p	5.0000000E-01 -8.6602540E-01 0.0000000E+00 1.1271300E+01
36	22	rcc	
37	22.1	cz	1.6835120E+01
40	40	rcc	
41	40.1	cz	3.6518900E+01
42	40.2	pz	4.8069500E+02
43	40.3	p	0.0000000E+00 0.0000000E+00 -1.0000000E+00 2.6670000E+01
44	41	rcc	
48	42	rcc	
49	42.1	cz	1.6986300E+01
52	43	rcc	
53	43.1	cz	2.6352500E+01
54	43.2	pz	-1.0160000E+01
55	43.3	p	0.0000000E+00 0.0000000E+00 -1.0000000E+00 1.7780000E+01
56	44	rcc	
57	44.1	cz	2.0174000E+01
58	44.2	pz	4.4450000E+02
60	45	rcc	
61	45.1	cz	3.1597600E+01
64	46	rcc	
65	46.1	cz	1.8910300E+01
66	46.2	pz	4.3068240E+02
67	46.3	p	0.0000000E+00 -1.0000000E+00 -1.3817600E+01
68	47	rcc	
69	47.1	cz	3.3327100E+01
72	48	rcc	
73	48.1	cz	3.3464500E+01
76	49	refl. rpp	
77	49.1	refl. px	3.6528900E+01
78	49.2	refl. p	-1.0000000E+00 0.0000000E+00 0.0000000E+00 3.6528900E+01
79	49.3	refl. py	3.6528900E+01
80	49.4	refl. p	0.0000000E+00 -1.0000000E+00 0.0000000E+00 3.6528900E+01
81	49.5	refl. pz	4.8070500E+02
82	49.6	refl. p	0.0000000E+00 0.0000000E+00 -1.0000000E+00 2.6680000E+01
83	10010	rhp	

84	10010.1	1001	px	2.7000000E+00				
85	10010.2	1001	p	-1.0000000E+00	0.0000000E+00	0.0000000E+00	9.0000000E-01	
86	10010.3	1001	p	5.0000000E-01	8.6602540E-01	0.0000000E+00	9.0003960E-01	
87	10010.4	1001	p	-5.0000000E-01	-8.6602540E-01	0.0000000E+00	2.6999604E+00	
88	10010.5	1001	p	-5.0000000E-01	8.6602540E-01	0.0000000E+00	3.9600581E-05	
89	10010.6	1001	p	5.0000000E-01	-8.6602540E-01	0.0000000E+00	3.5999604E+00	

1 identical surfaces

print table 70

master surface	identical surfaces						
10.7	10010.7						
10.8	10010.8						
20.5	21.5	22.2	42.2				
20.6	21.6	22.3	41.2	42.3	44.3	45.3	
40.1	41.1						
40.3	41.3						
44.2	45.2						
46.2	47.2	48.2					
46.3	47.3	48.3					

surface coefficients for identical surfaces not used.

surface	trans	type	surface coefficients					
90	10010.7	1001	pz	4.5312000E+02				
91	10010.8	1001	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	1.0000000E+00	
34	21.5	1	pz	4.5312000E+02				
38	22.2		pz	4.5212000E+02				
50	42.2		pz	4.5212000E+02				
35	21.6	1	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	0.0000000E+00	
39	22.3		p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	0.0000000E+00	
46	41.2		pz	0.0000000E+00				
51	42.3		p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	0.0000000E+00	
59	44.3		p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	0.0000000E+00	
63	45.3		p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	0.0000000E+00	
45	41.1		cz	3.6518900E+01				
47	41.3		p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	2.6670000E+01	
62	45.2		pz	4.4450000E+02				
70	47.2		pz	4.3068240E+02				
74	48.2		pz	4.3068240E+02				
71	47.3		p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	-1.3817600E+01	
75	48.3		p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	-1.3817600E+01	

1 cell temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

```
*****
* Random Number Generator = 2 *
* Random Number Seed = 19073486328125 *
* Random Number Multiplier = 9219741426499971445 *
* Random Number Adder = 1 *
* Random Number Bits Used = 63 *
* Random Number Stride = 152917 *
*****
```

5 warning messages so far.  
1physical constants

print table 98

name	value	description	
huge	1.0000000000000E+36	infinity	
pie	3.1415926535898E+00	pi	
euler	5.7721566490153E-01	euler constant	
avogad	6.0220434469282E+23	avogadro number (molecules/mole)	
aneut	1.0086649670000E+00	neutron mass (amu)	
avgdn	5.9703109000000E-01	avogadro number/neutron mass (1.e-24*molecules/mole/amu)	
slite	2.9979250000000E+02	speed of light (cm/shake)	
planck	4.1357320000000E-13	planck constant (mev shake)	
fscon	1.3703930000000E+02	inverse fine structure constant h*c/(2*pi*e**2)	
gpt(1)	9.3958000000000E+02	neutron mass (mev)	
gpt(3)	5.1109000000000E-01	electron mass (mev)	

fission q-values:	nuclide	q(mev)	nuclide	q(mev)
	90232	171.91	91233	175.57
	92233	180.84	92234	179.45
	92235	180.88	92236	179.50
	92237	180.40	92238	181.31
	92239	180.40	92240	180.40
	93237	183.67	94238	186.65
	94239	189.44	94240	186.36
	94241	188.99	94242	185.98
	94243	187.46	95241	190.83
	95242	190.54	95243	190.25
	96242	190.49	96244	190.49
	other	180.00		

the following compilation options were used:

```
cheap
dec
plot
mcplot
```

xlib  
default datapath: C:\Program Files\LANL\MCNPDATA  
C:\Progra-1\LANL\MCHPdata  
1cross-section tables print table 100

table	length				
tables from file actia					
1001.62c	5302	1-h-1 at 293.6K from endf-vi.8 njoy99.50	mat 125	12/05/01	
7014.62c	67462	7-n-14 at 293.6K from endf-vi.8 njoy99.50	mat 725	12/05/01	
8016.62c	170541	8-o-16 at 293.6K from endf-vi.8 njoy99.50	mat 825	12/05/01	
13027.62c	75363	13-al-27 at 293.6K from endf-vi.8 njoy99.50	mat1325	12/17/01	
24050.62c	194445	24-cr-50 at 293.6K from endf-vi.8 njoy99.50	mat2425	12/20/01	
24052.62c	174773	24-cr-52 at 293.6K from endf-vi.8 njoy99.50	mat2431	12/20/01	
24053.62c	147286	24-cr-53 at 293.6K from endf-vi.8 njoy99.50	mat2434	12/20/01	
24054.62c	132737	24-cr-54 at 293.6K from endf-vi.8 njoy99.50	mat2437	12/20/01	
25055.62c	134565	25-mn-55 at 293.6K from endf/b-vi.8 njoy99.50	mat2525	02/11/02	
26054.62c	143370	26-fe-54 at 293.6K from endf-vi.8 njoy99.50	mat2625	12/20/01	
26056.62c	230655	26-fe-56 at 293.6K from endf-vi.8 njoy99.50	mat2631	12/20/01	
26057.62c	148842	26-fe-57 at 293.6K from endf-vi.8 njoy99.50	mat2634	12/20/01	
26058.62c	87569	26-fe-58 at 293.6K from endf-vi.8 njoy99.50	mat2637	12/20/01	
28058.62c	235403	28-ni-58 at 293.6K from endf-vi.8 njoy99.50	mat2825	12/20/01	
28060.62c	158305	28-ni-60 at 293.6K from endf-vi.8 njoy99.50	mat2831	12/20/01	
28061.62c	112032	28-ni-61 at 293.6K from endf-vi.8 njoy99.50	mat2834	12/20/01	
28062.62c	104386	28-ni-62 at 293.6K from endf-vi.8 njoy99.50	mat2837	12/20/01	
28064.62c	97689	28-ni-64 at 293.6K from endf-vi.8 njoy99.50	mat2843	12/20/01	

tables from file endf66a					
7015.66c	19013	7-n-15 at 293.6K from endf-vi.0 njoy99.50	mat 728	07/13/01	

tables from file endf66b					
40000.66c	98524	40-cr-0 at 293.6K from endf-vi.1 njoy99.50	mat4000	07/24/01	

tables from file endl92  
50000.42c 141628 ENDL library name: nd920609 LANL/XTM modified: 951222 911219  
temperature = 2.5860E-08 adjusted to 2.5300E-08

tables from file endf66c					
82206.66c	219368	82-pb-206 at 293.6K from endf-vi.6 njoy99.50	mat8231	08/13/01	
82207.66c	134399	82-pb-207 at 293.6K from endf-vi.6 njoy99.50	mat8234	08/13/01	
82208.66c	135105	82-pb-208 at 293.6K from endf-vi.x njoy99.50	mat8237	03/16/02	
94238.66c	53256	94-pu-238 at 293.6K from endf-vi.0 njoy99.50	mat9434	09/06/01	
		probability tables used from 2.0000E-04 to 1.0000E-02 mev.			
94240.66c	309518	94-pu-240 at 293.6K from endf-vi.2 njoy99.50	mat9440	09/06/01	
		probability tables used from 5.7000E-03 to 4.0000E-02 mev.			
94241.66c	126607	94-pu-241 at 293.6K from endf-vi.3 njoy99.50	mat9443	09/06/01	
		probability tables used from 3.0000E-04 to 4.0200E-02 mev.			
94242.66c	107114	94-pu-242 at 293.6K from endf-vi.0 njoy99.50	mat9446	09/06/01	
		probability tables used from 9.8600E-04 to 1.0000E-02 mev.			

tables from file t16_2003					
92235.69c	587997	92-u-235 at 293.6K from t16 u2351a9d njoy99.50	mat9228	07/02/03	
		probability tables used from 2.2500E-03 to 2.5000E-02 mev.			
92238.69c	713320	92-u-238 at 293.6K from t16 u2381a8h njoy99.50	mat9237	07/02/03	
		probability tables used from 1.0000E-02 to 1.4903E-01 mev.			
94239.69c	506320	94-pu-239 at 293.6K from t16 pu2391a7d njoy99.50	mat9437	07/02/03	
		probability tables used from 2.5000E-03 to 3.0000E-02 mev.			

tables from file tmccs					
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin	1001	0	010/22/85
total	5582977				

warning. neutron energy cutoff is below some cross-section tables.

comment. 1 cross sections modified by free gas thermal treatment.  
assignment of s(a,b) data to nuclides. print table 102

mat	nuclide	s(a,b)
2	1001.62c	lwtr.01t
4	1001.62c	lwtr.01t
5	1001.62c	lwtr.01t
6	1001.62c	lwtr.01t

.....  
dump no. 1 on file MS\_Acc\_NACCoC\_c1.00\_g0.00\_e0.00\_d0.01cm\_HP\_36mm.inpr nps = 0 coll = 0  
ctm = 0.00 nrn = 0

6 warning messages so far.  
1estimated keff results by cycle print table 175

cycle	1	k(collission)	0.662630	prompt removal lifetime(abs)	8.1191E+03	source points generated	844
cycle	2	k(collission)	0.622585	prompt removal lifetime(abs)	8.6526E+03	source points generated	928
cycle	3	k(collission)	0.744636	prompt removal lifetime(abs)	8.5012E+03	source points generated	1189
cycle	4	k(collission)	0.686479	prompt removal lifetime(abs)	7.9407E+03	source points generated	916

```

cycle 5 k(collision) 0.671615 prompt removal lifetime(abs) 8.6591E+03 source points generated 972
cycle 6 k(collision) 0.675550 prompt removal lifetime(abs) 8.2834E+03 source points generated 999
cycle 7 k(collision) 0.692864 prompt removal lifetime(abs) 8.1740E+03 source points generated 1052
cycle 8 k(collision) 0.702859 prompt removal lifetime(abs) 8.6663E+03 source points generated 1006

```

```

estimator cycle 526 ave of 496 cycles combination simple average combined average corr
k(collision) 0.741770 0.703646 0.0016 k(col/abs) 0.703392 0.0015 0.703372 0.0015 0.7953
k(absorption) 0.756647 0.703139 0.0016 k(abs/tk ln) 0.703262 0.0016 0.703196 0.0015 0.4218
k(trk length) 0.717143 0.703386 0.0022 k(tk ln/col) 0.703516 0.0017 0.703605 0.0016 0.5823
rem life(col) 8.4284E+03 8.4718E+03 0.0017 k(col/abs/tk ln) 0.703390 0.0015 0.703328 0.0015
rem life(abs) 8.3911E+03 8.4726E+03 0.0016 life(col/abs/tl) 8.4742E+03 0.0015 8.4796E+03 0.0013
source points generated 1046

```

```

estimator cycle 527 ave of 497 cycles combination simple average combined average corr
k(collision) 0.643842 0.703525 0.0016 k(col/abs) 0.703297 0.0015 0.703275 0.0015 0.7960
k(absorption) 0.668059 0.703068 0.0016 k(abs/tk ln) 0.703158 0.0016 0.703110 0.0015 0.4250
k(trk length) 0.634707 0.703247 0.0022 k(tk ln/col) 0.703386 0.0017 0.703482 0.0016 0.5863
rem life(col) 8.2199E+03 8.4713E+03 0.0017 k(col/abs/tk ln) 0.703280 0.0015 0.703227 0.0015
rem life(abs) 8.1559E+03 8.4720E+03 0.0016 life(col/abs/tl) 8.4737E+03 0.0015 8.4793E+03 0.0013
source points generated 869

```

```

estimator cycle 528 ave of 498 cycles combination simple average combined average corr
k(collision) 0.717239 0.703553 0.0016 k(col/abs) 0.703307 0.0015 0.703282 0.0015 0.7956
k(absorption) 0.699228 0.703060 0.0016 k(abs/tk ln) 0.703150 0.0016 0.703102 0.0015 0.4250
k(trk length) 0.699455 0.703240 0.0022 k(tk ln/col) 0.703396 0.0017 0.703504 0.0016 0.5860
rem life(col) 8.7750E+03 8.4719E+03 0.0017 k(col/abs/tk ln) 0.703284 0.0015 0.703229 0.0015
rem life(abs) 8.6892E+03 8.4724E+03 0.0016 life(col/abs/tl) 8.4741E+03 0.0015 8.4795E+03 0.0013
source points generated 1119

```

```

estimator cycle 529 ave of 499 cycles combination simple average combined average corr
k(collision) 0.699031 0.703544 0.0016 k(col/abs) 0.703286 0.0015 0.703261 0.0015 0.7954
k(absorption) 0.686971 0.703028 0.0016 k(abs/tk ln) 0.703156 0.0016 0.703088 0.0015 0.4238
k(trk length) 0.725578 0.703285 0.0022 k(tk ln/col) 0.703414 0.0017 0.703503 0.0016 0.5854
rem life(col) 8.4836E+03 8.4719E+03 0.0017 k(col/abs/tk ln) 0.703286 0.0015 0.703216 0.0015
rem life(abs) 8.6100E+03 8.4727E+03 0.0016 life(col/abs/tl) 8.4744E+03 0.0015 8.4804E+03 0.0013
source points generated 961

```

```

estimator cycle 530 ave of 500 cycles combination simple average combined average corr
k(collision) 0.702529 0.703542 0.0016 k(col/abs) 0.703276 0.0015 0.703251 0.0015 0.7954
k(absorption) 0.694516 0.703011 0.0015 k(abs/tk ln) 0.703094 0.0016 0.703049 0.0015 0.4236
k(trk length) 0.649825 0.703178 0.0022 k(tk ln/col) 0.703360 0.0017 0.703485 0.0016 0.5841
rem life(col) 8.2172E+03 8.4714E+03 0.0017 k(col/abs/tk ln) 0.703244 0.0015 0.703190 0.0015
rem life(abs) 8.3284E+03 8.4724E+03 0.0016 life(col/abs/tl) 8.4741E+03 0.0015 8.4802E+03 0.0013
source points generated 1018

```

```

source distribution written to file MS_Acc_NACCoC_c1.00_g0.00_e0.00_d0.01cm_HP_36mm.inps cycle = 530
problem summary (active cycles only) source particle weight for summary table normalization = 500000.00

```

```

run terminated when 530 kcode cycles were done.
+ NAC-LWT Cask - MOX Experiments - Accident Transport Conditions 10/25/07 21:18:09
probid = 10/25/07 21:05:56
0

```

neutron creation	tracks	weight (per source particle)	energy	neutron loss	tracks	weight (per source particle)	energy
source	500502	1.0000E+00	2.1043E+00	escape	0	0.	0.
				energy cutoff	0	0.	0.
				time cutoff	0	0.	0.
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	1.0592E-01	4.8768E-06	weight cutoff	500977	1.0547E-01	4.3336E-06
e or t importance	0	0.	0.	e or t importance	0	0.	0.
dextran	0	0.	0.	dextran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	2.2571E-07	downscattering	0	0.	2.0393E+00
photoneuclear	0	0.	0.	capture	0	7.5486E-01	3.4580E-02
(n,xn)	949	1.6722E-03	1.5347E-03	loss to (n,xn)	474	8.3532E-04	8.0905E-03
prompt fission	0	0.	0.	loss to fission	0	2.4643E-01	2.3925E-02
delayed fission	0	0.	0.				
total	501451	1.1076E+00	2.1059E+00	total	501451	1.1076E+00	2.1059E+00

number of neutrons banked	501	average time of (shakes)	cutoffs
neutron tracks per source particle	1.0029E+00	escape	tco 1.0000E+33
neutron collisions per source particle	1.5353E+02	capture	eco 0.0000E+00
total neutron collisions	76766227	capture or escape	wc1 -5.0000E-01
net multiplication	1.0008E+00 0.0000	any termination	wc2 -2.5000E-01

```

computer time so far in this run 12.12 minutes maximum number ever in bank 2
computer time in mcrun 11.96 minutes bank overflows to backup file 0
source particles per minute 4.4359E+04
random numbers generated 776053288 most random numbers used was 12401 in history 255214

```

range of sampled source weights = 8.4104E-01 to 1.1848E+00

```

source efficiency = 1.0000 in cell 1
source efficiency = 0.1042 in cell 10
source efficiency = 1.0000 in cell 20

```

source efficiency = 1.0000 in cell 41  
neutron activity in each cell

print table 126

cell	tracks entering	population	collisions	collisions * weight (per history)	number weighted energy	flux weighted energy	average track weight (relative)	average track mfp (cm)
1	1	1255010	500853	588249	9.5138E-01	1.2434E-03	1.1278E+00	2.6471E+00
2	2	1783820	500655	71781	1.0077E-01	4.1502E-04	8.2308E-01	1.8137E+00
3	3	1923591	500862	78833	1.3909E-01	5.6258E-04	8.8063E-01	3.8130E+00
4	4	4728894	500933	23063782	3.3926E+01	1.9840E-04	5.3541E-01	1.3620E+00
5	10	1421751	373841	6076166	8.6070E+00	1.3853E-04	3.5425E-01	7.9418E-01
6	20	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	21	1663380	374111	1888	2.7445E-03	4.9624E-04	4.1450E-01	8.2621E-01
8	22	2075969	374082	2123010	3.6862E+00	5.4141E-04	3.4564E-01	8.1935E-01
9	23	2178870	357717	98	1.4370E-04	5.9979E-04	3.0426E-01	8.1703E-01
10	40	26756	5352	105825	1.4813E-01	3.0621E-03	1.0020E-01	7.1747E-01
11	41	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	42	117397	15536	1374254	1.8224E+00	2.6104E-03	1.0374E-01	7.2074E-01
13	43	3367057	211757	13287925	1.9309E+01	3.4664E-03	1.7878E-01	7.8829E-01
14	44	42780	15974	147895	2.0621E-01	8.2779E-04	1.6867E-01	7.5443E-01
15	45	2192306	356597	5325642	8.0534E+00	9.0372E-04	3.0289E-01	8.1723E-01
16	46	2661735	296813	24149944	3.7756E+01	1.6531E-03	2.2215E-01	8.0496E-01
17	47	88453	20419	366868	5.3434E-01	1.7669E-03	1.3640E-01	7.4778E-01
18	48	3155968	210444	0	0.0000E+00	2.8143E-03	1.8703E-01	7.9827E-01
19	49	1754788	180075	4067	6.0877E-03	3.8995E-03	1.8293E-01	7.8977E-01
total	30448425	4796221	76766227	1.1525E+02				

print table 128 requires 1067 decimal words of dynamically allocated storage.  
neutron weight balance in each cell

print table 130

cell index	1	2	3	4	5	6	7	8	9
cell number	1	2	3	4	10	20	21	22	23
external events:									
entering	1.2681E+00	3.1938E+00	3.4204E+00	7.9797E+00	2.3195E+00	0.0000E+00	2.7616E+00	3.4266E+00	3.5712E+00
source	1.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
energy cutoff	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
time cutoff	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
exiting	-1.8832E+00	-3.1934E+00	-3.4192E+00	-7.8425E+00	-2.2857E+00	0.0000E+00	-2.7616E+00	-3.3873E+00	-3.5712E+00
total	3.8488E-01	3.6018E-04	1.1827E-03	1.3724E-01	3.3874E-02	0.0000E+00	6.3609E-06	3.9247E-02	2.1550E-07
variance reduction events:									
weight window	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
cell importance	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
weight cutoff	2.8229E-05	2.7032E-06	-9.7040E-06	-1.9749E-05	-4.7973E-05	0.0000E+00	-9.9564E-07	5.7430E-05	0.0000E+00
source importance	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
dextran	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
forced collisions	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
exp. transform	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total	2.8229E-05	2.7032E-06	-9.7040E-06	-1.9749E-05	-4.7973E-05	0.0000E+00	-9.9564E-07	5.7430E-05	0.0000E+00
physical events:									
capture	-1.3879E-01	-3.6289E-04	-1.1985E-03	-1.3722E-01	-3.3826E-02	0.0000E+00	-5.3652E-06	-3.9305E-02	-2.1550E-07
(n,xn)	6.2341E-04	0.0000E+00	5.0860E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
loss to (n,xn)	-3.1093E-04	0.0000E+00	-2.5430E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
fission	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
loss to fission	-2.4643E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
photoneuclear	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total	-3.8491E-01	-3.6289E-04	-1.1730E-03	-1.3722E-01	-3.3826E-02	0.0000E+00	-5.3652E-06	-3.9305E-02	-2.1550E-07
total	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
cell index									
cell number	10	11	12	13	14	15	16	17	18
	40	41	42	43	44	45	46	47	48
external events:									
entering	3.8410E-02	0.0000E+00	1.7109E-01	5.3543E+00	6.4450E-02	3.6004E+00	4.2962E+00	1.3246E-01	5.0388E+00
source	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
energy cutoff	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
time cutoff	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
exiting	-3.8338E-02	0.0000E+00	-1.5873E-01	-5.2124E+00	-6.0345E-02	-3.3858E+00	-4.2663E+00	-1.3214E-01	-5.0388E+00
total	7.1248E-05	0.0000E+00	1.2354E-02	1.4195E-01	4.1045E-03	2.1458E-01	2.5932E-02	3.1701E-04	0.0000E+00
variance reduction events:									
weight window	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
cell importance	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
weight cutoff	5.9575E-07	0.0000E+00	-3.9444E-05	1.7827E-04	8.9663E-06	2.2838E-04	5.6942E-05	7.6461E-06	0.0000E+00
source importance	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
dextran	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
forced collisions	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
exp. transform	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total	5.9575E-07	0.0000E+00	-3.9444E-05	1.7827E-04	8.9663E-06	2.2838E-04	5.6942E-05	7.6461E-06	0.0000E+00
physical events:									
capture	-7.1844E-05	0.0000E+00	-1.2315E-02	-1.4204E-01	-4.1135E-03	-2.1481E-01	-3.0482E-02	-3.2465E-04	0.0000E+00
(n,xn)	0.0000E+00	0.0000E+00	0.0000E+00	6.9717E-06	0.0000E+00	6.6859E-06	9.8428E-04	0.0000E+00	0.0000E+00
loss to (n,xn)	0.0000E+00	0.0000E+00	0.0000E+00	-3.4859E-06	0.0000E+00	-3.3429E-06	-4.9214E-04	0.0000E+00	0.0000E+00



fission	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
loss to fission	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
photonuclear	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total	-7.1844E-05	0.0000E+00	-1.2315E-02	-1.4203E-01	-4.1135E-03	-2.1481E-01	-2.9989E-02	-3.2465E-04	0.0000E+00	0.0000E+00
total	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
cell index	19									
cell number	49	total								
external events:										
entering	2.7677E+00	4.9405E+01								
source	0.0000E+00	1.0000E+00								
energy cutoff	0.0000E+00	0.0000E+00								
time cutoff	0.0000E+00	0.0000E+00								
exiting	-2.7677E+00	-4.9405E+01								
total	9.6082E-07	1.0000E+00								
variance reduction events:										
weight window	0.0000E+00	0.0000E+00								
cell importance	0.0000E+00	0.0000E+00								
weight cutoff	5.0063E-07	4.5179E-04								
source importance	0.0000E+00	0.0000E+00								
dextran	0.0000E+00	0.0000E+00								
forced collisions	0.0000E+00	0.0000E+00								
exp. transform	0.0000E+00	0.0000E+00								
total	5.0063E-07	4.5179E-04								
physical events:										
capture	-1.4614E-06	-7.5486E-01								
(n, xn)	0.0000E+00	1.6722E-03								
loss to (n, xn)	0.0000E+00	-8.3532E-04								
fission	0.0000E+00	0.0000E+00								
loss to fission	0.0000E+00	-2.4643E-01								
photonuclear	0.0000E+00	0.0000E+00								
total	-1.4614E-06	-1.0005E+00								
total	0.0000E+00	0.0000E+00								

neutron activity of each nuclide in each cell, per source particle

print table 140

cell index	cell name	nuclides	atom fraction	total collisions	collisions * weight	wgt. lost to capture	wgt. gain by fission	wgt. gain by (n, xn)	photons produced	photon wt produced	avg photon energy
1	1	92235.69c	2.18E-03	13149	1.8238E-02	2.6523E-03	1.3545E-02	0.0000E+00	0	0.0000E+00	0.0000E+00
		92238.69c	3.06E-01	186994	3.3548E-01	2.5440E-02	5.4986E-03	3.0737E-04	0	0.0000E+00	0.0000E+00
		94238.66c	1.28E-05	67	9.7812E-05	7.8916E-05	4.0561E-06	0.0000E+00	0	0.0000E+00	0.0000E+00
		94239.69c	2.41E-02	247900	3.4650E-01	9.9448E-02	2.2599E-01	5.2057E-06	0	0.0000E+00	0.0000E+00
		94240.66c	1.14E-03	7457	1.1940E-02	1.0232E-02	1.0428E-04	0.0000E+00	0	0.0000E+00	0.0000E+00
		94241.66c	1.01E-04	1305	1.8084E-03	4.2713E-04	1.2840E-03	0.0000E+00	0	0.0000E+00	0.0000E+00
		94242.66c	1.25E-05	36	6.0894E-05	3.7138E-05	1.8504E-06	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	6.66E-01	131341	2.3725E-01	4.7184E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
2	2	1001.62c	6.67E-01	66694	9.2467E-02	3.5248E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	5087	8.3067E-03	1.0409E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
3	3	26054.62c	1.19E-04	4	7.4446E-06	8.2238E-07	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24050.62c	7.63E-05	8	1.1117E-05	5.2938E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		7014.62c	3.24E-03	270	4.2214E-04	2.9134E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26056.62c	1.87E-03	172	2.7365E-04	1.5704E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24052.62c	1.47E-03	60	1.0627E-04	4.4084E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		7015.66c	1.20E-05	1	2.0715E-06	4.3673E-12	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26057.62c	4.33E-05	3	5.7570E-06	2.7967E-09	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24053.62c	1.67E-04	20	3.0965E-05	7.3217E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26058.62c	5.71E-06	1	1.4554E-06	3.1973E-07	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24054.62c	4.14E-05	1	2.0725E-06	6.0645E-10	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		40000.66c	9.81E-01	77568	1.3693E-01	1.0679E-03	0.0000E+00	2.5430E-05	0	0.0000E+00	0.0000E+00
		50000.42c	1.15E-02	725	1.2911E-03	6.7541E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
4	4	1001.62c	6.67E-01	21628102	3.1581E+01	1.3528E-01	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	1435690	2.3453E+00	1.9355E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
5	10	1001.62c	6.67E-01	5707107	8.0275E+00	3.3538E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	369059	5.7955E-01	2.8754E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
6	20	1001.62c	6.67E-01	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
7	21	1001.62c	6.67E-01	1732	2.5018E-03	5.3619E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	156	2.4270E-04	3.2713E-09	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
8	22	13027.62c	1.00E+00	2123010	3.6862E+00	3.9305E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
9	23	1001.62c	6.67E-01	88	1.2864E-04	2.1542E-07	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	19	1.5062E-05	8.2269E-11	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
10	40	82206.66c	2.55E-01	25173	3.4731E-02	2.7307E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		82207.66c	2.21E-01	23283	3.2961E-02	4.1971E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		82208.66c	5.24E-01	57369	8.0440E-02	2.5667E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00

11	41	1001.62c 6.67E-01 8016.62c 3.33E-01	0 0	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0 0	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	
12	42	24050.62c 8.79E-03 26054.62c 4.03E-02 28058.62c 6.09E-02 24052.62c 1.69E-01 26056.62c 6.32E-01 28060.62c 2.35E-02 24053.62c 1.92E-02 26057.62c 1.46E-02 28061.62c 1.02E-03 24054.62c 4.77E-03 26058.62c 1.93E-03 28062.62c 3.25E-03 28064.62c 8.33E-04 25055.62c 2.01E-02	22634 43963 185596 95848 808702 27885 65788 17938 1327 3571 1926 14955 1172 82949	3.5886E-02 7.0549E-02 2.3990E-01 1.4109E-01 1.0013E+00 4.6516E-02 9.9650E-02 2.8672E-04 1.6196E-05 1.2960E-05 3.0589E-03 2.2767E-02 2.0355E-03 1.2342E-01	5.0283E-04 4.1193E-04 1.0944E-03 7.2604E-04 6.0096E-03 2.8672E-04 1.2037E-03 2.1264E-04 1.6196E-05 1.2960E-05 2.7125E-05 1.4098E-04 5.1368E-06 1.6648E-03	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	
13	43	24050.62c 8.79E-03 26054.62c 4.03E-02 28058.62c 6.09E-02 24052.62c 1.69E-01 26056.62c 6.32E-01 28060.62c 2.35E-02 24053.62c 1.92E-02 26057.62c 1.46E-02 28061.62c 1.02E-03 24054.62c 4.77E-03 26058.62c 1.93E-03 28062.62c 3.25E-03 28064.62c 8.33E-04 25055.62c 2.01E-02	224394 457333 1729500 1032660 7735666 284768 635953 187135 13567 37002 19846 144771 12360 772970	3.7208E-01 7.7117E-01 2.4409E+00 1.6563E+00 1.0652E+01 4.9380E-01 1.0153E+00 3.1564E-01 2.0961E-02 6.1565E-02 3.3234E-02 2.3200E-01 2.2167E-02 1.2215E+00	5.8811E-03 4.8990E-03 1.3150E-02 8.0696E-03 7.0255E-02 3.3119E-03 1.4020E-02 2.2517E-03 1.7693E-04 1.1488E-04 2.9139E-04 1.7147E-03 6.2663E-05 1.7836E-02	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	
14	44	24050.62c 8.79E-03 26054.62c 4.03E-02 28058.62c 6.09E-02 24052.62c 1.69E-01 26056.62c 6.32E-01 28060.62c 2.35E-02 24053.62c 1.92E-02 26057.62c 1.46E-02 28061.62c 1.02E-03 24054.62c 4.77E-03 26058.62c 1.93E-03 28062.62c 3.25E-03 28064.62c 8.33E-04 25055.62c 2.01E-02	2257 4235 19754 10363 90447 2541 6508 1792 113 329 182 1520 111 7743	3.6357E-03 6.9394E-03 2.6772E-02 1.5850E-02 1.1985E-01 4.3191E-03 1.0115E-02 2.9469E-03 1.6337E-04 5.3342E-04 2.8460E-04 2.4171E-03 1.9873E-04 1.2184E-02	1.7986E-04 1.3937E-04 3.8375E-04 2.0913E-04 2.1525E-03 8.9712E-05 4.1602E-04 5.7133E-05 2.9738E-06 2.5471E-06 4.0371E-06 5.6784E-05 2.0767E-07 4.1947E-04	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	
15	45	24050.62c 8.79E-03 26054.62c 4.03E-02 28058.62c 6.09E-02 24052.62c 1.69E-01 26056.62c 6.32E-01 28060.62c 2.35E-02 24053.62c 1.92E-02 26057.62c 1.46E-02 28061.62c 1.02E-03 24054.62c 4.77E-03 26058.62c 1.93E-03 28062.62c 3.25E-03 28064.62c 8.33E-04 25055.62c 2.01E-02	81095 163277 685869 396986 3259168 92241 232819 66241 5093 12749 6698 51276 3626 268504	1.3624E-01 2.8221E-01 1.0095E+00 6.5384E-01 4.7321E+00 1.6289E-01 3.7911E-01 1.1455E-01 8.0726E-03 2.1779E-02 1.1451E-02 8.5061E-02 6.6497E-03 4.4997E-01	9.6184E-03 6.7571E-03 2.0192E-02 5.5378E-03 1.1291E-01 4.6046E-03 2.3610E-02 2.6634E-03 1.8482E-04 1.3347E-04 2.0600E-04 3.1530E-03 8.9186E-05 2.1151E-02	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00	
16	46	82206.66c 2.55E-01 82207.66c 2.21E-01 82208.66c 5.24E-01	5804104 5361381 12984459	8.9875E+00 8.4381E+00 2.0331E+01	6.8570E-03 2.2860E-02 7.6484E-04	0.0000E+00 0.0000E+00 0.0000E+00	6.0193E-05 1.4604E-04 2.8591E-04	0 0 0	0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00	
17	47	82206.66c 2.55E-01 82207.66c 2.21E-01 82208.66c 5.24E-01	88291 80596 197981	1.2688E-01 1.1838E-01 2.8908E-01	7.9254E-05 2.3687E-04 8.4289E-06	0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00	0 0 0	0.0000E+00 0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00 0.0000E+00	
19	49	1001.62c 6.67E-01 8016.62c 3.33E-01	3648 419	5.4226E-03 6.6504E-04	1.4610E-06 3.9930E-10	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	0 0	0.0000E+00 0.0000E+00	0.0000E+00 0.0000E+00	
total			76766227	1.1525E+02	7.5486E-01	2.4643E-01	8.3668E-04	0	0.0000E+00	0.0000E+00	
total over all cells by nuclide			total collisions	collisions * weight	wgt. lost to capture	wgt. gain by fission	wgt. gain by (n,xn)	photons produced	photon produced	wgt. produced	avg photon energy
1001.62c			27407371	3.9709E+01	1.6918E-01	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
7014.62c			270	4.2214E-04	2.9134E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
7015.66c			1	2.0715E-06	4.3673E-12	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
8016.62c			1941752	3.1714E+00	2.7053E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
13027.62c			2123010	3.6862E+00	3.9305E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
24050.62c			330388	5.4785E-01	1.6187E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
24052.62c			1535917	2.4672E+00	1.8547E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
24053.62c			941088	1.5042E+00	3.9257E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
24054.62c			53652	9.9400E-02	2.6285E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
25055.62c			1132166	1.8071E+00	4.1071E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
26054.62c			668812	1.1309E+00	1.2208E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
26056.62c			11894155	1.6506E+01	1.9134E-01	0.0000E+00	4.9180E-06	0	0.0000E+00	0.0000E+00	
26057.62c			273109	4.6193E-01	5.1849E-03	0.0000E+00	1.9108E-06	0	0.0000E+00	0.0000E+00	
26058.62c			28653	4.8030E-02	5.2887E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
28058.62c			2620719	3.7171E+00	3.4821E-01	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
28060.62c			407435	7.0753E-01	8.2929E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	
28061.62c			20100	3.1067E-02	3.8093E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	

28062.62c	212522	3.4224E-01	5.0655E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
28064.62c	17269	3.1051E-02	1.5720E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
40000.66c	77568	1.3693E-01	1.0679E-03	0.0000E+00	2.5430E-05	0	0.0000E+00	0.0000E+00
50000.42c	725	1.2911E-03	6.7541E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
82206.66c	5917568	9.1491E+00	6.9637E-03	0.0000E+00	6.0193E-05	0	0.0000E+00	0.0000E+00
82207.66c	5465260	8.5894E+00	2.3138E-02	0.0000E+00	1.4604E-04	0	0.0000E+00	0.0000E+00
82208.66c	13239809	2.0700E+01	7.7584E-04	0.0000E+00	2.8591E-04	0	0.0000E+00	0.0000E+00
92235.69c	13149	1.8238E-02	2.6523E-03	1.3545E-02	0.0000E+00	0	0.0000E+00	0.0000E+00
92238.69c	186994	3.3548E-01	2.5440E-02	5.4986E-03	3.0727E-04	0	0.0000E+00	0.0000E+00
94238.66c	67	9.7812E-05	7.8916E-05	4.0561E-06	0.0000E+00	0	0.0000E+00	0.0000E+00
94239.69c	247900	3.4650E-01	9.9448E-02	2.2599E-01	5.2057E-06	0	0.0000E+00	0.0000E+00
94240.66c	7457	1.1940E-02	1.0232E-02	1.0428E-04	0.0000E+00	0	0.0000E+00	0.0000E+00
94241.66c	1305	1.8084E-03	4.2713E-04	1.2840E-03	0.0000E+00	0	0.0000E+00	0.0000E+00
94242.66c	36	6.0894E-05	3.7138E-05	1.8504E-06	0.0000E+00	0	0.0000E+00	0.0000E+00

kkeff results for: NAC-LWT Cask - MOX Experiments - Accident Transport Conditions  
21:05:56  
probid = 10/25/07

the initial fission neutron source distribution was generated from a general sdef source description.  
the criticality problem was scheduled to skip 30 cycles and run a total of 530 cycles with nominally 1000 neutrons per cycle.  
this problem has run 30 inactive cycles with 29983 neutron histories and 500 active cycles with 500502 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 530485 fission neutron source histories.  
all cells with fissionable material were sampled and had fission neutron source points.

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

the k (collision) cycle values appear normally distributed at the 95 percent confidence level  
the k(absorption) cycle values appear normally distributed at the 95 percent confidence level  
the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

the final estimated combined collision/absorption/track-length keff = 0.70319 with an estimated standard deviation of 0.00102

the estimated 68, 95, & 99 percent keff confidence intervals are 0.70216 to 0.70422, 0.70115 to 0.70523, and 0.70048 to 0.70590

the final combined (col/abs/tl) prompt removal lifetime = 8.4802E-05 seconds with an estimated standard deviation of 1.0633E-07

the average neutron energy causing fission = 9.7087E-02 mev

the energy corresponding to the average neutron lethargy causing fission = 1.2505E-07 mev

the percentages of fissions caused by neutrons in the thermal, intermediate, and fast neutron ranges are:

(<0.625 ev): 91.72% (0.625 ev - 100 kev): 4.76% (>100 kev): 3.52%

the average fission neutrons produced per neutron absorbed (capture + fission) in all cells with fission = 1.8263E+00

the average fission neutrons produced per neutron absorbed (capture + fission) in all the geometry cells = 7.0264E-01

the average number of neutrons produced per fission = 2.855

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

corr	keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence
	collision	0.70354	0.00111	0.70243 to 0.70465	0.70133 to 0.70575	0.70061 to 0.70648
	absorption	0.70301	0.00109	0.70192 to 0.70410	0.70084 to 0.70518	0.70013 to 0.70589
	track length	0.70318	0.00152	0.70165 to 0.70470	0.70064 to 0.70621	0.69915 to 0.70720
	col/absorp	0.70325	0.00104	0.70221 to 0.70430	0.70117 to 0.70533	0.70049 to 0.70601
0.7954	abs/trk len	0.70305	0.00104	0.70201 to 0.70409	0.70098 to 0.70510	0.70031 to 0.70579
0.4238	col/trk len	0.70349	0.00109	0.70239 to 0.70458	0.70130 to 0.70567	0.70059 to 0.70638
0.5841	col/abs/trk len	0.70319	0.00102	0.70216 to 0.70422	0.70115 to 0.70523	0.70048 to 0.70590

if the largest of each keff occurred on the next cycle, the keff results and 68, 95, and 99 percent confidence intervals would be:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence
collision	0.70369	0.00112	0.70257 to 0.70481	0.70146 to 0.70592	0.70073 to 0.70664
absorption	0.70314	0.00110	0.70205 to 0.70424	0.70096 to 0.70532	0.70025 to 0.70604
track length	0.70339	0.00154	0.70186 to 0.70493	0.70034 to 0.70645	0.69934 to 0.70745
col/abs/trk len	0.70334	0.00103	0.70231 to 0.70437	0.70128 to 0.70540	0.70061 to 0.70607

the estimated average prompt removal lifetimes, one standard deviations, and 68, 95, and 99 percent confidence intervals are (sec):

estimator	lifetime	std. dev.	68% confidence	95% confidence	99% confidence	
collision	8.47143E-05	1.42417E-07	8.4572E-05 to 8.4857E-05	8.4431E-05 to 8.4998E-05	8.4338E-05 to 8.5091E-05	
absorption	8.47241E-05	1.37731E-07	8.4586E-05 to 8.4862E-05	8.4450E-05 to 8.4998E-05	8.4360E-05 to 8.5088E-05	
track length	8.47846E-05	1.07925E-07	8.4677E-05 to 8.4893E-05	8.4570E-05 to 8.5000E-05	8.4499E-05 to 8.5070E-05	
col/absorp	8.47240E-05	1.37879E-07	8.4586E-05 to 8.4862E-05	8.4449E-05 to 8.4999E-05	8.4360E-05 to 8.5088E-05	
0.8665	abs/trk len	8.48024E-05	1.06263E-07	8.4696E-05 to 8.4909E-05	8.4591E-05 to 8.5014E-05	8.4522E-05 to 8.5083E-05
0.8746	col/trk len	8.47991E-05	1.06906E-07	8.4692E-05 to 8.4906E-05	8.4586E-05 to 8.5012E-05	8.4517E-05 to 8.5092E-05
0.8399	col/abs/trk len	8.48016E-05	1.06329E-07	8.4695E-05 to 8.4908E-05	8.4590E-05 to 8.5013E-05	8.4521E-05 to 8.5083E-05

absorption estimates of prompt lifetimes (sec):

	escape	capture	fission	removal
fraction	0.00000E+00	7.53886E-01	2.46114E-01	1.00000E+00
lifetime(abs)	0.00000E+00	1.12383E-04	3.44248E-04	8.47241E-05
lifetime(c/a/t)	0.00000E+00	1.12486E-04	3.44563E-04	8.48016E-05

laverage keff results summed over 10 cycles each to form 50 batch values of keff print table 178

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl k(c/a/t) st	
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev		k(track)
1	31	40	0.69464	0.70858	0.69703						
2	41	50	0.69991	0.69995	0.71175	0.69728	0.00264	0.70427	0.00431	0.70439	0.00736
3	51	60	0.69908	0.70175	0.71143	0.69788	0.00164	0.70343	0.00263	0.70674	0.00485
4	61	70	0.70512	0.70586	0.70015	0.69969	0.00215	0.70404	0.00195	0.70509	0.00391
0.00052											0.70399
5	71	80	0.70990	0.71146	0.70550	0.70173	0.00263	0.70552	0.00212	0.70517	0.00295
0.00173											0.70603
6	81	90	0.70562	0.70888	0.70384	0.70238	0.00225	0.70608	0.00182	0.70495	0.00242
0.00132											0.70627
7	91	100	0.69488	0.69474	0.70383	0.70131	0.00218	0.70446	0.00223	0.70479	0.00205
0.00189											0.70515
8	101	110	0.70672	0.69958	0.71642	0.70198	0.00201	0.70385	0.00203	0.70624	0.00229
0.00159											0.70565
9	111	120	0.70039	0.70157	0.69025	0.70181	0.00178	0.70360	0.00181	0.70447	0.00269
0.00169											0.70369
10	121	130	0.70465	0.70223	0.69620	0.70209	0.00162	0.70346	0.00162	0.70364	0.00255
0.00141											0.70323
11	131	140	0.70238	0.70619	0.69735	0.70212	0.00146	0.70371	0.00149	0.70307	0.00237
0.00127											0.70321
12	141	150	0.70607	0.70232	0.71159	0.70245	0.00137	0.70359	0.00136	0.70378	0.00228
0.00115											0.70344
13	151	160	0.70037	0.70040	0.70984	0.70229	0.00127	0.70335	0.00128	0.70424	0.00215
0.00107											0.70340
14	161	170	0.72037	0.71651	0.71747	0.70358	0.00175	0.70429	0.00151	0.70519	0.00220
0.00143											0.70471
15	171	180	0.69433	0.69238	0.70387	0.70296	0.00174	0.70349	0.00162	0.70510	0.00205
0.00148											0.70426
16	181	190	0.70269	0.70088	0.69643	0.70295	0.00163	0.70333	0.00152	0.70456	0.00199
0.00139											0.70381
17	191	200	0.70976	0.70864	0.70773	0.70335	0.00158	0.70364	0.00146	0.70475	0.00188
0.00132											0.70410
18	201	210	0.70393	0.71074	0.69819	0.70338	0.00149	0.70404	0.00143	0.70438	0.00181
0.00125											0.70423
19	211	220	0.70859	0.70134	0.70737	0.70365	0.00144	0.70389	0.00136	0.70454	0.00172
0.00117											0.70417
20	221	230	0.69003	0.68734	0.68572	0.70297	0.00152	0.70306	0.00154	0.70360	0.00188
0.00143											0.70321
21	231	240	0.69404	0.69697	0.70617	0.70255	0.00151	0.70277	0.00149	0.70372	0.00180
0.00138											0.70307
22	241	250	0.70290	0.70303	0.70274	0.70256	0.00144	0.70278	0.00142	0.70368	0.00171
0.00131											0.70307
23	251	260	0.69744	0.70080	0.69572	0.70234	0.00139	0.70270	0.00136	0.70333	0.00167
0.00127											0.70288
24	261	270	0.68944	0.68842	0.69940	0.70180	0.00144	0.70210	0.00143	0.70317	0.00161
0.00130											0.70253
25	271	280	0.71173	0.70875	0.69470	0.70220	0.00144	0.70237	0.00140	0.70293	0.00158
0.00123											0.70256
26	281	290	0.69046	0.69795	0.68252	0.70175	0.00145	0.70220	0.00136	0.70205	0.00171
0.00125											0.70218

0.00121	27	291	300	0.69890	0.70547	0.69782	0.70164	0.00140	0.70232	0.00131	0.70189	0.00165	0.70221
0.00131	28	301	310	0.72067	0.71493	0.72845	0.70232	0.00151	0.70277	0.00134	0.70284	0.00185	0.70287
0.00130	29	311	320	0.71248	0.71290	0.70837	0.70267	0.00150	0.70312	0.00134	0.70303	0.00180	0.70318
0.00126	30	321	330	0.70550	0.71034	0.68928	0.70277	0.00145	0.70336	0.00130	0.70257	0.00180	0.70322
---													
0.00124	31	331	340	0.70673	0.70583	0.72029	0.70290	0.00141	0.70344	0.00128	0.70314	0.00183	0.70344
0.00119	32	341	350	0.71397	0.70181	0.72231	0.70324	0.00141	0.70339	0.00124	0.70374	0.00187	0.70350
0.00119	33	351	360	0.69317	0.69015	0.70837	0.70294	0.00140	0.70299	0.00126	0.70388	0.00182	0.70330
0.00116	34	361	370	0.70051	0.70177	0.69207	0.70287	0.00136	0.70295	0.00123	0.70353	0.00180	0.70316
0.00112	35	371	380	0.72093	0.70273	0.70370	0.70338	0.00142	0.70295	0.00119	0.70354	0.00174	0.70307
0.00114	36	381	390	0.70896	0.71222	0.71827	0.70354	0.00139	0.70320	0.00119	0.70395	0.00174	0.70338
0.00113	37	391	400	0.70283	0.69897	0.68309	0.70352	0.00135	0.70309	0.00116	0.70339	0.00179	0.70316
0.00114	38	401	410	0.71038	0.71680	0.71233	0.70370	0.00132	0.70345	0.00118	0.70362	0.00176	0.70351
0.00112	39	411	420	0.70453	0.69894	0.71991	0.70372	0.00129	0.70333	0.00116	0.70404	0.00176	0.70351
0.00111	40	421	430	0.71224	0.71442	0.70680	0.70393	0.00128	0.70361	0.00116	0.70411	0.00172	0.70375
---													
0.00109	41	431	440	0.71180	0.70908	0.70762	0.70412	0.00126	0.70374	0.00114	0.70419	0.00168	0.70388
0.00107	42	441	450	0.69886	0.70084	0.70113	0.70400	0.00123	0.70368	0.00112	0.70410	0.00164	0.70380
0.00106	43	451	460	0.70033	0.69292	0.70745	0.70391	0.00121	0.70343	0.00112	0.70420	0.00160	0.70366
0.00103	44	461	470	0.70894	0.70544	0.69422	0.70403	0.00119	0.70347	0.00109	0.70397	0.00158	0.70365
0.00101	45	471	480	0.70260	0.70505	0.69236	0.70400	0.00116	0.70351	0.00107	0.70371	0.00157	0.70361
0.00099	46	481	490	0.69987	0.69934	0.69771	0.70391	0.00114	0.70342	0.00105	0.70358	0.00154	0.70351
0.00097	47	491	500	0.70292	0.70173	0.71993	0.70389	0.00111	0.70338	0.00103	0.70393	0.00154	0.70356
0.00099	48	501	510	0.69558	0.69375	0.68100	0.70371	0.00110	0.70318	0.00103	0.70345	0.00159	0.70332
0.00097	49	511	520	0.69737	0.69503	0.71016	0.70358	0.00109	0.70301	0.00102	0.70359	0.00156	0.70322
0.00096	50	521	530	0.70154	0.70293	0.68301	0.70354	0.00107	0.70301	0.00100	0.70318	0.00158	0.70313

average keff results summed over 20 cycles each to form 25 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t) st
1	31	50	0.69728	0.70427	0.70439	0.69969	0.00241	0.70404	0.00023	0.70509	0.00070	
2	51	70	0.70210	0.70381	0.70579	0.70238	0.00303	0.70608	0.00205	0.70495	0.00043	
3	71	90	0.70776	0.71017	0.70467	0.70198	0.00218	0.70385	0.00266	0.70624	0.00133	0.70631
4	91	110	0.70080	0.69716	0.71013	0.70209	0.00163	0.70346	0.00210	0.70364	0.00280	0.70281
5	111	130	0.70252	0.70190	0.69323	0.70245	0.00143	0.70359	0.00172	0.70378	0.00229	0.70309
6	131	150	0.70423	0.70425	0.70447	0.70358	0.00165	0.70429	0.00161	0.70519	0.00240	0.70431
7	151	170	0.71037	0.70840	0.71366	0.70295	0.00157	0.70333	0.00169	0.70456	0.00217	0.70344
8	171	190	0.69851	0.69663	0.70015	0.70338	0.00145	0.70404	0.00165	0.70438	0.00192	0.70383
9	191	210	0.70685	0.70969	0.70296	0.70297	0.00136	0.70306	0.00177	0.70360	0.00189	0.70311
10	211	230	0.69931	0.69429	0.69654	0.70256	0.00129	0.70278	0.00162	0.70368	0.00171	0.70287
11	231	250	0.69847	0.70000	0.70446	0.70180	0.00140	0.70210	0.00163	0.70317	0.00164	0.70228
12	251	270	0.69344	0.69461	0.69756	0.70175	0.00129	0.70220	0.00150	0.70205	0.00188	0.70186
13	271	290	0.70110	0.70335	0.68861	0.70232	0.00133	0.70277	0.00150	0.70284	0.00191	0.70245
14	291	310	0.70978	0.71020	0.71314	0.70277	0.00131	0.70330	0.00152	0.70257	0.00180	0.70275
15	311	330	0.70900	0.71162	0.69883	0.70324	0.00132	0.70339	0.00142	0.70374	0.00205	0.70337
16	331	350	0.71035	0.70382	0.72130	0.70287	0.00129	0.70295	0.00141	0.70353	0.00194	0.70300
17	351	370	0.69684	0.69596	0.70022	0.70354	0.00139	0.70320	0.00135	0.70395	0.00187	0.70342
18	371	390	0.71494	0.70748	0.71099							

19	391	410	0.70660	0.70788	0.69771	0.70370	0.00133	0.70345	0.00130	0.70362	0.00180	0.70352
0.00126												
20	411	430	0.70839	0.70668	0.71336	0.70393	0.00128	0.70361	0.00124	0.70411	0.00178	0.70376
0.00122												
-----												
21	431	450	0.70533	0.70496	0.70437	0.70400	0.00122	0.70368	0.00118	0.70412	0.00169	0.70381
0.00116												
22	451	470	0.70464	0.69918	0.70084	0.70403	0.00116	0.70347	0.00115	0.70397	0.00162	0.70369
0.00112												
23	471	490	0.70124	0.70219	0.69504	0.70391	0.00112	0.70342	0.00110	0.70358	0.00159	0.70355
0.00108												
24	491	510	0.69925	0.69774	0.70046	0.70371	0.00109	0.70318	0.00108	0.70345	0.00153	0.70335
0.00106												
25	511	530	0.69946	0.69898	0.69658	0.70354	0.00106	0.70301	0.00105	0.70318	0.00150	0.70317
0.00103												

average keff results summed over 25 cycles each to form 20 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t) st
1	31	55	0.69657	0.70340	0.70573							
2	56	80	0.70689	0.70764	0.70461	0.70173	0.00516	0.70552	0.00212	0.70517	0.00056	
3	81	105	0.70330	0.70294	0.70696	0.70225	0.00303	0.70466	0.00150	0.70577	0.00068	
4	106	130	0.70161	0.69985	0.69725	0.70209	0.00215	0.70346	0.00160	0.70364	0.00218	0.70307
0.00279												
5	131	155	0.70351	0.70440	0.70454	0.70238	0.00169	0.70365	0.00125	0.70382	0.00170	0.70330
0.00181												
6	156	180	0.70590	0.70272	0.71151	0.70296	0.00150	0.70349	0.00104	0.70510	0.00189	0.70355
0.00140												
7	181	205	0.70925	0.70930	0.70200	0.70386	0.00155	0.70432	0.00121	0.70466	0.00166	0.70439
0.00124												
8	206	230	0.69675	0.69424	0.69617	0.70297	0.00161	0.70306	0.00164	0.70360	0.00178	0.70322
0.00165												
9	231	255	0.69816	0.69762	0.70089	0.70244	0.00152	0.70246	0.00157	0.70330	0.00160	0.70281
0.00153												
10	256	280	0.70007	0.70157	0.69860	0.70220	0.00138	0.70237	0.00140	0.70283	0.00151	0.70247
0.00138												
-----												
11	281	305	0.69993	0.70605	0.69500	0.70199	0.00126	0.70270	0.00131	0.70212	0.00154	0.70230
0.00127												
12	306	330	0.71128	0.71058	0.70758	0.70277	0.00139	0.70336	0.00137	0.70257	0.00148	0.70296
0.00134												
13	331	355	0.70623	0.70055	0.71508	0.70303	0.00131	0.70314	0.00128	0.70353	0.00166	0.70325
0.00123												
14	356	380	0.70789	0.70037	0.70362	0.70338	0.00126	0.70295	0.00120	0.70354	0.00154	0.70318
0.00113												
15	381	405	0.70582	0.70761	0.70172	0.70354	0.00118	0.70326	0.00116	0.70342	0.00144	0.70335
0.00106												
16	406	430	0.70975	0.70893	0.71445	0.70393	0.00117	0.70361	0.00114	0.70411	0.00151	0.70379
0.00110												
17	431	455	0.70796	0.70519	0.71145	0.70416	0.00112	0.70370	0.00107	0.70454	0.00149	0.70397
0.00106												
18	456	480	0.70116	0.70015	0.68966	0.70400	0.00107	0.70351	0.00103	0.70371	0.00163	0.70369
0.00104												
19	481	505	0.70176	0.70044	0.70559	0.70388	0.00102	0.70334	0.00099	0.70381	0.00154	0.70357
0.00099												
20	506	530	0.69715	0.69667	0.69113	0.70354	0.00103	0.70301	0.00100	0.70318	0.00159	0.70324
0.00101												

average keff results summed over 50 cycles each to form 10 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t) st
1	31	80	0.70173	0.70552	0.70517							
2	81	130	0.70245	0.70140	0.70211	0.70209	0.00036	0.70346	0.00206	0.70264	0.00153	
3	131	180	0.70471	0.70356	0.70803	0.70296	0.00090	0.70349	0.00119	0.70510	0.00171	
4	181	230	0.70300	0.70177	0.69909	0.70297	0.00063	0.70306	0.00095	0.70360	0.00193	0.70267
0.00055												
5	231	280	0.69911	0.69960	0.69975	0.70220	0.00092	0.70237	0.00101	0.70283	0.00168	0.70213
0.00111												
6	281	330	0.70561	0.70832	0.70129	0.70277	0.00094	0.70336	0.00129	0.70257	0.00140	0.70271
0.00120												
7	331	380	0.70706	0.70046	0.70925	0.70338	0.00100	0.70295	0.00117	0.70354	0.00153	0.70322
0.00106												
8	381	430	0.70779	0.70827	0.70808	0.70393	0.00103	0.70361	0.00121	0.70411	0.00144	0.70384
0.00113												
9	431	480	0.70451	0.70267	0.70056	0.70400	0.00091	0.70351	0.00107	0.70371	0.00133	0.70380
0.00099												
10	481	530	0.69946	0.69855	0.69836	0.70354	0.00093	0.70301	0.00108	0.70318	0.00130	0.70336
0.00104												

average keff results summed over 100 cycles each to form 5 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t)
1	31	130	0.70209	0.70346	0.70364							
2	131	230	0.70385	0.70266	0.70356	0.70297	0.00088	0.70306	0.00040	0.70360	0.00004	
3	231	330	0.70236	0.70396	0.70052	0.70277	0.00055	0.70336	0.00038	0.70257	0.00103	
4	331	430	0.70742	0.70436	0.70872	0.70393	0.00123	0.70361	0.00037	0.70411	0.00170	0.70359
0.00063												
5	431	530	0.70198	0.70061	0.69946	0.70354	0.00103	0.70301	0.00066	0.70318	0.00161	0.70330
0.00075												

average keff results summed over 125 cycles each to form 4 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t)
1	31	155	0.70238	0.70365	0.70382							
2	156	280	0.70202	0.70109	0.70183	0.70220	0.00018	0.70237	0.00128	0.70283	0.00099	
3	281	405	0.70623	0.70503	0.70460	0.70354	0.00135	0.70326	0.00115	0.70342	0.00082	
4	406	530	0.70354	0.70227	0.70246	0.70354	0.00095	0.70301	0.00085	0.70318	0.00063	0.70379
0.00031												

average keff results summed over 250 cycles each to form 2 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t)
1	31	280	0.70220	0.70237	0.70283							
2	281	530	0.70488	0.70365	0.70353	0.70354	0.00134	0.70301	0.00064	0.70318	0.00035	

average individual and combined collision/absorption/track-length keff results for 10 different batch sizes

cycles per intervals keff batch confidence	number of batches	average keff estimators and deviations						normality co/ab/trk	average k(c/a/t)		k(c/a/t) confidence	
		k(coll)	st dev	k(abs)	st dev	k(trk)	st dev		k(c/a/t)	st dev	95% confidence	99%
1	500	0.7035	0.0011	0.7030	0.0011	0.7032	0.0015	195/95/95	0.70319	0.00102	0.70115-0.70523	0.70048-
0.70590												
2	250	0.7035	0.0011	0.7030	0.0010	0.7032	0.0016	195/95/95	0.70319	0.00101	0.70119-0.70520	0.70054-
0.70585												
4	125	0.7035	0.0010	0.7030	0.0010	0.7032	0.0015	199/95/95	0.70316	0.00096	0.70125-0.70507	0.70063-
0.70570												
5	100	0.7035	0.0010	0.7030	0.0010	0.7032	0.0016	195/95/95	0.70315	0.00096	0.70125-0.70506	0.70063-
0.70568												
10	50	0.7035	0.0011	0.7030	0.0010	0.7032	0.0016	195/95/95	0.70313	0.00096	0.70121-0.70506	0.70067-
0.70570												
20	25	0.7035	0.0011	0.7030	0.0010	0.7032	0.0015	195/95/95	0.70317	0.00103	0.70102-0.70531	0.70025-
0.70608												
25	20	0.7035	0.0010	0.7030	0.0010	0.7032	0.0016	195/95/95	0.70324	0.00101	0.70110-0.70537	0.70031-
0.70616												
50	10	0.7035	0.0009	0.7030	0.0011	0.7032	0.0013	195/95/95	0.70336	0.00104	0.70091-0.70581	0.69973-
0.70699												
100	5	0.7035	0.0010	0.7030	0.0007	0.7032	0.0016	195/95/95	0.70330	0.00075	0.70010-0.70651	0.69591-
0.71070												
125	4	0.7035	0.0010	0.7030	0.0009	0.7032	0.0006	195/95/95	0.70379	0.00031	0.69969-0.70769	0.68426-
0.72332												

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle			average keff estimators and deviations				average k(c/a/t)			
		k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t)	st dev
1	1000	0.66263	0.67157	0.66002								
2	844	0.62259	0.63335	0.60633								
3	928	0.74464	0.73878	0.73698								
4	1189	0.68648	0.69320	0.71005								
5	916	0.67162	0.67449	0.66605								
6	972	0.67555	0.69125	0.65326								
7	999	0.69386	0.68906	0.66118								
8	1052	0.70286	0.67585	0.73216								
9	1006	0.69990	0.70969	0.76966								
10	1024	0.69455	0.70359	0.71872								
11	992	0.71945	0.72461	0.77486								
12	1044	0.74157	0.74571	0.71944								
13	1026	0.71667	0.70198	0.67162								
14	971	0.68381	0.69304	0.65735								
15	972	0.67127	0.68589	0.70914								
16	980	0.70348	0.68749	0.72402								
17	1075	0.67107	0.68658	0.63445								
18	942	0.69601	0.70231	0.71773								
19	1027	0.70549	0.71679	0.64485								
20	1045	0.77572	0.74148	0.75166								
21	1103	0.69297	0.68583	0.72338								
22	898	0.67206	0.66187	0.67595								

23	949		0.71079	0.69071	0.73845								
24	1052		0.68395	0.66337	0.74105								
25	970		0.68790	0.69966	0.67099								
26	1010		0.70955	0.69614	0.70095								
27	1009		0.67223	0.64488	0.68232								
28	973		0.73330	0.74610	0.69315								
29	1080		0.69622	0.71162	0.68492								
30	935		0.73041	0.69416	0.74775								
----- begin active keff cycles -----													
31	1047		0.71428	0.73079	0.71371								
32	971		0.69249	0.71990	0.70235		0.70338	0.01089	0.72534	0.00544	0.70803	0.00568	
33	981		0.69778	0.70563	0.66827		0.70151	0.00656	0.71877	0.00728	0.69478	0.01365	
34	994		0.68924	0.69195	0.69822		0.69845	0.00556	0.71207	0.00846	0.69564	0.00969	
8655											0.69375	0.01721	
35	994		0.68162	0.70872	0.64083		0.69508	0.00547	0.71140	0.00658	0.68468	0.01329	
10969											0.69941	0.01388	
36	977		0.71544	0.70426	0.72827		0.69847	0.00561	0.71021	0.00551	0.69194	0.01306	
33097											0.70431	0.00742	
37	1037		0.73287	0.74246	0.72458		0.70339	0.00683	0.71481	0.00655	0.69660	0.01198	
16163											0.70980	0.01000	
38	1015		0.69058	0.70612	0.77117		0.70179	0.00612	0.71373	0.00577	0.70593	0.01395	
16573											0.70945	0.00924	
39	956		0.66418	0.66719	0.62670		0.69761	0.00683	0.70856	0.00726	0.69712	0.01513	
10967											0.70110	0.01044	
40	956		0.66792	0.70877	0.69622		0.69464	0.00679	0.70858	0.00649	0.69703	0.01353	
11412											0.70301	0.00977	
-----													
-----													
-----													
511	928		0.75910	0.74259	0.75416		0.70383	0.00113	0.70326	0.00111	0.70356	0.00154	
20679											0.70348	0.00104	
512	1183		0.67984	0.69205	0.72746		0.70378	0.00113	0.70324	0.00111	0.70361	0.00154	
20711											0.70346	0.00104	
513	882		0.68107	0.68076	0.70320		0.70373	0.00113	0.70319	0.00111	0.70361	0.00153	
20724											0.70342	0.00104	
514	1007		0.69072	0.68108	0.70462		0.70370	0.00112	0.70315	0.00111	0.70361	0.00153	
20741											0.70339	0.00104	
515	1027		0.64762	0.66328	0.62331		0.70359	0.00113	0.70306	0.00111	0.70344	0.00154	
20556											0.70328	0.00104	
516	932		0.68972	0.68472	0.71744		0.70356	0.00113	0.70303	0.00111	0.70347	0.00153	
20586											0.70326	0.00104	
517	1052		0.74062	0.71731	0.75135		0.70364	0.00113	0.70305	0.00111	0.70357	0.00153	
20573											0.70331	0.00104	
518	1053		0.70672	0.69771	0.68843		0.70364	0.00112	0.70304	0.00110	0.70354	0.00153	
20612											0.70330	0.00104	
519	938		0.67005	0.67215	0.67557		0.70357	0.00112	0.70298	0.00110	0.70348	0.00153	
20571											0.70323	0.00104	
520	937		0.70825	0.71869	0.75603		0.70358	0.00112	0.70301	0.00110	0.70359	0.00153	
20596											0.70327	0.00104	
-----													
521	1058		0.71063	0.71456	0.63479		0.70360	0.00112	0.70304	0.00110	0.70345	0.00153	
20634											0.70327	0.00103	
522	1009		0.68556	0.69318	0.65900		0.70356	0.00112	0.70302	0.00110	0.70336	0.00153	
20648											0.70323	0.00103	
523	969		0.67896	0.70949	0.66781		0.70351	0.00112	0.70303	0.00110	0.70329	0.00153	
20690											0.70321	0.00103	
524	978		0.72088	0.70570	0.70327		0.70355	0.00111	0.70303	0.00109	0.70329	0.00153	
20730											0.70322	0.00103	
525	1035		0.71400	0.70193	0.73850		0.70357	0.00111	0.70303	0.00109	0.70336	0.00153	
20767											0.70324	0.00103	
526	1006		0.74177	0.75665	0.71714		0.70365	0.00111	0.70314	0.00110	0.70339	0.00152	
20676											0.70333	0.00103	
527	1046		0.64384	0.66806	0.63471		0.70353	0.00112	0.70307	0.00110	0.70325	0.00153	
20527											0.70323	0.00103	
528	869		0.71724	0.69923	0.69946		0.70355	0.00112	0.70306	0.00109	0.70324	0.00152	
20572											0.70323	0.00103	
529	1119		0.69903	0.68697	0.72558		0.70354	0.00111	0.70303	0.00109	0.70328	0.00152	
20601											0.70322	0.00103	
530	961		0.70253	0.69452	0.64982		0.70354	0.00111	0.70301	0.00109	0.70318	0.00152	
20625											0.70319	0.00102	

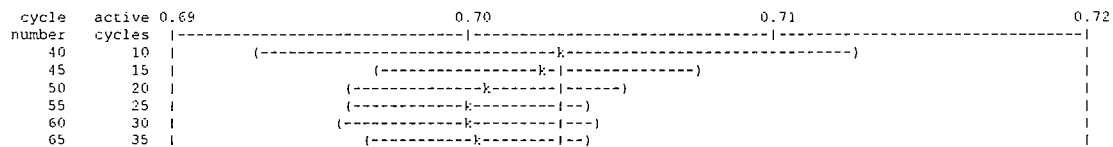
the largest active cycle keffs by estimator are:

the smallest active cycle keffs by estimator

collision 0.77667 on cycle 250  
absorption 0.76931 on cycle 201  
track length 0.81127 on cycle 331

collision 0.63361 on cycle 397  
absorption 0.63388 on cycle 510  
track length 0.60593 on cycle 445

!plot of the estimated col/abs/track-length keff one standard deviation interval versus cycle number (I = final keff = 0.70319)





70	40		(-----k--- -----)	
75	45		{----- k-----}	
80	50		{----- k-----}	
85	55	+	{----- k-----}	
90	60		{----- k-----}	
95	65		{-----k-----}	
100	70		{-----k -----}	
105	75		{----- k-----}	
110	80		{-----k -----}	
115	85		{-----k -----}	
120	90		{-----k -----}	
125	95		{-----k -----}	
130	100		{-----k -----}	
135	105	+	{-----k -----}	
140	110		{-----k -----}	
145	115		{----- k-----}	
150	120		{-----k-----}	
155	125		{-----k-----}	
160	130		{-----k-----}	
165	135		{----- k-----}	
170	140		{----- k-----}	
175	145		{----- k-----}	
180	150		{----- k-----}	
185	155	+	{-----k-----}	
190	160		{----- k-----}	
195	165		{----- k-----}	
200	170		{----- k-----}	
205	175		{----- k-----}	
210	180		{----- k-----}	
215	185		{----- k-----}	
220	190		{----- k-----}	
225	195		{----- k-----}	
230	200		{-----k-----}	
235	205	+	{-----k -----}	
240	210		{-----k -----}	
245	215		{-----k -----}	
250	220		{-----k -----}	
255	225		{-----k -----}	
260	230		{-----k -----}	
265	235		{-----k -----}	
270	240		{-----k--- ---}	
275	245		{-----k--- ---}	
280	250		{-----k--- ---}	
285	255	+	{-----k--- ---}	
290	260		{-----k--- ---}	
295	265		{-----k--- ---}	
300	270		{-----k--- ---}	
305	275		{-----k--- ---}	
310	280		{-----k -----}	
315	285		{-----k -----}	
320	290		{-----k--- ---	
325	295		{-----k--- ---	
330	300		{-----k--- ---	
335	305	+	{-----k--- ---	
340	310		{-----k--- ---	
345	315		{-----k--- ---	
350	320		{----- k-----}	
355	325		{----- k-----}	
360	330		{----- k-----}	
365	335		{----- k-----}	
370	340		{----- k-----}	
375	345		{----- k-----}	
380	350		{----- k-----}	
385	355	+	{----- k-----}	
390	360		{----- k-----}	
395	365		{----- k-----}	
400	370		{----- k-----}	
405	375		{----- k-----}	
410	380		{----- k-----}	
415	385		{----- k-----}	
420	390		{----- k-----}	
425	395		{----- k-----}	
430	400		{----- k-----}	
435	405	+	{----- k-----}	
440	410		{----- k-----}	
445	415		{----- k-----}	
450	420		{----- k-----}	
455	425		{----- k-----}	
460	430		{----- k-----}	
465	435		{----- k-----}	
470	440		{----- k-----}	
475	445		{----- k-----}	
480	450		{----- k-----}	
485	455	+	{----- k-----}	
490	460		{----- k-----}	
495	465		{----- k-----}	
500	470		{----- k-----}	
505	475		{----- k-----}	
510	480		{----- k-----}	
515	485		{----- k-----}	
520	490		{----- k-----}	
525	495		{----- k-----}	
530	500		{----- k-----}	

Individual and collision/absorption/track-length keffs for different numbers of inactive cycles skipped for fission source settling

skip active intervals	active cycles	active neutrons	average k(col)	keff st dev	estimators k(abs)	and st dev	deviations k(trk)	normality co/ab/tl	average k(c/a/t)	k(c/a/t) st dev	confidence 95%	confidence 99%	
0	520	530485	0.7032	0.0011	0.7026	0.0011	0.7030	0.0015	195/95/95	0.70281	0.00101	0.70081-0.70482	0.70015-
0.70547													
1	529	529485	0.7033	0.0011	0.7026	0.0011	0.7030	0.0015	195/95/95	0.70288	0.00101	0.70088-0.70488	0.70022-
0.70554													
2	528	528641	0.7034	0.0011	0.7028	0.0011	0.7032	0.0015	195/95/95	0.70303	0.00100	0.70104-0.70502	0.70039-
0.70566													
3	527	527713	0.7034	0.0011	0.7027	0.0011	0.7032	0.0015	195/95/95	0.70296	0.00100	0.70097-0.70495	0.70033-
0.70559													
4	526	526524	0.7034	0.0011	0.7027	0.0011	0.7031	0.0015	195/95/95	0.70298	0.00100	0.70099-0.70497	0.70034-
0.70562													
5	525	525608	0.7034	0.0011	0.7028	0.0011	0.7032	0.0015	195/95/95	0.70304	0.00100	0.70105-0.70503	0.70040-
0.70568													
6	524	524636	0.7035	0.0011	0.7028	0.0011	0.7033	0.0015	195/95/95	0.70308	0.00100	0.70109-0.70507	0.70044-
0.70572													
7	523	523637	0.7035	0.0011	0.7028	0.0011	0.7034	0.0015	195/95/95	0.70311	0.00100	0.70112-0.70511	0.70047-
0.70576													
8	522	522585	0.7035	0.0011	0.7029	0.0011	0.7033	0.0015	195/95/95	0.70313	0.00100	0.70113-0.70513	0.70048-
0.70578													
9	521	521579	0.7035	0.0011	0.7029	0.0011	0.7032	0.0015	195/95/95	0.70310	0.00100	0.70110-0.70510	0.70045-
0.70576													
10	520	520555	0.7035	0.0011	0.7029	0.0011	0.7032	0.0015	195/95/95	0.70310	0.00101	0.70110-0.70511	0.70044-
0.70576													
---													
11	519	519563	0.7035	0.0011	0.7028	0.0011	0.7030	0.0015	195/95/95	0.70305	0.00101	0.70104-0.70505	0.70038-
0.70571													
12	518	518519	0.7034	0.0011	0.7027	0.0011	0.7030	0.0015	195/95/95	0.70297	0.00101	0.70097-0.70498	0.70031-
0.70563													
13	517	517493	0.7034	0.0011	0.7027	0.0011	0.7031	0.0015	195/95/95	0.70298	0.00101	0.70097-0.70499	0.70031-
0.70564													
14	516	516522	0.7035	0.0011	0.7028	0.0011	0.7032	0.0015	195/95/95	0.70301	0.00101	0.70100-0.70502	0.70035-
0.70568													
15	515	515550	0.7035	0.0011	0.7028	0.0011	0.7031	0.0015	195/95/95	0.70305	0.00101	0.70104-0.70506	0.70038-
0.70572													
16	514	514570	0.7035	0.0011	0.7028	0.0011	0.7031	0.0015	195/95/95	0.70306	0.00101	0.70104-0.70506	0.70038-
0.70573													
17	513	513495	0.7036	0.0011	0.7028	0.0011	0.7032	0.0015	195/95/95	0.70312	0.00101	0.70110-0.70514	0.70044-
0.70580													
18	512	512553	0.7036	0.0011	0.7028	0.0011	0.7032	0.0015	195/95/95	0.70312	0.00102	0.70110-0.70514	0.70044-
0.70580													
19	511	511526	0.7036	0.0011	0.7028	0.0011	0.7033	0.0015	195/95/95	0.70312	0.00102	0.70109-0.70515	0.70043-
0.70581													
20	510	510481	0.7034	0.0011	0.7027	0.0011	0.7032	0.0015	195/95/95	0.70303	0.00101	0.70101-0.70505	0.70035-
0.70571													
---													
.													
.													
.													
.													
.													
---													
475	55	55110	0.6995	0.0033	0.6991	0.0032	0.6982	0.0046	195/95/95	0.69904	0.00308	0.69285-0.70523	0.69079-
0.70723													
480	50	50070	0.6995	0.0034	0.6986	0.0034	0.6984	0.0049	195/95/95	0.69873	0.00330	0.69209-0.70538	0.68986-
0.70761													
485	45	45025	0.6998	0.0038	0.6990	0.0037	0.6998	0.0053	195/95/95	0.69932	0.00362	0.69201-0.70663	0.68955-
0.70909													
490	40	40100	0.6994	0.0039	0.6984	0.0038	0.6985	0.0056	195/95/95	0.69858	0.00374	0.69100-0.70617	0.68842-
0.70875													
495	35	39999	0.6989	0.0043	0.6970	0.0041	0.6955	0.0062	195/95/95	0.69704	0.00414	0.68861-0.70547	0.68571-
0.70838													
500	30	29990	0.6982	0.0049	0.6972	0.0046	0.6914	0.0068	195/95/95	0.69647	0.00484	0.68655-0.70640	0.68307-
0.70987													
505	25	25031	0.6972	0.0057	0.6967	0.0053	0.6911	0.0079	195/95/95	0.69596	0.00554	0.68436-0.70735	0.68023-
0.71148													
510	20	19989	0.6995	0.0066	0.6990	0.0052	0.6966	0.0092	195/95/95	0.69852	0.00542	0.68707-0.70996	0.68279-
0.71424													
515	15	14962	0.7021	0.0066	0.7013	0.0055	0.6946	0.0104	195/95/95	0.70061	0.00608	0.68736-0.71386	0.68203-
0.71919													
520	10	10050	0.7015	0.0085	0.7029	0.0072	0.6830	0.0122	195/95/95	0.69931	0.00934	0.67722-0.72141	0.66662-
0.73201													
---													
525	5	5001	0.7009	0.0161	0.7011	0.0149	0.6853	0.0182	195/95/95	0.69614	0.02351	0.59496-0.79732	0.46277-
0.92951													
527	3	2949	0.7063	0.0056	0.6936	0.0036	0.6916	0.0222	1				
528	2	2080	0.7008	0.0017	0.6907	0.0038	0.6877	0.0379	1				

the minimum estimated standard deviation for the col/abs/tl keff estimator occurs with 3 inactive cycles and 527 active cycles.

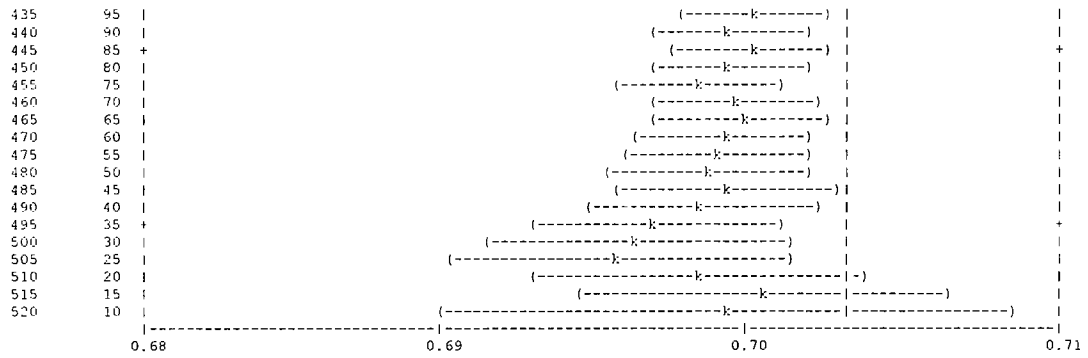
the first active half of the problem skips 30 cycles and uses 250 active cycles; the second half skips 480 and uses 250 cycles. the col/abs/trk-len keff, one standard deviation, and 68, 95, and 99 percent intervals for each active half of the problem are:

problem	keff	standard deviation	68% confidence	95% confidence	99% confidence
first half	0.70239	0.00143	0.70096 to 0.70381	0.69954 to 0.70523	0.69862 to 0.70616

second half 0.70385 0.00147 0.70238 to 0.70532 0.70092 to 0.70678 0.69997 to 0.70773  
final result 0.70319 0.00102 0.70216 to 0.70422 0.70115 to 0.70523 0.70048 to 0.70590

the first and second half values of k(collision/absorption/track length) appear to be the same at the 68 percent confidence level.  
plot of the estimated col/abs/track-length keff one standard deviation interval by active cycle number (1 = final keff = 0.70319)

inactive cycles	active cycles	0.68	0.69	0.70	0.71
0	530			(---k )	
5	525			(--k --)	
10	520			(---k---)	
15	515			(--k --)	
20	510			(---k---)	
25	505			(--k --)	
30	500			(---k---)	
35	495			(--k --)	
40	490			(---k---)	
45	485			(--k --)	
50	480			(---k---)	
55	475			(--k --)	
60	470			(---k---)	
65	465			(--k --)	
70	460			(---k---)	
75	455			(--k --)	
80	450			(---k---)	
85	445			(--k --)	
90	440			(---k---)	
95	435			(--k --)	
100	430			(---k---)	
105	425			(--k --)	
110	420			(---k---)	
115	415			(--k --)	
120	410			(---k---)	
125	405			(--k --)	
130	400			(---k---)	
135	395			(--k --)	
140	390			(---k---)	
145	385			(--k --)	
150	380			(---k---)	
155	375			(--k --)	
160	370			(---k---)	
165	365			(--k --)	
170	360			(---k---)	
175	355			(--k --)	
180	350			(---k---)	
185	345			(--k --)	
190	340			(---k---)	
195	335			(--k --)	
200	330			(---k---)	
205	325			(--k --)	
210	320			(---k---)	
215	315			(--k --)	
220	310			(---k---)	
225	305			(--k --)	
230	300			(---k---)	
235	295			(--k --)	
240	290			(---k---)	
245	285			(--k --)	
250	280			(---k---)	
255	275			(--k --)	
260	270			(---k---)	
265	265			(--k --)	
270	260			(---k---)	
275	255			(--k --)	
280	250			(---k---)	
285	245			(--k --)	
290	240			(---k---)	
295	235			(--k --)	
300	230			(---k---)	
305	225			(--k --)	
310	220			(---k---)	
315	215			(--k --)	
320	210			(---k---)	
325	205			(--k --)	
330	200			(---k---)	
335	195			(--k --)	
340	190			(---k---)	
345	185			(--k --)	
350	180			(---k---)	
355	175			(--k --)	
360	170			(---k---)	
365	165			(--k --)	
370	160			(---k---)	
375	155			(--k --)	
380	150			(---k---)	
385	145			(--k --)	
390	140			(---k---)	
395	135			(--k --)	
400	130			(---k---)	
405	125			(--k --)	
410	120			(---k---)	
415	115			(--k --)	
420	110			(---k---)	
425	105			(--k --)	
430	100			(---k---)	



```

*****
dump no.   2 on file MS_Acc_NACCoC_c1.00_g0.00_e0.00_d0.01cm_HP_36mm.inpr   nps =   530485   coll =   76766227
ctm =     11.96   nrn =   776053288
  
```

6 warning messages so far.

run terminated when 520 kcode cycles were done.

computer time = 12.12 minutes

mcnp version 5 06212004

10/25/07 21:18:09

probid = 10/25/07 21:05:56

Figure 6.6.15-2 Hexagonal Pitch MOX Rods – <sup>241</sup>Pu Fuel Composition

```
Thread Name & Version = MCNP5_RSICC, 1.30

-----
| This program was prepared by the Regents of the University of |
| California at Los Alamos National Laboratory (the University) under |
| contract number W-7405-ENG-36 with the U.S. Department of Energy |
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| liability or responsibility for the use of this software. |
|-----

lmcnp version 5 ld=06212004 10/25/07 23:04:59
name=Pl_Acc_NACCoC_c1.00_g0.00_e0.00_d0.01cm_HP_36mm.inp host=amdeng2-it1459
probid = 10/25/07 23:04:59

1- NAC-LWT Cask - MOX Experiments - Accident Transport Conditions
2- C
3- C EXCEL File Version: v2.00
4- C Run Version: v2.00
5- C
6- C Fissile Material Type: All Pu-241
7- C Rod Interior Void Moderator Density: 0.9982 g/cc
8- C Canister Interior Moderator Density: 0.9982 g/cc
9- C Canister to Cask Gap Moderator Density: 0.0001 g/cc
10- C Cask Exterior Moderator Density: 0.0001 g/cc
11- C Boundary Condition / Distance: Reflected / 0.01 cm
12- C
13- C Fuel Rod Pitch: 3.6 cm
14- C Fuel Rod Pitch Configuration: Hexagonal
15- C Number of Rods: 16
16- C
17- C Base Fuel Parameters: NACCoC
18- C
19- c Cells - Fuel Rod - NACCoC
20- 1 1 -10.554 -1 u=3 $ Fuel
21- 2 2 -0.9982 -2 +1 u=3 $ Plenum + Fuel to Clad Gap
22- 3 3 -6.56 -3 +2 u=3 $ Clad + End Plugs
23- 4 4 -0.9982 +3 u=3 $ Outside Fuel Rod
24- C 16 Rods - Hexagonal Pitch
25- 10 4 -0.9982 -10
26- *trcl=( 0.9000 -1.5588 0.0000 )
27- lat=2 u=2 fill=-7:6 -5:5 0:0
28- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
29- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
30- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
31- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
32- 2 2 2 2 2 2 3 3 3 2 2 2 2 2 2 2
33- 2 2 2 2 2 3 3 3 3 3 2 2 2 2 2 2
34- 2 2 2 2 2 3 3 3 3 3 2 2 2 2 2 2
35- 2 2 2 2 2 3 3 3 3 2 2 2 2 2 2 2
36- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
37- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
38- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
39- C PWR Basket - Cells
40- 4 -0.9982 -20 fill=2 u=1 $ Rod Array Container
41- 5 -0.0001 +20 -21 u=1 $ Basket Cavity
42- 7 -2.7020 -22 +21 u=1 $ Basket Body
43- 5 -0.0001 +22 u=1 $ Outside
44- C Cells - LWT Cask Accident Conditions
45- 8 -11.344 -43 u=0 $ BotEb
46- 15 -0.0001 -42 fill=1 u=0 $ Cavity
47- 9 -7.9400 -41 +43 u=0 $ Bottom
48- 13 -7.9400 -40 +41 +45 +48 +42 u=0 $ OuterShell
49- 14 -7.9400 -44 +47 +42 u=0 $ InnerShellTaper
50- 15 -7.9400 -46 +42 u=0 $ InnerShell
51- 8 -11.344 -47 +46 u=0 $ Lead
52- 8 -11.344 -45 +44 +47 u=0 $ LeadTaper
53- 48 0 -48 +47 u=0 $ LeadGap
54- 6 -0.0001 -49 +40 u=0 $ Gap to Reflector
55- 50 0 +49 u=0 $ Boundary
56-
57- c Surfaces - Fuel Rod - NACCoC
58- 1 RCC 0.0000 0.0000 10.5207 0.0000 0.0000 389.8900 0.4781 $ Fuel pellet stack
59- 2 RCC 0.0000 0.0000 6.3990 0.0000 0.0000 409.4227 0.4876 $ Annulus + Plenum
60- 3 RCC 0.0000 0.0000 5.0800 0.0000 0.0000 411.8226 0.5588 $ Clad + End-Caps
61- c Surfaces - Pitch - NACCoC
62- 10 RHP 0.0000 0.0000 -1.0000 0.0000 0.0000 454.12 1.8000 0.0000 0.0000 $ Lattice
63- C PWR Basket - Surfaces
64- 20 1 RPP -7.4148 7.4148 -7.4148 7.4148 0.0000 452.1200 $ Array Container
65- 21 1 RPP -11.2713 11.2713 -11.2713 11.2713 0.0000 452.1200 $ Basket Opening
66- 2 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 452.1200 16.83512 $ Basket Outer Body
67- C Surfaces - LWT Cask Accident Conditions
68- 40 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 507.3650 36.5189 $ Lwt Body
69- 41 FCC 0.0000 0.0000 -26.6700 0.0000 0.0000 26.6700 36.5189 $ Bottom
```

```

70- 42 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 452.1200 16.9863 $ Cavity
71- 43 RCC 0.0000 0.0000 -17.7800 0.0000 0.0000 7.6200 26.3525 $ Bottom gamma shield
72- 44 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 20.1740 $ Lead id - taper
73- 45 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 31.5976 $ Lead cd - taper
74- 46 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 18.9103 $ Lead id
75- 47 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.3271 $ Lead cd
76- 48 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.4645 $ Lead gap
77- *49 RPP -36.5289 36.5289 -36.5289 36.5289 -26.6800 480.7050 $ Container
78-
79- c
80- c Materials List
81- c
82- C MOX Material Composition Fuel
83- m1 92235 -5.7210E-03
84- 92238 -8.1157E-01
85- 94238 -6.4417E-10
86- 94239 -6.4417E-10
87- 94240 -6.4417E-10
88- 94241 -6.4417E-02
89- 94242 -6.4417E-10
90- 8016 -1.1829E-01
91- C Rod Interior Void Material
92- m2 1001 2
93- 8016 1
94- mt2 lwtr.01
95- c Clad Material
96- m3 26054 -7.063E-05 24050 -4.179E-05 7014 -4.980E-04
97- 26056 -1.149E-03 24052 -8.370E-04 7015 -1.981E-06
98- 26057 -2.702E-05 24053 -9.673E-05
99- 26058 -3.631E-06 24054 -2.448E-05
100- 40000 -9.823E-01 50000 -1.500E-02
101- C Canister Interior Non-Fuel Space
102- m4 1001 2
103- 8016 1
104- mt4 lwtr.01
105- C Canister to Cask Gap Material
106- m5 1001 2
107- 8016 1
108- mt5 lwtr.01
109- C Cask Exterior Material
110- m6 1001 2
111- 8016 1
112- mt6 lwtr.01
113- c Aluminum
114- m7 13027 -1.000E+00
115- C Water/Glycol
116- m10 1001 -1.03651E-01
warning, material 10 is not used in the problem.
117- 8016 -6.75619E-01
118- 6000 -2.20730E-01
119- mt10 lwtr.01
warning, material 10 is not used in the problem.
120- c Lead
121- m8 82206 -2.534E-01
122- 82207 -2.207E-01
123- 82208 -5.259E-01
124- c SS304
125- m9 24050 -7.939E-03 26054 -3.927E-02 26058 -6.384E-02
126- 24052 -1.590E-01 26056 -6.387E-01 28060 -2.543E-02
127- 24053 -1.838E-02 26057 -1.502E-02 28061 -1.124E-03
128- 24054 -4.652E-03 26058 -2.019E-03 28062 -3.639E-03
129- 28064 -9.623E-04
130- 25055 -2.000E-02
131- C Aluminum Honeycomb Impact Limiter
132- m11 13027 -1.0
warning, material 11 is not used in the problem.
133- C Mode
134- mode n
135- C Cell Importances
136- imp:n 1 18r 0
137- C
138- C Criticality Controls
139- kcode 1000 0.80 30 530
140- C
141- C Starting Source Definition
142- sdef cell=41:20:10:1
143- erg=d1
144- pos=0 0 10.5207
145- rad=d2
146- axs=0 0 1
147- ext=d3
148- sp1 -3
149- si2 0.0000 0.4781
150- sp2 -21 1
151- si3 0.0000 389.8900
152- sp3 0 1
153- C Print Control
154- print
155- C Random Number Generator
156- rand gen=2 seed=19075486328125 stride=152917 hist=1
157- c
158- c Rotation Matrix
159- *TR1 0.0 0.0 0.0 -30 60 90 -110 -30 90 90 0 0 $ z-rotation -30 degrees

```

!source

print table 10

values of defaulted or explicitly defined source variables

```

sur      0.0000E+00
tme      0.0000E+00
dir      isotropic
pos      0.0000E+00  0.0000E+00  1.0521E+01
x        0.0000E+00
y        0.0000E+00
z        0.0000E+00
axs      0.0000E+00  0.0000E+00  1.0000E+00
vec      0.0000E+00  0.0000E+00  0.0000E+00
ccc      0.0000E+00
nrm      1.0000E+00
ara      0.0000E+00
wgt      1.0000E+00
eff      1.0000E-02
par      0.0000E+00
tr       0.0000E+00
    
```

probability distribution 1 for source variable erg  
energy function 3: watt (fission) spectrum (endf law 10)

$f(e)=c \cdot \exp(-e/a) \cdot \sinh(\sqrt{b \cdot e})$   
a = 9.6500E-01    b = 2.2900E+00    c = 4.5270E-01

the mean of source distribution 1 is 1.9806E+00

probability distribution 2 for source variable rad  
power law 21:  $f(x)=c \cdot \text{abs}(x)^{-k}$     k = 1.0000E+00

probability distribution 3 for source variable ext  
unbiased histogram distribution

source entry	source value	cumulative probability	probability of bin
1	0.00000E+00	0.000000E+00	0.000000E+00
2	3.89890E+02	1.000000E+00	1.000000E+00

the mean of source distribution 3 is 1.9494E+02

order of sampling source variables.  
cel axs rad ext pos erg tme

comment. total fission nubar data are being used.  
material composition

print table 40

the sum of the fractions of material 2 was 3.000000E+00  
the sum of the fractions of material 3 was 1.000050E+00  
the sum of the fractions of material 4 was 3.000000E+00  
the sum of the fractions of material 5 was 3.000000E+00  
the sum of the fractions of material 6 was 3.000000E+00  
the sum of the fractions of material 9 was 9.999753E-01

material

number	component nuclide, atom fraction
1	92235, 2.19354E-03
	94240, 2.41832E-10
2	1001, 6.66667E-01
	8016, 3.33333E-01
3	26054, 1.19346E-04
	24052, 1.46874E-03
	26058, 5.71247E-06
	1001, 6.66667E-01
4	8016, 3.33333E-01
	8016, 3.33333E-01
5	1001, 6.66667E-01
	8016, 3.33333E-01
6	1001, 6.66667E-01
	8016, 3.33333E-01
7	13027, 1.00000E+00
	82207, 1.20987E-01
8	82206, 2.54963E-01
	24050, 8.79087E-03
9	26056, 6.31511E-01
	28061, 1.02022E-03
10	28064, 8.32505E-04
	25055, 2.01337E-02

print table 40

material

number	component nuclide, mass fraction
1	92235, 5.72101E-03
	94240, 6.44171E-10
2	1001, 1.11915E-01
	8016, 9.88085E-01
3	26054, 7.06265E-05
	24052, 8.36958E-04
4	26058, 3.63082E-06
	1001, 1.11915E-01

5	1001, 1.11915E-01	8016, 8.88085E-01				
6	1001, 1.11915E-01	8016, 8.88085E-01				
7	13027, 1.00000E+00					
8	82206, 2.53400E-01	82207, 2.20700E-01	82208, 5.25900E-01			
9	24050, 7.93920E-03	26054, 3.92710E-02	28058, 6.38416E-02	24052, 1.59004E-01		
	26056, 6.38716E-01	28060, 2.54306E-02	24053, 1.83805E-02	26057, 1.50204E-02		
	38061, 1.12403E-03	24054, 4.65211E-03	26058, 2.01905E-03	28062, 3.63909E-03		
	28064, 9.62324E-04	25055, 2.00005E-02				

warning. 6 materials had unnormalized fractions. print table 40.  
1cell volumes and masses

print table 50

cell	atom density	gram density	input volume	calculated volume	mass	pieces	reason volume not calculated
1	1	7.05243E-02	1.05540E+01	0.00000E+00	2.79982E+02	2.95493E+03	1
2	2	1.00128E-01	9.98200E-01	0.00000E+00	2.58267E+01	2.57802E+01	1
3	3	4.33411E-02	6.56000E+00	0.00000E+00	9.81838E+01	6.44086E+02	1
4	4	1.00128E-01	9.98200E-01	0.00000E+00	0.00000E+00	0.00000E+00	infinite
5	10	1.00128E-01	9.98200E-01	0.00000E+00	5.09690E+03	5.08773E+03	0
6	20	1.00128E-01	9.98200E-01	0.00000E+00	9.94289E+04	9.92499E+04	0
7	21	1.00309E-05	1.00000E-04	0.00000E+00	1.30324E+05	1.30324E+01	0
8	22	6.03063E-02	2.70200E+00	0.00000E+00	0.00000E+00	0.00000E+00	asymmetric
9	23	1.00309E-05	1.00000E-04	0.00000E+00	0.00000E+00	0.00000E+00	infinite
10	40	3.29629E-02	1.13440E+01	0.00000E+00	1.66245E+04	1.88588E+05	1
11	41	1.00309E-05	1.00000E-04	0.00000E+00	4.09828E+05	4.09828E+01	1
12	42	8.64586E-02	7.94000E+00	0.00000E+00	9.51154E+04	7.55216E+05	1
13	43	8.64586E-02	7.94000E+00	0.00000E+00	4.53784E+05	3.60304E+06	1
14	44	8.64586E-02	7.94000E+00	0.00000E+00	1.02842E+04	8.16563E+04	2
15	45	8.64586E-02	7.94000E+00	0.00000E+00	9.04489E+04	7.18165E+05	1
16	46	3.29629E-02	1.13440E+01	0.00000E+00	9.86269E+05	1.11882E+07	1
17	47	3.29629E-02	1.13440E+01	0.00000E+00	5.13461E+04	5.82470E+05	2
18	48	0.00000E+00	0.00000E+00	0.00000E+00	1.20186E+04	0.00000E+00	1
19	49	1.00309E-05	1.00000E-04	0.00000E+00	0.00000E+00	0.00000E+00	asymmetric
20	50	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	infinite

warning. 2 cells appear to consist of more than one piece.  
1surface areas

print table 50

surface	input area	calculated area	reason area not calculated	
2	1.1	0.00000E+00	1.17123E+03	
3	1.2	0.00000E+00	7.18104E-01	
4	1.3	0.00000E+00	7.18104E-01	
6	2.1	0.00000E+00	1.25434E+03	
7	2.2	0.00000E+00	7.46925E-01	
8	2.3	0.00000E+00	7.46925E-01	
10	3.1	0.00000E+00	1.44593E+03	
11	3.2	0.00000E+00	9.80986E-01	
12	3.3	0.00000E+00	9.80986E-01	
14	10.1	0.00000E+00	0.00000E+00	not a boundary
15	10.2	0.00000E+00	0.00000E+00	not a boundary
16	10.3	0.00000E+00	0.00000E+00	not a boundary
17	10.4	0.00000E+00	0.00000E+00	not a boundary
18	10.5	0.00000E+00	0.00000E+00	not a boundary
19	10.6	0.00000E+00	0.00000E+00	not a boundary
20	10.7	0.00000E+00	1.12237E+01	
21	10.8	0.00000E+00	1.12237E+01	
23	20.1	0.00000E+00	6.70476E+03	
24	20.2	0.00000E+00	6.70476E+03	
25	20.3	0.00000E+00	6.70476E+03	
26	20.4	0.00000E+00	6.70476E+03	
27	20.5	0.00000E+00	0.00000E+00	asymmetric
28	20.6	0.00000E+00	0.00000E+00	asymmetric
30	21.1	0.00000E+00	1.01920E+04	
31	21.2	0.00000E+00	1.01920E+04	
32	21.3	0.00000E+00	1.01920E+04	
33	21.4	0.00000E+00	1.01920E+04	
37	22.1	0.00000E+00	4.78244E+04	
41	40.1	0.00000E+00	1.16417E+05	
42	40.2	0.00000E+00	4.18972E+03	
43	40.3	0.00000E+00	4.18972E+03	
49	42.1	0.00000E+00	4.82539E+04	
53	43.1	0.00000E+00	1.26170E+03	
54	43.2	0.00000E+00	2.18169E+03	
55	43.3	0.00000E+00	2.18169E+03	
57	44.1	0.00000E+00	3.50295E+03	
58	44.2	0.00000E+00	2.23013E+03	
61	45.1	0.00000E+00	5.48652E+03	
65	46.1	0.00000E+00	4.95306E+04	
66	46.2	0.00000E+00	2.61173E+03	
67	46.3	0.00000E+00	2.61173E+03	
69	47.1	0.00000E+00	8.72918E+04	
73	48.1	0.00000E+00	8.76515E+04	
77	49.1	0.00000E+00	3.70684E+04	
78	49.2	0.00000E+00	3.70684E+04	
79	49.3	0.00000E+00	3.70684E+04	
80	49.4	0.00000E+00	3.70684E+04	
81	49.5	0.00000E+00	5.33744E+03	
82	49.6	0.00000E+00	5.33744E+03	
84	10010.1	0.00000E+00	9.43871E+02	
85	10010.2	0.00000E+00	9.43871E+02	
86	10010.3	0.00000E+00	9.43871E+02	
87	10010.4	0.00000E+00	9.43871E+02	
88	10010.5	0.00000E+00	9.43871E+02	
89	10010.6	0.00000E+00	9.43871E+02	



1cells

print table 60

cell	mat	atom density	gram density	volume	mass	pieces	neutron importance
1	1	1	7.05243E-02	1.05540E+01	2.79982E+02	2.95493E+03	1 1.0000E+00
2	2	2s	1.00128E-01	9.98200E-01	2.58267E+01	2.57602E+01	1 1.0000E+00
3	3	3	4.33411E-02	6.56000E+00	9.81838E+01	6.44086E+03	1 1.0000E+00
4	4	4s	1.00128E-01	9.98200E-01	0.00000E+00	0.00000E+00	0 1.0000E+00
5	10	4s	1.00128E-01	9.98200E-01	5.09690E+03	5.08773E+03	0 1.0000E+00
6	20	4s	1.00128E-01	9.98200E-01	9.94289E+04	9.92499E+04	0 1.0000E+00
7	21	5s	1.00309E-05	1.00000E-04	1.30324E+05	1.30324E+01	0 1.0000E+00
8	22	7	6.03063E-02	2.70200E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
9	23	5s	1.00309E-05	1.00000E-04	0.00000E+00	0.00000E+00	0 1.0000E+00
10	40	8	3.29629E-02	1.13440E+01	1.66245E+04	1.88588E+05	1 1.0000E+00
11	41	5s	1.00309E-05	1.00000E-04	4.09828E+05	4.09828E+01	1 1.0000E+00
12	42	9	8.64586E-02	7.94000E+00	9.51154E+04	7.55216E+05	1 1.0000E+00
13	43	9	8.64586E-02	7.94000E+00	4.53784E+05	3.60304E+06	1 1.0000E+00
14	44	9	8.64586E-02	7.94000E+00	1.02842E+04	8.16563E+04	2 1.0000E+00
15	45	9	8.64586E-02	7.94000E+00	9.04489E+04	7.18165E+05	1 1.0000E+00
16	46	8	3.29629E-02	1.13440E+01	9.86269E+05	1.11882E+07	1 1.0000E+00
17	47	8	3.29629E-02	1.13440E+01	5.13461E+04	5.82470E+05	2 1.0000E+00
18	48	0	0.00000E+00	0.00000E+00	1.20186E+04	0.00000E+00	1 1.0000E+00
19	49	6s	1.00309E-05	1.00000E-04	0.00000E+00	0.00000E+00	0 1.0000E+00
20	50	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 0.0000E+00

total  
1surfaces 2.36097E+06 1.72254E+07

print table 70

surface	trans	type	surface coefficients			
1	1	rcc				
2	1.1	cz	4.7810000E-01			
3	1.2	pz	4.0041070E+02			
4	1.3	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	-1.0520700E+01
5	2	rcc				
6	2.1	cz	4.8760000E-01			
7	2.2	pz	4.1582170E+02			
8	2.3	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	-6.3990000E+00
9	3	rcc				
10	3.1	cz	5.5880000E-01			
11	3.2	pz	4.1690260E+02			
12	3.3	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	-5.0800000E+00
13	10	rhp				
14	10.1	px	1.8000000E+00			
15	10.2	p	-1.0000000E+00	0.0000000E+00	0.0000000E+00	1.8000000E+00
16	10.3	p	5.0000000E-01	8.6602540E-01	0.0000000E+00	1.8000000E+00
17	10.4	p	-5.0000000E-01	-8.6602540E-01	0.0000000E+00	1.8000000E+00
18	10.5	p	-5.0000000E-01	8.6602540E-01	0.0000000E+00	1.8000000E+00
19	10.6	p	5.0000000E-01	-8.6602540E-01	0.0000000E+00	1.8000000E+00
20	10.7	pz	4.5312000E+02			
21	10.8	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	1.0000000E+00
22	20	rpp				
23	20.1	p	8.6602540E-01	5.0000000E-01	0.0000000E+00	7.4148000E+00
24	20.2	p	-8.6602540E-01	-5.0000000E-01	0.0000000E+00	7.4148000E+00
25	20.3	p	-5.0000000E-01	8.6602540E-01	0.0000000E+00	7.4148000E+00
26	20.4	p	5.0000000E-01	-8.6602540E-01	0.0000000E+00	7.4148000E+00
27	20.5	pz	4.5212000E+02			
28	20.6	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	0.0000000E+00
29	21	rpp				
30	21.1	p	8.6602540E-01	5.0000000E-01	0.0000000E+00	1.1271300E+01
31	21.2	p	-8.6602540E-01	-5.0000000E-01	0.0000000E+00	1.1271300E+01
32	21.3	p	-5.0000000E-01	8.6602540E-01	0.0000000E+00	1.1271300E+01
33	21.4	p	5.0000000E-01	-8.6602540E-01	0.0000000E+00	1.1271300E+01
36	22	rcc				
37	22.1	cz	1.6835120E+01			
40	40	rcc				
41	40.1	cz	3.6518900E+01			
42	40.2	pz	4.8069500E+02			
43	40.3	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	2.6670000E+01
44	41	rcc				
48	42	rcc				
49	42.1	cz	1.6986300E+01			
52	43	rcc				
53	43.1	cz	2.6352500E+01			
54	43.2	pz	-1.0160000E+01			
55	43.3	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	1.7780000E+01
56	44	rcc				
57	44.1	cz	2.0174000E+01			
58	44.2	pz	4.4450000E+02			
60	45	rcc				
61	45.1	cz	3.1597600E+01			
64	46	rcc				
65	46.1	cz	1.8910300E+01			
66	46.2	pz	4.3068240E+02			
67	46.3	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	-1.3817600E+01
68	47	rcc				
69	47.1	cz	3.3327100E+01			
72	48	rcc				
73	48.1	cz	3.3464500E+01			
76	49 refl.	rpp				
77	49.1 refl.	px	3.6528900E+01			
78	49.2 refl.	p	-1.0000000E+00	0.0000000E+00	0.0000000E+00	3.6528900E+01
79	49.3 refl.	py	3.6528900E+01			
80	49.4 refl.	p	0.0000000E+00	-1.0000000E+00	0.0000000E+00	3.6528900E+01
81	49.5 refl.	pz	4.8070500E+02			
82	49.6 refl.	p	0.0000000E+00	0.0000000E+00	-1.0000000E+00	2.6680000E+01

```

83 10010          rhp
84 10010.1        1001 px  2.7000000E+00
85 10010.2        1001 p  -1.0000000E+00  0.0000000E+00  0.0000000E+00  9.0000000E-01
86 10010.3        1001 p  5.0000000E-01  8.6602540E-01  0.0000000E+00  9.0003960E-01
87 10010.4        1001 p  -5.0000000E-01  -8.6602540E-01  0.0000000E+00  2.6999604E+00
88 10010.5        1001 p  -5.0000000E-01  8.6602540E-01  0.0000000E+00  3.9600581E-05
89 10010.6        1001 p  5.0000000E-01  -8.6602540E-01  0.0000000E+00  3.5999604E+00

```

1 identical surfaces

print table 70

```

master surface    identical surfaces
10.7              10010.7
10.8              10010.8
20.5              21.5      22.2      42.2
20.6              21.6      22.3      41.2      42.3      44.3      45.3
40.1              41.1
40.2              41.3
44.2              45.2
46.2              47.2      48.2
46.3              47.3      48.3

```

surface coefficients for identical surfaces not used.

```

surface  trans  type  surface coefficients
90 10010.7    1001  pz  4.5312000E+02
91 10010.8    1001  p   0.0000000E+00
34  21.5      1      pz  4.5212000E+02
38  22.2      1      pz  4.5212000E+02
50  42.2      1      pz  4.5212000E+02
35  21.6      1      p   0.0000000E+00  -1.0000000E+00  0.0000000E+00
39  22.3      1      p   0.0000000E+00  0.0000000E+00  -1.0000000E+00  0.0000000E+00
46  41.2      1      pz  0.0000000E+00
51  42.3      1      p   0.0000000E+00  0.0000000E+00  -1.0000000E+00  0.0000000E+00
59  44.3      1      p   0.0000000E+00  0.0000000E+00  -1.0000000E+00  0.0000000E+00
63  45.3      1      p   0.0000000E+00  0.0000000E+00  -1.0000000E+00  0.0000000E+00
45  41.1      1      cz  3.6518900E+01
47  41.3      1      p   0.0000000E+00  0.0000000E+00  -1.0000000E+00  2.6670000E+01
62  45.2      1      pz  4.4450000E+02
70  47.2      1      pz  4.3068240E+02
74  48.2      1      pz  4.3068240E+02
71  47.3      1      p   0.0000000E+00  0.0000000E+00  -1.0000000E+00  -1.3817600E+01
75  48.3      1      p   0.0000000E+00  0.0000000E+00  -1.0000000E+00  -1.3817600E+01

```

1 cell temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-06 mev.

```

* Random Number Generator = 2 *
* Random Number Seed = 19073486328125 *
* Random Number Multiplier = 9219741426499971445 *
* Random Number Adder = 1 *
* Random Number Bits Used = 63 *
* Random Number Stride = 152917 *

```

5 warning messages so far.  
1 physical constants

print table 98

name	value	description
huge	1.0000000000000E+36	infinity
pie	3.1415926535898E+00	pi
euler	5.7721566490153E-01	euler constant
avogad	6.02204344682E+23	avogadro number (molecules/mole)
aneut	1.00866491588E+00	neutron mass (amu)
avgdn	5.9703109000000E-01	avogadro number/neutron mass (1.e-24*molecules/mole/amu)
slite	2.9979250000000E+02	speed of light (cm/shake)
planck	4.1357320000000E-13	planck constant (mev shake)
fscon	1.3703930000000E+02	inverse fine structure constant h*c/(2*pi*e**2)
gpt(1)	9.3958000000000E+02	neutron mass (mev)
gpt(3)	5.1100800000000E-01	electron mass (mev)

fission q-values:	nuclide	q(mev)	nuclide	q(mev)
	90232	171.91	91233	175.57
	92233	180.84	92234	179.45
	92235	180.88	92236	179.50
	92237	180.40	92238	181.31
	92239	180.40	92240	180.40
	93237	183.67	94238	186.65
	94239	189.44	94240	186.36
	94241	188.99	94242	185.98
	94243	187.48	95241	190.83
	95242	190.54	95243	190.25
	96242	190.49	96244	190.49
	other	180.00		

the following compilation options were used:

```

cheap
dec
plot

```

```

mcplot
xlib
default datapath: C:\Program Files\LANL\MCNPFDATA
                  C:\Progra-1\LANL\MCNPFdata
cross-section tables                                     print table 100

table length

tables from file actia

1001.62c 5202 1-h-1 at 293.6K from endf-vi.8 njoy99.50 mat 125 12/05/01
7014.62c 67462 7-n-14 at 293.6K from endf-vi.8 njoy99.50 mat 725 12/05/01
8016.62c 170541 8-c-16 at 293.6K from endf-vi.8 njoy99.50 mat 825 12/05/01
13027.62c 75363 13-al-27 at 293.6K from endf-vi.8 njoy99.50 mat1325 12/17/01
24050.62c 194445 24-cr-50 at 293.6K from endf-vi.8 njoy99.50 mat2425 12/20/01
24052.62c 174773 24-cr-52 at 293.6K from endf-vi.8 njoy99.50 mat2431 12/20/01
24053.62c 147286 24-cr-53 at 293.6K from endf-vi.8 njoy99.50 mat2434 12/20/01
24054.62c 132737 24-cr-54 at 293.6K from endf-vi.8 njoy99.50 mat2437 12/20/01
25055.62c 134565 25-mn-55 at 293.6K from endf/b-vi.8 njoy99.50 mat2525 02/11/02
26054.62c 143370 26-fe-54 at 293.6K from endf-vi.8 njoy99.50 mat2625 12/20/01
26056.62c 230655 26-fe-56 at 293.6K from endf-vi.8 njoy99.50 mat2631 12/20/01
26057.62c 148842 26-fe-57 at 293.6K from endf-vi.8 njoy99.50 mat2634 12/20/01
26058.62c 87569 26-fe-58 at 293.6K from endf-vi.8 njoy99.50 mat2637 12/20/01
28058.62c 235403 28-ni-58 at 293.6K from endf-vi.8 njoy99.50 mat2825 12/20/01
28060.62c 158305 28-ni-60 at 293.6K from endf-vi.8 njoy99.50 mat2831 12/20/01
28061.62c 112032 28-ni-61 at 293.6K from endf-vi.8 njoy99.50 mat2834 12/20/01
28062.62c 104386 28-ni-62 at 293.6K from endf-vi.8 njoy99.50 mat2837 12/20/01
28064.62c 97689 28-ni-64 at 293.6K from endf-vi.8 njoy99.50 mat2843 12/20/01

tables from file endf66a

7015.66c 19013 7-n-15 at 293.6K from endf-vi.0 njoy99.50 mat 728 07/13/01

tables from file endf66b

40000.66c 98524 40-zr-0 at 293.6K from endf-vi.1 njoy99.50 mat4000 07/24/01

tables from file end192

50000.42c 141628 ENDL library name: nd920609 LANL/XTM modified: 951222 911219
temperature = 2.5860E-08 adjusted to 2.5300E-08

tables from file endf66c

82206.66c 219368 82-pb-206 at 293.6K from endf-vi.6 njoy99.50 mat8231 08/13/01
82207.66c 134389 82-pb-207 at 293.6K from endf-vi.6 njoy99.50 mat8234 08/13/01
82208.66c 135105 82-pb-208 at 293.6K from endf-vi.x njoy99.50 mat8237 03/16/02
94238.66c 53256 94-pu-238 at 293.6K from endf-vi.0 njoy99.50 total nu mat9434 09/06/01
probability tables used from 2.0000E-04 to 1.0000E-02 mev.
94240.66c 309518 94-pu-240 at 293.6K from endf-vi.2 njoy99.50 total nu mat9440 09/06/01
probability tables used from 5.7000E-03 to 4.0000E-02 mev.
94241.66c 126607 94-pu-241 at 293.6K from endf-vi.3 njoy99.50 total nu mat9443 09/06/01
probability tables used from 3.0000E-04 to 4.0200E-02 mev.
94242.66c 107114 94-pu-242 at 293.6K from endf-vi.0 njoy99.50 total nu mat9446 09/06/01
probability tables used from 9.8600E-04 to 1.0000E-02 mev.

tables from file t16_2003

92235.69c 587997 92-u-235 at 293.6K from t16 u2351a9d njoy99.50 total nu mat9228 07/02/03
probability tables used from 2.2500E-03 to 2.5000E-02 mev.
92238.69c 713320 92-u-238 at 293.6K from t16 u2381a8h njoy99.50 total nu mat9237 07/02/03
probability tables used from 1.0000E-02 to 1.4903E-01 mev.
94239.69c 506320 94-pu-239 at 293.6K from t16 pu2391a7d njoy99.50 total nu mat9437 07/02/03
probability tables used from 2.5000E-03 to 3.0000E-02 mev.

tables from file tmccs

lwtr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

total 5582977

warning. neutron energy cutoff is below some cross-section tables.

comment. 1 cross sections modified by free gas thermal treatment.
assignment of s(a,b) data to nuclides.                                     print table 102

mat nuclide s(a,b)
2 1001.62c lwtr.01t
4 1001.62c lwtr.01t
5 1001.62c lwtr.01t
6 1001.62c lwtr.01t

```

```

lestimated keff results by cycle                                     print table 175

cycle 1 k(collison) 0.773576 prompt removal lifetime(abs) 7.9159E+03 source points generated 986
cycle 2 k(collison) 0.761973 prompt removal lifetime(abs) 8.7475E+03 source points generated 1002
cycle 3 k(collison) 0.792952 prompt removal lifetime(abs) 8.6388E+03 source points generated 1019
cycle 4 k(collison) 0.798553 prompt removal lifetime(abs) 8.0609E+02 source points generated 1013
cycle 5 k(collison) 0.846007 prompt removal lifetime(abs) 8.0978E+03 source points generated 1058
cycle 6 k(collison) 0.778445 prompt removal lifetime(abs) 8.7756E+03 source points generated 927

```

```

cycle 7 k(collision) 0.852315 prompt removal lifetime(abs) 8.2963E+03 source points generated 1086
cycle 8 k(collision) 0.776196 prompt removal lifetime(abs) 8.4369E+03 source points generated 916
.
.
.
estimator cycle 526 ave of 496 cycles combination simple average combined average corr
k(collision) 0.813156 0.812679 0.0016 k(col/abs) 0.811904 0.0015 0.811535 0.0015 0.8154
k(absorption) 0.811817 0.811128 0.0015 k(abs/tk ln) 0.811770 0.0015 0.811387 0.0014 0.4631
k(trk length) 0.745849 0.812412 0.0021 k(tk ln/col) 0.812546 0.0017 0.812633 0.0016 0.6279
rem life(col) 8.6684E+03 8.3853E+03 0.0016 k(col/abs/tk ln) 0.812073 0.0015 0.811477 0.0014
rem life(abs) 8.6270E+03 8.3849E+03 0.0016 life(col/abs/tl) 8.3888E+03 0.0014 8.3982E+03 0.0012
source points generated 1039

estimator cycle 527 ave of 497 cycles combination simple average combined average corr
k(collision) 0.809185 0.812672 0.0016 k(col/abs) 0.811898 0.0015 0.811530 0.0015 0.8154
k(absorption) 0.809090 0.811124 0.0015 k(abs/tk ln) 0.811777 0.0015 0.811387 0.0014 0.4630
k(trk length) 0.821169 0.812430 0.0021 k(tk ln/col) 0.812551 0.0017 0.812630 0.0016 0.6278
rem life(col) 8.0102E+03 8.3845E+03 0.0016 k(col/abs/tk ln) 0.812075 0.0015 0.811477 0.0014
rem life(abs) 8.0245E+03 8.3841E+03 0.0016 life(col/abs/tl) 8.3881E+03 0.0014 8.3977E+03 0.0012
source points generated 1005

estimator cycle 528 ave of 498 cycles combination simple average combined average corr
k(collision) 0.821391 0.812690 0.0016 k(col/abs) 0.811905 0.0015 0.811532 0.0015 0.8153
k(absorption) 0.809602 0.811121 0.0015 k(abs/tk ln) 0.811753 0.0015 0.811376 0.0014 0.4629
k(trk length) 0.790409 0.812386 0.0021 k(tk ln/col) 0.812538 0.0017 0.812636 0.0016 0.6272
rem life(col) 7.9693E+03 8.3837E+03 0.0016 k(col/abs/tk ln) 0.812066 0.0015 0.811468 0.0014
rem life(abs) 8.0772E+03 8.3835E+03 0.0016 life(col/abs/tl) 8.3875E+03 0.0014 8.3975E+03 0.0012
source points generated 1027

estimator cycle 529 ave of 499 cycles combination simple average combined average corr
k(collision) 0.788892 0.812642 0.0016 k(col/abs) 0.811869 0.0015 0.811499 0.0015 0.8154
k(absorption) 0.798522 0.811096 0.0015 k(abs/tk ln) 0.811733 0.0015 0.811352 0.0014 0.4630
k(trk length) 0.804736 0.812370 0.0021 k(tk ln/col) 0.812506 0.0017 0.812594 0.0016 0.6271
rem life(col) 8.4590E+03 8.3839E+03 0.0016 k(col/abs/tk ln) 0.812036 0.0015 0.811442 0.0014
rem life(abs) 8.4459E+03 8.3837E+03 0.0016 life(col/abs/tl) 8.3878E+03 0.0014 8.3979E+03 0.0012
source points generated 969

estimator cycle 530 ave of 500 cycles combination simple average combined average corr
k(collision) 0.864442 0.812746 0.0016 k(col/abs) 0.811973 0.0015 0.811603 0.0015 0.8166
k(absorption) 0.862854 0.811199 0.0015 k(abs/tk ln) 0.811816 0.0015 0.811450 0.0014 0.4642
k(trk length) 0.843483 0.812433 0.0021 k(tk ln/col) 0.812589 0.0017 0.812690 0.0016 0.6276
rem life(col) 8.0058E+03 8.3831E+03 0.0016 k(col/abs/tk ln) 0.812126 0.0015 0.811537 0.0014
rem life(abs) 8.0790E+03 8.3830E+03 0.0016 life(col/abs/tl) 8.3872E+03 0.0014 8.3977E+03 0.0012
source points generated 1088

source distribution written to file Pl_Acc_NACCoC_c1.00_g0.00_e0.00_d0.01cm_HP_36mm.inps cycle = 530
problem summary (active cycles only) source particle weight for summary table normalization = 500000.00

run terminated when 530 kcode cycles were done.

+ NAC-LWT Cask - MOX Experiments - Accident Transport Conditions 10/25/07 23:17:01
0 probid = 10/25/07 23:04:59

neutron creation tracks weight energy neutron loss tracks weight energy
(per source particle) (per source particle)

source 500798 1.0000E+00 2.0304E+00 escape 0 0. 0.
energy cutoff 0 0. 0.
time cutoff 0 0. 0.
weight window 0 0. 0.
cell importance 0 0. 0.
weight cutoff 0 1.0507E-01 4.7424E-06 weight cutoff 501256 1.0507E-01 4.2477E-06
e or t importance 0 0. 0. e or t importance 0 0. 0.
dxtran 0 0. 0. dxtran 0 0. 0.
forced collisions 0 0. 0. forced collisions 0 0. 0.
exp. transform 0 0. 0. exp. transform 0 0. 0.
upscattering 0 0. 2.2358E-07 downscattering 0 0. 1.9694E+00
photonuclear 0 0. 0. capture 0 7.2325E-01 3.3293E-02
(n,xn) 514 1.5938E-03 1.3448E-03 loss to (n,xn) 456 7.9510E-04 7.6641E-03
prompt fission 0 0. 0. loss to fission 0 2.7755E-01 2.1466E-02
delayed fission 0 0. 0.
total 501712 1.1067E+00 2.0318E+00 total 501712 1.1067E+00 2.0318E+00

number of neutrons banked 487 average time of (shakes) cutoffs
neutron tracks per source particle 1.0034E+00 escape 0.0000E+00 tco 1.0000E+33
neutron collisions per source particle 1.5178E+02 capture 9.5720E+03 eco 0.0000E+00
total neutron collisions 75988898 capture or escape 9.5720E+03 wcl -5.0000E-01
net multiplication 1.0008E+00 0.0000 any termination 9.6263E+03 wc2 -2.5000E-01

computer time so far in this run 11.91 minutes maximum number ever in bank 2
computer time in mcrun 11.75 minutes bank overflows to backup file 0
source particles per minute 4.5171E+04 most random numbers used was 12106 in history 314654
random numbers generated 769937194

range of sampled source weights = 8.5106E-01 to 1.1655E+00

source efficiency = 1.0000 in cell 1
source efficiency = 0.1042 in cell 10
source efficiency = 1.0000 in cell 20
source efficiency = 1.0000 in cell 41
neutron activity in each cell print table 126

```

cell	tracks entering	population	collisions	collisions * weight (per history)	number weighted energy	flux weighted energy	average track weight (relative)	average track mfp (cm)	
1	1	1241569	501146	586077	9.5153E-01	1.3646E-03	1.1014E+00	9.2286E-01	2.6348E+00
2	2	1753661	501152	72734	1.0239E-01	4.0488E-04	7.9744E-01	8.3249E-01	1.7794E+00
3	3	1892568	501155	78060	1.3935E-01	5.6811E-04	8.5842E-01	8.8595E-01	3.7904E+00
4	4	4675755	501209	22767197	3.3677E+01	1.9441E-04	5.2073E-01	8.3143E-01	1.3415E+00
5	10	1405445	371543	6018259	8.5610E+00	1.3456E-04	3.4232E-01	7.9570E-01	1.0857E+00
6	20	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	21	1643189	371205	1813	2.6501E-03	4.8443E-04	4.0398E-01	8.2611E-01	1.3004E+04
8	22	2050981	371181	2086136	3.6199E+00	5.2913E-04	3.3678E-01	8.1901E-01	9.7847E+00
9	23	2153778	354933	90	1.4430E-04	5.8421E-04	2.9581E-01	8.1614E-01	1.1843E+04
10	40	25792	5252	101677	1.4356E-01	3.2300E-03	1.0644E-01	7.2359E-01	3.2337E+00
11	41	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	42	115694	15185	1342637	1.7759E+00	2.6306E-03	1.0677E-01	7.2112E-01	2.5371E+00
13	43	3325425	208962	13169115	1.9143E+01	3.4252E-03	1.7553E-01	7.8816E-01	2.7485E+00
14	44	42149	15682	143930	2.0099E-01	8.1919E-04	1.6865E-01	7.5553E-01	2.3693E+00
15	45	2163315	353876	5282663	7.9853E+00	8.7776E-04	2.9482E-01	6.1629E-01	2.5676E+00
16	46	2626045	293982	23873147	3.7303E+01	1.6270E-03	2.1773E-01	8.0445E-01	3.5473E+00
17	47	87444	20018	361275	5.2806E-01	1.8325E-03	1.3891E-01	7.5094E-01	3.3232E+00
18	48	3117979	207568	0	0.0000E+00	2.7619E-03	1.8387E-01	7.9764E-01	0.0000E+00
19	49	1731775	177414	4088	6.0903E-03	3.8532E-03	1.7945E-01	7.8941E-01	1.0816E+04
total	30052564	4771463	75888898	1.1414E+02					

neutron weight balance in each cell

print table 130

cell index	1	2	3	4	5	6	7	8	9
cell number	1	2	3	4	10	20	21	22	23
external events:									
entering	1.2512E+00	3.1557E+00	3.3816E+00	7.8956E+00	2.2976E+00	0.0000E+00	2.7283E+00	3.3845E+00	3.5279E+00
source	1.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
energy cutoff	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
time cutoff	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
exiting	-1.8614E+00	-3.1553E+00	-3.3804E+00	-7.7598E+00	-2.2640E+00	0.0000E+00	-2.7283E+00	-3.3455E+00	-3.5279E+00
total	3.8978E-01	3.6619E-04	1.1670E-03	1.3572E-01	3.3608E-02	0.0000E+00	6.9143E-06	3.9023E-02	1.3065E-07
variance reduction events:									
weight window	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
cell importance	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
weight cutoff	1.1135E-04	3.7032E-06	1.9991E-06	4.5624E-05	-1.5941E-05	0.0000E+00	-1.4890E-06	-4.0693E-05	0.0000E+00
energy or t importance	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
dextran	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
forced collisions	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
exp. transform	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total	1.1135E-04	3.7032E-06	1.9991E-06	4.5624E-05	-1.5941E-05	0.0000E+00	-1.4890E-06	-4.0693E-05	0.0000E+00
physical events:									
capture (n,xn)	-1.1266E-01	-3.6990E-04	-1.1822E-03	-1.3576E-01	-3.3593E-02	0.0000E+00	-5.4253E-06	-3.8983E-02	-1.3065E-07
loss to (n,xn)	6.2734E-04	0.0000E+00	2.6371E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
fission	-3.1285E-04	0.0000E+00	-1.3185E-05	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
loss to fission	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
loss to fission	-2.7755E-01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
photonuclear	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total	-3.8989E-01	-3.6990E-04	-1.1690E-03	-1.3576E-01	-3.3593E-02	0.0000E+00	-5.4253E-06	-3.8983E-02	-1.3065E-07
total	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
cell index	10	11	12	13	14	15	16	17	18
cell number	40	41	42	43	44	45	46	47	48

external events:									
entering	3.7341E-02	0.0000E+00	1.6904E-01	5.2877E+00	6.3487E-02	3.5504E+00	4.2362E+00	1.3150E-01	4.9768E+00
source	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
energy cutoff	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
time cutoff	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
exiting	-3.7270E-02	0.0000E+00	-1.5693E-01	-5.1469E+00	-5.9514E-02	-3.3370E+00	-4.2065E+00	-1.3116E-01	-4.9768E+00
total	7.0996E-05	0.0000E+00	1.2111E-02	1.4074E-01	3.9735E-03	2.1336E-01	2.9727E-02	3.4420E-04	0.0000E+00
variance reduction events:									
weight window	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
cell importance	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
weight cutoff	-2.4210E-06	0.0000E+00	9.0859E-05	-3.1358E-04	-1.0418E-05	1.3278E-04	2.2441E-05	-1.8057E-05	0.0000E+00
energy or t importance	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
dextran	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
forced collisions	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
exp. transform	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total	-2.4210E-06	0.0000E+00	9.0859E-05	-3.1358E-04	-1.0418E-05	1.3278E-04	2.2441E-05	-1.8057E-05	0.0000E+00
physical events:									
capture (n,xn)	-6.8575E-05	0.0000E+00	-1.2202E-02	-1.4044E-01	-3.9631E-03	-2.1350E-01	-3.0195E-02	-3.2969E-04	0.0000E+00
loss to (n,xn)	0.0000E+00	0.0000E+00	0.0000E+00	1.4057E-05	0.0000E+00	2.9429E-05	8.8912E-04	7.4907E-06	0.0000E+00
fission	0.0000E+00	0.0000E+00	0.0000E+00	-7.0285E-06	0.0000E+00	-1.4715E-05	-4.4358E-04	-3.7454E-06	0.0000E+00
loss to fission	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
loss to fission	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
photonuclear	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total	-6.8575E-05	0.0000E+00	-1.2202E-02	-1.4044E-01	-3.9631E-03	-2.1349E-01	-2.9750E-02	-3.2614E-04	0.0000E+00

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total	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	
cell index	19										
cell number	49	total									
external events:											
entering	2.7311E+00	4.8806E+01									
source	0.0000E+00	1.0000E+00									
energy cutoff	0.0000E+00	0.0000E+00									
time cutoff	0.0000E+00	0.0000E+00									
exiting	-2.7311E+00	-4.8806E+01									
total	1.4036E-06	1.0000E+00									
variance reduction events:											
weight window	0.0000E+00	0.0000E+00									
cell importance	0.0000E+00	0.0000E+00									
weight cutoff	0.0000E+00	6.1524E-06									
energy importance	0.0000E+00	0.0000E+00									
dxtran	0.0000E+00	0.0000E+00									
forced collisions	0.0000E+00	0.0000E+00									
exp. transform	0.0000E+00	0.0000E+00									
total	0.0000E+00	6.1524E-06									
physical events:											
capture	-1.4036E-06	-7.2325E-01									
(n,xn)	0.0000E+00	1.5938E-03									
loss to (n,xn)	0.0000E+00	-7.9510E-04									
fission	0.0000E+00	0.0000E+00									
loss to fission	0.0000E+00	-2.7755E-01									
photonuclear	0.0000E+00	0.0000E+00									
total	-1.4036E-06	-1.0000E+00									
total	0.0000E+00	0.0000E+00									
-----											
neutron activity of each nuclide in each cell, per source particle											
print table 140											
cell index	cell name	nuclides	atom fraction	total collisions	collisions * weight	wgt. lost to capture	wgt. gain by fission	wgt. gain by (n,xn)	photons produced	photon wgt produced	avg photon energy
1	1	92235.69c	2.19E-03	11604	1.6516E-02	2.3773E-03	1.2019E-02	1.2382E-06	0	0.0000E+00	0.0000E+00
		92238.69c	3.07E-01	182793	3.3056E-01	2.3571E-02	5.1779E-03	2.8296E-04	0	0.0000E+00	0.0000E+00
		94238.66c	2.44E-10	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		94239.69c	2.43E-10	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		94240.66c	2.42E-10	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		94241.66c	2.41E-02	261894	3.6794E-01	8.6289E-02	2.6036E-01	3.0294E-05	0	0.0000E+00	0.0000E+00
		94242.66c	2.40E-10	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	6.66E-01	129786	2.3652E-01	4.2088E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
2	2	1001.62c	6.67E-01	67564	9.4009E-02	3.5973E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	5170	8.3772E-03	1.0168E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
3	3	26054.62c	1.19E-04	8	1.3417E-05	2.1703E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24050.62c	7.63E-05	8	1.5666E-05	3.9708E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		7014.62c	3.24E-03	267	4.4474E-04	2.3671E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26056.62c	1.87E-03	192	3.0462E-04	2.1713E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24052.62c	1.47E-03	61	1.1116E-04	3.5581E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		7015.66c	1.20E-05	1	2.0596E-06	1.1114E-12	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26057.62c	4.33E-05	9	1.5459E-05	1.0398E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24053.62c	1.67E-04	32	4.9398E-05	9.4886E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26058.62c	5.71E-06	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24054.62c	4.14E-05	2	4.1326E-06	3.8278E-08	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		40000.66c	9.81E-01	76724	1.3605E-01	1.0591E-03	0.0000E+00	1.3185E-05	0	0.0000E+00	0.0000E+00
		50000.42c	1.15E-02	756	1.3400E-03	5.7434E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
4	4	1001.62c	6.67E-01	21345331	3.1346E+01	1.3390E-01	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	1421866	2.3311E+00	1.8663E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
5	10	1001.62c	6.67E-01	5653062	7.9858E+00	3.3326E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	365197	5.7522E-01	2.6681E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
6	20	1001.62c	6.67E-01	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
7	21	1001.62c	6.67E-01	1675	2.4240E-03	5.4231E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	138	2.2604E-04	2.2451E-09	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
8	22	13027.62c	1.00E+00	2086136	3.6199E+00	3.8983E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
9	23	1001.62c	6.67E-01	83	1.3264E-04	1.3062E-07	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	7	1.1663E-05	2.8285E-11	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
10	40	82206.66c	2.55E-01	24516	3.4087E-02	2.7874E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		82207.66c	2.21E-01	12486	3.2056E-02	3.8482E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		82208.66c	5.24E-01	54675	7.7416E-02	2.2389E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
11	41	1001.62c	6.67E-01	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
12	42	24050.62c	8.79E-03	21758	3.4511E-02	4.7860E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26054.62c	4.03E-02	42532	6.8094E-02	4.1345E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00

		28058.62c	6.05E-02	181784	2.3443E-01	1.0840E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24052.62c	1.69E-01	93120	1.3676E-01	6.9642E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26056.62c	6.32E-01	791641	9.7764E-01	6.0022E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28060.62c	2.35E-02	26722	4.4624E-02	2.8130E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24053.62c	1.92E-02	64103	9.6929E-02	1.1944E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26057.62c	1.46E-02	17618	2.8309E-02	2.0807E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28061.62c	1.02E-03	1322	1.8890E-03	1.4576E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24054.62c	4.77E-03	3470	5.4180E-03	9.0893E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26058.62c	1.93E-03	1803	2.8359E-03	2.7057E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28062.62c	3.25E-03	14711	2.2397E-02	1.4380E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28064.62c	8.33E-04	1134	1.9718E-03	6.5208E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		25055.62c	2.01E-02	80889	1.2014E-01	1.6420E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
13	43	24050.62c	8.79E-03	221175	3.6703E-01	5.7475E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26054.62c	4.03E-02	451871	7.6283E-01	4.7802E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28058.62c	6.09E-02	1715612	2.4243E+00	1.2971E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24052.62c	1.69E-01	1019845	1.6356E+00	7.9758E-03	0.0000E+00	1.8340E-06	0	0.0000E+00	0.0000E+00
		26056.62c	6.32E-01	7666679	1.0557E+01	6.9495E-02	0.0000E+00	2.0165E-05	0	0.0000E+00	0.0000E+00
		28060.62c	2.35E-02	283261	4.9171E-01	3.2930E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24053.62c	1.92E-02	630863	1.0081E+00	1.3984E-02	0.0000E+00	1.5387E-06	0	0.0000E+00	0.0000E+00
		26057.62c	1.46E-02	185000	3.1223E-01	2.2263E-03	0.0000E+00	1.6393E-06	0	0.0000E+00	0.0000E+00
		28061.62c	1.02E-03	13468	2.0832E-02	1.7934E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24054.62c	4.77E-03	36356	6.0531E-02	1.2171E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26058.62c	1.93E-03	19406	3.2608E-02	2.6030E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28062.62c	3.25E-03	144976	2.3288E-01	1.6922E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28064.62c	8.33E-04	12230	2.1954E-02	7.1773E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		25055.62c	2.01E-02	768373	1.2152E+00	1.7635E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
14	44	24050.62c	8.79E-03	2269	3.6509E-03	1.8711E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26054.62c	4.03E-02	4128	6.7625E-03	1.1895E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28058.62c	6.09E-02	19305	2.6369E-02	3.6453E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24052.62c	1.69E-01	9781	1.5040E-02	1.7043E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26056.62c	6.32E-01	87969	1.1668E-01	2.1107E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28060.62c	2.35E-02	2542	4.3148E-03	8.3706E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24053.62c	1.92E-02	6286	9.7393E-03	4.0739E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26057.62c	1.46E-02	1769	2.9096E-03	5.1876E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28061.62c	1.02E-03	127	1.8882E-04	4.4798E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24054.62c	4.77E-03	325	5.1374E-04	2.4205E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26058.62c	1.93E-03	178	2.8855E-04	2.4763E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28062.62c	3.25E-03	1406	2.2061E-03	5.6112E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28064.62c	8.33E-04	92	1.6133E-04	2.3044E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		25055.62c	2.01E-02	7751	1.2164E-02	3.9874E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
15	45	24050.62c	8.79E-03	80564	1.3531E-01	9.5234E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26054.62c	4.03E-02	160789	2.7759E-01	6.8030E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28058.62c	6.09E-02	681315	1.0027E+00	2.0061E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24052.62c	1.69E-01	391001	6.4399E-01	9.4778E-03	0.0000E+00	1.6111E-06	0	0.0000E+00	0.0000E+00
		26056.62c	6.32E-01	3234714	4.6943E+00	1.1239E-01	0.0000E+00	8.7451E-06	0	0.0000E+00	0.0000E+00
		28060.62c	2.35E-02	91514	1.6155E-01	4.5728E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24053.62c	1.92E-02	231983	3.7789E-01	2.3538E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		26057.62c	1.46E-02	64846	1.1199E-01	2.6033E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28061.62c	1.02E-03	5128	8.0158E-03	2.0266E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		24054.62c	4.77E-03	12710	2.1748E-02	1.2227E-04	0.0000E+00	4.3583E-06	0	0.0000E+00	0.0000E+00
		26058.62c	1.93E-03	6657	1.1330E-02	1.9784E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28062.62c	3.25E-03	51037	8.4785E-02	3.0676E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		28064.62c	8.33E-04	3627	6.6572E-03	7.6507E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		25055.62c	2.01E-02	266778	4.4741E-01	2.0862E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
16	46	82206.66c	2.55E-01	5741763	8.8860E+00	6.7912E-03	0.0000E+00	6.4064E-05	0	0.0000E+00	0.0000E+00
		82207.66c	2.21E-01	5300449	8.3363E+00	2.2654E-02	0.0000E+00	1.2740E-04	0	0.0000E+00	0.0000E+00
		82208.66c	5.24E-01	12830935	2.0081E+01	7.5043E-04	0.0000E+00	2.5407E-04	0	0.0000E+00	0.0000E+00
17	47	82206.66c	2.55E-01	86445	1.2471E-01	8.9207E-05	0.0000E+00	1.9156E-06	0	0.0000E+00	0.0000E+00
		82207.66c	2.21E-01	79902	1.1779E-01	2.3046E-04	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		82208.66c	5.24E-01	194928	2.8556E-01	1.0224E-05	0.0000E+00	1.8298E-06	0	0.0000E+00	0.0000E+00
19	49	1001.62c	6.67E-01	3653	5.3988E-03	1.4029E-06	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		8016.62c	3.33E-01	435	6.9146E-04	6.3757E-10	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00
		total		75898898	1.1414E+02	7.2325E-01	2.7755E-01	7.9870E-04	0	0.0000E+00	0.0000E+00

total over all cells by nuclide		total collisions	collisions * weight	wgt. lost to capture	wgt. gain by fission	wgt. gain by (n,xn)	photons produced	photon produced	wgt produced	avg photon energy
	1001.62c	27071368	3.9433E+01	1.6759E-01	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	0.0000E+00
	7014.62c	267	4.4474E-04	2.3671E-05	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	0.0000E+00
	7015.66c	1	2.0596E-06	1.1114E-12	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	0.0000E+00
	8016.62c	1922599	3.1521E+00	2.5641E-03	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	0.0000E+00
	13027.62c	2086136	3.6199E+00	2.8983E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	0.0000E+00
	24050.62c	325774	5.4051E-01	1.5941E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	0.0000E+00
	24052.62c	1513808	2.4315E+00	1.8324E-02	0.0000E+00	3.4452E-06	0	0.0000E+00	0.0000E+00	0.0000E+00
	24053.62c	933267	1.4927E+00	3.9133E-02	0.0000E+00	1.5387E-06	0	0.0000E+00	0.0000E+00	0.0000E+00
	24054.62c	52663	8.8215E-02	2.6554E-04	0.0000E+00	4.3583E-06	0	0.0000E+00	0.0000E+00	0.0000E+00
	25055.62c	1123791	1.7949E+00	4.0537E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	0.0000E+00
	26054.62c	659328	1.1153E+00	1.2118E-02	0.0000E+00	0.0000E+00	0	0.0000E+00	0.0000E+00	0.0000E+00
	26056.62c	11781195	1.6346E+01	1.9002E-01	0.0000E+00	1.8762E-05	0	0.0000E+00	0.0000E+00	0.0000E+00
	26057.62c	269242	4.5546E-01	5.0906E-03	0.0000E+00	1.6393				

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82207.66c      5402837  8.4862E+00  2.2923E-02  0.0000E+00  1.2740E-04      0  0.0000E+00  0.0000E+00
82208.66c      13090538  2.0444E+01  7.6289E-04  0.0000E+00  2.5590E-04      0  0.0000E+00  0.0000E+00
92235.69c      11604  1.6516E-02  1.3773E-03  1.2018E-02  1.2382E-05      0  0.0000E+00  0.0000E+00
92238.69c      182793  3.3056E-01  2.3571E-02  5.1778E-03  2.8296E-04      0  0.0000E+00  0.0000E+00
94238.66c      0  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00      0  0.0000E+00  0.0000E+00
94239.69c      0  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00      0  0.0000E+00  0.0000E+00
94240.66c      0  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00      0  0.0000E+00  0.0000E+00
94241.66c      261894  3.6794E-01  8.6289E-02  2.6036E-01  3.0294E-05      0  0.0000E+00  0.0000E+00
94242.66c      0  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00      0  0.0000E+00  0.0000E+00
1keff results for: NAC-LWT Cask - MOX Experiments - Accident Transport Conditions      prohibd = 10/25/07
23:04:59

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the initial fission neutron source distribution was generated from a general sdf source description. the criticality problem was scheduled to skip 30 cycles and run a total of 530 cycles with nominally 1000 neutrons per cycle. this problem has run 30 inactive cycles with 30072 neutron histories and 500 active cycles with 500799 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 530970 fission neutron source histories. all cells with fissionable material were sampled and had fission neutron source points.

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

the k (collision) cycle values appear normally distributed at the 95 percent confidence level  
the k (absorption) cycle values appear normally distributed at the 95 percent confidence level  
the k (trk length) cycle values appear normally distributed at the 95 percent confidence level

the final estimated combined collision/absorption/track-length keff = 0.81154 with an estimated standard deviation of 0.00116

the estimated 68, 95, & 99 percent keff confidence intervals are 0.81038 to 0.81269, 0.80923 to 0.81384, and 0.80848 to 0.81459

the final combined (col/abs/trk) prompt removal lifetime = 8.3977E-05 seconds with an estimated standard deviation of 1.0227E-07

the average neutron energy causing fission = 7.7342E-02 mev

the energy corresponding to the average neutron lethargy causing fission = 1.3304E-07 mev

the percentages of fissions caused by neutrons in the thermal, intermediate, and fast neutron ranges are:

(<0.625 ev): 89.17%      (0.625 ev - 100 kev): 7.97%      (>100 kev): 2.86%

the average fission neutrons produced per neutron absorbed (capture + fission) in all cells with fission = 2.0828E+00

the average fission neutrons produced per neutron absorbed (capture + fission) in all the geometry cells = 8.1209E-01

the average number of neutrons produced per fission = 2.928

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

corr	keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence
	collision	0.81275	0.00130	0.81144 to 0.81405	0.81015 to 0.81534	0.80930 to 0.81619
	absorption	0.81120	0.00119	0.81001 to 0.81239	0.80883 to 0.81357	0.80805 to 0.81435
	track length	0.81243	0.00169	0.81074 to 0.81412	0.80907 to 0.81579	0.80797 to 0.81689
	col/absorp	0.81160	0.00118	0.81042 to 0.81279	0.80925 to 0.81396	0.80848 to 0.81472
0.8166	abs/trk len	0.81145	0.00115	0.81030 to 0.81260	0.80916 to 0.81374	0.80841 to 0.81449
0.4642	col/trk len	0.81269	0.00128	0.81141 to 0.81397	0.81013 to 0.81525	0.80930 to 0.81608
0.6276	col/abs/trk len	0.81154	0.00116	0.81038 to 0.81269	0.80923 to 0.81384	0.80848 to 0.81459

if the largest of each keff occurred on the next cycle, the keff results and 68, 95, and 99 percent confidence intervals would be:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence
collision	0.81294	0.00132	0.81162 to 0.81426	0.81032 to 0.81556	0.80947 to 0.81642



absorption	0.81135	0.00120	0.81015 to 0.81255	0.80896 to 0.81374	0.80818 to 0.81452
track length	0.81269	0.00170	0.81098 to 0.81439	0.80929 to 0.81608	0.80819 to 0.81719
col/abs/trk len	0.81169	0.00117	0.81053 to 0.81266	0.80937 to 0.81402	0.80861 to 0.81478

The estimated average prompt removal lifetimes, one standard deviations, and 68, 95, and 99 percent confidence intervals are (sec):

estimator	lifetime	std. dev.	68% confidence	95% confidence	99% confidence
collision	8.38310E-05	1.35781E-07	8.2695E-05 to 8.3967E-05	8.3561E-05 to 8.4102E-05	8.3472E-05 to 8.4190E-05
absorption	8.38304E-05	1.31414E-07	8.3699E-05 to 8.3962E-05	8.3564E-05 to 8.4092E-05	8.3483E-05 to 8.4178E-05
track length	8.39544E-05	1.02540E-07	8.3852E-05 to 8.4057E-05	8.3750E-05 to 8.4159E-05	8.3684E-05 to 8.4225E-05
col/absorp	8.38305E-05	1.31533E-07	8.3699E-05 to 8.3962E-05	8.3568E-05 to 8.4092E-05	8.3483E-05 to 8.4178E-05
0.9641 abs/trk len	8.39766E-05	1.02177E-07	8.3874E-05 to 8.4079E-05	8.3773E-05 to 8.4180E-05	8.3707E-05 to 8.4247E-05
0.8463 col/trk len	8.39708E-05	1.02352E-07	8.3866E-05 to 8.4073E-05	8.3767E-05 to 8.4175E-05	8.3700E-05 to 8.4241E-05
0.8149 col/abs/trk len	8.39767E-05	1.02267E-07	8.3874E-05 to 8.4079E-05	8.3773E-05 to 8.4180E-05	8.3706E-05 to 8.4247E-05

absorption estimates of prompt lifetimes (sec):

	escape	capture	fission	removal
fraction	0.00000E+00	7.22671E-01	2.77329E-01	1.00000E+00
lifetime(abs)	0.00000E+00	1.16001E-04	3.02278E-04	8.38304E-05
lifetime(c/a/t)	0.00000E+00	1.16203E-04	3.02805E-04	8.39767E-05

average keff results summed over 10 cycles each to form 50 batch values of keff print table 178

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t) st
1	31	40	0.82966	0.83432	0.81935							
2	41	50	0.81388	0.81282	0.81550	0.82177	0.00789	0.82357	0.01075	0.81743	0.00193	
3	51	60	0.81591	0.81479	0.81007	0.81981	0.00496	0.82065	0.00686	0.81497	0.00269	
4	61	70	0.82413	0.82314	0.81926	0.82089	0.00367	0.82127	0.00499	0.81605	0.00218	0.81694
0.00574 5	71	80	0.82191	0.82228	0.81994	0.82110	0.00285	0.82147	0.00379	0.81683	0.00186	0.81825
0.00362 6	81	90	0.81341	0.81903	0.80153	0.81982	0.00265	0.82107	0.00312	0.81428	0.00297	0.81800
0.00617 7	91	100	0.81570	0.80876	0.80207	0.81923	0.00232	0.81931	0.00317	0.81253	0.00306	0.81900
0.00447 8	101	110	0.82256	0.81550	0.81347	0.81964	0.00205	0.81883	0.00279	0.81265	0.00265	0.81916
0.00422 9	111	120	0.82739	0.81588	0.82961	0.82050	0.00200	0.81950	0.00248	0.81453	0.00300	0.82101
0.00377 10	121	130	0.81189	0.80694	0.79886	0.81964	0.00199	0.81735	0.00250	0.81297	0.00311	0.82178
0.00370												
11	131	140	0.81512	0.81798	0.81439	0.81923	0.00184	0.81741	0.00226	0.81310	0.00282	0.82030
0.00312 12	141	150	0.81892	0.80779	0.81619	0.81921	0.00168	0.81660	0.00222	0.81335	0.00258	0.82018
0.00294 13	151	160	0.81253	0.80385	0.81782	0.81869	0.00163	0.81562	0.00226	0.81370	0.00240	0.81873
0.00276 14	161	170	0.82293	0.81659	0.81584	0.81900	0.00154	0.81569	0.00210	0.81385	0.00223	0.81876
0.00269 15	171	180	0.81782	0.81307	0.81272	0.81892	0.00144	0.81552	0.00196	0.81378	0.00208	0.81870
0.00256 16	181	190	0.81490	0.80501	0.83582	0.81867	0.00137	0.81486	0.00195	0.81515	0.00238	0.81813
0.00211 17	191	200	0.80059	0.80287	0.80113	0.81760	0.00167	0.81416	0.00196	0.81433	0.00238	0.81579
0.00232 18	201	210	0.80941	0.79895	0.80353	0.81715	0.00164	0.81331	0.00203	0.81373	0.00233	0.81600
0.00240 19	211	220	0.81458	0.82191	0.81115	0.81701	0.00155	0.81376	0.00197	0.81359	0.00220	0.81590
0.00210 20	221	230	0.79879	0.80440	0.80211	0.81610	0.00173	0.81330	0.00193	0.81302	0.00217	0.81416
0.00206												
21	231	240	0.82474	0.82558	0.81525	0.81651	0.00170	0.81388	0.00193	0.81312	0.00207	0.81450
0.00204 22	241	250	0.80621	0.81448	0.80174	0.81604	0.00169	0.81391	0.00184	0.81261	0.00204	0.81398
0.00192 23	251	260	0.80096	0.81176	0.80767	0.81539	0.00174	0.81381	0.00176	0.81239	0.00196	0.81344
0.00172 24	261	270	0.81023	0.80779	0.80387	0.81517	0.00168	0.81356	0.00170	0.81204	0.00191	0.81322
0.00170 25	271	280	0.82492	0.81865	0.82710	0.81556	0.00166	0.81377	0.00165	0.81264	0.00193	0.81362
0.00168 26	281	290	0.80925	0.81282	0.80933	0.81532	0.00161	0.81373	0.00158	0.81251	0.00186	0.81349
0.00160 27	291	300	0.81000	0.80975	0.80467	0.81512	0.00156	0.81358	0.00153	0.81222	0.00181	0.81331
0.00156 28	301	310	0.79874	0.79355	0.81099	0.81454	0.00162	0.81287	0.00164	0.81218	0.00174	0.81258
0.00155 29	311	320	0.81086	0.81598	0.80630	0.81441	0.00156	0.81298	0.00158	0.81197	0.00169	0.81254
0.00149												

30 0.00145	321	330	0.80031	0.80718	0.80098	0.81394	0.00158	0.81278	0.00154	0.81161	0.00168	0.81215
---												
31 0.00140	331	340	0.80388	0.79876	0.81420	0.81362	0.00156	0.81233	0.00156	0.81169	0.00162	0.81188
32 0.00138	341	350	0.81724	0.82617	0.81614	0.81373	0.00152	0.81276	0.00157	0.81183	0.00158	0.81229
33 0.00149	351	360	0.83520	0.81845	0.85451	0.81438	0.00161	0.81293	0.00153	0.81312	0.00200	0.81299
34 0.00150	361	370	0.80886	0.80069	0.80539	0.81422	0.00157	0.81257	0.00153	0.81290	0.00196	0.81279
35 0.00145	371	380	0.81531	0.81537	0.82615	0.81425	0.00152	0.81265	0.00149	0.81328	0.00194	0.81301
36 0.00142	381	390	0.81009	0.80545	0.81262	0.81413	0.00149	0.81245	0.00146	0.81326	0.00188	0.81287
37 0.00138	391	400	0.81143	0.80964	0.80847	0.81406	0.00145	0.81238	0.00142	0.81313	0.00184	0.81279
38 0.00136	401	410	0.82492	0.81788	0.80537	0.81435	0.00144	0.81252	0.00139	0.81292	0.00180	0.81280
39 0.00133	411	420	0.80586	0.80407	0.81463	0.81413	0.00142	0.81231	0.00137	0.81297	0.00175	0.81263
40 0.00133	421	430	0.80978	0.79689	0.81285	0.81402	0.00139	0.81192	0.00139	0.81296	0.00171	0.81250
---												
41 0.00128	431	440	0.80815	0.81161	0.81895	0.81388	0.00136	0.81191	0.00136	0.81311	0.00167	0.81253
42 0.00128	441	450	0.79458	0.80377	0.79193	0.81342	0.00140	0.81172	0.00134	0.81261	0.00171	0.81208
43 0.00125	451	460	0.81535	0.81672	0.81120	0.81346	0.00137	0.81184	0.00131	0.81257	0.00167	0.81215
44 0.00122	461	470	0.80700	0.81373	0.79954	0.81332	0.00135	0.81188	0.00128	0.81228	0.00166	0.81206
45 0.00118	471	480	0.79961	0.80600	0.81020	0.81301	0.00135	0.81175	0.00126	0.81223	0.00162	0.81191
46 0.00118	481	490	0.80546	0.79821	0.80770	0.81285	0.00133	0.81145	0.00127	0.81213	0.00159	0.81171
47 0.00117	491	500	0.82768	0.80894	0.82950	0.81316	0.00134	0.81140	0.00124	0.81250	0.00160	0.81175
48 0.00115	501	510	0.79942	0.80020	0.81243	0.81288	0.00134	0.81117	0.00124	0.81250	0.00156	0.81156
49 0.00113	511	520	0.81145	0.80954	0.81694	0.81285	0.00132	0.81113	0.00121	0.81259	0.00153	0.81157
50 0.00110	521	530	0.80779	0.81443	0.80466	0.81275	0.00129	0.81120	0.00119	0.81243	0.00151	0.81156
average keff results summed over 20 cycles each to form 25 batch values of keff												
batch keff number dev	start cycle	end cycle	keff estimators by batch k(coll) k(abs) k(track)			average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev						col/abs/tl k(c/a/t) st
1	31	50	0.82177	0.82357	0.81743	0.82089	0.00088	0.82127	0.00230	0.81605	0.00138	
2	51	70	0.82002	0.81897	0.81466	0.81982	0.00119	0.82107	0.00135	0.81428	0.00194	
3	71	90	0.81766	0.82066	0.81074	0.81964	0.00086	0.81883	0.00243	0.81265	0.00213	0.82491
4	91	110	0.81913	0.81213	0.80777							
5	111	130	0.81964	0.81141	0.81424	0.81964	0.00067	0.81735	0.00240	0.81297	0.00168	0.82164
6	131	150	0.81702	0.81289	0.81529	0.81921	0.00070	0.81660	0.00209	0.81335	0.00142	0.81897
7	151	170	0.81773	0.81022	0.81683	0.81900	0.00063	0.81569	0.00199	0.81385	0.00130	0.81868
8	171	190	0.81636	0.80904	0.82427	0.81867	0.00063	0.81486	0.00191	0.81515	0.00172	0.81847
9	191	210	0.80500	0.80091	0.80233	0.81715	0.00162	0.81331	0.00229	0.81373	0.00208	0.81685
10	211	230	0.80668	0.81316	0.80663	0.81610	0.00179	0.81330	0.00205	0.81302	0.00199	0.81400
---												
11	231	250	0.81547	0.82003	0.80849	0.81604	0.00162	0.81391	0.00195	0.81261	0.00185	0.81404
12	251	270	0.80559	0.80977	0.80577	0.81517	0.00171	0.81356	0.00181	0.81204	0.00178	0.81292
13	271	290	0.81708	0.81574	0.81822	0.81532	0.00158	0.81373	0.00168	0.81251	0.00171	0.81341
14	291	310	0.80437	0.80165	0.80783	0.81454	0.00166	0.81287	0.00178	0.81218	0.00162	0.81242
15	311	330	0.80558	0.81158	0.80364	0.81394	0.00166	0.81278	0.00166	0.81161	0.00161	0.81191
16	331	350	0.81056	0.81246	0.81517	0.81373	0.00157	0.81276	0.00155	0.81183	0.00152	0.81217
17	351	370	0.82203	0.80957	0.82995	0.81422	0.00155	0.81257	0.00147	0.81290	0.00178	0.81256
18	371	390	0.81270	0.81041	0.81938	0.81413	0.00146	0.81245	0.00139	0.81326	0.00172	0.81267
19	391	410	0.81817	0.81376	0.80692	0.81435	0.00140	0.81252	0.00132	0.81292	0.00166	0.81265
20	411	430	0.80782	0.80048	0.81374	0.81402	0.00137	0.81192	0.00139	0.81296	0.00157	0.81232
---												

21	431	450	0.80137	0.80769	0.80544	0.81342	0.00143	0.81172	0.00133	0.81261	0.00154	0.81189
0.00121												
22	451	470	0.81117	0.81523	0.80537	0.81332	0.00137	0.81188	0.00128	0.81228	0.00150	0.81185
0.00114												
23	471	490	0.80253	0.80211	0.80895	0.81285	0.00139	0.81145	0.00130	0.81213	0.00145	0.81149
0.00112												
24	491	510	0.81355	0.80457	0.82096	0.81289	0.00133	0.81117	0.00127	0.81250	0.00143	0.81149
0.00108												
25	511	530	0.80962	0.81198	0.81080	0.81275	0.00128	0.81120	0.00122	0.81243	0.00137	0.81151
0.00102												

average keff results summed over 25 cycles each to form 20 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t)
1	31	55	0.82053	0.82250	0.81285							
2	56	80	0.82167	0.82044	0.82080	0.82110	0.00057	0.82147	0.00103	0.81683	0.00397	
3	81	105	0.81838	0.81434	0.80979	0.82019	0.00096	0.81909	0.00245	0.81448	0.00328	
4	106	130	0.81800	0.81211	0.80842	0.81964	0.00087	0.81735	0.00246	0.81297	0.00277	0.82224
0.00032												
5	131	155	0.81447	0.81041	0.81672	0.81861	0.00124	0.81596	0.00236	0.81372	0.00227	0.81922
0.00207												
6	156	180	0.82046	0.81331	0.81407	0.81992	0.00106	0.81552	0.00198	0.81378	0.00186	0.81893
0.00216												
7	181	205	0.80757	0.80137	0.81314	0.81730	0.00185	0.81350	0.00262	0.81368	0.00157	0.81729
0.00252												
8	206	230	0.80773	0.81189	0.80835	0.81610	0.00200	0.81330	0.00228	0.81302	0.00152	0.81355
0.00221												
9	231	255	0.81254	0.81725	0.80802	0.81571	0.00181	0.81374	0.00206	0.81246	0.00145	0.81295
0.00186												
10	256	280	0.81428	0.81405	0.81423	0.81556	0.00162	0.81377	0.00184	0.81264	0.00131	0.81313
0.00159												
-----												
11	281	305	0.80535	0.80546	0.80570	0.81463	0.00174	0.81301	0.00183	0.81201	0.00134	0.81211
0.00165												
12	306	330	0.80631	0.81025	0.80721	0.81394	0.00173	0.81278	0.00168	0.81161	0.00129	0.81160
0.00145												
13	331	355	0.81434	0.81294	0.82462	0.81397	0.00159	0.81279	0.00155	0.81261	0.00155	0.81274
0.00144												
14	356	380	0.81786	0.81084	0.82194	0.81425	0.00150	0.81265	0.00144	0.81328	0.00158	0.81291
0.00138												
15	381	405	0.81727	0.81240	0.81194	0.81445	0.00141	0.81264	0.00134	0.81319	0.00148	0.81288
0.00131												
16	406	430	0.80757	0.80117	0.80963	0.81402	0.00139	0.81192	0.00145	0.81296	0.00140	0.81260
0.00138												
17	431	455	0.80436	0.80922	0.80511	0.81345	0.00142	0.81176	0.00137	0.81250	0.00139	0.81203
0.00128												
18	456	480	0.80551	0.81151	0.80762	0.81301	0.00141	0.81175	0.00129	0.81223	0.00134	0.81185
0.00116												
19	481	505	0.81200	0.80345	0.81735	0.81296	0.00134	0.81131	0.00130	0.81253	0.00130	0.81180
0.00112												
20	506	530	0.80872	0.80907	0.81054	0.81275	0.00129	0.81120	0.00123	0.81243	0.00124	0.81169
0.00105												

average keff results summed over 50 cycles each to form 10 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t)
1	31	80	0.82110	0.82147	0.81683							
2	81	130	0.81819	0.81322	0.80911	0.81964	0.00145	0.81735	0.00412	0.81297	0.00386	
3	131	180	0.81746	0.81186	0.81539	0.81892	0.00111	0.81552	0.00300	0.81378	0.00237	
4	181	230	0.80765	0.80663	0.81075	0.81610	0.00292	0.81330	0.00307	0.81302	0.00184	0.81410
0.00461												
5	231	280	0.81341	0.81565	0.81112	0.81556	0.00233	0.81377	0.00243	0.81264	0.00147	0.81288
0.00269												
6	281	330	0.80583	0.80786	0.80646	0.81394	0.00250	0.81278	0.00221	0.81161	0.00158	0.81120
0.00232												
7	331	380	0.81610	0.81189	0.82328	0.81425	0.00213	0.81265	0.00187	0.81328	0.00214	0.81255
0.00226												
8	381	430	0.81242	0.80678	0.81079	0.81402	0.00186	0.81192	0.00178	0.81296	0.00188	0.81238
0.00219												
9	431	480	0.80494	0.81037	0.80636	0.81301	0.00193	0.81175	0.00158	0.81223	0.00181	0.81170
0.00170												
10	481	530	0.81036	0.80626	0.81424	0.81275	0.00174	0.81120	0.00152	0.81243	0.00163	0.81151
0.00155												

average keff results summed over 100 cycles each to form 5 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl		
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t)
1	31	130	0.81964	0.81735	0.81297							

2	131	230	0.81256	0.80924	0.81307	0.81610	0.00354	0.81230	0.00405	0.81302	0.00005	
3	231	330	0.80962	0.81175	0.80879	0.81394	0.00297	0.81278	0.00240	0.81161	0.00141	
4	331	430	0.81426	0.80934	0.81703	0.81402	0.00210	0.81192	0.00190	0.81296	0.00168	0.81086
5	431	530	0.80765	0.80831	0.81030	0.81275	0.00207	0.81120	0.00164	0.81243	0.00141	0.81084

average keff results summed over 125 cycles each to form 4 batch values of keff

batch keff number dev	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations						col/abs/tl	
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t) st	
1	31	155	0.81861	0.81596	0.81372								
2	156	280	0.81252	0.81157	0.81156	0.81556	0.00305	0.81377	0.00219	0.81264	0.00108		
3	281	405	0.81223	0.81038	0.81428	0.81445	0.00208	0.81264	0.00170	0.81319	0.00083		
4	406	530	0.80763	0.80689	0.81017	0.81275	0.00225	0.81120	0.00187	0.81243	0.00095	0.80866	

average keff results summed over 250 cycles each to form 2 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations							
			k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev		
1	31	280	0.81556	0.81377	0.81264								
2	281	530	0.80993	0.80863	0.81223	0.81275	0.00282	0.81120	0.00257	0.81243	0.00021		

laverage individual and combined collision/absorption/track-length keff results for 10 different batch sizes

cycles per intervals keff batch confidence	number of batches	average keff estimators and deviations						normality	average k(c/a/t)			95% confidence	99%
		k(coll)	st dev	k(abs)	st dev	k(trk)	st dev		co/ab/trk	k(c/a/t)	st dev		
1 0.81459	500	0.8127	0.0013	0.8112	0.0012	0.8124	0.0017	195/95/95	0.81154	0.00116	0.80923-0.81384	0.80849-	
2 0.81456	250	0.8127	0.0013	0.8112	0.0012	0.8124	0.0016	195/95/95	0.81152	0.00115	0.80924-0.81381	0.80849-	
4 0.81424	125	0.8127	0.0012	0.8112	0.0011	0.8124	0.0016	195/95/95	0.81150	0.00104	0.80943-0.81356	0.80876-	
5 0.81444	100	0.8127	0.0013	0.8112	0.0011	0.8124	0.0016	195/95/95	0.81156	0.00109	0.80939-0.81373	0.80868-	
10 0.81452	50	0.8127	0.0013	0.8112	0.0012	0.8124	0.0015	195/95/95	0.81156	0.00110	0.80935-0.81378	0.80861-	
20 0.81439	25	0.8127	0.0013	0.8112	0.0012	0.8124	0.0014	195/95/95	0.81151	0.00102	0.80939-0.81363	0.80863-	
25 0.81475	20	0.8127	0.0013	0.8112	0.0012	0.8124	0.0012	195/95/95	0.81169	0.00105	0.80946-0.81391	0.80863-	
50 0.81693	10	0.8127	0.0017	0.8112	0.0015	0.8124	0.0016	195/95/95	0.81151	0.00155	0.80785-0.81518	0.80610-	
100 0.81658	5	0.8127	0.0021	0.8112	0.0016	0.8124	0.0014	195/95/95	0.81084	0.00058	0.80835-0.81333	0.80510-	
125 0.93682	4	0.8127	0.0023	0.8112	0.0019	0.8124	0.0010	195/95/95	0.80866	0.00201	0.78307-0.83424	0.68049-	

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle			average keff estimators and deviations						average k(c/a/t)	
		k(coll)	k(abs)	k(track)	k(coll)	st dev	k(abs)	st dev	k(track)	st dev	k(c/a/t)	st dev
1	1000	0.77358	0.79932	0.74740								
2	986	0.76197	0.79060	0.75265								
3	1002	0.79295	0.77210	0.82091								
4	1019	0.79855	0.80426	0.80619								
5	1013	0.84601	0.85820	0.82484								
6	1058	0.77844	0.75337	0.72031								
7	927	0.85231	0.84192	0.83283								
8	1086	0.77620	0.80320	0.77936								
9	916	0.79294	0.79443	0.78476								
10	1021	0.81179	0.81686	0.82052								
11	1034	0.77867	0.78231	0.75394								
12	960	0.81982	0.81026	0.73652								
13	1046	0.80821	0.82129	0.79494								
14	998	0.78548	0.78599	0.78331								
15	966	0.85796	0.85715	0.80780								
16	1101	0.79257	0.77507	0.78607								
17	912	0.82974	0.83238	0.82775								
18	1038	0.80387	0.79760	0.86017								
19	966	0.81923	0.79387	0.86437								
20	1014	0.82715	0.80886	0.80226								
21	1014	0.82259	0.85874	0.80640								
22	992	0.86693	0.86026	0.84444								
23	1050	0.84547	0.83464	0.84392								
24	963	0.76921	0.78385	0.77723								
25	914	0.86921	0.85248	0.88038								
26	1121	0.80505	0.83543	0.81121								
27	939	0.83546	0.81099	0.89213								
28	1027	0.80724	0.82815	0.77292								

29	976		0.83872	0.81914	0.85585							
30	1025		0.79972	0.80144	0.84044							
----- begin active keff cycles -----												
31	985		0.79769	0.81254	0.77994							
32	1003		0.78199	0.79373	0.78218		0.78984	0.00785	0.80313	0.00940	0.78106	0.00112
33	999		0.82857	0.82168	0.80760		0.80275	0.01368	0.80931	0.00823	0.78991	0.00887
34	1051		0.82903	0.85712	0.80382		0.80932	0.01170	0.82127	0.01329	0.79339	0.00717
14266											0.78247	0.01718
35	1009		0.83682	0.82981	0.86441		0.81482	0.01060	0.82298	0.01044	0.80759	0.01525
14997											0.81913	0.01841
36	1023		0.84764	0.83567	0.83147		0.82029	0.01024	0.82509	0.00878	0.81157	0.01307
22601											0.82250	0.01228
37	1023		0.82213	0.82044	0.81896		0.82055	0.00866	0.82443	0.00745	0.81263	0.01110
30546											0.82202	0.00976
38	974		0.83130	0.84804	0.85184		0.82190	0.00762	0.82738	0.00710	0.81753	0.01079
32910											0.82559	0.00890
39	1015		0.82956	0.84174	0.80362		0.82275	0.00677	0.82897	0.00646	0.81598	0.00964
34663											0.82631	0.00820
40	969		0.89183	0.88243	0.84970		0.82966	0.00919	0.83432	0.00787	0.81935	0.00926
23195											0.82988	0.00961

511	1007		0.81678	0.82585	0.81986		0.81288	0.00132	0.81120	0.00120	0.81251	0.00170
30004											0.81156	0.00116
512	1001		0.76297	0.75270	0.73827		0.81278	0.00132	0.81108	0.00121	0.81235	0.00171
29684											0.81144	0.00117
513	943		0.80793	0.79311	0.77191		0.81277	0.00132	0.81104	0.00120	0.81227	0.00170
29688											0.81140	0.00117
514	1074		0.84159	0.85901	0.82520		0.81283	0.00131	0.81114	0.00121	0.81230	0.00170
29623											0.81149	0.00117
515	1059		0.79077	0.77557	0.83553		0.81278	0.00131	0.81106	0.00121	0.81234	0.00170
29618											0.81145	0.00117
516	943		0.83794	0.82702	0.82522		0.81284	0.00131	0.81110	0.00120	0.81237	0.00170
29655											0.81148	0.00116
517	1087		0.80995	0.82004	0.78851		0.81283	0.00131	0.81112	0.00120	0.81232	0.00169
29721											0.81148	0.00116
518	968		0.89895	0.87356	0.93949		0.81301	0.00132	0.81124	0.00121	0.81258	0.00171
29252											0.81162	0.00117
519	1102		0.78411	0.80850	0.85787		0.81295	0.00132	0.81124	0.00120	0.81268	0.00171
29329											0.81163	0.00117
520	875		0.76352	0.75999	0.77152		0.81285	0.00132	0.81113	0.00121	0.81259	0.00171
29162											0.81153	0.00117

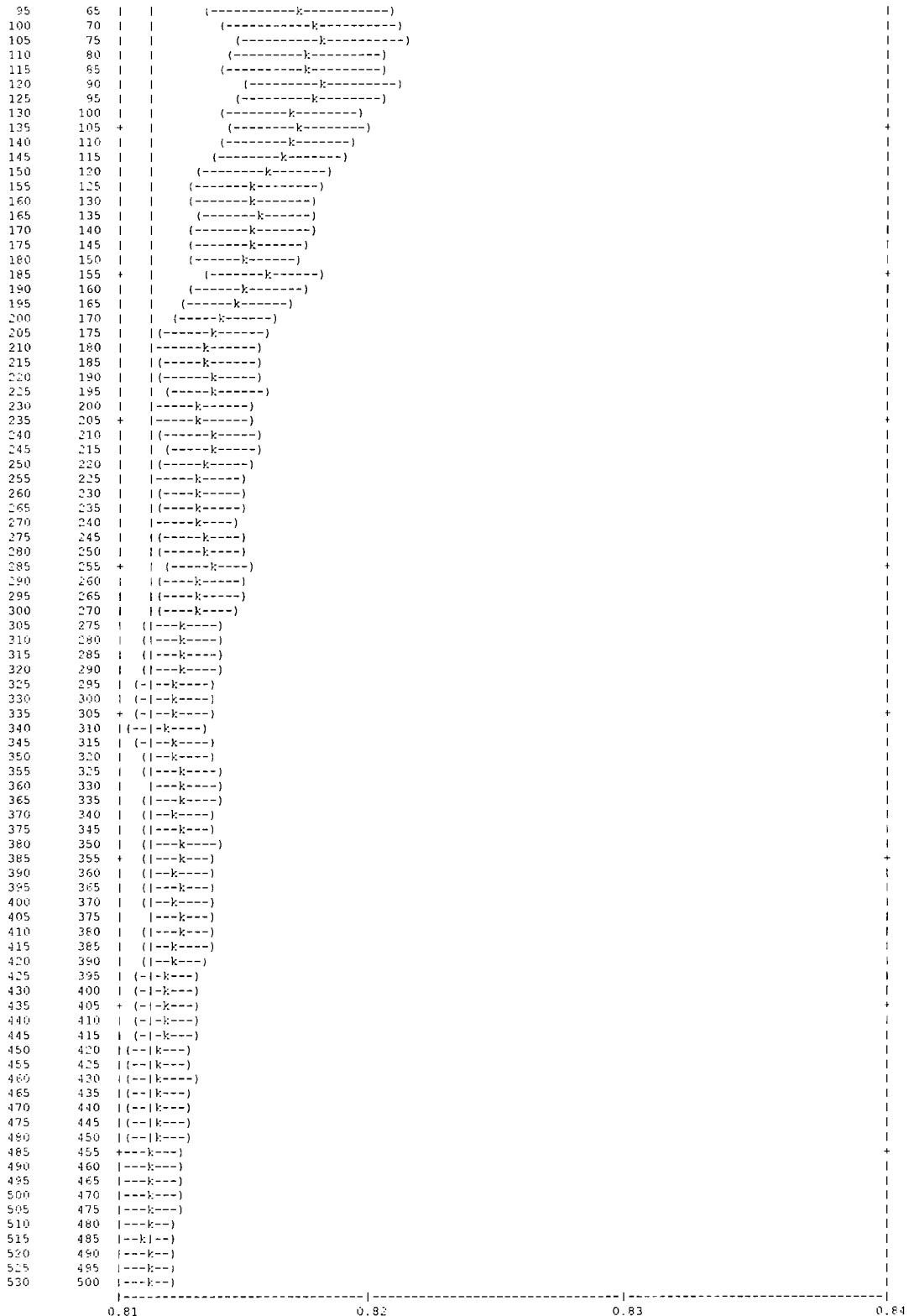
521	989		0.80518	0.81700	0.80918		0.81283	0.00131	0.81115	0.00120	0.81258	0.00170
29234											0.81154	0.00117
522	1062		0.82496	0.84155	0.83930		0.81286	0.00131	0.81121	0.00120	0.81264	0.00170
29242											0.81160	0.00117
523	1036		0.82159	0.83155	0.85448		0.81287	0.00131	0.81125	0.00120	0.81272	0.00170
29266											0.81165	0.00116
524	975		0.75715	0.77727	0.77199		0.81276	0.00131	0.81118	0.00120	0.81264	0.00170
29207											0.81157	0.00116
525	920		0.77191	0.78500	0.76597		0.81268	0.00131	0.81113	0.00120	0.81255	0.00170
29183											0.81150	0.00116
526	1036		0.81316	0.81182	0.74585		0.81268	0.00131	0.81113	0.00120	0.81241	0.00170
29223											0.81148	0.00116
527	1039		0.80919	0.80909	0.82117		0.81267	0.00131	0.81112	0.00119	0.81243	0.00170
29277											0.81148	0.00116
528	1005		0.82139	0.80960	0.79041		0.81269	0.00130	0.81112	0.00119	0.81239	0.00169
29327											0.81147	0.00116
529	1027		0.78889	0.79852	0.80474		0.81264	0.00130	0.81110	0.00119	0.81237	0.00169
29371											0.81144	0.00115
530	969		0.86444	0.86285	0.84348		0.81275	0.00130	0.81120	0.00119	0.81243	0.00169
29242											0.81154	0.00116

the largest active cycle keffs by estimator are:

the smallest active cycle keffs by estimator

collision 0.91061 on cycle 312  
 absorption 0.88814 on cycle 312  
 track length 0.93949 on cycle 518  
 collision 0.73198 on cycle 226  
 absorption 0.72474 on cycle 226  
 track length 0.71577 on cycle 390  
 plot of the estimated col/abs/track-length keff one standard deviation interval versus cycle number (I = final keff = 0.81154)

cycle number	active cycles	0.81	0.82	0.83	0.84
40	10				
45	15				
50	20				
55	25				
60	30				
65	35				
70	40				
75	45				
80	50				
85	55				
90	60				



Individual and collision/absorption/track-length keffs for different numbers of inactive cycles skipped for fission source settling

skip intervals	active cycles	active neutrons	average k(coll)	average k(abs)	average k(track)	normality	average k(c/a/t)	k(c/a/t) confidence
			st dev	st dev	st dev	co/ab/tl	k(c/a/t) st dev	95% confidence 99% confidence

0	530	530870	0.8127	0.0013	0.8113	0.0012	0.8122	0.0017	195/95/95	0.81157	0.00113	0.80932-0.81381	0.80859-
0.81454													
1	529	529870	0.8128	0.0013	0.8113	0.0012	0.8123	0.0017	195/95/95	0.81162	0.00113	0.80937-0.81386	0.80864-
0.81459													
2	528	528884	0.8129	0.0013	0.8114	0.0012	0.8124	0.0016	195/95/95	0.81168	0.00113	0.80943-0.81393	0.80870-
0.81466													
3	527	527882	0.8129	0.0013	0.8114	0.0012	0.8124	0.0017	195/95/95	0.81173	0.00113	0.80948-0.81398	0.80875-
0.81471													
4	526	526863	0.8130	0.0013	0.8114	0.0012	0.8124	0.0017	195/95/95	0.81175	0.00113	0.80949-0.81400	0.80876-
0.81473													
5	525	525850	0.8129	0.0013	0.8114	0.0012	0.8124	0.0017	195/95/95	0.81167	0.00113	0.80941-0.81392	0.80868-
0.81465													
6	524	524792	0.8130	0.0013	0.8115	0.0012	0.8126	0.0017	195/95/95	0.81177	0.00113	0.80952-0.81401	0.80879-
0.81474													
7	523	523865	0.8129	0.0013	0.8114	0.0012	0.8125	0.0017	195/95/95	0.81172	0.00113	0.80947-0.81396	0.80874-
0.81469													
8	522	522779	0.8129	0.0013	0.8114	0.0012	0.8126	0.0017	195/95/95	0.81175	0.00113	0.80950-0.81400	0.80877-
0.81473													
9	521	521863	0.8130	0.0013	0.8115	0.0012	0.8126	0.0017	195/95/95	0.81179	0.00113	0.80953-0.81404	0.80880-
0.81477													
10	520	520842	0.8130	0.0013	0.8114	0.0012	0.8126	0.0017	195/95/95	0.81177	0.00113	0.80952-0.81403	0.80878-
0.81477													
-----													
11	519	519808	0.8131	0.0013	0.8115	0.0012	0.8127	0.0017	195/95/95	0.81184	0.00113	0.80959-0.81410	0.80885-
0.81484													
12	518	518848	0.8130	0.0013	0.8115	0.0012	0.8129	0.0017	195/95/95	0.81187	0.00113	0.80961-0.81413	0.80887-
0.81487													
13	517	517802	0.8131	0.0013	0.8115	0.0012	0.8129	0.0017	195/95/95	0.81186	0.00114	0.80960-0.81413	0.80886-
0.81487													
14	516	516816	0.8131	0.0013	0.8115	0.0012	0.8130	0.0017	195/95/95	0.81191	0.00114	0.80965-0.81418	0.80891-
0.81492													
15	515	515850	0.8130	0.0013	0.8114	0.0012	0.8130	0.0017	195/95/95	0.81184	0.00114	0.80958-0.81411	0.80884-
0.81485													
16	514	514749	0.8131	0.0013	0.8115	0.0012	0.8130	0.0017	195/95/95	0.81190	0.00114	0.80964-0.81417	0.80890-
0.81491													
17	513	513837	0.8130	0.0013	0.8115	0.0012	0.8130	0.0017	195/95/95	0.81187	0.00114	0.80959-0.81414	0.80885-
0.81488													
18	512	512799	0.8130	0.0013	0.8115	0.0012	0.8129	0.0017	195/95/95	0.81186	0.00114	0.80959-0.81414	0.80885-
0.81488													
19	511	511833	0.8130	0.0013	0.8115	0.0012	0.8128	0.0017	195/95/95	0.81187	0.00114	0.80959-0.81415	0.80885-
0.81489													
20	510	510819	0.8130	0.0013	0.8115	0.0012	0.8128	0.0017	195/95/95	0.81187	0.00115	0.80959-0.81416	0.80885-
0.81490													
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475	55	55160	0.8091	0.0040	0.8061	0.0037	0.8134	0.0053	195/95/95	0.80765	0.00368	0.80025-0.81504	0.79780-
0.81750													
480	50	50124	0.8104	0.0043	0.8063	0.0039	0.8142	0.0058	195/95/95	0.80785	0.00405	0.79971-0.81599	0.79698-
0.81871													
485	45	45138	0.8117	0.0047	0.8075	0.0042	0.8169	0.0058	195/95/95	0.80926	0.00443	0.80032-0.81620	0.79731-
0.82121													
490	40	40182	0.8116	0.0051	0.8083	0.0044	0.8159	0.0064	195/95/95	0.80894	0.00466	0.79949-0.81839	0.79628-
0.82160													
495	35	35116	0.8117	0.0056	0.8094	0.0049	0.8181	0.0071	195/95/95	0.81015	0.00517	0.79962-0.82067	0.79600-
0.82429													
500	30	30049	0.8062	0.0056	0.8081	0.0053	0.8113	0.0074	195/95/95	0.80779	0.00552	0.79646-0.81911	0.79250-
0.82308													
505	25	25133	0.8087	0.0064	0.8091	0.0061	0.8105	0.0086	195/95/95	0.80898	0.00634	0.79583-0.82214	0.79110-
0.82687													
510	20	20117	0.8096	0.0078	0.8120	0.0073	0.8108	0.0104	195/95/95	0.81175	0.00785	0.79518-0.82633	0.78898-
0.83452													
515	15	15033	0.8115	0.0097	0.8156	0.0077	0.8153	0.0125	195/95/95	0.81902	0.00788	0.80185-0.83620	0.79494-
0.84311													
520	10	10059	0.8078	0.0095	0.8144	0.0081	0.8047	0.0114	195/95/95	0.82210	0.01244	0.79269-0.85152	0.77857-
0.86564													
-----													
525	5	5076	0.8194	0.0125	0.8184	0.0114	0.8011	0.0164	195/99/95	0.81633	0.01852	0.73663-0.89603	0.63251-
1.00015													
527	3	3001	0.8249	0.0219	0.8237	0.0199	0.8129	0.0159					
528	2	1996	0.8267	0.0378	0.8307	0.0322	0.8241	0.0194					

the minimum estimated standard deviation for the col/abs/trk keff estimator occurs with 0 inactive cycles and 530 active cycles.

the first active half of the problem skips 30 cycles and uses 250 active cycles; the second half skips 280 and uses 250 cycles. the col/abs/trk-len keff, one standard deviation, and 68, 95, and 99 percent intervals for each active half of the problem are:

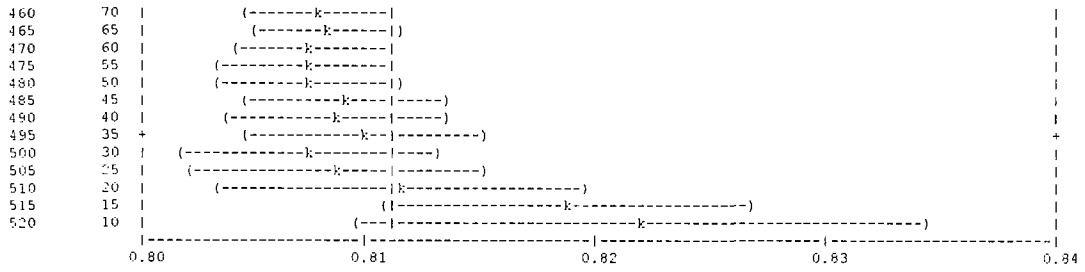
problem	keff	standard deviation	68% confidence	95% confidence	99% confidence
first half	0.81362	0.00164	0.81198 to 0.81526	0.81035 to 0.81688	0.80929 to 0.81794
second half	0.80936	0.00164	0.80771 to 0.81100	0.80608 to 0.81263	0.80501 to 0.81370
final result	0.81154	0.00116	0.81038 to 0.81269	0.80923 to 0.81384	0.80848 to 0.81459

the first and second half values of k(collisions/absorption/track length) appear to be the same at the 95 percent confidence level.

lplot of the estimated col/abs/track-length keff one standard deviation interval by active cycle number (l = final keff = 0.81154)

inactive cycles	active cycles	0.80	0.81	0.82	0.83	0.84
0	530		(-k--)			
5	525		(- k-)			
10	520		(- k--)			
15	515		(- k--)			
20	510		(- k--)			
25	505		(- k-)			
30	500		(--k--)			
35	495		(--k--)			
40	490		(--k )			
45	485		(--k )			
50	480		(--k )			
55	475		(--k )			
60	470		(--k )			
65	465		(--k )			
70	460		(--k- )			
75	455		(--k- )			
80	450		(--k- )			
85	445		(--k- )			
90	440		(---k- )			
95	435		(---k- )			
100	430		(---k- )			
105	425		(---k-- )			
110	420		(---k-- )			
115	415		(---k-- )			
120	410		(---k-- )			
125	405		(---k-- )			
130	400		(---k-- )			
135	395		(---k-- )			
140	390		(---k-- )			
145	385		(---k-- )			
150	380		(---k-- )			
155	375		(---k-- )			
160	370		(---k-- )			
165	365		(---k-- )			
170	360		(---k-- )			
175	355		(---k-- )			
180	350		(---k-- )			
185	345		(---k-- )			
190	340		(---k-- )			
195	335		(---k-- )			
200	330		(---k-- )			
205	325		(---k-- )			
210	320		(---k-- )			
215	315		(---k-- )			
220	310		(---k-- )			
225	305		(---k-- )			
230	300		(---k-- )			
235	295		(---k-- )			
240	290		(---k-- )			
245	285		(---k-- )			
250	280		(---k-- )			
255	275		(---k-- )			
260	270		(---k-- )			
265	265		(---k-- )			
270	260		(---k-- )			
275	255		(---k-- )			
280	250		(---k-- )			
285	245		(---k-- )			
290	240		(---k-- )			
295	235		(---k-- )			
300	230		(---k-- )			
305	225		(---k-- )			
310	220		(---k-- )			
315	215		(---k-- )			
320	210		(---k-- )			
325	205		(---k-- )			
330	200		(---k-- )			
335	195		(---k-- )			
340	190		(---k-- )			
345	185		(---k-- )			
350	180		(---k-- )			
355	175		(---k-- )			
360	170		(---k-- )			
365	165		(---k-- )			
370	160		(---k-- )			
375	155		(---k-- )			
380	150		(---k-- )			
385	145		(---k-- )			
390	140		(---k-- )			
395	135		(---k-- )			
400	130		(---k-- )			
405	125		(---k-- )			
410	120		(---k-- )			
415	115		(---k-- )			
420	110		(---k-- )			
425	105		(---k-- )			
430	100		(---k-- )			
435	95		(---k-- )			
440	90		(---k-- )			
445	85		(---k-- )			
450	80		(---k-- )			
455	75		(---k-- )			





.....  
dump no. 2 on file P1\_Acc\_NACCoC\_c1.00\_g0.00\_e0.00\_d0.01cm\_HP\_36mm.inpr nps = 530870 coll = 75888898  
ctm = 11.75 nzn = 769937194

6 warning messages so far.

run terminated when 530 kcode cycles were done.

computer time = 11.91 minutes

mcnp version 5 06212004

10/25/07 23:17:01

probid = 10/25/07 23:04:59

Figure 6.6.15-3 Square Pitch MOX Rods – MOX Services Fuel Composition

```

NAC-LWT Cask - MOX Experiments - Accident Transport Conditions
C
C EXCEL File Version: v2.00
C Run Version: v2.00
C
C Fissile Material Type: MOX Services
C Rod Interior Void Moderator Density: 0.9982 g/cc
C Canister Interior Moderator Density: 0.9982 g/cc
C Canister to Cask Gap Moderator Density: 0.9982 g/cc
C Cask Exterior Moderator Density: 0.0001 g/cc
C Boundary Condition / Distance: Reflected / 0.01 cm
C
C Fuel Rod Pitch: 3.8 cm
C Fuel Rod Pitch Configuration: Square
C Number of Rods: 16
C
C Base Fuel Parameters: NACCoC
C
c Cells - Fuel Rod - NACCoC
1 1 -10.555 -1 u=3 $ Fuel
2 2 -0.9982 -2 +1 u=3 $ Plenum + Fuel to Clad Gap
3 3 -6.56 -3 +2 u=3 $ Clad + End Plugs
4 4 -0.9982 +3 u=3 $ Outside Fuel Rod
C 16 Rods - Square Pitch
10 4 -0.9982 -10
      *trcl=( 1.9000 1.9000 0.0000 )
      lat=1 u=2 fill=-3:3 -3:3 0:0
      2 2 2 2 2 2
      2 3 3 3 2 2
      2 3 3 3 2 2
      2 3 3 3 2 2
      2 3 3 3 2 2
      2 3 3 3 2 2
      2 2 2 2 2 2
      2 2 2 2 2 2
C FWR Basket - Cells
20 4 -0.9982 -20 fill=2 u=1 $ Rod Array Container
21 5 -0.9982 +20 -21 u=1 $ Basket Cavity
22 7 -2.7020 -22 +21 u=1 $ Basket Body
23 5 -0.9982 +22 u=1 $ Outside
C Cells - LWT Cask Accident Conditions
40 8 -11.344 -43 u=0 $ BotPb
41 5 -0.9982 -42 fill=1 u=0 $ Cavity
42 9 -7.9400 -41 +43 u=0 $ Bottom
43 9 -7.9400 -40 +41 +45 +48 +42 u=0 $ OuterShell
44 9 -7.9400 -44 +47 +42 u=0 $ InnerShellTaper
45 9 -7.9400 -46 +42 u=0 $ InnerShell
46 8 -11.344 -47 +46 u=0 $ Lead
47 8 -11.344 -45 +44 +47 u=0 $ LeadTaper
48 0 -48 +47 u=0 $ LeadGap
49 6 -0.0001 -49 +40 u=0 $ Gap to Reflector
50 0 +49 u=0 $ Boundary

c Surfaces - Fuel Rod - NACCoC
1 RCC 0.0000 0.0000 10.5207 0.0000 0.0000 389.8900 0.4781 $ Fuel pellet stack
2 RCC 0.0000 0.0000 6.3990 0.0000 0.0000 409.4227 0.4876 $ Annulus + Plenum
3 RCC 0.0000 0.0000 5.0800 0.0000 0.0000 411.8226 0.5588 $ Clad + End-Caps
c Surfaces - Pitch - NACCoC
10 RPP -1.9000 1.9000 -1.9000 1.9000 -1.0000 453.12 $ Lattice Cell Boundaries
C PWR Basket - Surfaces
20 RPP -6.9294 6.9294 -6.9294 6.9294 0.0000 452.1200 $ Array Container
21 RPP -11.2713 11.2713 -11.2713 11.2713 0.0000 452.1200 $ Basket Opening
22 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 452.1200 16.83512 $ Basket Outer Body
C Surfaces - LWT Cask Accident Conditions
40 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 507.3650 36.5189 $ Lwt Body
41 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 26.6700 36.5189 $ Bottom
42 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 452.1200 16.9863 $ Cavity
43 RCC 0.0000 0.0000 -17.7800 0.0000 0.0000 7.6200 26.3525 $ Bottom gamma shield
44 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 20.1740 $ Lead id - taper
45 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 31.5976 $ Lead od - taper
46 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 18.9103 $ Lead id
47 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.3271 $ Lead od
48 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.4645 $ Lead gap
49 RPP -36.5289 36.5289 -36.5289 36.5289 -26.6800 480.7050 $ Container

C
c Materials List
C
C MOX Material Composition Fuel
m1 92235 -5.6994E-03
92238 -8.0851E-01
94238 -3.3724E-05
94239 -6.4076E-02
94240 -3.0252E-03
94241 -2.6980E-04
94242 -3.3724E-05
8016 -1.1835E-01
C Rod Interior Void Material
m2 1001 2
8016 1
m22 lwtr.01

```

```
c Clad Material
m3 26054 -7.063E-05 24050 -4.179E-05 7014 -4.980E-04
    26056 -1.149E-03 24052 -8.370E-04 7015 -1.981E-06
    26057 -2.702E-05 24053 -9.673E-05
    26058 -3.631E-06 24054 -2.448E-05
    40000 -9.823E-01 50000 -1.500E-02
C Canister Interior Non-Fuel Space
m4 1001 2
    8016 1
mt4 lwtr.01
C Canister to Cask Gap Material
m5 1001 2
    8016 1
mt5 lwtr.01
C Cask Exterior Material
m6 1001 2
    8016 1
mt6 lwtr.01
c Aluminum
m7 13027 -1.000E+00
C Water/Glycol
m10 1001 -1.03651E-01
    8016 -6.75619E-01
    6000 -2.20730E-01
mt10 lwtr.01
c Lead
m8 82206 -2.534E-01
    82207 -2.207E-01
    82208 -5.259E-01
c SS304
m9 24050 -7.939E-03 26054 -3.927E-02 28058 -6.384E-02
    24052 -1.590E-01 26056 -6.387E-01 28060 -2.543E-02
    24053 -1.838E-02 26057 -1.502E-02 28061 -1.124E-03
    24054 -4.652E-03 26058 -2.019E-03 28062 -3.639E-03
    28064 -9.623E-04
    25055 -2.000E-02
C Aluminum Honeycomb Impact Limiter
m11 13027 -1.0
C Mode
mode n
C Cell Importances
imp:n 1 18r 0
C
C Criticality Controls
kcode 1000 0.80 30 530
C
C Starting Source Definition
sdef cell=41:20:10:1
    erg=d1
    pos=0 0 10.5207
    rad=d2
    axs=0 0 1
    ext=d3
spl -3
si2 0.0000 0.4781
sp2 -21 1
si3 0.0000 389.8900
sp3 0 1
C Print Control
print
C Random Number Generator
rand gen=2 seed=19073486328125 stride=152917 hist=1
c
c Rotation Matrix
*TR1 0.0 0.0 0.0 -30 60 90 -120 -30 90 90 0 0 $ z-rotation -30 degrees
```

**6.6.16      ANSTO/DIDO Combined Basket Payload**

This section contains input and output files from the evaluation of the combined DIDO and ANSTO fuel models. These files are shown in Figure 6.6.16-1.

Figure 6.6.16-1 Combined DIDO and ANSTO Basket Sample Input/Output

```

PRIMARY MODULE ACCESS AND INPUT RECORD ( SCALE DRIVER - 95/03/29 - 09:06:37 )
MODULE CSAS25 WILL BE CALLED
LWT 5 DIDO with DIDO, 1 ANSTO with Moata load

27GROUPNDF4 LATTICECELL

'Material Description for DIDO HEU Fuel
URANIUM 1 DEN=0.4450 1.00 293.0 92235 94.0 92238 06.0 END
AL 1 DEN=1.4568 1.00 293.0 END
AL 2 1.00 293.0 END
H2O 3 DEN=0.9998 1.00 293.0 END

'Material Description for MOATA Mark II Fuel
URANIUM 11 DEN=0.3093 1.00 293.0 92235 92.0 92238 08.0 END
AL 11 DEN=0.7718 1.00 293.0 END
AL 12 1.00 293.0 END
H2O 13 DEN=0.9998 1.00 293.0 END

'Material Description for DIDO HIFAR Mark III Fuel
URANIUM 21 DEN=0.4084 1.00 293.0 92235 85.0 92238 15.0 END
AL 21 DEN=0.2957 1.00 293.0 END
AL 22 1.00 293.0 END
H2O 23 DEN=0.9998 1.00 293.0 END

'General Material Description
H2O 4 DEN=0.9998 1.00 293.0 END
PB 5 1.00 293.0 END
SS304 6 1.00 293.0 END
AL 7 1.00 293.0 END
SS304 8 1.00 293.0 END
H2O 9 DEN=0.0001 1.00 293.0 END
H2O 10 DEN=0.9998 1.00 293.0 END

END COMP

'Used to find the Dancoff factor for Mark II fuel:
'SYMSLABCELL 0.3832 0.1832 11 13 0.2032 12 END

'Used to find the Dancoff factor for Mark III fuel:
'SYMSLABCELL 0.6342 0.1039 21 23 0.1239 22 END

SYMSLABCELL 1.0000 0.0800 1 3 0.1300 2 END
MORE DATA
RES=11 SLAB 0.1832 DAN(11)=0.44644913
RES=21 SLAB 0.1039 DAN(21)=0.30363533 END

READ PARAM
TBA=5 TME=90 RUN=YES GEN=1203 NPG=1000
END PARAM

READ START
XSM=-16.85 XSP=16.85 YSM=16.85 YSP=-16.85 ZSM=26.67 ZSP=473.35
END START

READ GEOM
UNIT 1
COM='DIDO Fueled Annular Sections DIDO Tube 1 Loose'
' DIDO Fuel Annulus 1
CYLINDER 3 1 3.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.0550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.1350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
' DIDO Fuel Annulus 2
CYLINDER 3 1 3.5300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.5550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.6350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 58.7500 0.0000 ORIGIN 0.0000 0.0000
' DIDO Fuel Annulus 3
CYLINDER 3 1 4.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.0550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 4.1350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
' DIDO Fuel Annulus 4
CYLINDER 3 1 4.5300 58.7500 0.0000
CYLINDER 2 1 4.5550 58.7500 0.0000
CYLINDER 1 1 4.6350 58.7500 0.0000
CYLINDER 2 1 4.6599 58.7500 0.0000
UNIT 2
COM='DIDO Axial Clad Sections DIDO Tube 1 Loose'
' DIDO Clad Axial End Piece 1
CYLINDER 3 1 3.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
' DIDO Clad Axial End Piece 2
CYLINDER 3 1 3.5300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 1.3750 0.0000 ORIGIN 0.0000 0.0000
' DIDO Clad Axial End Piece 3
CYLINDER 3 1 4.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
' DIDO Clad Axial End Piece 4
CYLINDER 3 1 4.5300 1.3750 0.0000
CYLINDER 2 1 4.6599 1.3750 0.0000
UNIT 3
COM='DIDO Fuel Element DIDO Tube 1'
CYLINDER 3 1 4.6600 61.5000 0.0000
HOLE 2 0.0000 0.0000 0.0000
HOLE 1 0.0000 0.0000 1.3750
HOLE 2 0.0000 0.0000 60.1250
UNIT 4
COM='DIDO Basket Fuel Tube - Fuel Down Radial Centered'
CYLINDER 4 1 5.0927 73.1773 0.0000
HOLE 3 0.0000 0.0000 0.0000
CYLINDER 6 1 5.3974 73.1773 0.0000
UNIT 5
COM='DIDO Basket Fuel Tube - Fuel Up Radial Centered'
CYLINDER 4 1 5.0927 73.1773 0.0000
HOLE 3 0.0000 0.0000 11.6772

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CYLINDER 6 1 5.3974 73.1773 0.0000
UNIT 6
COM='DIDO Basket Bottom Plate Hole'
CYLINDER 4 1 1.27 1.2698 0.0000
UNIT 7
COM='DIDO Basket Bottom Plate'
CYLINDER 6 1 16.8466 1.2698 0.0000
HOLE 6 0.0000 0.0000 0.0000
HOLE 6 10.7950 0.0000 0.0000
HOLE 6 5.3975 9.3487 0.0000
HOLE 6 -5.3975 9.3487 0.0000
HOLE 6 -10.7950 0.0000 0.0000
HOLE 6 -5.3975 -9.3487 0.0000
HOLE 6 5.3975 -9.3487 0.0000
UNIT 8
COM='DIDO Heat Transfer Bar / Rod'
CYLINDER 7 1 0.3165 73.1773 0.0000
UNIT 9
COM='DIDO Basket Fuel Down'
CYLINDER 4 1 16.1926 73.1773 0.0000
HOLE 4 0.0000 0.0000 0.0000
HOLE 4 10.7950 0.0000 0.0000
HOLE 8 4.9493 2.8575 0.0000
HOLE 8 4.6024 3.3881 0.0000
HOLE 8 5.2354 2.2917 0.0000
HOLE 4 5.3975 9.3487 0.0000
HOLE 8 0.0000 5.7150 0.0000
HOLE 8 -0.6330 5.6798 0.0000
HOLE 8 0.6330 5.6798 0.0000
HOLE 4 -5.3975 9.3487 0.0000
HOLE 8 -4.9493 2.8575 0.0000
HOLE 8 -5.2354 2.2917 0.0000
HOLE 8 -4.6024 3.3881 0.0000
HOLE 4 -10.7950 0.0000 0.0000
HOLE 8 -4.9493 -2.8575 0.0000
HOLE 8 -4.6024 -3.3881 0.0000
HOLE 8 -5.2354 -2.2917 0.0000
HOLE 4 -5.3975 -9.3487 0.0000
HOLE 8 0.0000 -5.7150 0.0000
HOLE 8 0.6330 -5.6798 0.0000
HOLE 8 -0.6330 -5.6798 0.0000
HOLE 4 5.3975 -9.3487 0.0000
HOLE 8 4.9493 -2.8575 0.0000
HOLE 8 5.2354 -2.2917 0.0000
HOLE 8 4.6024 -3.3881 0.0000
CYLINDER 6 1 16.6688 73.1773 0.0000
CYLINDER 4 1 16.8466 73.1773 0.0000
UNIT 10
COM='DIDO Basket Fuel Up'
CYLINDER 4 1 16.1926 73.1773 0.0000
HOLE 5 0.0000 0.0000 0.0000
HOLE 5 10.7950 0.0000 0.0000
HOLE 8 4.9493 2.8575 0.0000
HOLE 8 4.6024 3.3881 0.0000
HOLE 8 5.2354 2.2917 0.0000
HOLE 5 5.3975 9.3487 0.0000
HOLE 8 0.0000 5.7150 0.0000
HOLE 8 -0.6330 5.6798 0.0000
HOLE 8 0.6330 5.6798 0.0000
HOLE 5 -5.3975 9.3487 0.0000
HOLE 8 -4.9493 2.8575 0.0000
HOLE 8 -5.2354 2.2917 0.0000
HOLE 8 -4.6024 3.3881 0.0000
HOLE 5 -10.7950 0.0000 0.0000
HOLE 8 -4.9493 -2.8575 0.0000
HOLE 8 -4.6024 -3.3881 0.0000
HOLE 8 -5.2354 -2.2917 0.0000
HOLE 5 -5.3975 -9.3487 0.0000
HOLE 8 0.0000 -5.7150 0.0000
HOLE 8 0.6330 -5.6798 0.0000
HOLE 8 -0.6330 -5.6798 0.0000
HOLE 5 5.3975 -9.3487 0.0000
HOLE 8 4.9493 -2.8575 0.0000
HOLE 8 5.2354 -2.2917 0.0000
HOLE 8 4.6024 -3.3881 0.0000
CYLINDER 6 1 16.6688 73.1773 0.0000
CYLINDER 4 1 16.8466 73.1773 0.0000
UNIT 101
COM='Mark II Fuel Plate'
CUBOID 11 1 2P0.0916 2P3.6608 58.4200 0.0000
CUBOID 12 1 2P0.1016 2P3.8291 58.4200 0.0000
CUBOID 13 1 2P0.1916 2P3.9334 58.4200 0.0000
UNIT 102
COM='Mark II Fuel Cavity Material Replacement - Side Plate'
CUBOID 13 1 2P0.3175 2P3.9334 58.4200 0.0000
UNIT 103
COM='Mark II Fuel Water Gap to Side Plate'
CUBOID 13 1 2P0.0450 2P3.9334 58.4200 0.0000
UNIT 104
COM='Mark II Plate Bundle'
ARRAY 111 -3.4074 -3.9334 0.0000
UNIT 105
COM='Mark II Fuel Plate'
CUBOID 11 1 2P3.6608 2P0.0916 58.4200 0.0000
CUBOID 12 1 2P3.8291 2P0.1016 58.4200 0.0000
CUBOID 13 1 2P3.9334 2P0.1916 58.4200 0.0000
UNIT 106
COM='Mark II Fuel Cavity Material Replacement - Side Plate'
CUBOID 13 1 2P3.9334 2P0.3175 58.4200 0.0000
UNIT 107
COM='Mark II Fuel Water Gap to Side Plate'
CUBOID 13 1 2P3.9334 2P0.0450 58.4200 0.0000
UNIT 108
COM='Mark II Plate Bundle'
ARRAY 112 -3.9334 -3.4074 0.0000
UNIT 109
COM='Mark II Tube 1 - Fuel Down Radial Shifted toward 0'
CYLINDER 13 1 5.2388 73.0240 0.0000
HOLE 104 0.0000 0.0000 0.0000
    
```

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CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 111
COM='Mark II Tube 2 - Fuel Down Radial Shifted toward 180 '
CYLINDER 13 1 5.2388 73.0240 0.0000
HOLE 104 -0.0508 0.0000 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 113
COM='Mark II Tube 3 - Fuel Down Radial Shifted toward 240 '
CYLINDER 13 1 5.2388 73.0240 0.0000
HOLE 108 -0.0164 -0.0298 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 115
COM='Mark II Tube 4 - Fuel Down Radial Shifted toward 300 '
CYLINDER 13 1 5.2388 73.0240 0.0000
HOLE 108 0.0164 -0.0298 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 117
COM='Mark II Tube 5 - Fuel Down Radial Shifted toward 0 '
CYLINDER 13 1 5.2388 73.0240 0.0000
HOLE 104 0.0508 0.0000 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 119
COM='Mark II Tube 6 - Fuel Down Radial Shifted toward 60 '
CYLINDER 13 1 5.2388 73.0240 0.0000
HOLE 108 0.0164 0.0298 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000
UNIT 121
COM='Mark II Tube 7 - Fuel Down Radial Shifted toward 120 '
CYLINDER 13 1 5.2388 73.0240 0.0000
HOLE 108 -0.0164 0.0298 0.0000
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 201
COM='Mark III Fueled Annular Sections Tube 1 '
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 59.0750 0.0000
CYLINDER 22 1 2.911 59.0750 0.0000
Mark III Fuel Annulus 1
CYLINDER 23 1 3.0994 59.0750 0.0000
CYLINDER 22 1 3.1094 59.0750 0.0000
CYLINDER 21 1 3.2133 59.0750 0.0000
CYLINDER 22 1 3.2233 59.0750 0.0000
Mark III Fuel Annulus 2
CYLINDER 23 1 3.9218 59.0750 0.0000
CYLINDER 22 1 3.9318 59.0750 0.0000
CYLINDER 21 1 4.0357 59.0750 0.0000
CYLINDER 22 1 4.0457 59.0750 0.0000
Mark III Fuel Annulus 3
CYLINDER 23 1 4.7442 59.0750 0.0000
CYLINDER 22 1 4.7542 59.0750 0.0000
CYLINDER 21 1 4.8581 59.0750 0.0000
CYLINDER 22 1 4.8681 59.0750 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 59.0750 0.0000
CYLINDER 22 1 5.0799 59.0750 0.0000
UNIT 202
COM='Mark III Axial Clad Sections Tube 1 '
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 0.0005 0.0000
CYLINDER 22 1 2.911 0.0005 0.0000
Mark III Clad Axial End Piece 1
CYLINDER 23 1 3.0994 0.0005 0.0000
CYLINDER 22 1 3.2233 0.0005 0.0000
Mark III Clad Axial End Piece 2
CYLINDER 23 1 3.9218 0.0005 0.0000
CYLINDER 22 1 4.0457 0.0005 0.0000
Mark III Clad Axial End Piece 3
CYLINDER 23 1 4.7442 0.0005 0.0000
CYLINDER 22 1 4.8681 0.0005 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 0.0005 0.0000
CYLINDER 22 1 5.0799 0.0005 0.0000
UNIT 203
COM='Mark III Fuel Element Tube 1 '
CYLINDER 23 1 5.0800 59.0763 0.0000
HOLE 202 0.0000 0.0000 0.0000
HOLE 201 0.0000 0.0000 0.0006
HOLE 202 0.0000 0.0000 59.0757
UNIT 204
COM='Mark III Basket Fuel Tube - Fuel Down Radial Shift toward 0 Deg'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 203 0.0000 0.0000 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 206
COM='Mark III Fueled Annular Sections Tube 2 '
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 59.0750 0.0000
CYLINDER 22 1 2.911 59.0750 0.0000
Mark III Fuel Annulus 1
CYLINDER 23 1 3.0994 59.0750 0.0000
CYLINDER 22 1 3.1094 59.0750 0.0000
CYLINDER 21 1 3.2133 59.0750 0.0000
CYLINDER 22 1 3.2233 59.0750 0.0000
Mark III Fuel Annulus 2
CYLINDER 23 1 3.9218 59.0750 0.0000
CYLINDER 22 1 3.9318 59.0750 0.0000
CYLINDER 21 1 4.0357 59.0750 0.0000
CYLINDER 22 1 4.0457 59.0750 0.0000
Mark III Fuel Annulus 3
CYLINDER 23 1 4.7442 59.0750 0.0000
CYLINDER 22 1 4.7542 59.0750 0.0000
CYLINDER 21 1 4.8581 59.0750 0.0000
CYLINDER 22 1 4.8681 59.0750 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 59.0750 0.0000
CYLINDER 22 1 5.0799 59.0750 0.0000
UNIT 207
COM='Mark III Axial Clad Sections Tube 2 '
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 0.0005 0.0000

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CYLINDER 22 1 2.911 0.0005 0.0000
* Mark III Clad Axial End Piece 1
CYLINDER 23 1 3.0994 0.0005 0.0000
CYLINDER 22 1 3.2233 0.0005 0.0000
* Mark III Clad Axial End Piece 2
CYLINDER 23 1 3.9218 0.0005 0.0000
CYLINDER 22 1 4.0457 0.0005 0.0000
* Mark III Clad Axial End Piece 3
CYLINDER 23 1 4.7442 0.0005 0.0000
CYLINDER 22 1 4.8681 0.0005 0.0000
* Mark III Aluminum Outer
CYLINDER 23 1 5.0700 0.0005 0.0000
CYLINDER 22 1 5.0799 0.0005 0.0000
UNIT 208
COM='Mark III Fuel Element Tube 2'
CYLINDER 23 1 5.0800 59.0763 0.0000
HOLE 207 0.0000 0.0000 0.0000
HOLE 206 0.0000 0.0000 0.0006
HOLE 207 0.0000 0.0000 59.0757
UNIT 209
COM='Mark III Basket Fuel Tube - Fuel Down Radial Shift toward 180 Deg'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 208 -0.1777 0.0000 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 211
COM='Mark III Fueled Annular Sections Tube 3 '
* Mark III Aluminum Inner
CYLINDER 23 1 2.9100 59.0750 0.0000
CYLINDER 22 1 2.911 59.0750 0.0000
* Mark III Fuel Annulus 1
CYLINDER 23 1 3.0994 59.0750 0.0000
CYLINDER 22 1 3.1094 59.0750 0.0000
CYLINDER 21 1 3.2133 59.0750 0.0000
CYLINDER 22 1 3.2233 59.0750 0.0000
* Mark III Fuel Annulus 2
CYLINDER 23 1 3.9218 59.0750 0.0000
CYLINDER 22 1 3.9318 59.0750 0.0000
CYLINDER 21 1 4.0357 59.0750 0.0000
CYLINDER 22 1 4.0457 59.0750 0.0000
* Mark III Fuel Annulus 3
CYLINDER 23 1 4.7442 59.0750 0.0000
CYLINDER 22 1 4.7542 59.0750 0.0000
CYLINDER 21 1 4.8581 59.0750 0.0000
CYLINDER 22 1 4.8681 59.0750 0.0000
* Mark III Aluminum Outer
CYLINDER 23 1 5.0700 59.0750 0.0000
CYLINDER 22 1 5.0799 59.0750 0.0000
UNIT 212
COM='Mark III Axial Clad Sections Tube 3 '
* Mark III Aluminum Inner
CYLINDER 23 1 2.9100 0.0005 0.0000
CYLINDER 22 1 2.911 0.0005 0.0000
* Mark III Clad Axial End Piece 1
CYLINDER 23 1 3.0994 0.0005 0.0000
CYLINDER 22 1 3.2233 0.0005 0.0000
* Mark III Clad Axial End Piece 2
CYLINDER 23 1 3.9218 0.0005 0.0000
CYLINDER 22 1 4.0457 0.0005 0.0000
* Mark III Clad Axial End Piece 3
CYLINDER 23 1 4.7442 0.0005 0.0000
CYLINDER 22 1 4.8681 0.0005 0.0000
* Mark III Aluminum Outer
CYLINDER 23 1 5.0700 0.0005 0.0000
CYLINDER 22 1 5.0799 0.0005 0.0000
UNIT 213
COM='Mark III Fuel Element Tube 3'
CYLINDER 23 1 5.0800 59.0763 0.0000
HOLE 212 0.0000 0.0000 0.0000
HOLE 211 0.0000 0.0000 0.0006
HOLE 212 0.0000 0.0000 59.0757
UNIT 214
COM='Mark III Basket Fuel Tube - Fuel Down Radial Shift toward 240 Deg'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 213 -0.0889 -0.1539 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 216
COM='Mark III Fueled Annular Sections Tube 4 '
* Mark III Aluminum Inner
CYLINDER 23 1 2.9100 59.0750 0.0000
CYLINDER 22 1 2.911 59.0750 0.0000
* Mark III Fuel Annulus 1
CYLINDER 23 1 3.0994 59.0750 0.0000
CYLINDER 22 1 3.1094 59.0750 0.0000
CYLINDER 21 1 3.2133 59.0750 0.0000
CYLINDER 22 1 3.2233 59.0750 0.0000
* Mark III Fuel Annulus 2
CYLINDER 23 1 3.9218 59.0750 0.0000
CYLINDER 22 1 3.9318 59.0750 0.0000
CYLINDER 21 1 4.0357 59.0750 0.0000
CYLINDER 22 1 4.0457 59.0750 0.0000
* Mark III Fuel Annulus 3
CYLINDER 23 1 4.7442 59.0750 0.0000
CYLINDER 22 1 4.7542 59.0750 0.0000
CYLINDER 21 1 4.8581 59.0750 0.0000
CYLINDER 22 1 4.8681 59.0750 0.0000
* Mark III Aluminum Outer
CYLINDER 23 1 5.0700 59.0750 0.0000
CYLINDER 22 1 5.0799 59.0750 0.0000
UNIT 217
COM='Mark III Axial Clad Sections Tube 4 '
* Mark III Aluminum Inner
CYLINDER 23 1 2.9100 0.0005 0.0000
CYLINDER 22 1 2.911 0.0005 0.0000
* Mark III Clad Axial End Piece 1
CYLINDER 23 1 3.0994 0.0005 0.0000
CYLINDER 22 1 3.2233 0.0005 0.0000
* Mark III Clad Axial End Piece 2
CYLINDER 23 1 3.9218 0.0005 0.0000
CYLINDER 22 1 4.0457 0.0005 0.0000
* Mark III Clad Axial End Piece 3

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CYLINDER 23 1 4.7442 0.0005 0.0000
CYLINDER 22 1 4.8681 0.0005 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 0.0005 0.0000
CYLINDER 22 1 5.0799 0.0005 0.0000
UNIT 218
COM='Mark III Fuel Element Tube 4'
CYLINDER 23 1 5.0800 59.0763 0.0000
HOLE 217 0.0000 0.0000 0.0000
HOLE 216 0.0000 0.0000 0.0006
HOLE 217 0.0000 0.0000 59.0757
UNIT 219
COM='Mark III Basket Fuel Tube - Fuel Down Radial Shift toward 300 Deg'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 218 0.0889 -0.1539 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 221
COM='Mark III Fueled Annular Sections Tube 5 '
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 59.0750 0.0000
CYLINDER 22 1 2.911 59.0750 0.0000
Mark III Fuel Annulus 1
CYLINDER 23 1 3.0994 59.0750 0.0000
CYLINDER 22 1 3.1094 59.0750 0.0000
CYLINDER 21 1 3.2133 59.0750 0.0000
CYLINDER 22 1 3.2233 59.0750 0.0000
Mark III Fuel Annulus 2
CYLINDER 23 1 3.9218 59.0750 0.0000
CYLINDER 22 1 3.9318 59.0750 0.0000
CYLINDER 21 1 4.0357 59.0750 0.0000
CYLINDER 22 1 4.0457 59.0750 0.0000
Mark III Fuel Annulus 3
CYLINDER 23 1 4.7442 59.0750 0.0000
CYLINDER 22 1 4.7542 59.0750 0.0000
CYLINDER 21 1 4.8581 59.0750 0.0000
CYLINDER 22 1 4.8681 59.0750 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 59.0750 0.0000
CYLINDER 22 1 5.0799 59.0750 0.0000
UNIT 222
COM='Mark III Axial Clad Sections Tube 5 '
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 0.0005 0.0000
CYLINDER 22 1 2.911 0.0005 0.0000
Mark III Clad Axial End Piece 1
CYLINDER 23 1 3.0994 0.0005 0.0000
CYLINDER 22 1 3.2233 0.0005 0.0000
Mark III Clad Axial End Piece 2
CYLINDER 23 1 3.9218 0.0005 0.0000
CYLINDER 22 1 4.0457 0.0005 0.0000
Mark III Clad Axial End Piece 3
CYLINDER 23 1 4.7442 0.0005 0.0000
CYLINDER 22 1 4.8681 0.0005 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 0.0005 0.0000
CYLINDER 22 1 5.0799 0.0005 0.0000
UNIT 223
COM='Mark III Fuel Element Tube 5'
CYLINDER 23 1 5.0800 59.0763 0.0000
HOLE 222 0.0000 0.0000 0.0000
HOLE 221 0.0000 0.0000 0.0006
HOLE 222 0.0000 0.0000 59.0757
UNIT 224
COM='Mark III Basket Fuel Tube - Fuel Down Radial Shift toward 0 Deg'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 223 0.1777 0.0000 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 226
COM='Mark III Fueled Annular Sections Tube 6 '
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 59.0750 0.0000
CYLINDER 22 1 2.911 59.0750 0.0000
Mark III Fuel Annulus 1
CYLINDER 23 1 3.0994 59.0750 0.0000
CYLINDER 22 1 3.1094 59.0750 0.0000
CYLINDER 21 1 3.2133 59.0750 0.0000
CYLINDER 22 1 3.2233 59.0750 0.0000
Mark III Fuel Annulus 2
CYLINDER 23 1 3.9218 59.0750 0.0000
CYLINDER 22 1 3.9318 59.0750 0.0000
CYLINDER 21 1 4.0357 59.0750 0.0000
CYLINDER 22 1 4.0457 59.0750 0.0000
Mark III Fuel Annulus 3
CYLINDER 23 1 4.7442 59.0750 0.0000
CYLINDER 22 1 4.7542 59.0750 0.0000
CYLINDER 21 1 4.8581 59.0750 0.0000
CYLINDER 22 1 4.8681 59.0750 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 59.0750 0.0000
CYLINDER 22 1 5.0799 59.0750 0.0000
UNIT 227
COM='Mark III Axial Clad Sections Tube 6 '
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 0.0005 0.0000
CYLINDER 22 1 2.911 0.0005 0.0000
Mark III Clad Axial End Piece 1
CYLINDER 23 1 3.0994 0.0005 0.0000
CYLINDER 22 1 3.2233 0.0005 0.0000
Mark III Clad Axial End Piece 2
CYLINDER 23 1 3.9218 0.0005 0.0000
CYLINDER 22 1 4.0457 0.0005 0.0000
Mark III Clad Axial End Piece 3
CYLINDER 23 1 4.7442 0.0005 0.0000
CYLINDER 22 1 4.8681 0.0005 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 0.0005 0.0000
CYLINDER 22 1 5.0799 0.0005 0.0000
UNIT 228
COM='Mark III Fuel Element Tube 6'
CYLINDER 23 1 5.0800 59.0763 0.0000

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HOLE 227 0.0000 0.0000 0.0000
HOLE 226 0.0000 0.0000 0.0006
HOLE 227 0.0000 0.0000 59.0757
UNIT 229
COM='Mark III Basket Fuel Tube - Fuel Down Radial Shift toward 60 Deg'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 228 0.0889 0.1539 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 231
COM='Mark III Fueled Annular Sections Tube 7'
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 59.0750 0.0000
CYLINDER 22 1 2.911 59.0750 0.0000
Mark III Fuel Annulus 1
CYLINDER 23 1 3.0994 59.0750 0.0000
CYLINDER 22 1 3.1094 59.0750 0.0000
CYLINDER 21 1 3.2133 59.0750 0.0000
CYLINDER 22 1 3.2233 59.0750 0.0000
Mark III Fuel Annulus 2
CYLINDER 23 1 3.9218 59.0750 0.0000
CYLINDER 22 1 3.9318 59.0750 0.0000
CYLINDER 21 1 4.0357 59.0750 0.0000
CYLINDER 22 1 4.0457 59.0750 0.0000
Mark III Fuel Annulus 3
CYLINDER 23 1 4.7442 59.0750 0.0000
CYLINDER 22 1 4.7542 59.0750 0.0000
CYLINDER 21 1 4.8581 59.0750 0.0000
CYLINDER 22 1 4.8681 59.0750 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 59.0750 0.0000
CYLINDER 22 1 5.0799 59.0750 0.0000
UNIT 232
COM='Mark III Axial Clad Sections Tube 7'
Mark III Aluminum Inner
CYLINDER 23 1 2.9100 0.0005 0.0000
CYLINDER 22 1 2.911 0.0005 0.0000
Mark III Clad Axial End Piece 1
CYLINDER 23 1 3.0994 0.0005 0.0000
CYLINDER 22 1 3.2233 0.0005 0.0000
Mark III Clad Axial End Piece 2
CYLINDER 23 1 3.9218 0.0005 0.0000
CYLINDER 22 1 4.0457 0.0005 0.0000
Mark III Clad Axial End Piece 3
CYLINDER 23 1 4.7442 0.0005 0.0000
CYLINDER 22 1 4.8681 0.0005 0.0000
Mark III Aluminum Outer
CYLINDER 23 1 5.0700 0.0005 0.0000
CYLINDER 22 1 5.0799 0.0005 0.0000
UNIT 233
COM='Mark III Fuel Element Tube 7'
CYLINDER 23 1 5.0800 59.0763 0.0000
HOLE 232 0.0000 0.0000 0.0000
HOLE 231 0.0000 0.0000 0.0006
HOLE 232 0.0000 0.0000 59.0757
UNIT 234
COM='Mark III Basket Fuel Tube - Fuel Down Radial Shift toward 120 Deg'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 233 0.0889 0.1539 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 301
COM='DIDO Fueled Annular Sections ANSTO Tube 1 Loose'
DIDO Fuel Annulus 1
CYLINDER 3 1 3.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.0550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.1350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
DIDO Fuel Annulus 2
CYLINDER 3 1 3.5300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.5550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.6350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 58.7500 0.0000 ORIGIN 0.0000 0.0000
DIDO Fuel Annulus 3
CYLINDER 3 1 4.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.0550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 4.1350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
DIDO Fuel Annulus 4
CYLINDER 3 1 4.5300 58.7500 0.0000
CYLINDER 2 1 4.5550 58.7500 0.0000
CYLINDER 1 1 4.6350 58.7500 0.0000
CYLINDER 2 1 4.6599 58.7500 0.0000
UNIT 302
COM='DIDO Axial Clad Sections ANSTO Tube 1 Loose'
DIDO Clad Axial End Piece 1
CYLINDER 3 1 3.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
DIDO Clad Axial End Piece 2
CYLINDER 3 1 3.5300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 1.3750 0.0000 ORIGIN 0.0000 0.0000
DIDO Clad Axial End Piece 3
CYLINDER 3 1 4.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
DIDO Clad Axial End Piece 4
CYLINDER 3 1 4.5300 1.3750 0.0000
CYLINDER 2 1 4.6599 1.3750 0.0000
UNIT 303
COM='DIDO Fuel Element ANSTO Tube 1'
CYLINDER 3 1 5.0800 61.5000 0.0000
HOLE 302 0.0000 0.0000 0.0000
HOLE 301 0.0000 0.0000 1.3750
HOLE 302 0.0000 0.0000 60.1250
UNIT 304
COM='ANSTO Basket DIDO Fuel Tube - Fuel Down'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 303 0.0000 0.0000 0.0000
CYLINDER 6 1 5.57510 73.0249 0.0000
UNIT 305
COM='Mark II Fuel Plate With Can'

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CUBOID 11 1 2P0.0916 2P3.6608 58.4200 0.0000
CUBOID 12 1 2P0.1016 2P3.8291 58.4200 0.0000
CUBOID 10 1 2P0.2200 2P3.8311 58.4200 0.0000
UNIT 306
COM='Mark II Plate Bundle With Can'
ARRAY 311 -3.0869 -3.8311 0.0000
UNIT 307
COM='Mark II Fuel Plate With Can'
CUBOID 11 1 2P3.6608 2P0.0916 58.4200 0.0000
CUBOID 12 1 2P3.8291 2P0.1016 58.4200 0.0000
CUBOID 10 1 2P3.9334 2P0.2070 58.4200 0.0000
UNIT 308
COM='Mark II Plate Bundle With Can'
ARRAY 312 -3.9334 -2.8500 0.0000
UNIT 309
COM='Mark II Tube 1 - Fuel Down - In DFC - Radial Centered'
CYLINDER 10 1 4.9200 70.0000 0.0000
HOLE 306 0.0000 0.0000 0.0000
CYLINDER 7 1 5.0800 70.0000 0.0000
CYLINDER 4 1 5.2388 73.0240 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 310
COM='Mark II Tube 1 - Fuel Down - In DFC - Radial Centered'
CYLINDER 10 1 4.9200 70.0000 0.0000
HOLE 308 0.0000 0.0000 0.0000
CYLINDER 7 1 5.0800 70.0000 0.0000
CYLINDER 4 1 5.2388 73.0240 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 311
COM='Mark III Fuel Plate'
CUBOID 21 1 2P0.0735 2P3.0000 58.4200 0.0000
CUBOID 23 1 2P0.3875 2P3.0010 58.4200 0.0000
UNIT 312
COM='Mark III Plate Bundle'
ARRAY 321 -3.8750 -3.0000 0.0000
UNIT 313
COM='Mark III Fuel Plate'
CUBOID 21 1 2P3.0000 2P0.0735 58.4200 0.0000
CUBOID 23 1 2P3.0010 2P0.3875 58.4200 0.0000
UNIT 314
COM='Mark III Plate Bundle'
ARRAY 322 -3.0000 -3.8750 0.0000
UNIT 315
COM='Mark III Tube 1 - Fuel Down - In DFC - Radial Centered'
CYLINDER 10 1 4.9200 70.0000 0.0000
HOLE 312 0.0000 0.0000 0.0000
CYLINDER 7 1 5.0800 70.0000 0.0000
CYLINDER 4 1 5.2388 73.0240 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 316
COM='DIDO Fueled Annular Sections ANSTO Tube 1 Loose'
DIDO Fuel Annulus 1
CYLINDER 10 1 3.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.0550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.1350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
DIDO Fuel Annulus 2
CYLINDER 10 1 3.5300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.5550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 3.6350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 58.7500 0.0000 ORIGIN 0.0000 0.0000
DIDO Fuel Annulus 3
CYLINDER 10 1 4.0300 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.0550 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 1 1 4.1350 58.7500 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 58.7500 0.0000 ORIGIN 0.0000 0.0000
DIDO Fuel Annulus 4
CYLINDER 10 1 4.5300 58.7500 0.0000
CYLINDER 2 1 4.5550 58.7500 0.0000
CYLINDER 1 1 4.6350 58.7500 0.0000
CYLINDER 2 1 4.6599 58.7500 0.0000
UNIT 317
COM='DIDO Axial Clad Sections ANSTO Tube 1 Loose'
DIDO Clad Axial End Piece 1
CYLINDER 10 1 3.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
DIDO Clad Axial End Piece 2
CYLINDER 10 1 3.5300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 3.6600 1.3750 0.0000 ORIGIN 0.0000 0.0000
DIDO Clad Axial End Piece 3
CYLINDER 10 1 4.0300 1.3750 0.0000 ORIGIN 0.0000 0.0000
CYLINDER 2 1 4.1600 1.3750 0.0000 ORIGIN 0.0000 0.0000
DIDO Clad Axial End Piece 4
CYLINDER 10 1 4.5300 1.3750 0.0000
CYLINDER 2 1 4.6599 1.3750 0.0000
UNIT 318
COM='DIDO Fuel Element ANSTO Tube 1'
CYLINDER 10 1 4.9200 70.0000 0.0000
HOLE 317 0.0000 0.0000 0.0000
HOLE 316 0.0000 0.0000 1.3750
HOLE 317 0.0000 0.0000 60.1250
CYLINDER 7 1 5.0800 70.0000 0.0000
UNIT 319
COM='ANSTO Basket DIDO Fuel Tube - Fuel Down'
CYLINDER 4 1 5.2578 73.0249 0.0000
HOLE 318 0.0000 0.0000 0.0000
CYLINDER 6 1 5.5751 73.0249 0.0000
UNIT 320
COM='Empty ANSTO Basket Tube'
CYLINDER 4 1 5.2578 73.0249 0.0000
CYLINDER 6 1 5.5751 73.0249 0.0000
UNIT 321
COM='Mark II Fuel Plate Cut 7 cm'
CUBOID 11 1 2P0.0916 2P3.6608 51.4200 0.0000
CUBOID 12 1 2P0.1016 2P3.8291 51.4200 0.0000
CUBOID 13 1 2P0.2450 2P3.9334 51.4200 0.0000
    
```

UNIT 322  
COM='Mark II Plate Bundle Cut 7 cm'  
ARRAY 313 -3.4074 -3.9334 0.0000

UNIT 323  
COM='Mark II Fuel Plate Cut 7 cm'  
CUBOID 11 1 2P3.6608 2P0.0916 51.4200 0.0000  
CUBOID 12 1 2P3.8291 2P0.1016 51.4200 0.0000  
CUBOID 13 1 2P3.9334 2P0.2450 51.4200 0.0000

UNIT 324  
COM='Mark II Plate Bundle Cut 7 cm'  
ARRAY 314 -3.9334 -3.4074 0.0000

UNIT 325  
COM='Mark II Tube 1 - Fuel Down - Cut 7 cm - Radial Centered'  
CYLINDER 4 1 5.2388 73.0240 0.0000  
HOLE 322 0.0000 0.0000 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 326  
COM='Mark II Tube 1 - Fuel Down - Cut 7 cm - Radial Centered'  
CYLINDER 4 1 5.2388 73.0240 0.0000  
HOLE 324 0.0000 0.0000 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 327  
COM='Mark II Fuel Plate With Can - Cut'  
CUBOID 11 1 2P0.0916 2P3.6608 29.2100 0.0000  
CUBOID 12 1 2P0.1016 2P3.8291 29.2100 0.0000  
CUBOID 10 1 2P0.1100 2P3.8311 29.2100 0.0000

UNIT 328  
COM='Mark II Plate Bundle With Can - Cut'  
ARRAY 315 -3.0800 -3.8311 0.0000

UNIT 329  
COM='Mark II Fuel Plate With Can'  
CUBOID 11 1 2P3.6608 2P0.0916 51.4200 0.0000  
CUBOID 12 1 2P3.8291 2P0.1016 51.4200 0.0000  
CUBOID 10 1 2P3.9334 2P0.2070 51.4200 0.0000

UNIT 330  
COM='Mark II Plate Bundle With Can - Cut'  
ARRAY 316 -3.9334 -2.8500 0.0000

UNIT 331  
COM='Mark II Tube 1 - Fuel Down - In DFC - Cut - Radial Centered'  
CYLINDER 10 1 4.9200 70.0000 0.0000  
HOLE 328 0.0000 0.0000 0.0000  
CYLINDER 7 1 5.0800 70.0000 0.0000  
CYLINDER 4 1 5.2388 73.0240 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 332  
COM='Mark II Tube 1 - Fuel Down - In DFC - Cut - Radial Centered'  
CYLINDER 10 1 4.9200 70.0000 0.0000  
HOLE 330 0.0000 0.0000 0.0000  
CYLINDER 7 1 5.0800 70.0000 0.0000  
CYLINDER 4 1 5.2388 73.0240 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 333  
COM='Mark II Fuel Plate'  
CUBOID 11 1 2P0.0916 2P3.6608 58.4200 0.0000  
CUBOID 12 1 2P0.1016 2P3.8291 58.4200 0.0000  
CUBOID 13 1 2P0.2668 2P3.8311 58.4200 0.0000

UNIT 334  
COM='Mark II Left Outer Fuel Plate'  
CUBOID3 11 1 2P0.0916 2P3.6608 58.4200 0.0000  
CUBOID 12 1 2P0.1016 2P3.8291 58.4200 0.0000  
CUBOID 13 1 0.2668 -0.1016 2P3.8311 58.4200 0.0000

UNIT 335  
COM='Mark II Right Outer Fuel Plate'  
CUBOID 11 1 2P0.0916 2P3.6608 58.4200 0.0000  
CUBOID 12 1 2P0.1016 2P3.8291 58.4200 0.0000  
CUBOID 13 1 0.1016 -0.2668 2P3.8311 58.4200 0.0000

UNIT 336  
COM='Mark II Plate Bundle'  
ARRAY 317 -3.5700 -3.8311 0.0000

UNIT 337  
COM='Mark III Left Fuel Plate'  
CUBOID 21 1 2P0.0735 2P3.0000 58.4200 0.0000  
CUBOID 23 1 0.4685 -0.0735 2P3.0010 58.4200 0.0000

UNIT 338  
COM='Mark III Right Fuel Plate'  
CUBOID 21 1 2P0.0735 2P3.0000 58.4200 0.0000  
CUBOID 23 1 0.0735 -0.4685 2P3.0010 58.4200 0.0000

UNIT 339  
COM='Mark III Fuel Plate'  
CUBOID 21 1 2P0.0735 2P3.0000 58.4200 0.0000  
CUBOID 23 1 2P0.4685 2P3.0010 58.4200 0.0000

UNIT 340  
COM='Mark III Plate Bundle'  
ARRAY 319 -4.2900 -3.0000 0.0000

UNIT 341  
COM='Mark III Tube 1 - Fuel Down Radial Centered'  
CYLINDER 4 1 5.2388 73.0240 0.0000  
HOLE 340 0.0000 0.0000 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 342  
COM='Mark III Tube 2 - Fuel Down Shifted Toward 180'  
CYLINDER 4 1 5.2388 73.0240 0.0000  
HOLE 340 -0.0012 0.0000 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 343  
COM='Mark III Tube 3 - Fuel Down Shifted Toward 240'  
CYLINDER 4 1 5.2388 73.0240 0.0000  
HOLE 340 0.0000 -0.0005 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 344  
COM='Mark III Tube 4 - Fuel Down Shifted Toward 300'  
CYLINDER 4 1 5.2388 73.0240 0.0000  
HOLE 340 0.0000 -0.0005 0.0000  
CYLINDER 6 1 5.55525 73.0240 0.0000

UNIT 345  
COM='Mark III Tube 5 - Fuel Down Shifted Toward 0'

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CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 340 0.0012 0.0000 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 346
COM='Mark III Tube 6 - Fuel Down Shifted Toward 60'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 340 0.0000 0.0005 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 347
COM='Mark III Tube 7 - Fuel Down Shifted Toward 120'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 340 0.0000 0.0005 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 348
COM='Mark II Tube 1 - Fuel Down Radial Centered'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 336 0.0000 0.0000 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 349
COM='Mark II Tube 2 - Fuel Down Shifted Toward 180'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 336 0.0000 0.0000 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 350
COM='Mark II Tube 3 - Fuel Down Shifted Toward 240'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 336 0.0000 0.0000 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 351
COM='Mark II Tube 4 - Fuel Down Shifted Toward 300'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 336 0.0000 0.0000 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 352
COM='Mark II Tube 5 - Fuel Down Shifted Toward 0'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 336 0.0000 0.0000 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 353
COM='Mark II Tube 6 - Fuel Down Shifted Toward 60'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 336 0.0000 0.0000 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 354
COM='Mark II Tube 7 - Fuel Down Shifted Toward 120'
CYLINDER 4 1 5.2388 73.0240 0.0000
HOLE 336 0.0000 0.0000 0.0000
CYLINDER 6 1 5.5525 73.0240 0.0000
UNIT 401
COM='ANSTO Basket Fuel Down'
CYLINDER 4 1 16.7260 73.0249 0.0000
HOLE 348 0.0000 0.0000 0.0000
HOLE 349 11.1506 0.0000 0.0000
HOLE 350 5.5753 9.6567 0.0000
HOLE 351 -5.5753 9.6567 0.0000
HOLE 352 -11.1506 0.0000 0.0000
HOLE 353 -5.5753 -9.6567 0.0000
HOLE 354 5.5753 -9.6567 0.0000
CYLINDER 4 1 16.8466 73.0249 0.0000
UNIT 402
COM='ANSTO Basket Bottom Plate Hole'
CYLINDER 4 1 1.27 1.2172 0.0000
UNIT 403
COM='Basket Bottom Plate '
CYLINDER 6 1 16.8466 1.2172 0.0000
HOLE 402 0.0000 0.0000 0.0000
HOLE 402 11.1125 0.0000 0.0000
HOLE 402 5.5563 9.6237 0.0000
HOLE 402 -5.5563 9.6237 0.0000
HOLE 402 -11.1125 0.0000 0.0000
HOLE 402 -5.5563 -9.6237 0.0000
HOLE 402 5.5562 -9.6237 0.0000
UNIT 404
COM='Cask Cavity '
CYLINDER 4 1 16.9863 446.6844 0.0000
HOLE 7 0.0000 0.0000 0.0001
HOLE 10 0.0000 0.0000 1.2700
HOLE 7 0.0000 0.0000 74.4475
HOLE 9 0.0000 0.0000 75.7174
HOLE 7 0.0000 0.0000 148.8949
HOLE 10 0.0000 0.0000 150.1648
HOLE 7 0.0000 0.0000 223.3423
HOLE 9 0.0000 0.0000 224.6122
HOLE 7 0.0000 0.0000 297.7897
HOLE 10 0.0000 0.0000 299.0596
HOLE 403 0.0000 0.0000 372.2371
HOLE 401 0.0000 0.0000 373.4548
UNIT 405
COM='Cask Shield Radial Configuration'
CYLINDER 4 1 16.9863 446.6844 0.0000
HOLE 404 0.0000 0.0000 0.0000
CYLINDER 8 1 18.9103 446.6844 0.0000
CYLINDER 5 1 33.4645 446.6844 0.0000
CYLINDER 8 1 36.5189 446.6844 0.0000
CYLINDER 9 1 49.2189 446.6844 0.0000
CYLINDER 8 1 49.8183 446.6844 0.0000
CUBOID 9 1 4P49.8183 446.6844 0.0000
UNIT 406
COM='LWT Lid '
CYLINDER 8 1 36.5189 28.5750 0.5994
CYLINDER 9 1 49.8183 28.5750 0.5994
CYLINDER 8 1 49.8183 28.5750 0.0000
CUBOID 9 1 4P49.8183 28.5750 0.0000
UNIT 407
COM='LWT Bottom Weldment '
CYLINDER 5 1 26.3525 16.5100 8.8900
CYLINDER 8 1 36.5189 26.0706 0.0000
CYLINDER 9 1 49.8183 26.0706 0.0000
    
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CYLINDER 8 1 49.8183 26.6700 0.0000
CUBOID 9 1 4P49.8183 26.6700 0.0000
Global UNIT 408
COM='LWT Cask '
ARRAY 401 -49.8183 -49.8183 0.0000
END GEOM
    
```

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READ ARRAY
ARA=111 NUX=18 NUZ=1 FILL 102 103 14R101 103 102 END FILL
ARA=112 NUX=1 NUZ=1 FILL 106 107 14R105 107 106 END FILL
ARA=311 NUX=14 NUZ=1 FILL 14R305 END FILL
ARA=312 NUX=1 NUZ=1 FILL 14R307 END FILL
ARA=313 NUX=14 NUZ=1 FILL 14R321 END FILL
ARA=314 NUX=1 NUZ=1 FILL 14R323 END FILL
ARA=315 NUX=28 NUZ=1 FILL 28R327 END FILL
ARA=316 NUX=1 NUZ=1 FILL 14R329 END FILL
ARA=317 NUX=14 NUZ=1 FILL 334 12R333 335 END FILL
ARA=319 NUX=10 NUZ=1 FILL 337 8R339 338 END FILL
ARA=320 NUX=1 NUZ=1 FILL 10R341 END FILL
ARA=321 NUX=10 NUZ=1 FILL 10R311 END FILL
ARA=322 NUX=1 NUZ=1 FILL 10R313 END FILL
ARA=401 NUX=1 NUZ=3 FILL 407 405 406 END FILL
END ARRAY
    
```

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READ BOUNDS ALL=MIRROR END BOUNDS
    
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READ PLOT
PLT=no
TTL='X-Y PLOT OF CENTER ELEMENT - FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-5.4 YUL=5.4 ZUL=57.4
XLR=5.4 YLR=-5.4 ZLR=57.4 END
TTL='X-Y PLOT OF BASKET - FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-17.0 YUL=17.0 ZUL=57.4
XLR=17.0 YLR=-17.0 ZLR=57.4 END
TTL='X-Y PLOT OF CASK - FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-49.8 YUL=49.8 ZUL=57.4
XLR=49.8 YLR=-49.8 ZLR=57.4 END
TTL='X-Z PLOT OF BOTTOM BASKET - CENTER FUEL ELEMENT CROSS SECTION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-5.4 YUL=0.0 ZUL=77.4
XLR=5.4 YLR=0.0 ZLR=57.4 END
TTL='X-Z PLOT OF BOTTOM BASKET - CENTER FUEL ELEMENT ROW'
SCR=YES PIC=MAT LPI=10
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-17.0 YUL=0.0 ZUL=101.1
XLR=17.0 YLR=0.0 ZLR=26.7 END
TTL='Y-Z (X=0) PLOT OF BOTTOM BASKET'
SCR=YES PIC=MAT LPI=10
VAX=1.0 WDN=-1.0 NAX=1500
XUL=0.0 YUL=-17.0 ZUL=101.1
XLR=0.0 YLR=17.0 ZLR=26.7 END
TTL='X-Z PLOT OF BOTTOM BASKET - TOP FUEL ELEMENT ROW'
SCR=YES PIC=MAT LPI=10
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-17.0 YUL=9.3 ZUL=101.1
XLR=17.0 YLR=9.3 ZLR=26.7 END
TTL='X-Z PLOT OF CASK CAVITY'
SCR=YES PIC=MAT LPI=5
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-17.0 YUL=0.0 ZUL=474.4
XLR=17.0 YLR=0.0 ZLR=25.7 END
TTL='X-Z PLOT OF CASK'
SCR=YES PIC=MAT LPI=5
UAX=1.0 WDN=-1.0 NAX=1500
XUL=-49.8 YUL=0.0 ZUL=502.9
XLR=49.8 YLR=0.0 ZLR=0.0 END
    
```

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'Plots of TOP BASKET fuel
TTL='X-Y PLOT OF CENTER ELEMENT - TOP FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-5.4 YUL=5.4 ZUL=435
XLR=5.4 YLR=-5.4 ZLR=435 END
TTL='X-Y PLOT OF BASKET - TOP FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-17.0 YUL=17.0 ZUL=435
XLR=17.0 YLR=-17.0 ZLR=435 END
TTL='X-Y PLOT OF CASK - TOP FUEL ELEVATION'
SCR=YES PIC=MAT LPI=10
UAX=1.0 VDN=-1.0 NAX=1500
XUL=-49.8 YUL=49.8 ZUL=435
XLR=49.8 YLR=-49.8 ZLR=435 END
    
```

```

END PLOT
END DATA
    
```

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SECONDARY MODULE 000008 HAS BEEN CALLED.
MODULE 000008 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 0.33 (SECONDS).
SECONDARY MODULE 000002 HAS BEEN CALLED.
MODULE 000002 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 1.98 (SECONDS).
SECONDARY MODULE 000009 HAS BEEN CALLED.
MODULE 000009 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 305.16 (SECONDS).
MODULE CSAS25 IS FINISHED. COMPLETION CODE 0. CPU TIME USED 308.57 (SECONDS).
    
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**NAC-LWT Cask SAR**  
**Revision 43**

January 2015

TAPE IDENTIFICATION NUMBER 4321  
 NUMBER OF NUCLIDES ON TAPE 34  
 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 1680 WORDS  
 XSDRN TAPE 4321

SCALE 4.2 - 27 GROUP NEUTRON GROUP LIBRARY  
 BASED ON ENDF-B VERSION 4 DATA  
 COMPILED FOR NRC 1/27/89  
 LAST UPDATED  
 L.M.PETRIE - ORNL

08/12/94

NUCLIDES FROM XSDRN TAPE					
1	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	3001001	
2	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	13001001	
3	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	23001001	
4	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	4001001	
5	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	9001001	
6	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED 08/12/94	10001001	
7	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	3008016	
8	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	13008016	
9	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	23008016	
10	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	4008016	
11	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	9008016	
12	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED 08/12/94	10008016	
13	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	1013027	
14	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	2013027	
15	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	11013027	
16	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	12013027	
17	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	21013027	
18	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	22013027	
19	AL-27 1193 218 GP 040375(5)		UPDATED 08/12/94	7013027	
20	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	6024304	
21	CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	8024304	
22	MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	6025055	
23	MANGANESE-55 ENDF/B-IV MAT 1197		UPDATED 08/12/94	8025055	
24	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	6026304	
25	FE 1192 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	8026304	
26	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	6028304	
27	NI 1190 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'		UPDATED 08/12/94	8028304	
28	PB 1288 218NGP 042375 P-3 293K		UPDATED 08/12/94	5082000	
29	URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	1092235	
30	URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	11092235	
31	URANIUM-235 ENDF/B-IV MAT 1261		UPDATED 08/12/94	21092235	
32	URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	1092238	
33	URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	11092238	
34	URANIUM-238 ENDF/B-IV MAT 1262		UPDATED 08/12/94	21092238	
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	3001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	13001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	23001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	4001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	9001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
HYDROGEN	ENDF/B-IV MAT 1269/THRM1002		UPDATED 08/12/94	10001001	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	3008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	13008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	23008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	4008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	9008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
OXYGEN-16	ENDF/B-IV MAT 1276		UPDATED 08/12/94	10008016	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
AL-27 1193 218 GP 040375(5)			UPDATED 08/12/94	1013027	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
AL-27 1193 218 GP 040375(5)			UPDATED 08/12/94	2013027	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
AL-27 1193 218 GP 040375(5)			UPDATED 08/12/94	11013027	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
AL-27 1193 218 GP 040375(5)			UPDATED 08/12/94	12013027	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
AL-27 1193 218 GP 040375(5)			UPDATED 08/12/94	21013027	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
AL-27 1193 218 GP 040375(5)			UPDATED 08/12/94	22013027	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
AL-27 1193 218 GP 040375(5)			UPDATED 08/12/94	7013027	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00
CR 1191 WT SS-304(1/EST) P-3 293K SP=5+4(42375)'			UPDATED 08/12/94	6024304	TEMPERATURE= 293.00
				PROCESS NUMBER 1007 IS AT	TEMPERATURE= 293.00



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SPIN FACTOR (G) = 15171.100 LUMP DIMENSION (A-BAR) = 7.9999998E-02  
 INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 1.4650537E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM) = 4.0851063E+01

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 238.051 SIGMA(PER ABSORBER ATOM) = 7.7685082E-01

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-1.704016E+00	-1.048080E+00	-4.398005E-02
13	-5.163832E+00	-2.530548E+00	-1.177652E-01
14	-3.723215E+00	-2.202300E+00	-2.809409E-02
15	-2.244852E-04	-1.708981E-04	1.529968E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.15992E+02  
 FISSION 1.28685E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261

UPDATED 08/12/94 11092235 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 233.025 TEMPERATURE (KELVIN) = 293.000  
 POTENTIAL SCATTER SIGMA = 11.500 LUMPED NUCLEAR DENSITY = 7.2906964E-04  
 SPIN FACTOR (G) = 15171.100 LUMP DIMENSION (A-BAR) = 1.8320000E-01  
 INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 4.4644913E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM) = 3.1814728E+01

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 238.051 SIGMA(PER ABSORBER ATOM) = 1.0583184E+00

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-3.443092E+00	-2.117629E+00	-8.826129E-02
13	-1.008169E+01	-4.926846E+00	-2.272950E-01
14	-7.340443E+00	-4.320512E+00	-5.476373E-02
15	-4.198233E-04	-3.196314E-04	3.368596E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.03902E+02  
 FISSION 1.22076E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-235 ENDF/B-IV MAT 1261

UPDATED 08/12/94 21092235 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 233.025 TEMPERATURE (KELVIN) = 293.000  
 POTENTIAL SCATTER SIGMA = 11.500 LUMPED NUCLEAR DENSITY = 8.8941806E-04  
 SPIN FACTOR (G) = 15171.100 LUMP DIMENSION (A-BAR) = 1.0390000E-01  
 INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 3.0363533E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA(PER ABSORBER ATOM) = 9.9916658E+00

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 238.051 SIGMA(PER ABSORBER ATOM) = 2.1477635E+00

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-2.174708E+00	-1.338090E+00	-5.598649E-02
13	-6.530482E+00	-3.199709E+00	-1.485872E-01
14	-4.716246E+00	-2.786873E+00	-3.558919E-02
15	-2.805605E-04	-2.136031E-04	2.053226E-06

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.12660E+02  
 FISSION 1.26857E+02

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00  
URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 1092238 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 236.006 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 10.599 LUMPED NUCLEAR DENSITY = 6.7544795E-05  
SPIN FACTOR (G) = 656.527 LUMP DIMENSION (A-BAR) = 7.9999998E-02  
INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 1.4650537E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA (PER ABSORBER ATOM) = 6.4818732E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 235.044 SIGMA (PER ABSORBER ATOM) = 1.8885783E+02

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-1.303381E-04	0.000000E+00	-1.468809E-03
10	-6.994279E-03	-3.886728E-08	-5.076653E-02
11	-3.286570E-01	0.000000E+00	-1.049223E+00
12	-3.090056E+00	0.000000E+00	-3.705011E+00
13	-3.566053E+00	0.000000E+00	-1.183352E+00
14	-6.549177E+00	0.000000E+00	-3.855168E-01
15	-4.152076E-09	0.000000E+00	3.744929E-09

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.57170E+02  
FISSION 5.33631E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 11092238 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 236.006 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 10.599 LUMPED NUCLEAR DENSITY = 6.2596569E-05  
SPIN FACTOR (G) = 656.527 LUMP DIMENSION (A-BAR) = 1.8320000E-01  
INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 4.4644913E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA (PER ABSORBER ATOM) = 3.7054990E+02

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 235.044 SIGMA (PER ABSORBER ATOM) = 1.3862970E+02

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

THIS RESONANCE MATERIAL WILL BE TREATED AS A 1-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	-3.620582E-04	0.000000E+00	-4.064494E-03
10	-1.913557E-02	-1.082530E-07	-1.386904E-01
11	-8.633477E-01	0.000000E+00	-2.746832E+00
12	-7.765469E+00	0.000000E+00	-9.294101E+00
13	-9.083701E+00	0.000000E+00	-3.011560E+00
14	-1.674567E+01	0.000000E+00	-9.847641E-01
15	-5.750381E-09	0.000000E+00	6.853097E-09

EXCESS RESONANCE INTEGRALS

RESOLVED

ABSORPTION 2.32087E+02  
FISSION 5.33513E-04

PROCESS NUMBER 1007 IS AT TEMPERATURE= 293.00

URANIUM-238 ENDF/B-IV MAT 1262 UPDATED 08/12/94 21092238 TEMPERATURE= 293.00

RESONANCE DATA FOR THIS NUCLIDE

MASS NUMBER (A) = 236.006 TEMPERATURE (KELVIN) = 293.000  
POTENTIAL SCATTER SIGMA = 10.599 LUMPED NUCLEAR DENSITY = 1.5497355E-04  
SPIN FACTOR (G) = 656.527 LUMP DIMENSION (A-BAR) = 1.0390000E-01  
INNER RADIUS = 0.0000000E+00 DANCOFF CORRECTION (C) = 3.0363533E-01

THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-1 = 26.982 SIGMA (PER ABSORBER ATOM) = 5.7343777E+01

MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

MASS OF MODERATOR-2 = 235.044 SIGMA (PER ABSORBER ATOM) = 6.8310303E+01

MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.



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***** 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 YES ***
*** 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 FISSION PROD MATRIX BY UNIT NUMBER NO FMP PRINT FISSION 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 FISSION PROD MATRIX BY HOLE NUMBER NO FMA PRINT FISSION 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 GAS PRINT FAR BY GROUP NO ***
*** XS2 PRINT 2-D MIXTURE X-SECTIONS NO PAX PRINT XSEC-ALBEDO CORRELATION TABLES NO ***
*** XAP PRINT MIXTURE ANGLES & PROBABILITIES NO PWT PRINT WEIGHT AVERAGE ARRAY NO ***
*** PKI PRINT FISSION SPECTRUM NO PGM PRINT INPUT GEOMETRY NO ***
*** PID PRINT EXTRA 1-D CROSS SECTIONS NO BUG PRINT DEBUG INFORMATION NO ***
*** TRK PRINT TRACKING INFORMATION NO ***
*****
PARAMETER INPUT COMPLETED

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..... 0 IO'S WERE USED READING THE PARAMETER DATA .....

\*\*\*\*\* DATA READING COMPLETED \*\*\*\*\*

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UNIT NUMBER DATA SET NAME VOLUME NAME UNIT FUNCTION
-----
*** XSC 14 D:\RAA\LWT ANSTO input\f_12_p_5336\FT14F001 MIXED CROSS SECTIONS ***
*** ALB 79 M:\scale43\DATALIB\FT79F001 INPUT ALBEDOS ***
*** WTS 80 M:\scale43\DATALIB\FT80F001 INPUT WEIGHTS ***
*** SKT 16 UNKNOWN WRITE SCRATCH DATA ***
*** BIN 95 D:\RAA\LWT ANSTO input\f_12_p_5336\FT95F001 BINARY INPUT DATA ***
*** RST 95 D:\RAA\LWT ANSTO input\f_12_p_5336\FT95F001 READ RESTART DATA ***
*** LIB 4 D:\RAA\LWT ANSTO input\f_12_p_5336\FT04F001 INPUT AMPX WORKING LIBRARY ***
*** 8 D:\RAA\LWT ANSTO input\f_12_p_5336\FT08F001 INPUT DATA DIRECT ACCESS ***
*** 9 UNKNOWN SUPER GROUPED DIRECT ACCESS ***
*** 10 UNKNOWN XSEC MIXING DIRECT ACCESS ***

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..... 0 IO'S WERE USED PREPARING INPUT DATA .....

CROSS SECTIONS READ FROM THE AMPX WORKING LIBRARY ON UNIT 4

MIXING TABLE

NUMBER OF SCATTERING ANGLES = 2  
CROSS SECTION MESSAGE THRESHOLD = 3.0E-05

MIXTURE =	1	DENSITY (G/CC) =	1.9018					
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT	NUCLIDE	TITLE		UPDATED
1013027	3.25147E-02	7.66011E-01	13027	26.9818	AL-27	1193 218 GP 040375(5)		UPDATED
08/12/94								
1092235	1.07174E-03	2.19950E-01	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261		UPDATED
08/12/94								
1092238	6.75448E-05	1.40393E-02	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262		UPDATED
08/12/94								

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MIXTURE =	2	DENSITY (G/CC) =	2.7020			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
2013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27	1193 218 GP 040375(5)	UPDATED
08/12/94							
MIXTURE =	3	DENSITY (G/CC) =	0.99977			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
3001001	6.68762E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94							
3008016	3.34381E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
08/12/94							
MIXTURE =	4	DENSITY (G/CC) =	0.99977			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
4001001	6.68762E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94							
4008016	3.34381E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
08/12/94							
MIXTURE =	5	DENSITY (G/CC) =	11.344			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
5082000	3.29690E-02	1.00000E+00	82000	207.2100	PB 1288 218NGP 042375 P-3 293K		UPDATED
08/12/94							
MIXTURE =	6	DENSITY (G/CC) =	7.9200			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
6024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED
08/12/94							
6025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED
08/12/94							
6026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED
08/12/94							
6028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED
08/12/94							
MIXTURE =	7	DENSITY (G/CC) =	2.7020			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
7013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27	1193 218 GP 040375(5)	UPDATED
08/12/94							
MIXTURE =	8	DENSITY (G/CC) =	7.9200			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
8024304	1.74286E-02	1.90000E-01	24000	51.9957	CR 1191 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED
08/12/94							
8025055	1.73633E-03	1.99999E-02	25055	54.9379	MANGANESE-55	ENDF/B-IV MAT 1197	UPDATED
08/12/94							
8026304	5.93579E-02	6.95000E-01	26000	55.8447	FE 1192 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED
08/12/94							
8028304	7.72070E-03	9.50001E-02	28000	58.6872	NI 1190 WT SS-304 (1/EST) P-3 293K SP=5+4 (42375)'		UPDATED
08/12/94							
MIXTURE =	9	DENSITY (G/CC) =	0.99997E-04			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
9001001	6.68896E-06	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94							
9008016	3.34448E-06	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
08/12/94							
MIXTURE =	10	DENSITY (G/CC) =	0.99977			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
10001001	6.68762E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94							
10008016	3.34381E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
08/12/94							
MIXTURE =	11	DENSITY (G/CC) =	1.0811			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
11013027	1.72260E-02	7.13902E-01	13027	26.9818	AL-27	1193 218 GP 040375(5)	UPDATED
08/12/94							
11092235	7.29070E-04	2.63210E-01	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED
08/12/94							
11092238	6.25966E-05	2.28878E-02	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED
08/12/94							
MIXTURE =	12	DENSITY (G/CC) =	2.7020			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
12013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27	1193 218 GP 040375(5)	UPDATED
08/12/94							
MIXTURE =	13	DENSITY (G/CC) =	0.99977			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
13001001	6.68762E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94							
13008016	3.34381E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
08/12/94							
MIXTURE =	21	DENSITY (G/CC) =	0.70410			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
21013027	6.59980E-03	4.19969E-01	13027	26.9818	AL-27	1193 218 GP 040375(5)	UPDATED
08/12/94							
21092235	8.89418E-04	4.93027E-01	92235	235.0441	URANIUM-235	ENDF/B-IV MAT 1261	UPDATED
08/12/94							
21092238	1.54974E-04	8.70047E-02	92238	238.0510	URANIUM-238	ENDF/B-IV MAT 1262	UPDATED
08/12/94							
MIXTURE =	22	DENSITY (G/CC) =	2.7020			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
22013027	6.03066E-02	1.00000E+00	13027	26.9818	AL-27	1193 218 GP 040375(5)	UPDATED
08/12/94							
MIXTURE =	23	DENSITY (G/CC) =	0.99977			NUCLIDE TITLE	
NUCLIDE	ATOM-DENS.	WGT. FRAC.	ZA	AWT			
23001001	6.68762E-02	1.11927E-01	1001	1.0077	HYDROGEN	ENDF/B-IV MAT 1269/THRM1002	UPDATED
08/12/94							
23008016	3.34381E-02	8.88074E-01	8016	15.9904	OXYGEN-16	ENDF/B-IV MAT 1276	UPDATED
08/12/94							

3001001 HYDROGEN ENDF/B-IV MAT 1269/THRM1002 UPDATED 08/12/94

13001001	HYDROGEN	ENDF/B-IV	MAT 1269/THRM1002	UPDATED	08/12/94
23001001	HYDROGEN	ENDF/B-IV	MAT 1269/THRM1002	UPDATED	08/12/94
4001001	HYDROGEN	ENDF/B-IV	MAT 1269/THRM1002	UPDATED	08/12/94
9001001	HYDROGEN	ENDF/B-IV	MAT 1269/THRM1002	UPDATED	08/12/94
10001001	HYDROGEN	ENDF/B-IV	MAT 1269/THRM1002	UPDATED	08/12/94
3008016	OXYGEN-16	ENDF/B-IV	MAT 1276	UPDATED	08/12/94
13008016	OXYGEN-16	ENDF/B-IV	MAT 1276	UPDATED	08/12/94
23008016	OXYGEN-16	ENDF/B-IV	MAT 1276	UPDATED	08/12/94
4008016	OXYGEN-16	ENDF/B-IV	MAT 1276	UPDATED	08/12/94
9008016	OXYGEN-16	ENDF/B-IV	MAT 1276	UPDATED	08/12/94
10008016	OXYGEN-16	ENDF/B-IV	MAT 1276	UPDATED	08/12/94
1013027	AL-27	1193	218 GP 040375(5)	UPDATED	08/12/94
2013027	AL-27	1193	218 GP 040375(5)	UPDATED	08/12/94
11013027	AL-27	1193	218 GP 040375(5)	UPDATED	08/12/94
12013027	AL-27	1193	218 GP 040375(5)	UPDATED	08/12/94
21013027	AL-27	1193	218 GP 040375(5)	UPDATED	08/12/94
22013027	AL-27	1193	218 GP 040375(5)	UPDATED	08/12/94
7013027	AL-27	1193	218 GP 040375(5)	UPDATED	08/12/94
6024304	CR 1191	WT SS-304(1/EST)	P-3 293K SP=5+4(42375)'	UPDATED	08/12/94
8024304	CR 1191	WT SS-304(1/EST)	P-3 293K SP=5+4(42375)'	UPDATED	08/12/94
6025055	MANGANESE-55	ENDF/B-IV	MAT 1197	UPDATED	08/12/94
8025055	MANGANESE-55	ENDF/B-IV	MAT 1197	UPDATED	08/12/94
6026304	FE 1192	WT SS-304(1/EST)	P-3 293K SP=5+4(42375)'	UPDATED	08/12/94
8026304	FE 1192	WT SS-304(1/EST)	P-3 293K SP=5+4(42375)'	UPDATED	08/12/94
6028304	NI 1190	WT SS-304(1/EST)	P-3 293K SP=5+4(42375)'	UPDATED	08/12/94
8028304	NI 1190	WT SS-304(1/EST)	P-3 293K SP=5+4(42375)'	UPDATED	08/12/94
5082000	PB 1288	218NGP 042375	P-3 293K	UPDATED	08/12/94
1092235	URANIUM-235	ENDF/B-IV	MAT 1261	UPDATED	08/12/94
11092235	URANIUM-235	ENDF/B-IV	MAT 1261	UPDATED	08/12/94
21092235	URANIUM-235	ENDF/B-IV	MAT 1261	UPDATED	08/12/94
1092238	URANIUM-238	ENDF/B-IV	MAT 1262	UPDATED	08/12/94
11092238	URANIUM-238	ENDF/B-IV	MAT 1262	UPDATED	08/12/94
21092238	URANIUM-238	ENDF/B-IV	MAT 1262	UPDATED	08/12/94

VOLUMES FOR THOSE UNITS UTILIZED IN THIS PROBLEM

UNIT	REGION	GEOMETRY REGION	VOLUME	CUMULATIVE VOLUME
1	1	1	1.69451E+03 CM**3	1.69451E+03 CM**3
	2	2	2.80775E+01 CM**3	1.72258E+03 CM**3
	3	3	9.13984E+01 CM**3	1.81398E+03 CM**3
	4	4	2.90465E+01 CM**3	1.84303E+03 CM**3
	5	5	4.56862E+02 CM**3	2.29989E+03 CM**3
	6	6	3.26919E+01 CM**3	2.33258E+03 CM**3
	7	7	1.06164E+02 CM**3	2.43875E+03 CM**3
	8	8	3.36606E+01 CM**3	2.47241E+03 CM**3
	9	9	5.25153E+02 CM**3	2.99756E+03 CM**3
	10	10	3.73052E+01 CM**3	3.03487E+03 CM**3
	11	11	1.20930E+02 CM**3	3.15580E+03 CM**3
	12	12	3.82744E+01 CM**3	3.19407E+03 CM**3
	13	13	5.93444E+02 CM**3	3.78751E+03 CM**3
	14	14	4.19194E+01 CM**3	3.82943E+03 CM**3
	15	15	1.35695E+02 CM**3	3.96513E+03 CM**3
	16	16	4.27173E+01 CM**3	4.00785E+03 CM**3
2	1	17	3.96586E+01 CM**3	3.96586E+01 CM**3
	2	18	3.47606E+00 CM**3	4.31347E+01 CM**3
	3	19	1.06925E+01 CM**3	5.38272E+01 CM**3
	4	20	4.03762E+00 CM**3	5.78648E+01 CM**3
	5	21	1.22908E+01 CM**3	7.01557E+01 CM**3
	6	22	4.59916E+00 CM**3	7.47548E+01 CM**3
	7	23	1.38891E+01 CM**3	8.86439E+01 CM**3
	8	24	5.15671E+00 CM**3	9.38006E+01 CM**3
3	1	25	1.79337E-01 CM**3	4.19563E+03 CM**3
4	1	26	1.76679E+03 CM**3	5.96242E+03 CM**3
	2	27	7.34815E+02 CM**3	6.69723E+03 CM**3
5	1	28	1.76679E+03 CM**3	5.96242E+03 CM**3
	2	29	7.34815E+02 CM**3	6.69723E+03 CM**3
6	1	30	6.43417E+00 CM**3	6.43417E+00 CM**3
7	1	31	1.08713E+03 CM**3	1.13216E+03 CM**3
8	1	32	2.30289E+01 CM**3	2.30289E+01 CM**3
9	1	33	1.29829E+04 CM**3	6.02781E+04 CM**3
	2	34	3.59751E+03 CM**3	6.38756E+04 CM**3
	3	35	1.36994E+03 CM**3	6.52455E+04 CM**3
10	1	36	1.29829E+04 CM**3	6.02781E+04 CM**3
	2	37	3.59751E+03 CM**3	6.38756E+04 CM**3
	3	38	1.36994E+03 CM**3	6.52455E+04 CM**3
333	1	379	7.83597E+01 CM**3	7.83597E+01 CM**3
	2	380	1.25503E+01 CM**3	9.09101E+01 CM**3
	3	381	1.47943E+02 CM**3	2.38853E+02 CM**3
334	1	382	7.83597E+01 CM**3	7.83597E+01 CM**3
	2	383	1.25503E+01 CM**3	9.09101E+01 CM**3
	3	384	7.39952E+01 CM**3	1.64905E+02 CM**3
335	1	385	7.83597E+01 CM**3	7.83597E+01 CM**3
	2	386	1.25503E+01 CM**3	9.09101E+01 CM**3
	3	387	7.39952E+01 CM**3	1.64905E+02 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 388 IS AN ARRAY PLACEMENT BOUNDARY REGION				
336	1	388	3.19605E+03 CM**3	3.19605E+03 CM**3
348	1	410	3.10016E+03 CM**3	6.29621E+03 CM**3
	2	411	7.83619E+02 CM**3	7.07983E+03 CM**3
349	1	412	3.10016E+03 CM**3	6.29621E+03 CM**3
	2	413	7.83619E+02 CM**3	7.07983E+03 CM**3



350	1	414	3.10016E+03 CM**3	6.29621E+03 CM**3
	2	415	7.83619E+02 CM**3	7.07983E+03 CM**3
351	1	416	3.10016E+03 CM**3	6.29621E+03 CM**3
	2	417	7.83619E+02 CM**3	7.07983E+03 CM**3
352	1	418	3.10016E+03 CM**3	6.29621E+03 CM**3
	2	419	7.83619E+02 CM**3	7.07983E+03 CM**3
353	1	420	3.10016E+03 CM**3	6.29621E+03 CM**3
	2	421	7.83619E+02 CM**3	7.07983E+03 CM**3
354	1	422	3.10016E+03 CM**3	6.29621E+03 CM**3
	2	423	7.83619E+02 CM**3	7.07983E+03 CM**3
401	1	424	1.46220E+04 CM**3	6.41808E+04 CM**3
	2	425	9.28867E+02 CM**3	6.51097E+04 CM**3
402	1	426	6.16764E+00 CM**3	6.16764E+00 CM**3
403	1	427	1.04209E+03 CM**3	1.08527E+03 CM**3
404	1	428	6.81699E+03 CM**3	4.04900E+05 CM**3
405	1	429	0.00000E+00 CM**3	4.04900E+05 CM**3
	2	430	9.69190E+04 CM**3	5.01819E+05 CM**3
	3	431	1.06970E+06 CM**3	1.57152E+06 CM**3
	4	432	2.99966E+05 CM**3	1.87148E+06 CM**3
	5	433	1.52801E+06 CM**3	3.39950E+06 CM**3
	6	434	8.33038E+04 CM**3	3.48280E+06 CM**3
	7	435	9.51639E+05 CM**3	4.43444E+06 CM**3
406	1	436	1.17210E+05 CM**3	1.17210E+05 CM**3
	2	437	1.00916E+05 CM**3	2.18126E+05 CM**3
	3	438	4.67352E+03 CM**3	2.32799E+05 CM**3
	4	439	6.08776E+04 CM**3	2.83677E+05 CM**3
407	1	440	1.66245E+04 CM**3	1.66245E+04 CM**3
	2	441	9.26041E+04 CM**3	1.09229E+05 CM**3
	3	442	9.40439E+04 CM**3	2.03273E+05 CM**3
	4	443	4.67353E+03 CM**3	2.07946E+05 CM**3
	5	444	5.68191E+04 CM**3	2.64765E+05 CM**3
SURROUNDING GEOMETRY VOLUMES - GEOMETRY REGION 445 IS AN ARRAY PLACEMENT BOUNDARY REGION				
408	1	445	4.98288E+06 CM**3	4.98288E+06 CM**3

UNIT	USES	REGION	MIXTURE	TOTAL VOLUME
1	35	1	3	5.93077E+04 CM**3
		2	2	9.82713E+02 CM**3
		3	1	3.19895E+03 CM**3
		4	2	1.01663E+03 CM**3
		5	3	1.59902E+04 CM**3
		6	2	1.14422E+03 CM**3
		7	1	3.71573E+03 CM**3
		8	2	1.17812E+03 CM**3
		9	3	1.83804E+04 CM**3
		10	2	1.30568E+03 CM**3
		11	1	4.23255E+03 CM**3
		12	2	1.33960E+03 CM**3
		13	3	2.07705E+04 CM**3
		14	2	1.46718E+03 CM**3
		15	1	4.74934E+03 CM**3
		16	2	1.49510E+03 CM**3
2	70	1	3	2.77610E+03 CM**3
		2	2	2.43324E+02 CM**3
		3	3	7.48477E+02 CM**3
		4	2	2.82633E+02 CM**3
		5	3	8.60358E+02 CM**3
		6	2	3.21941E+02 CM**3
		7	3	9.72238E+02 CM**3
		8	2	3.60970E+02 CM**3
3	35	1	3	6.27678E+00 CM**3
4	14	1	4	2.47351E+04 CM**3
		2	6	1.02874E+04 CM**3
5	21	1	4	3.71026E+04 CM**3
		2	6	1.54311E+04 CM**3
6	35	1	4	2.25196E+02 CM**3
7	5	1	6	5.43563E+03 CM**3
8	90	1	7	2.07260E+03 CM**3
9	2	1	4	2.59659E+04 CM**3
		2	6	7.19502E+03 CM**3
		3	4	2.73988E+03 CM**3
10	3	1	4	3.89488E+04 CM**3
		2	6	1.07925E+04 CM**3
		3	4	4.10981E+03 CM**3
333	84	1	11	6.58222E+03 CM**3
		2	12	1.05423E+03 CM**3
		3	13	1.24272E+04 CM**3
334	7	1	11	5.48518E+02 CM**3
		2	12	8.78522E+01 CM**3
		3	13	5.17967E+02 CM**3
335	7	1	11	5.48518E+02 CM**3
		2	12	8.78522E+01 CM**3
		3	13	5.17967E+02 CM**3

336	7	1		2.23723E+04	CM**3
348	1	1	4	3.10016E+03	CM**3
		2	6	7.83619E+02	CM**3
349	1	1	4	3.10016E+03	CM**3
		2	6	7.83619E+02	CM**3
350	1	1	4	3.10016E+03	CM**3
		2	6	7.83619E+02	CM**3
351	1	1	4	3.10016E+03	CM**3
		2	6	7.83619E+02	CM**3
352	1	1	4	3.10016E+03	CM**3
		2	6	7.83619E+02	CM**3
353	1	1	4	3.10016E+03	CM**3
		2	6	7.83619E+02	CM**3
354	1	1	4	3.10016E+03	CM**3
		2	6	7.83619E+02	CM**3
401	1	1	4	1.46220E+04	CM**3
		2	4	9.28867E+02	CM**3
402	7	1	4	4.31735E+01	CM**3
403	1	1	6	1.04209E+03	CM**3
404	1	1	4	6.81699E+03	CM**3
405	1	1	4	0.00000E+00	CM**3
		2	8	9.69190E+04	CM**3
		3	5	1.06970E+06	CM**3
		4	8	2.99966E+05	CM**3
		5	9	1.52801E+06	CM**3
		6	8	8.33038E+04	CM**3
		7	9	9.51639E+05	CM**3
406	1	1	8	1.17210E+05	CM**3
		2	9	1.00916E+05	CM**3
		3	8	4.67352E+03	CM**3
		4	9	6.08776E+04	CM**3
407	1	1	5	1.66245E+04	CM**3
		2	8	9.26041E+04	CM**3
		3	9	9.40439E+04	CM**3
		4	8	4.67353E+03	CM**3
		5	9	5.68191E+04	CM**3
408	1	1		4.98288E+06	CM**3

TOTAL MIXTURE VOLUMES		
MIXTURE	TOTAL VOLUME	MASS (G)
1	1.58966E+04 CM**3	3.02321E+04
2	1.11381E+04 CM**3	3.00952E+04
3	1.19812E+05 CM**3	1.19785E+05
4	1.77939E+05 CM**3	1.77899E+05
5	1.08632E+06 CM**3	1.23233E+07
6	5.56691E+04 CM**3	4.40900E+05
7	2.07260E+03 CM**3	5.60017E+03
8	6.99350E+05 CM**3	5.53885E+06
9	2.79231E+06 CM**3	2.79223E+02
11	7.67925E+03 CM**3	8.30204E+03
12	1.22993E+03 CM**3	3.32327E+03
13	1.34631E+04 CM**3	1.34601E+04

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***
***          BIASING INFORMATION          ***
***
*** A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL BIAS ID'S. ***
***
*****

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..... 0 IO'S WERE USED IN KENO-V BEFORE TRACKING .....
..... 0.00367 MINUTES WERE USED PROCESSING DATA. ....

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VOLUME FRACTION OF FISSIONABLE MATERIAL IN THE CORE= 4.73136E-03

START TYPE 0 WAS USED.

THE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 1.68500E+01 -X=-1.68500E+01 +Y=-1.68500E+01 -Y= 1.68500E+01 +Z= 4.73350E+02 -Z= 2.66700E+01

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	827 INDEPENDENT	FISSION POINTS WERE GENERATED		
1	7.50359E-01	5.93167E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132		WARNING... ONLY	860 INDEPENDENT	FISSION POINTS WERE GENERATED		
2	7.82334E-01	5.96833E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
KENO MESSAGE NUMBER K5-132		WARNING... ONLY	875 INDEPENDENT	FISSION POINTS WERE GENERATED		
3	7.83747E-01	6.01333E-01	7.83747E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	7.45056E-01	6.05000E-01	7.64402E-01	1.93453E-02	0.00000E+00	0.00000E+00
5	8.19328E-01	6.08667E-01	7.82710E-01	2.14466E-02	0.00000E+00	0.00000E+00
6	8.47645E-01	6.12333E-01	7.98944E-01	2.22152E-02	0.00000E+00	0.00000E+00
7	7.94256E-01	6.17000E-01	7.98006E-01	1.72333E-02	0.00000E+00	0.00000E+00
8	8.09936E-01	6.20667E-01	7.99995E-01	1.42107E-02	0.00000E+00	0.00000E+00
9	7.71958E-01	6.24333E-01	7.95989E-01	1.26605E-02	0.00000E+00	0.00000E+00
10	7.74480E-01	6.28000E-01	7.93301E-01	1.12892E-02	0.00000E+00	0.00000E+00
11	8.11229E-01	6.31667E-01	7.95293E-01	1.01535E-02	0.00000E+00	0.00000E+00
12	8.29979E-01	6.36167E-01	7.98761E-01	9.72141E-03	0.00000E+00	0.00000E+00
13	7.63073E-01	6.39833E-01	7.95517E-01	9.37277E-03	0.00000E+00	0.00000E+00

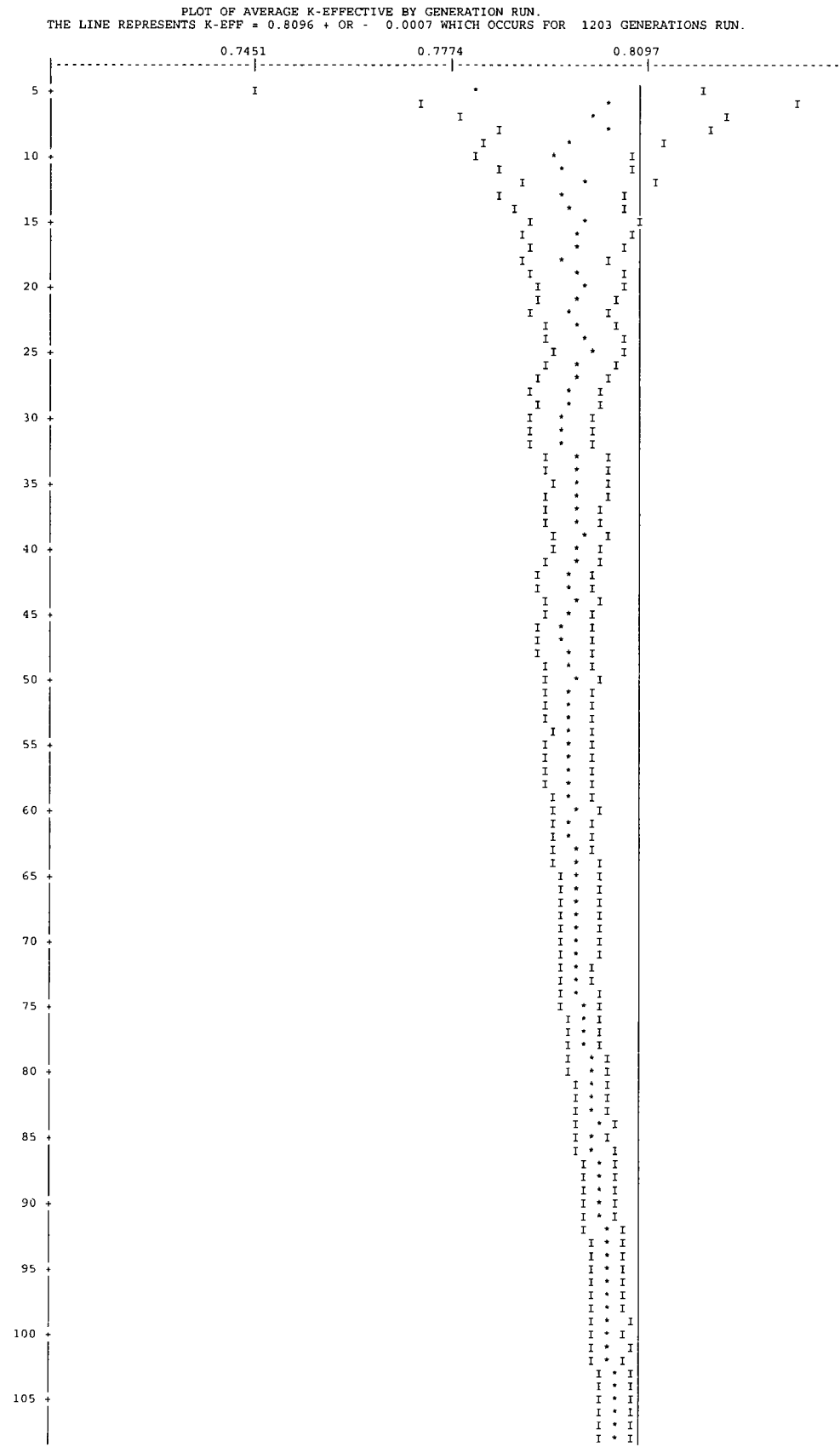
14	8.03280E-01	6.43500E-01	7.96164E-01	8.58055E-03	0.00000E+00	0.00000E+00
15	8.34718E-01	6.47167E-01	7.99130E-01	8.43174E-03	0.00000E+00	0.00000E+00
16	7.79338E-01	6.50833E-01	7.97716E-01	7.93325E-03	0.00000E+00	0.00000E+00
17	7.93468E-01	6.55333E-01	7.97433E-01	7.39088E-03	0.00000E+00	0.00000E+00
18	7.71581E-01	6.59000E-01	7.95817E-01	7.09983E-03	0.00000E+00	0.00000E+00
19	8.34116E-01	6.62667E-01	7.98070E-01	7.03937E-03	0.00000E+00	0.00000E+00
20	8.09109E-01	6.66333E-01	7.98683E-01	6.66505E-03	0.00000E+00	0.00000E+00
21	7.92570E-01	6.71000E-01	7.98361E-01	6.31271E-03	0.00000E+00	0.00000E+00
22	7.75841E-01	6.74667E-01	7.97235E-01	6.09371E-03	0.00000E+00	0.00000E+00
23	8.25693E-01	6.78333E-01	7.98590E-01	5.95257E-03	0.00000E+00	0.00000E+00
24	8.13923E-01	6.82000E-01	7.99287E-01	5.71818E-03	0.00000E+00	0.00000E+00
25	8.14694E-01	6.86500E-01	7.99957E-01	5.50482E-03	0.00000E+00	0.00000E+00
26	7.65619E-01	6.90167E-01	7.98527E-01	5.46121E-03	0.00000E+00	0.00000E+00
27	7.77418E-01	6.93833E-01	7.97682E-01	5.30583E-03	0.00000E+00	0.00000E+00
28	7.64078E-01	6.97500E-01	7.96390E-01	5.25897E-03	0.00000E+00	0.00000E+00
29	8.07263E-01	7.01167E-01	7.96792E-01	5.07644E-03	0.00000E+00	0.00000E+00
30	7.78546E-01	7.04833E-01	7.96141E-01	4.93499E-03	0.00000E+00	0.00000E+00
31	7.81461E-01	7.08500E-01	7.95635E-01	4.78861E-03	0.00000E+00	0.00000E+00
32	7.91193E-01	7.13000E-01	7.95486E-01	4.62861E-03	0.00000E+00	0.00000E+00
33	8.64093E-01	7.16667E-01	7.97700E-01	4.99397E-03	0.00000E+00	0.00000E+00
34	8.21471E-01	7.20333E-01	7.98442E-01	4.89212E-03	0.00000E+00	0.00000E+00
35	8.04735E-01	7.24000E-01	7.98633E-01	4.74539E-03	0.00000E+00	0.00000E+00
36	7.80656E-01	7.27667E-01	7.98104E-01	4.63397E-03	0.00000E+00	0.00000E+00
37	7.99842E-01	7.31333E-01	7.98154E-01	4.49990E-03	0.00000E+00	0.00000E+00
38	7.88168E-01	7.36000E-01	7.97877E-01	4.38190E-03	0.00000E+00	0.00000E+00
39	8.41407E-01	7.39667E-01	7.99053E-01	4.42123E-03	0.00000E+00	0.00000E+00
40	7.72077E-01	7.43333E-01	7.98343E-01	4.36148E-03	0.00000E+00	0.00000E+00

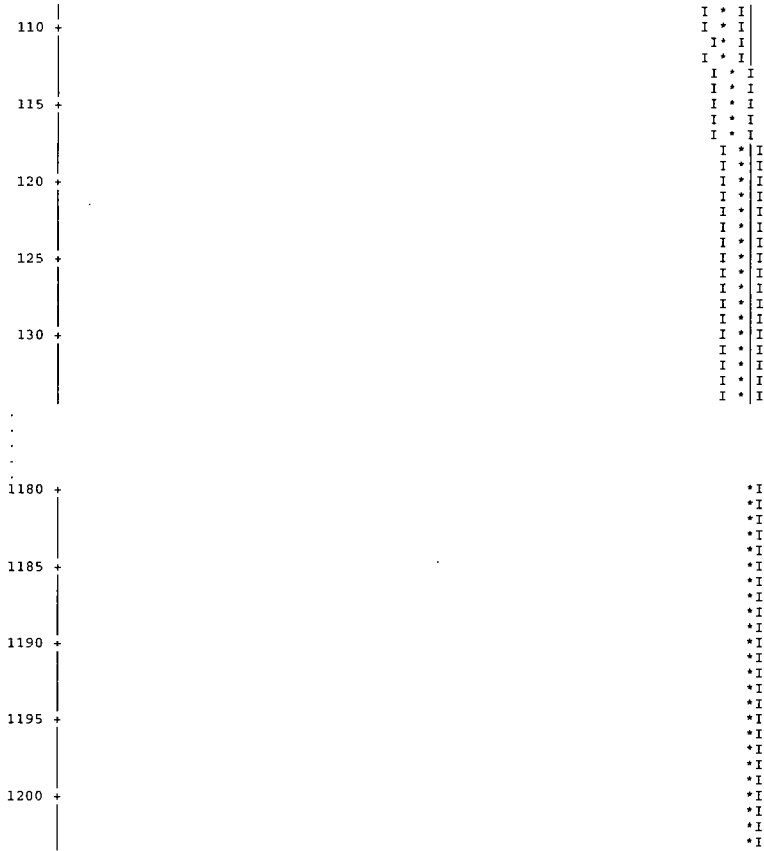
1182	8.31447E-01	5.00367E+00	8.09463E-01	7.36443E-04	0.00000E+00	0.00000E+00
1183	8.14944E-01	5.00733E+00	8.09468E-01	7.35834E-04	0.00000E+00	0.00000E+00
1184	8.34418E-01	5.01100E+00	8.09489E-01	7.35514E-04	0.00000E+00	0.00000E+00
1185	7.81893E-01	5.01467E+00	8.09465E-01	7.35262E-04	0.00000E+00	0.00000E+00
1186	8.35161E-01	5.01833E+00	8.09487E-01	7.34962E-04	0.00000E+00	0.00000E+00
1187	8.09147E-01	5.02200E+00	8.09487E-01	7.34341E-04	0.00000E+00	0.00000E+00
1188	8.55458E-01	5.02567E+00	8.09526E-01	7.34745E-04	0.00000E+00	0.00000E+00
1189	7.93934E-01	5.02933E+00	8.09512E-01	7.34243E-04	0.00000E+00	0.00000E+00
1190	8.42446E-01	5.03300E+00	8.09540E-01	7.34148E-04	0.00000E+00	0.00000E+00
1191	7.91687E-01	5.03667E+00	8.09525E-01	7.33684E-04	0.00000E+00	0.00000E+00
1192	8.02959E-01	5.04117E+00	8.09520E-01	7.33088E-04	0.00000E+00	0.00000E+00
1193	8.37834E-01	5.04483E+00	8.09543E-01	7.32858E-04	0.00000E+00	0.00000E+00
1194	8.27174E-01	5.04850E+00	8.09558E-01	7.32393E-04	0.00000E+00	0.00000E+00
1195	8.29739E-01	5.05217E+00	8.09575E-01	7.31974E-04	0.00000E+00	0.00000E+00
1196	8.09184E-01	5.05583E+00	8.09575E-01	7.31361E-04	0.00000E+00	0.00000E+00
1197	8.45144E-01	5.05950E+00	8.09605E-01	7.31354E-04	0.00000E+00	0.00000E+00
1198	7.82475E-01	5.06317E+00	8.09582E-01	7.31095E-04	0.00000E+00	0.00000E+00
1199	8.24244E-01	5.06683E+00	8.09594E-01	7.30586E-04	0.00000E+00	0.00000E+00
1200	8.19320E-01	5.07050E+00	8.09602E-01	7.30021E-04	0.00000E+00	0.00000E+00
1201	7.87654E-01	5.07417E+00	8.09584E-01	7.29642E-04	0.00000E+00	0.00000E+00
1202	8.18055E-01	5.07783E+00	8.09591E-01	7.29068E-04	0.00000E+00	0.00000E+00
1203	8.37256E-01	5.08150E+00	8.09614E-01	7.28825E-04	0.00000E+00	0.00000E+00

KENO MESSAGE NUMBER K5-123 EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

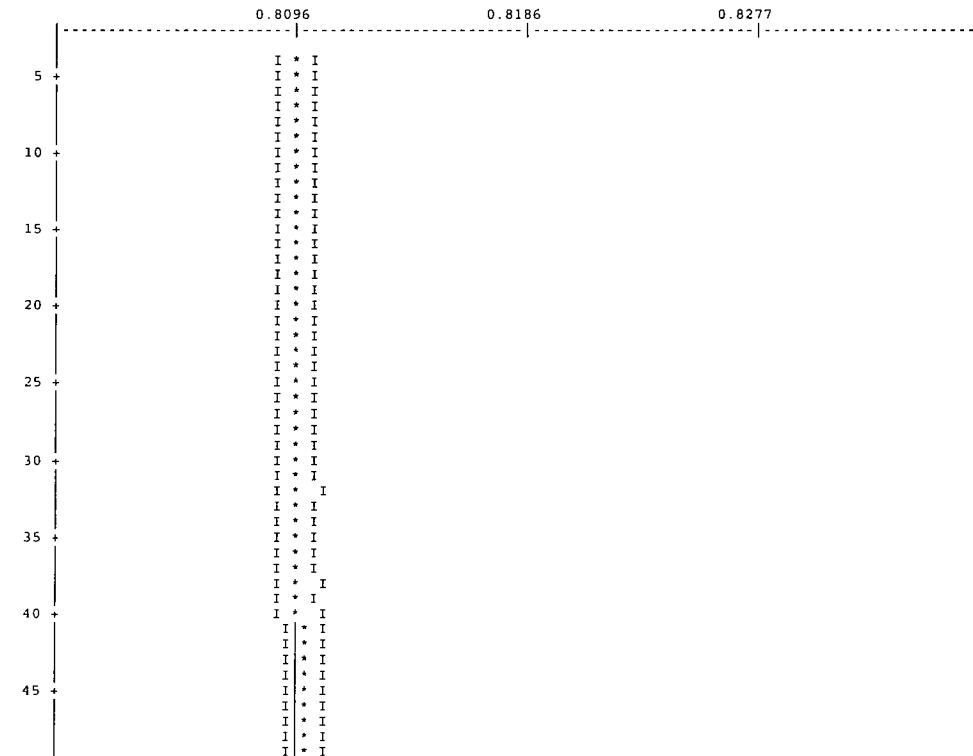
LIFETIME = 9.36018E-05 + OR - 1.03393E-07 GENERATION TIME = 6.57371E-05 + OR - 8.96054E-08  
 NU BAR = 2.41961E+00 + OR - 5.68813E-06 AVERAGE FISSION GROUP = 2.41990E+01 + OR - 2.98182E-03  
 ENERGY (EV) OF THE AVERAGE LETHARGY CAUSING FISSION = 4.07645E-02 + OR - 1.06361E-04

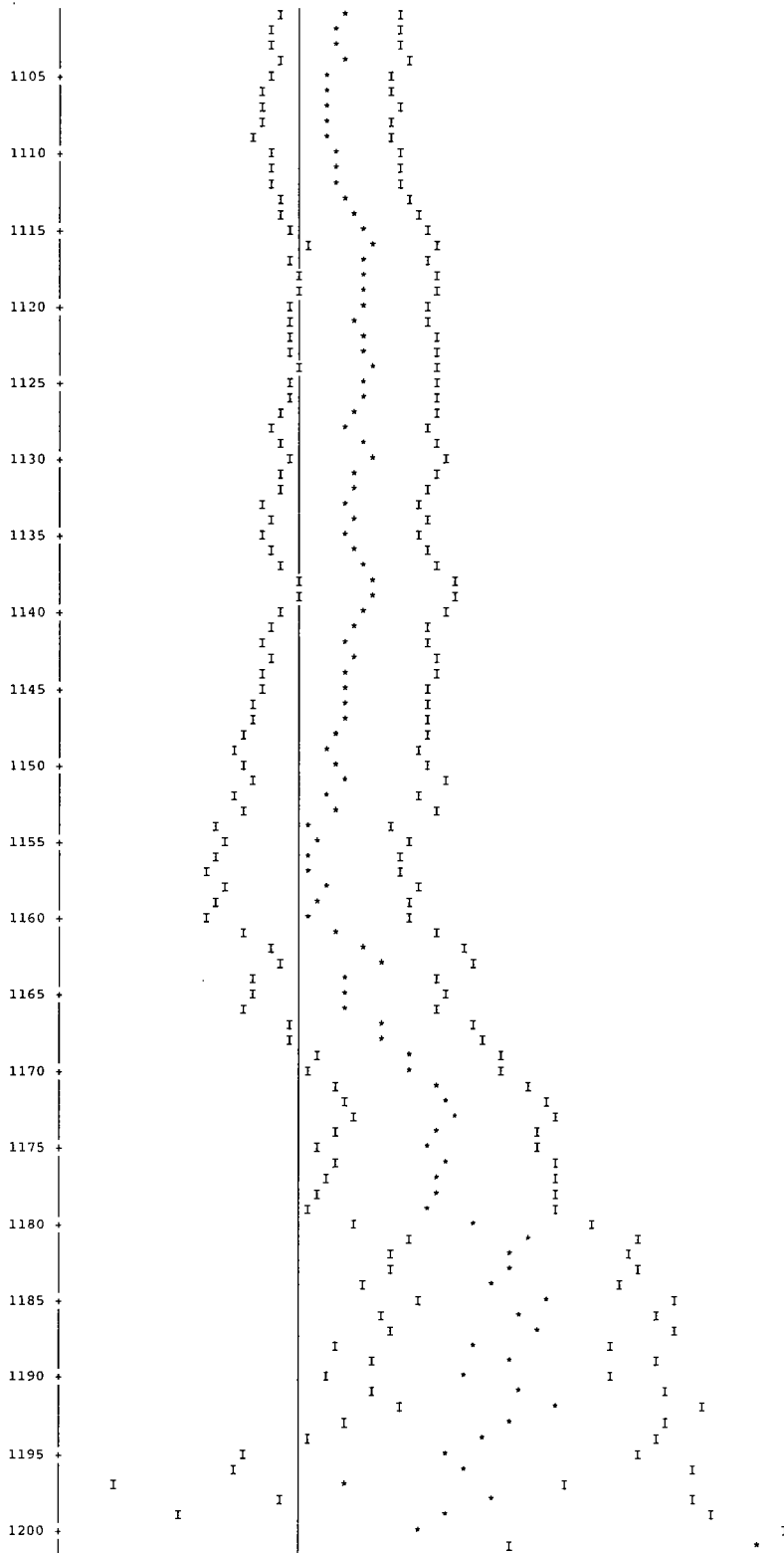
NO. OF INITIAL GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	DEVIATION	67 PER CENT		95 PER CENT		99 PER CENT		NUMBER OF HISTORIES
			CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	CONFIDENCE	INTERVAL	
3	0.80964	+ OR - 0.00073	0.80891	TO 0.81036	0.80818	TO 0.81109	0.80745	TO 0.81182	1200000
4	0.80969	+ OR - 0.00073	0.80896	TO 0.81042	0.80823	TO 0.81114	0.80751	TO 0.81187	1199000
5	0.80968	+ OR - 0.00073	0.80895	TO 0.81041	0.80822	TO 0.81114	0.80750	TO 0.81187	1198000
6	0.80965	+ OR - 0.00073	0.80892	TO 0.81038	0.80819	TO 0.81111	0.80747	TO 0.81183	1197000
7	0.80966	+ OR - 0.00073	0.80893	TO 0.81039	0.80821	TO 0.81112	0.80748	TO 0.81185	1196000
8	0.80966	+ OR - 0.00073	0.80893	TO 0.81039	0.80820	TO 0.81112	0.80747	TO 0.81185	1195000
9	0.80969	+ OR - 0.00073	0.80896	TO 0.81042	0.80824	TO 0.81115	0.80751	TO 0.81188	1194000
10	0.80972	+ OR - 0.00073	0.80899	TO 0.81045	0.80826	TO 0.81118	0.80754	TO 0.81191	1193000
11	0.80972	+ OR - 0.00073	0.80899	TO 0.81045	0.80826	TO 0.81118	0.80753	TO 0.81191	1192000
12	0.80971	+ OR - 0.00073	0.80897	TO 0.81044	0.80824	TO 0.81117	0.80751	TO 0.81190	1191000
17	0.80977	+ OR - 0.00073	0.80904	TO 0.81050	0.80831	TO 0.81123	0.80757	TO 0.81196	1186000
22	0.80982	+ OR - 0.00073	0.80909	TO 0.81056	0.80836	TO 0.81129	0.80763	TO 0.81202	1181000
27	0.80987	+ OR - 0.00073	0.80913	TO 0.81060	0.80840	TO 0.81134	0.80766	TO 0.81207	1176000
32	0.80998	+ OR - 0.00074	0.80924	TO 0.81071	0.80851	TO 0.81145	0.80777	TO 0.81218	1171000
37	0.80996	+ OR - 0.00074	0.80922	TO 0.81069	0.80849	TO 0.81143	0.80775	TO 0.81217	1166000
1177	0.81530	+ OR - 0.00452	0.81078	TO 0.81982	0.80626	TO 0.82434	0.80174	TO 0.82886	26000
1182	0.81810	+ OR - 0.00475	0.81335	TO 0.82285	0.80860	TO 0.82760	0.80385	TO 0.83235	21000
1187	0.81904	+ OR - 0.00559	0.81344	TO 0.82463	0.80785	TO 0.83022	0.80226	TO 0.83581	16000
1192	0.81983	+ OR - 0.00602	0.81380	TO 0.82585	0.80778	TO 0.83187	0.80176	TO 0.83789	11000
1197	0.81150	+ OR - 0.00883	0.80267	TO 0.82033	0.79383	TO 0.82917	0.78500	TO 0.83800	6000





PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.  
THE LINE REPRESENTS  $K-EFF = 0.8097 \pm 0.0007$  WHICH OCCURS FOR 4 GENERATIONS SKIPPED.





SKIPPING 3 GENERATIONS

0.7286 TO 0.7319 \* FREQUENCY FOR GENERATIONS 4 TO 1203

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```

0.7319 TO 0.7351 *
0.7351 TO 0.7384 *
0.7384 TO 0.7416 *
0.7416 TO 0.7449 *
0.7449 TO 0.7481 ***
0.7481 TO 0.7514 ****
0.7514 TO 0.7546 *****
0.7546 TO 0.7578 *****
0.7578 TO 0.7611 *****
0.7611 TO 0.7643 *****
0.7643 TO 0.7676 *****
0.7676 TO 0.7708 *****
0.7708 TO 0.7741 *****
0.7741 TO 0.7773 *****
0.7773 TO 0.7806 *****
0.7806 TO 0.7838 *****
0.7838 TO 0.7871 *****
0.7871 TO 0.7903 *****
0.7903 TO 0.7936 *****
0.7936 TO 0.7968 *****
0.7968 TO 0.8001 *****
0.8001 TO 0.8033 *****
0.8033 TO 0.8066 *****
0.8066 TO 0.8098 *****
0.8098 TO 0.8130 *****
0.8130 TO 0.8163 *****
0.8163 TO 0.8195 *****
0.8195 TO 0.8228 *****
0.8228 TO 0.8260 *****
0.8260 TO 0.8293 *****
0.8293 TO 0.8325 *****
0.8325 TO 0.8358 *****
0.8358 TO 0.8390 *****
0.8390 TO 0.8423 *****
0.8423 TO 0.8455 *****
0.8455 TO 0.8488 *****
0.8488 TO 0.8520 *****
0.8520 TO 0.8553 *****
0.8553 TO 0.8585 *****
0.8585 TO 0.8617 ****
0.8617 TO 0.8650 *****
0.8650 TO 0.8682 ****
0.8682 TO 0.8715 ****
0.8715 TO 0.8747 ****
0.8747 TO 0.8780 ****
0.8780 TO 0.8812 *
0.8812 TO 0.8845 *
0.8845 TO 0.8877 *
0.8877 TO 0.8910 *
0.8910 TO 0.8942 *
0.8942 TO 0.8975 *
0.8975 TO 0.9007 *
0.9007 TO 0.9040 *
0.9040 TO 0.9072 *
0.9072 TO 0.9105 *
0.9105 TO 0.9137 *
0.9137 TO 0.9169 *
0.9169 TO 0.9202 *

```

FREQUENCY FOR GENERATIONS 304 TO 1203

```

0.7286 TO 0.7319 *
0.7319 TO 0.7351 *
0.7351 TO 0.7384 *
0.7384 TO 0.7416 *
0.7416 TO 0.7449 *
0.7449 TO 0.7481 *
0.7481 TO 0.7514 ****
0.7514 TO 0.7546 *****
0.7546 TO 0.7578 *****
0.7578 TO 0.7611 *****
0.7611 TO 0.7643 *****
0.7643 TO 0.7676 *****
0.7676 TO 0.7708 *****
0.7708 TO 0.7741 *****
0.7741 TO 0.7773 *****
0.7773 TO 0.7806 *****
0.7806 TO 0.7838 *****
0.7838 TO 0.7871 *****
0.7871 TO 0.7903 *****
0.7903 TO 0.7936 *****
0.7936 TO 0.7968 *****
0.7968 TO 0.8001 *****
0.8001 TO 0.8033 *****
0.8033 TO 0.8066 *****
0.8066 TO 0.8098 *****
0.8098 TO 0.8130 *****
0.8130 TO 0.8163 *****
0.8163 TO 0.8195 *****
0.8195 TO 0.8228 *****
0.8228 TO 0.8260 *****
0.8260 TO 0.8293 *****
0.8293 TO 0.8325 *****
0.8325 TO 0.8358 *****
0.8358 TO 0.8390 *****
0.8390 TO 0.8423 *****
0.8423 TO 0.8455 *****
0.8455 TO 0.8488 *****
0.8488 TO 0.8520 *****
0.8520 TO 0.8553 *****
0.8553 TO 0.8585 *****
0.8585 TO 0.8617 ****
0.8617 TO 0.8650 *****
0.8650 TO 0.8682 ****
0.8682 TO 0.8715 ****
0.8715 TO 0.8747 ****
0.8747 TO 0.8780 ****
0.8780 TO 0.8812 *
0.8812 TO 0.8845 *
0.8845 TO 0.8877 *

```

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```

0.8877 TO 0.8910 *
0.8910 TO 0.8942
0.8942 TO 0.8975
0.8975 TO 0.9007
0.9007 TO 0.9040 *
0.9040 TO 0.9072
0.9072 TO 0.9105
0.9105 TO 0.9137
0.9137 TO 0.9169
0.9169 TO 0.9202

```

FREQUENCY FOR GENERATIONS 604 TO 1203

```

0.7286 TO 0.7319
0.7319 TO 0.7351
0.7351 TO 0.7384 *
0.7384 TO 0.7416
0.7416 TO 0.7449
0.7449 TO 0.7481 *
0.7481 TO 0.7514 **
0.7514 TO 0.7546 ****
0.7546 TO 0.7578 ***
0.7578 TO 0.7611 **
0.7611 TO 0.7643 *****
0.7643 TO 0.7676 ****
0.7676 TO 0.7708 *****
0.7708 TO 0.7741 *****
0.7741 TO 0.7773 *****
0.7773 TO 0.7806 *****
0.7806 TO 0.7838 *****
0.7838 TO 0.7871 *****
0.7871 TO 0.7903 *****
0.7903 TO 0.7936 *****
0.7936 TO 0.7968 *****
0.7968 TO 0.8001 *****
0.8001 TO 0.8033 *****
0.8033 TO 0.8066 *****
0.8066 TO 0.8098 *****
0.8098 TO 0.8130 *****
0.8130 TO 0.8163 *****
0.8163 TO 0.8195 *****
0.8195 TO 0.8228 *****
0.8228 TO 0.8260 *****
0.8260 TO 0.8293 *****
0.8293 TO 0.8325 *****
0.8325 TO 0.8358 *****
0.8358 TO 0.8390 *****
0.8390 TO 0.8423 *****
0.8423 TO 0.8455 *****
0.8455 TO 0.8488 *****
0.8488 TO 0.8520 *****
0.8520 TO 0.8553 *****
0.8553 TO 0.8585 *****
0.8585 TO 0.8617 *****
0.8617 TO 0.8650 *****
0.8650 TO 0.8682 *****
0.8682 TO 0.8715 *****
0.8715 TO 0.8747 *****
0.8747 TO 0.8780 *****
0.8780 TO 0.8812 *****
0.8812 TO 0.8845 *****
0.8845 TO 0.8877 *****
0.8877 TO 0.8910 *
0.8910 TO 0.8942
0.8942 TO 0.8975
0.8975 TO 0.9007
0.9007 TO 0.9040 *
0.9040 TO 0.9072
0.9072 TO 0.9105
0.9105 TO 0.9137
0.9137 TO 0.9169
0.9169 TO 0.9202

```

FREQUENCY FOR GENERATIONS 904 TO 1203

```

0.7286 TO 0.7319
0.7319 TO 0.7351
0.7351 TO 0.7384 *
0.7384 TO 0.7416
0.7416 TO 0.7449
0.7449 TO 0.7481 *
0.7481 TO 0.7514 **
0.7514 TO 0.7546 ****
0.7546 TO 0.7578 ***
0.7578 TO 0.7611 **
0.7611 TO 0.7643 *****
0.7643 TO 0.7676 ****
0.7676 TO 0.7708 *****
0.7708 TO 0.7741 *****
0.7741 TO 0.7773 *****
0.7773 TO 0.7806 *****
0.7806 TO 0.7838 *****
0.7838 TO 0.7871 *****
0.7871 TO 0.7903 *****
0.7903 TO 0.7936 *****
0.7936 TO 0.7968 *****
0.7968 TO 0.8001 *****
0.8001 TO 0.8033 *****
0.8033 TO 0.8066 *****
0.8066 TO 0.8098 *****
0.8098 TO 0.8130 *****
0.8130 TO 0.8163 *****
0.8163 TO 0.8195 *****
0.8195 TO 0.8228 *****
0.8228 TO 0.8260 *****
0.8260 TO 0.8293 *****
0.8293 TO 0.8325 *****
0.8325 TO 0.8358 *****
0.8358 TO 0.8390 *****
0.8390 TO 0.8423 *****

```



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---

0.8423 TO 0.8455 \*\*\*\*\*  
0.8455 TO 0.8488 \*\*  
0.8488 TO 0.8520 \*\*\*  
0.8520 TO 0.8553 \*\*\*\*  
0.8553 TO 0.8585 \*\*\*\*\*  
0.8585 TO 0.8617 \*\*  
0.8617 TO 0.8650 \*\*\*\*  
0.8650 TO 0.8682  
0.8682 TO 0.8715  
0.8715 TO 0.8747 \*  
0.8747 TO 0.8780 \*\*\*  
0.8780 TO 0.8812  
0.8812 TO 0.8845  
0.8845 TO 0.8877  
0.8877 TO 0.8910 \*  
0.8910 TO 0.8942  
0.8942 TO 0.8975  
0.8975 TO 0.9007  
0.9007 TO 0.9040  
0.9040 TO 0.9072  
0.9072 TO 0.9105  
0.9105 TO 0.9137  
0.9137 TO 0.9169  
0.9169 TO 0.9202 \*

**6.6.17**      **SLOWPOKE Fuel MCNP Input**

This section contains sample input files from the evaluation of SLOWPOKE fuel elements in the LWT cask. The input files are shown in Figures 6.6.17-1 and 6.6.17-2.

Figure 6.6.17-1 Maximum Reactivity Input for Undamaged SLOWPOKE Fuel

```
NAC-LWT Cask - Accident Transport Conditions
C SlowPoke Fuel - Fuel in Aluminum Tubes
C Fuel Assembly Cells
1 1 -3.4570 -1 2 -3 u=8 $ Fuel Meat
2 2 -2.7000 -4 1 +2 -3 u=8 $ Clad
3 2 -2.7000 -5 3 u=8 $ Top Cap
4 2 -2.7000 -5 -2 u=8 $ Bottom Cap
5 3 -0.9982 #1 #2 #3 #4 u=8 $ Outside Rod
C Canister Pelated Cells
c Aluminum Tubes - Centered
31 3 -0.9982 -31 u=7 $ Tube ID
32 5 -2.7000 -32 +31 u=7 $ Tube OD
33 3 -0.9982 32 u=7 $ Outside Tube
c Tube array
41 3 -0.9982 -33 +34 -35 +36 $ Tube Array
trcl=(0 0 0.635) lat=1 u=6 fill=-3:3 -3:3 0:0
6 6 6 6 6 6 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 6 6 6 6 6 6
51 5 -2.7000 -38 -37 u=5 $ Base Plate for Array
52 3 -0.9982 -41 fill=8 trcl = ( -2.6834 2.6834 0.6351 ) u=5 $ Fuel Rod 1
53 like 52 but fill=8 trcl = ( -1.4134 2.6834 0.6351 ) u=5 $ Fuel Rod 2
54 like 52 but fill=8 trcl = ( 0.0000 2.7429 0.6351 ) u=5 $ Fuel Rod 3
55 like 52 but fill=8 trcl = ( 1.4134 2.6834 0.6351 ) u=5 $ Fuel Rod 4
56 like 52 but fill=8 trcl = ( 2.6834 2.6834 0.6351 ) u=5 $ Fuel Rod 5
57 like 52 but fill=8 trcl = ( -2.6834 1.4134 0.6351 ) u=5 $ Fuel Rod 6
58 like 52 but fill=8 trcl = ( -1.4134 1.4134 0.6351 ) u=5 $ Fuel Rod 7
59 like 52 but fill=8 trcl = ( 0.0000 1.4729 0.6351 ) u=5 $ Fuel Rod 8
60 like 52 but fill=8 trcl = ( 1.4134 1.4134 0.6351 ) u=5 $ Fuel Rod 9
61 like 52 but fill=8 trcl = ( 2.6834 1.4134 0.6351 ) u=5 $ Fuel Rod 10
62 like 52 but fill=8 trcl = ( -2.7429 0.0000 0.6351 ) u=5 $ Fuel Rod 11
63 like 52 but fill=8 trcl = ( -1.4729 0.0000 0.6351 ) u=5 $ Fuel Rod 12
64 like 52 but fill=8 trcl = ( 0.0000 0.0000 0.6351 ) u=5 $ Fuel Rod 13
65 like 52 but fill=8 trcl = ( 1.4729 0.0000 0.6351 ) u=5 $ Fuel Rod 14
66 like 52 but fill=8 trcl = ( 2.7429 0.0000 0.6351 ) u=5 $ Fuel Rod 15
67 like 52 but fill=8 trcl = ( -2.6834 -1.4134 0.6351 ) u=5 $ Fuel Rod 16
68 like 52 but fill=8 trcl = ( -1.4134 -1.4134 0.6351 ) u=5 $ Fuel Rod 17
69 like 52 but fill=8 trcl = ( 0.0000 -1.4729 0.6351 ) u=5 $ Fuel Rod 18
70 like 52 but fill=8 trcl = ( 1.4134 -1.4134 0.6351 ) u=5 $ Fuel Rod 19
71 like 52 but fill=8 trcl = ( 2.6834 -1.4134 0.6351 ) u=5 $ Fuel Rod 20
72 like 52 but fill=8 trcl = ( -2.6834 -2.6834 0.6351 ) u=5 $ Fuel Rod 21
73 like 52 but fill=8 trcl = ( -1.4134 -2.6834 0.6351 ) u=5 $ Fuel Rod 22
74 like 52 but fill=8 trcl = ( 0.0000 -2.7429 0.6351 ) u=5 $ Fuel Rod 23
75 like 52 but fill=8 trcl = ( 1.4134 -2.6834 0.6351 ) u=5 $ Fuel Rod 24
76 like 52 but fill=8 trcl = ( 2.6834 -2.6834 0.6351 ) u=5 $ Fuel Rod 25
77 3 -0.9982 -38 +37
#52 #53 #54 #55 #56 #57 #58 #59 #60 #61 #62 #63 #64 #65
#66 #67 #68 #69 #70 #71 #72 #73 #74 #75 #76
fill=6 u=5 $ Tube Array Around Fuel Rods
78 3 -0.9982 +38 u=5 $ Tube Array Exterior
c Canister for four tube arrays
81 5 -2.7000 -40 +39 u=4 $ Can Base and Shell
82 3 -0.9982 -38 fill=5 trcl = ( 0.0000 0.0000 0.9650 ) u=4 $ Tube Assy 1
83 like 82 but fill=5 trcl = ( 0.0000 0.0000 25.0952 ) u=4 $ Tube Assy 2
84 like 82 but fill=5 trcl = ( 0.0000 0.0000 49.2252 ) u=4 $ Tube Assy 3
85 like 82 but fill=5 trcl = ( 0.0000 0.0000 73.3552 ) u=4 $ Tube Assy 4
86 3 -0.9982 -39 #82 #83 #84 #85 u=4 $ Canister Cavity
87 4 -0.0001 40 u=4 $ Canister Exterior
C Cells - MTR 7 Element Basket
91 6 -7.9400 -91 +94 +95 +96 +97 +98 +99 +100 u=3 $ Base plate
92 6 -7.9400 -92 +101 +105 u=3 $ Support plate
93 6 -7.9400 -93 +101 +105 u=3 $ Support plate
94 6 -7.9400 -101 +102 #91 #92 #93 u=3 $ Center column
95 6 -7.9400 -103 #91 #92 #93 u=3 $ Center divider upper
96 6 -7.9400 -104 #91 #92 #93 u=3 $ Center divider lower
97 6 -7.9400 -105 +106 +101 #91 #92 #93 u=3 $ Small side
98 6 -7.9400 -107 #91 #92 #93 u=3 $ Left divider
99 6 -7.9400 -108 #91 #92 #93 u=3 $ Right divider
100 4 -0.0001 #91 #92 #93 #94 #95 #96 #97 #98 #99 u=3 $ Cask Cavity Material
C Cells - Basket Cell Opening
151 4 -0.0001 -151 fill=4 trcl = ( -9.3503 4.5222 1.2700 ) u=2 $ UL
152 like 151 but trcl = ( -9.3503 -4.5222 1.2700 ) u=2 $ LL
153 like 151 but trcl = ( 9.3503 4.5222 1.2700 ) u=2 $ UR
154 like 151 but trcl = ( 9.3503 -4.5222 1.2700 ) u=2 $ LR
155 4 -0.0001 #151 #152 #153 #154 fill=3 u=2 $ Basket Materials
C Cells - LWT Cavity
201 4 -0.0001 -201 fill=3 ( 0.0000 0.0000 3.8100 ) u=1
202 4 -0.0001 -202 fill=3 ( 0.0000 0.0000 115.5700 ) u=1
203 4 -0.0001 -203 fill=2 ( 0.0000 0.0000 227.3300 ) u=1
204 4 -0.0001 -204 fill=2 ( 0.0000 0.0000 339.0900 ) u=1
205 4 -0.0001 #201 #202 #203 #204 u=1
C Cells - LWT Cask Accident Conditions
301 7 -11.344 -304 $ BotPb
302 4 -0.0001 -303 fill=1 $ Cavity
303 6 -7.9400 -302 +304 $ Bottom
304 6 -7.9400 -301 +302 +306 +309 +303 $ OuterShell
305 6 -7.9400 -305 +308 +303 $ InnerShellTaper
306 6 -7.9400 -307 +303 $ InnerShell
307 7 -11.344 -308 +307 $ Lead
```

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```

308 7 -11.344 -306 +305 +308 $ LeadTaper
309 0 -309 +308 $ LeadGap
310 9 -0.0001 +301 -310 $ Gap To Reflector
311 0 +310 $ Outside

C Fuel Assembly Surfaces
1 CZ 0.2110 $ Fuel Meat
2 PZ 0.4150 $ Lower Meat Elevation
3 PZ 22.4150 $ Upper Meat Elevation
4 CZ 0.2650 $ Clad
5 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 22.8300 0.3051 $ Rod Outline
C Canister Surfaces
c Aluminum Tubes
31 CZ 0.5080 $ Tube ID
32 CZ 0.6350 $ Tube OD
33 PX 0.6350
34 PX -0.6350
35 PY 0.6350
36 PY -0.6350 $ Tube Pitch Box
c Tube array base and outer envelope
37 PZ 0.6351 $ Base Plate Top Elevation
38 RPP -3.1750 3.1750 -3.1750 3.1750 0.0000 24.1300 $ Tube Container
c Canister for four tube arrays
39 RPP -3.5560 3.5560 -3.5560 3.5560 0.9652 100.1776 $ Can Cavity
40 RPP -4.1910 4.1910 -4.1910 4.1910 0.0000 101.1428 $ Can Outer
41 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 22.8300 0.3050 $ Rod Outline
C Surfaces - MTR 7 Element Basket
91 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 1.2700 16.8466 $ Base plate
92 RCC 0.0000 0.0000 52.0700 0.0000 0.0000 1.2700 16.8466 $ Support plate
93 RCC 0.0000 0.0000 104.1400 0.0000 0.0000 1.2700 16.8466 $ Support plate
94 CZ 1.2700 $ Hole CC
95 C/Z 0.0000 9.5250 1.2700 $ Hole UC
96 C/Z 0.0000 -9.5250 1.2700 $ Hole LC
97 C/Z -9.5250 4.6990 1.2700 $ Hole UL
98 C/Z -9.5250 -4.6990 1.2700 $ Hole LL
99 C/Z 9.5250 4.6990 1.2700 $ Hole UR
100 C/Z 9.5250 -4.6990 1.2700 $ Hole LR
101 RPP -5.1604 5.1604 -14.6939 14.6939 1.2700 111.7600 $ Center column outer
102 RPP -4.3667 4.3667 -13.9002 13.9002 1.2700 111.7600 $ Center column inner
103 RPP -4.3667 4.3667 4.3668 5.1626 1.2700 111.7600 $ Center divider upper
104 RPP -4.3667 4.3667 -5.1626 -4.3668 1.2700 111.7600 $ Center divider lower
105 RPP -14.1986 14.1986 -9.3599 9.3599 1.2700 111.7600 $ Small side outer
106 RPP -13.8938 13.8938 -9.0551 9.0551 1.2700 111.7600 $ Small side inner
107 RPP -13.8938 -5.1604 -0.3175 0.3175 1.2700 111.7600 $ Left divider
108 RPP 5.1604 13.8938 -0.3175 0.3175 1.2700 111.7600 $ Right divider
C Surfaces - Basket Cell Opening
151 RPP -4.1909 4.1911 -4.1909 4.1911 1.2700 111.7600 $ Opening in Basket
C Surfaces - LWT Cavity
201 RCC 0.0000 0.0000 3.8100 0.0000 0.0000 111.7600 16.8467 $ Basket
202 RCC 0.0000 0.0000 115.5700 0.0000 0.0000 111.7600 16.8467 $ Basket
203 RCC 0.0000 0.0000 227.3300 0.0000 0.0000 111.7600 16.8467 $ Basket
204 RCC 0.0000 0.0000 339.0900 0.0000 0.0000 111.7600 16.8467 $ Basket
C Surfaces - LWT Cask Accident Conditions
301 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 507.3650 36.5189 $ Lwt
302 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 26.6700 36.5189 $ Bottom
303 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 452.1200 16.9863 $ Cavity
304 RCC 0.0000 0.0000 -17.7800 0.0000 0.0000 7.6200 26.3525 $ Bottom gamma shield
305 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 20.1740 $ Lead id - taper
306 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 31.5976 $ Lead od - taper
307 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 18.9103 $ Lead id
308 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.3271 $ Lead od
309 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.4645 $ Lead gap
*310 RCC 0.0000 0.0000 -27.1700 0.0000 0.0000 506.3650 37.0189 $ Container

C
C Materials List
C
C - U-Al
m1 92235 -2.6400E-01
  92238 -1.3000E-02
  13027 -7.2300E-01
C Aluminum / Clad
m2 13027 -1.0
C Canister Water
m3 1001 6.6667E-01 8016 3.3333E-01
mt3 lwtr.01
C Cask Cavity Water
m4 1001 6.6667E-01 8016 3.3333E-01
mt4 lwtr.01
C Aluminum
m5 13027 -1.0
C Stainless Steel 304
m6 26000 -0.695 24000 -0.190 28000 -0.095
  25055 -0.020
C Lead
m7 82000 -1.0
C Aluminum Honeycomb Impact Limiter
m8 13027 -1.0
C Water/Glycol - Cask Neutron Shield
m10 1001 -1.03651E-01 8016 -6.75619E-01 6000 -2.20730E-01
C Cask Exterior (Water at Various Densities)
m9 1001 6.6667E-01 8016 3.3333E-01
mt9 lwtr.01
C
C Cell Importances
imp:n 1 73r 0
c

```

```
c Criticality Controls
c
kcode 2000 1.00 30 530
c
c Source Distribution for Initial Generation
SDEF CEL= 302:D4:D5:D6:D7:-1
      EPG= D1
      POS= 0.0000 0.00 0.4150
      RAD= D2
      AXS= 0.00 0.00 1.00
      EXT= D3
C - Neutron Source Energy Source Distribution
#   SP1
      -3
C - Uniform Radial Distribution in Fuel Rod
# S12 SP2
      0.0000 -21
      0.2110 1
C - Axial Source Profile
# S13 SP3
      0 0.0
      22 1.0
C - Two Baskets With Fuel in Cask
#   S14   SP4
      1   d
      203 1
      204 1
C - Four Openings in Basket with Fuel
#   S15   SP5
      1   d
      151 1
      152 1
      153 1
      154 1
C - Four Tube Arrays per Canister
#   S16   SP6
      1   d
      82 1
      83 1
      84 1
      85 1
C - 25 Fuel Rods
#   S17   SP7
      1   d
      52 1
      53 1
      54 1
      55 1
      56 1
      57 1
      58 1
      59 1
      60 1
      61 1
      62 1
      63 1
      64 1
      65 1
      66 1
      67 1
      68 1
      69 1
      70 1
      71 1
      72 1
      73 1
      74 1
      75 1
      76 1
C Print Control
prtmp -30 -60 1 2
print
C Random Number Generator
rand gen=2 1.90735E+13 stride=152917 hist=1
```

Figure 6.6.17-2 Maximum Reactivity Input for Damaged SLOWPOKE Fuel

```

NAC-LWT Cask - Accident Transport Conditions
C SlowPoke Fuel - Fuel in Aluminum Tubes
C Canister Related Cells
c Aluminum Tubes - Centered
31 1 -1.2795 -31 u=7 $ Tube ID
32 5 -2.7000 -32 +31 u=7 $ Tube OD
33 1 -1.2795 32 u=7 $ Outside Tube
c Tube array
41 1 -1.2795 -33 +34 -35 +36 $ Tube Array
trcl=(0 0 0.635) lat=1 u=6 fill=-3:3 -3:3 0:0
6 6 6 6 6 6 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 7 7 7 7 7 6
6 6 6 6 6 6 6
51 5 -2.7000 -38 -37 u=5 $ Base Plate for Array
52 1 -1.2795 -38 +37
fill=6 u=5 $ Tube Array Around Fuel Rods
53 1 -1.2795 +38 u=5 $ Tube Array Exterior
c Canister for four tube arrays
81 5 -2.7000 -40 +39 u=4 $ Can Base and Shell
82 1 -1.2795 -38 fill=5 trcl = ( 0.0000 0.0000 0.9652 ) u=4 $ Tube Assy 1
83 like 82 but fill=5 trcl = ( 0.0000 0.0000 25.0952 ) u=4 $ Tube Assy 2
84 like 82 but fill=5 trcl = ( 0.0000 0.0000 49.2252 ) u=4 $ Tube Assy 3
85 like 82 but fill=5 trcl = ( 0.0000 0.0000 73.3552 ) u=4 $ Tube Assy 4
86 1 -1.2795 -39 #82 #83 #94 #85 u=4 $ Canister Cavity
87 4 -0.0001 40 u=4 $ Canister Exterior
C Cells - MTR 7 Element Basket
91 6 -7.9400 -91 +94 +95 +96 +97 +98 +99 +100 u=3 $ Base plate
92 6 -7.9400 -92 +101 +105 u=3 $ Support plate
93 6 -7.9400 -93 +101 +105 u=3 $ Support plate
94 6 -7.9400 -101 +102 #91 #92 #93 u=3 $ Center column
95 6 -7.9400 -103 #91 #92 #93 u=3 $ Center divider upper
96 6 -7.9400 -104 #91 #92 #93 u=3 $ Center divider lower
97 6 -7.9400 -105 +106 +101 #91 #92 #93 u=3 $ Small side
98 6 -7.9400 -107 #91 #92 #93 u=3 $ Left divider
99 6 -7.9400 -108 #91 #92 #93 u=3 $ Right divider
100 4 -0.0001 #91 #92 #93 #94 #95 #96 #97 #98 #99 u=3 $ Cask Cavity Material
C Cells - Basket Cell Opening
151 4 -0.0001 -151 fill=4 trcl = ( -9.3503 4.5222 1.2700 ) u=2 $ UL
152 like 151 but trcl = ( -9.3503 -4.5222 1.2700 ) u=2 $ LL
153 like 151 but trcl = ( 9.3503 4.5222 1.2700 ) u=2 $ UR
154 like 151 but trcl = ( 9.3503 -4.5222 1.2700 ) u=2 $ LR
155 4 -0.0001 #151 #152 #153 #154 fill=3 u=2 $ Basket Materials
C Cells - LWT Cavity
201 4 -0.0001 -201 fill=3 ( 0.0000 0.0000 3.8100 ) u=1
202 4 -0.0001 -202 fill=3 ( 0.0000 0.0000 115.5700 ) u=1
203 4 -0.0001 -203 fill=2 ( 0.0000 0.0000 227.3300 ) u=1
204 4 -0.0001 -204 fill=2 ( 0.0000 0.0000 339.0900 ) u=1
205 4 -0.0001 #201 #202 #203 #204 u=1
C Cells - LWT Cask Accident Conditions
301 7 -11.344 -304 $ BotPb
302 4 -0.0001 -303 fill=1 $ Cavity
303 6 -7.9400 -302 +304 $ Bottom
304 6 -7.9400 -301 +302 +306 +309 +303 $ OuterShell
305 6 -7.9400 -305 +308 +303 $ InnerShellTaper
306 6 -7.9400 -307 +303 $ InnerShell
307 7 -11.344 -308 +307 $ Lead
308 7 -11.344 -306 +305 +308 $ LeadTaper
309 0 -309 +308 $ LeadGap
310 9 -0.0001 +301 -310 $ Gap To Reflector
311 0 +310 $ Outside
C Canister Surfaces
c Aluminum Tubes
31 CZ 0.5080 $ Tube ID
32 CZ 0.6350 $ Tube OD
33 PX 0.6350
34 PX -0.6350
35 PY 0.6350
36 FY -0.6350 $ Tube Pitch Box
c Tube array base and outer envelope
37 PZ 0.6351 $ Base Plate Top Elevation
38 RPP -3.1750 3.1750 -3.1750 3.1750 0.0000 24.1300 $ Tube Container
c Canister for four tube arrays
39 RPP -3.5560 3.5560 -3.5560 3.5560 0.9652 100.1776 $ Can Cavity
40 RPP -4.1910 4.1910 -4.1910 4.1910 0.0000 101.1428 $ Can Outer
41 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 22.8300 0.3050 $ Rod Outline
C Surfaces - MTR 7 Element Basket
91 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 1.2700 16.8466 $ Base plate
92 RCC 0.0000 0.0000 52.0700 0.0000 0.0000 1.2700 16.8466 $ Support plate
93 RCC 0.0000 0.0000 104.1400 0.0000 0.0000 1.2700 16.8466 $ Support plate
94 CZ 1.2700 $ Hole CC
95 C/Z 0.0000 9.5250 1.2700 $ Hole UC
96 C/Z 0.0000 -9.5250 1.2700 $ Hole LC
97 C/Z -9.5250 4.6990 1.2700 $ Hole UL
98 C/Z -9.5250 -4.6990 1.2700 $ Hole LL
99 C/Z 9.5250 4.6990 1.2700 $ Hole UR
100 C/Z 9.5250 -4.6990 1.2700 $ Hole LR
101 RPP -5.1604 5.1604 -14.6939 14.6939 1.2700 111.7600 $ Center column outer
102 RPP -4.3667 4.3667 -13.9002 13.9002 1.2700 111.7600 $ Center column inner

```

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```

103 RPP -4.3667 4.3667 4.3688 5.1626 1.2700 111.7600 $ Center divider upper
104 RPP -4.3667 4.3667 -5.1626 -4.3688 1.2700 111.7600 $ Center divider lower
105 RPP -14.1986 14.1986 -9.3599 9.3599 1.2700 111.7600 $ Small side outer
106 RPP -13.8938 13.8938 -9.0551 9.0551 1.2700 111.7600 $ Small side inner
107 RPP -13.8938 -5.1604 -0.3175 0.3175 1.2700 111.7600 $ Left divider
108 RPP 5.1604 13.8938 -0.3175 0.3175 1.2700 111.7600 $ Right divider
C Surfaces - Basket Cell Opening
151 RPP -4.1909 4.1911 -4.1909 4.1911 1.2700 111.7600 $ Opening in Basket
C Surfaces - LWT Cavity
201 RCC 0.0000 0.0000 3.8100 0.0000 0.0000 111.7600 16.8467 $ Basket
202 RCC 0.0000 0.0000 115.5700 0.0000 0.0000 111.7600 16.8467 $ Basket
203 RCC 0.0000 0.0000 227.3300 0.0000 0.0000 111.7600 16.8467 $ Basket
204 RCC 0.0000 0.0000 339.0900 0.0000 0.0000 111.7600 16.8467 $ Basket
C Surfaces - LWT Cask Accident Conditions
301 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 507.3650 36.5189 $ Lwt
302 RCC 0.0000 0.0000 -26.6700 0.0000 0.0000 26.6700 36.5189 $ Bottom
303 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 452.1200 16.9863 $ Cavity
304 RCC 0.0000 0.0000 -17.7800 0.0000 0.0000 7.6200 26.3525 $ Bottom gamma shield
305 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 20.1740 $ Lead id - taper
306 RCC 0.0000 0.0000 0.0000 0.0000 0.0000 444.5000 31.5976 $ Lead od - taper
307 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 18.9103 $ Lead id
308 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.3271 $ Lead od
309 RCC 0.0000 0.0000 13.8176 0.0000 0.0000 416.8648 33.4645 $ Lead gap
*310 RCC 0.0000 0.0000 -27.1700 0.0000 0.0000 508.3650 37.0189 $ Container

```

```

C
C Materials List
C
C - U-A1_H2O
m1 92235 -5.7000E-02 1001 -7.5000E-02
    92238 -3.0000E-03 8016 -6.0400E-01
    13027 -2.6100E-01
C Aluminum / Clad
m2 13027 -1.0
C Canister Water
m3 1001 6.6667E-01 8016 3.3333E-01
mt3 lwtr.01
C Cask Cavity Water
m4 1001 6.6667E-01 8016 3.3333E-01
mt4 lwtr.01
C Aluminum
m5 13027 -1.0
C Stainless Steel 304
m6 26000 -0.695 24000 -0.190 28000 -0.095
    25055 -0.020
C Lead
m7 82000 -1.0
C Aluminum Honeycomb Impact Limiter
m8 13027 -1.0
C Water/Glycol - Cask Neutron Shield
m10 1001 -1.03651E-01 8016 -6.75619E-01 6000 -2.20730E-01
C Cask Exterior (Water at Various Densities)
m9 1001 6.6667E-01 8016 3.3333E-01
mt9 lwtr.01
C
C Cell Importances
imp:n 1 43r 0
c
c Criticality Controls
c
kcode 2000 1.00 30 530
c
c Source Distribution for Initial Generation
SDEF CEL= 302:D4:D5:D6
    ERG= D1
    POS= 0.0000 0.00 0.4150
    RAD= D2
    AXS= 0.00 0.00 1.00
    EXT= D3
C - Neutron Source Energy Source Distribution
# S1 SP1
    -3
C - Uniform Radial Distribution in Fuel Rod
# S12 SP2
    0.0000 -21
    3.5560 1
C - Axial Source Profile
# S13 SP3
    0 0.0
    100 1.0
C - Two Baskets With Fuel in Cask
# S14 SP4
    1 d
    203 1
    204 1
C - Four Openings in Basket with Fuel
# S15 SP5
    1 d
    151 1
    152 1
    153 1
    154 1
C - Four Tube Arrays per Canister
# S16 SP6
    1 d
    82 1
    83 1

```

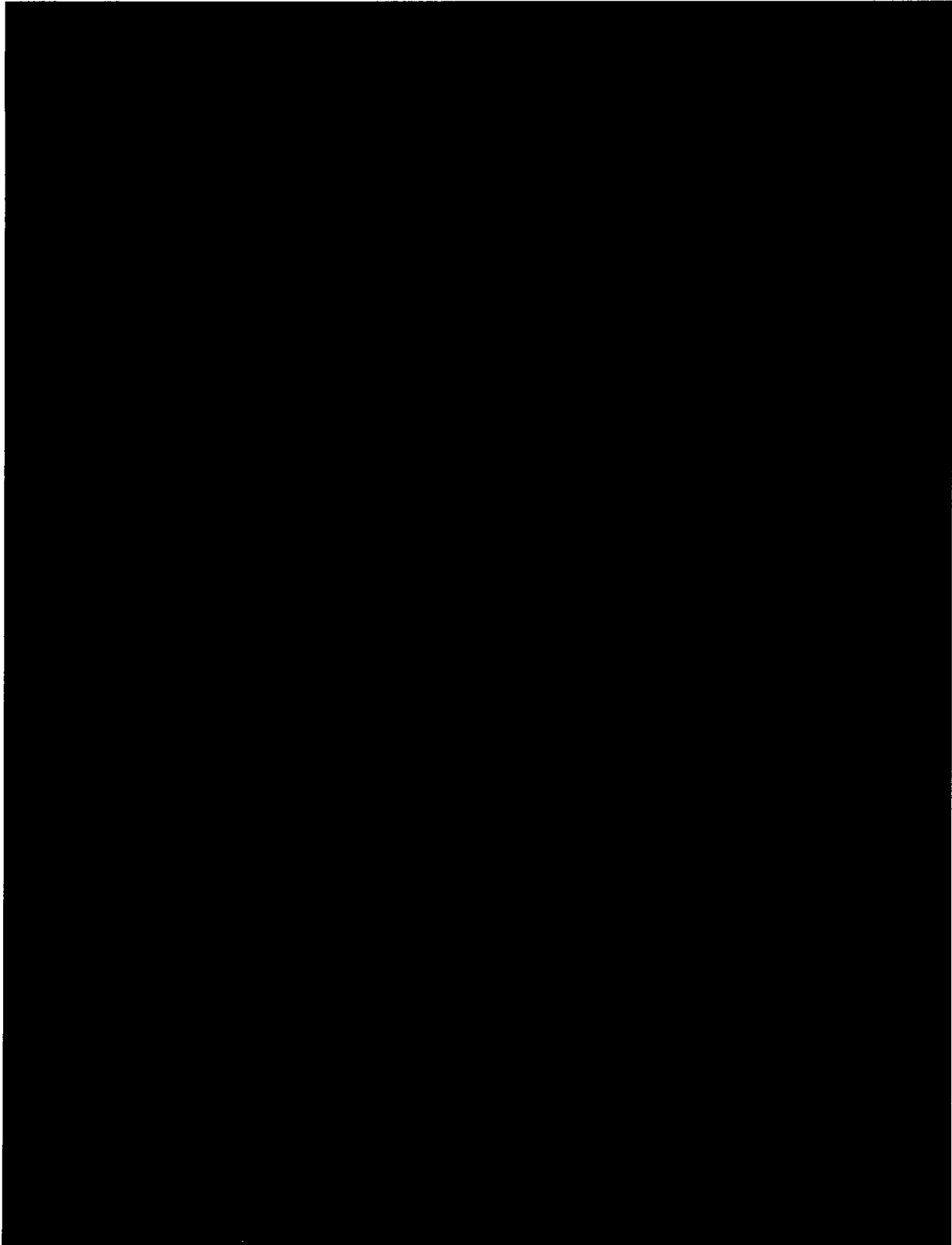
```
84 1
85 1
C Print Control
prtmp -30 -60 1 2
print
C Random Number Generator
rand gen=2 1.90735E+13 stride=152917 hist=1
```

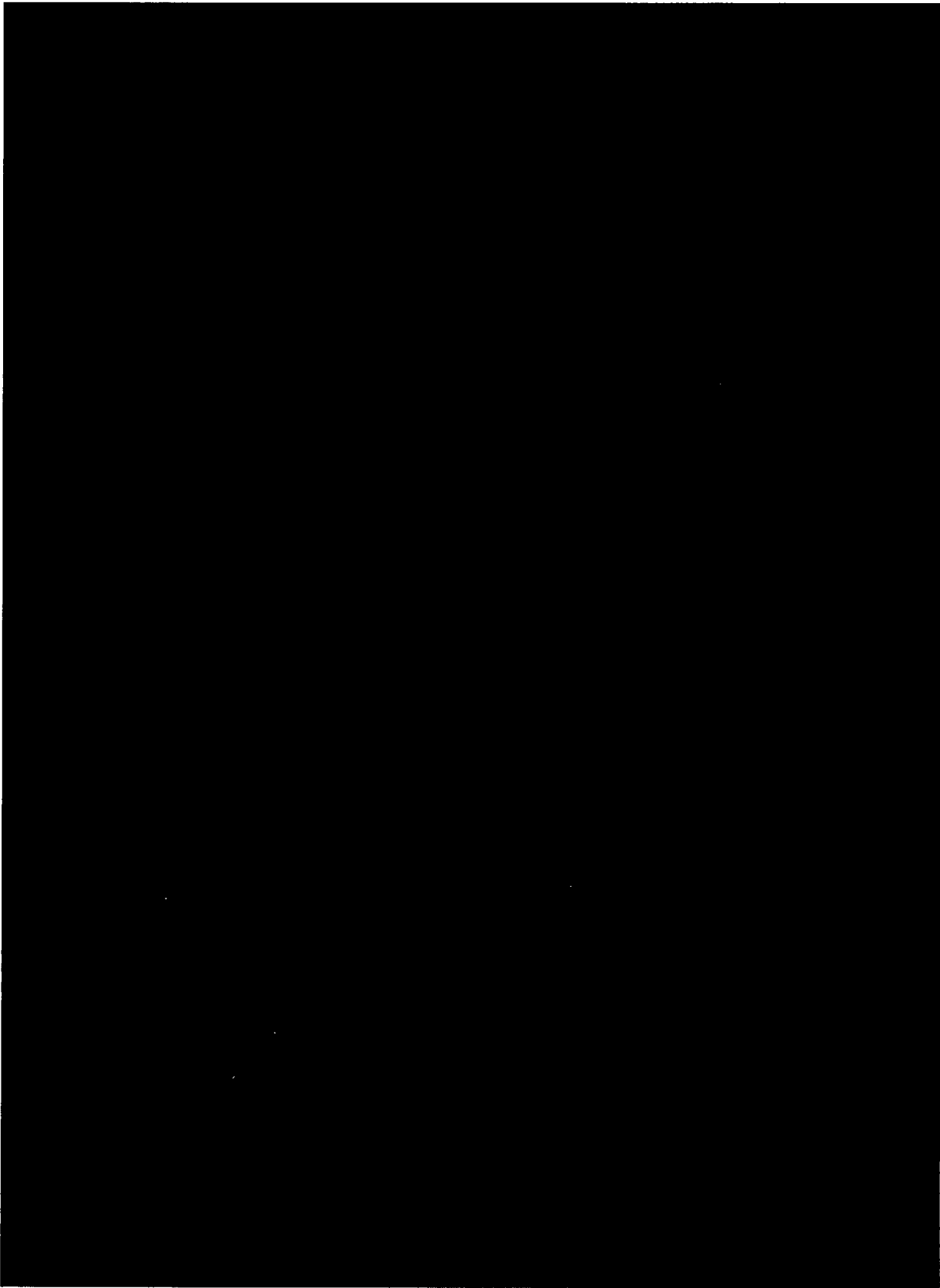


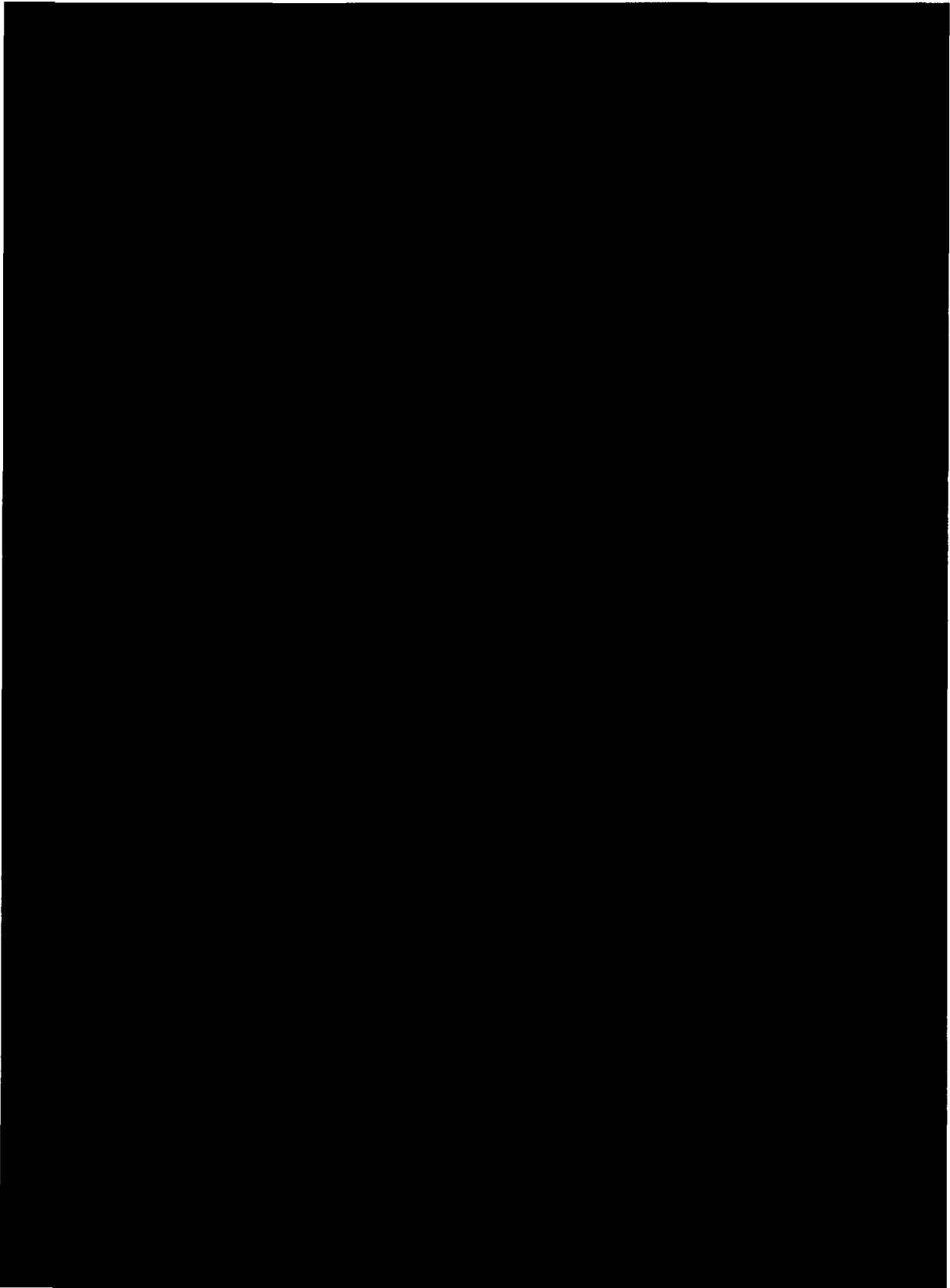
**6.6.18**      **HEUNL in the LWT Cask**

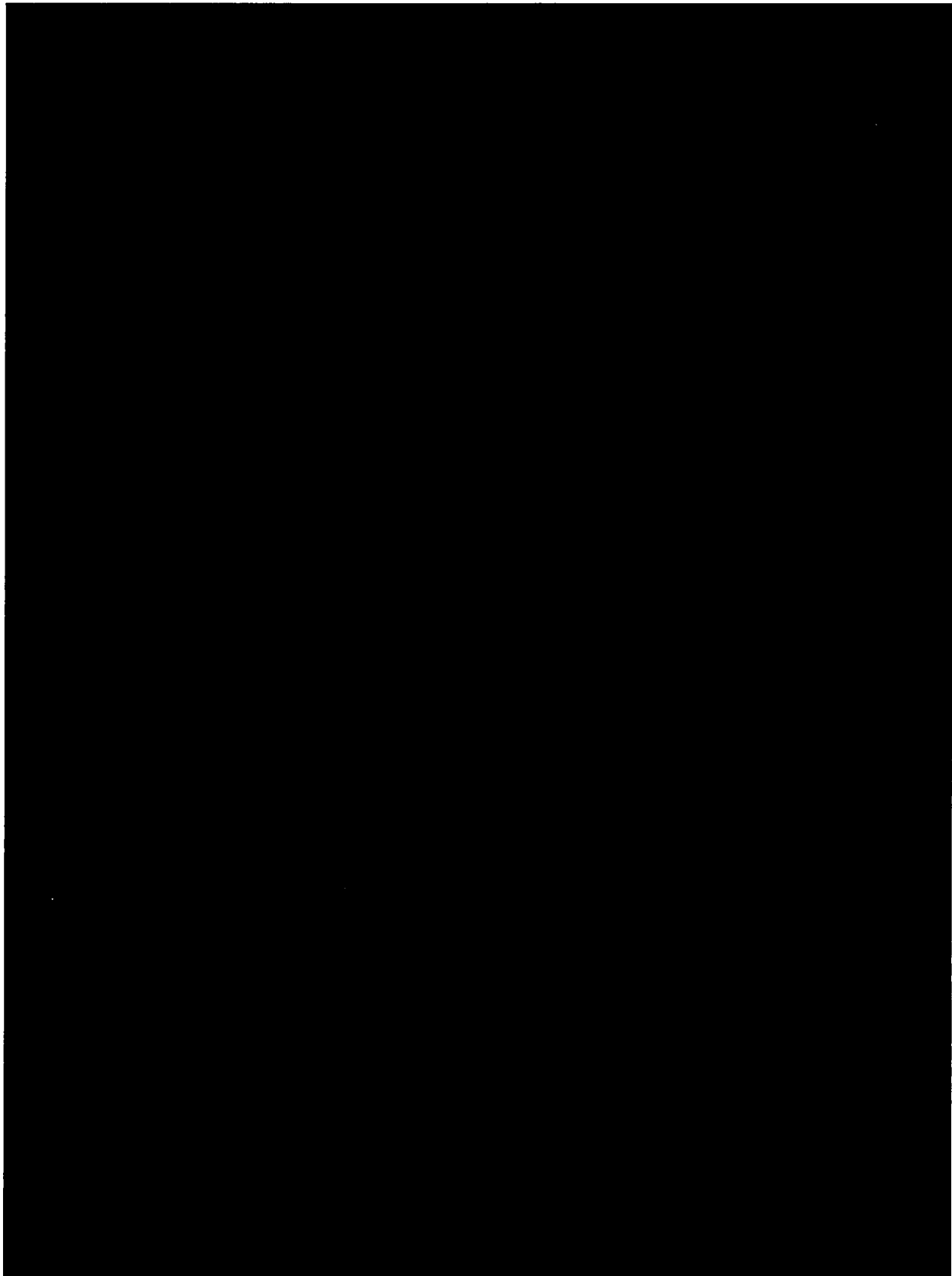
This section contains a sample (truncated) output file from the evaluation of HEUNL in the LWT cask. The output file is shown in Figure 6.6.18-1.

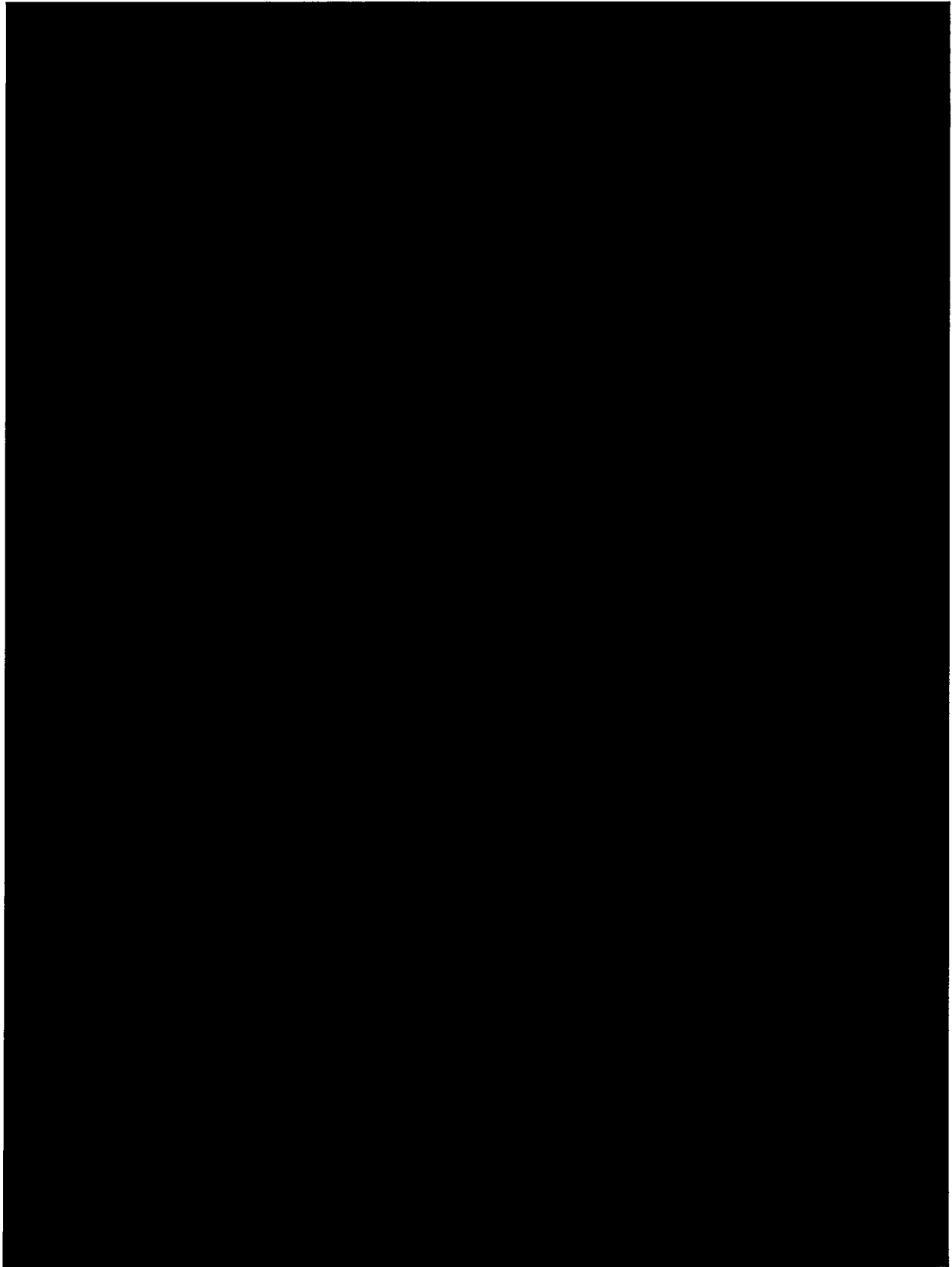
Figure 6.6.18-1 Maximum Reactivity HEUNL Configuration

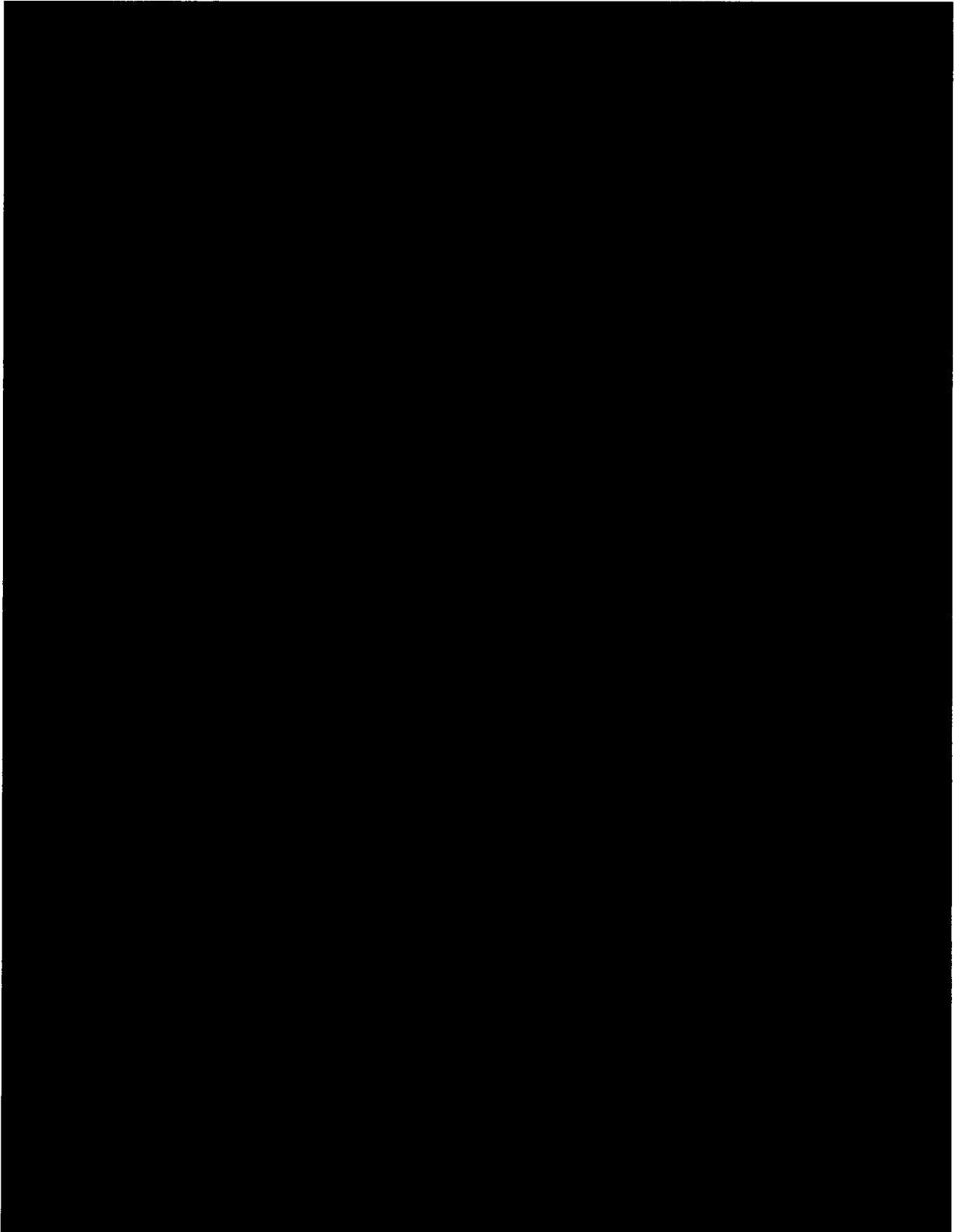


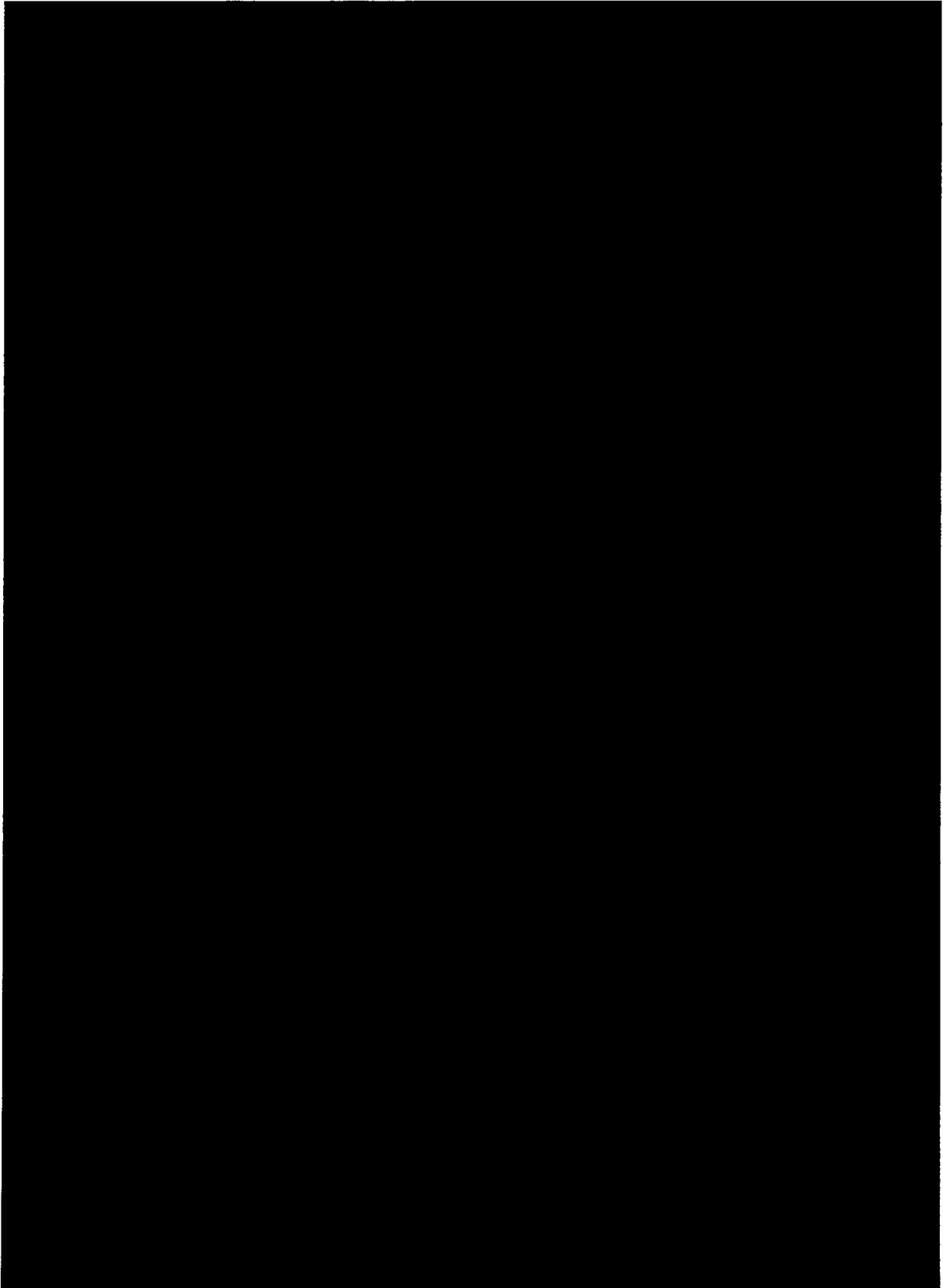




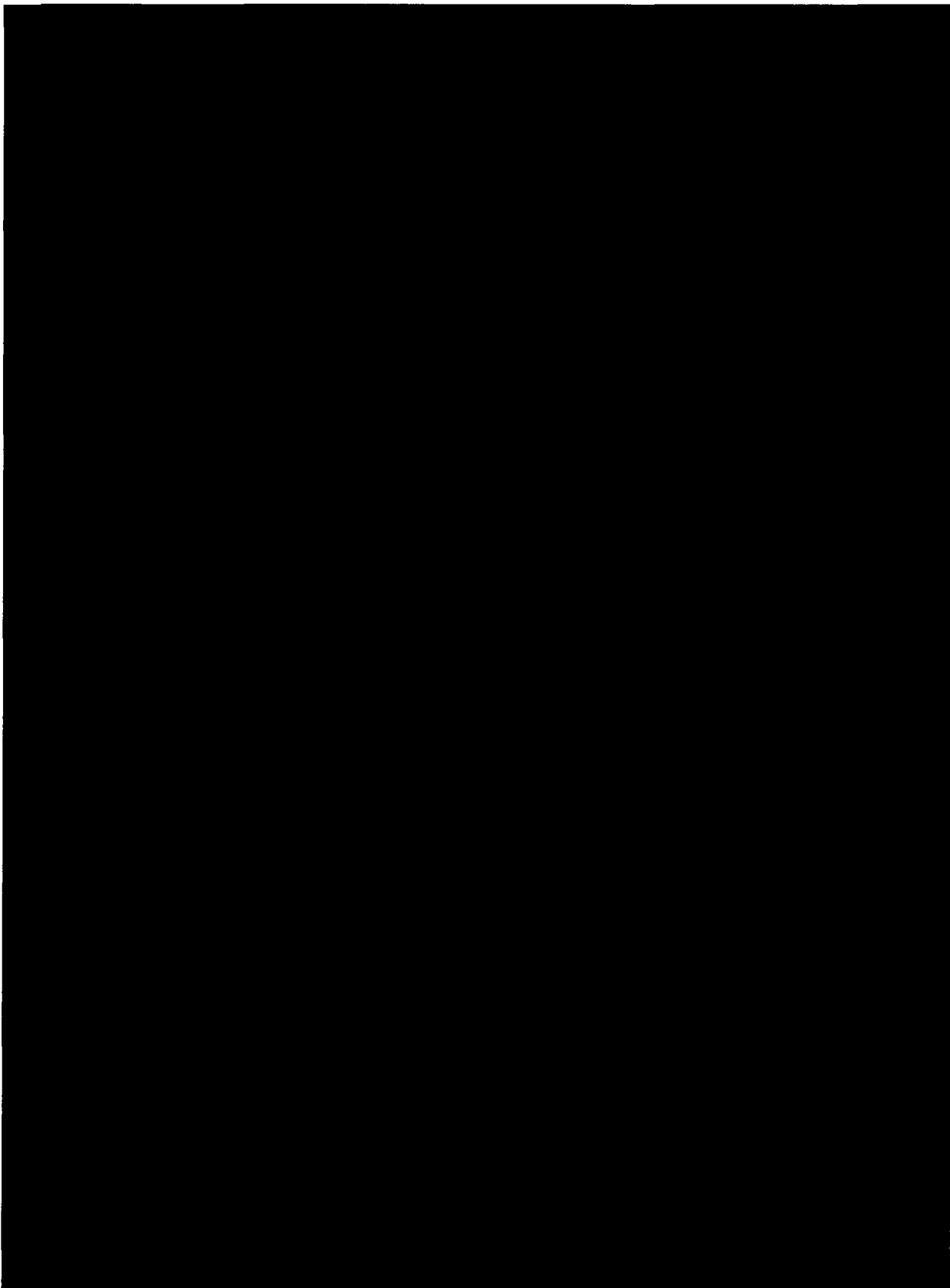


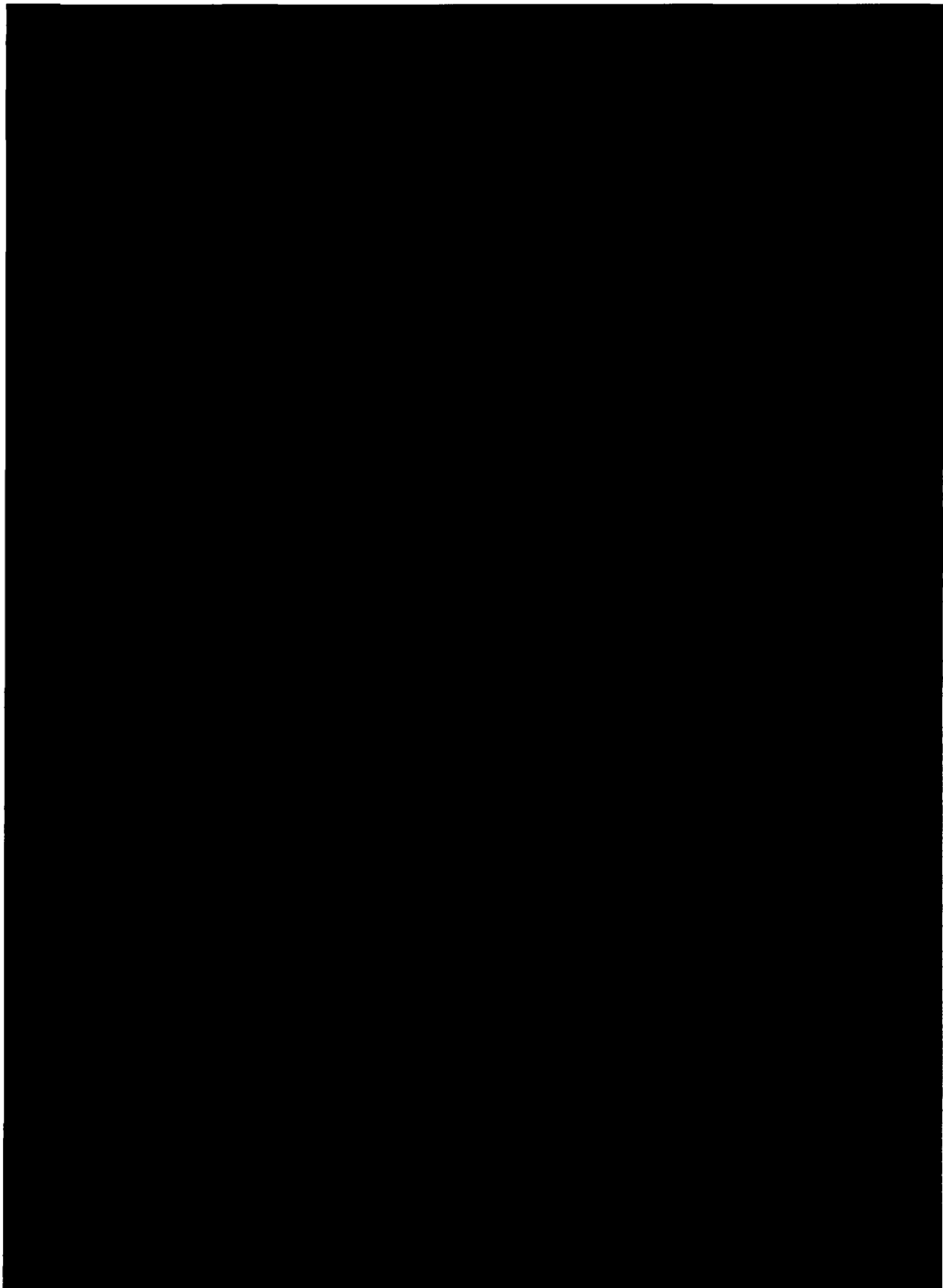


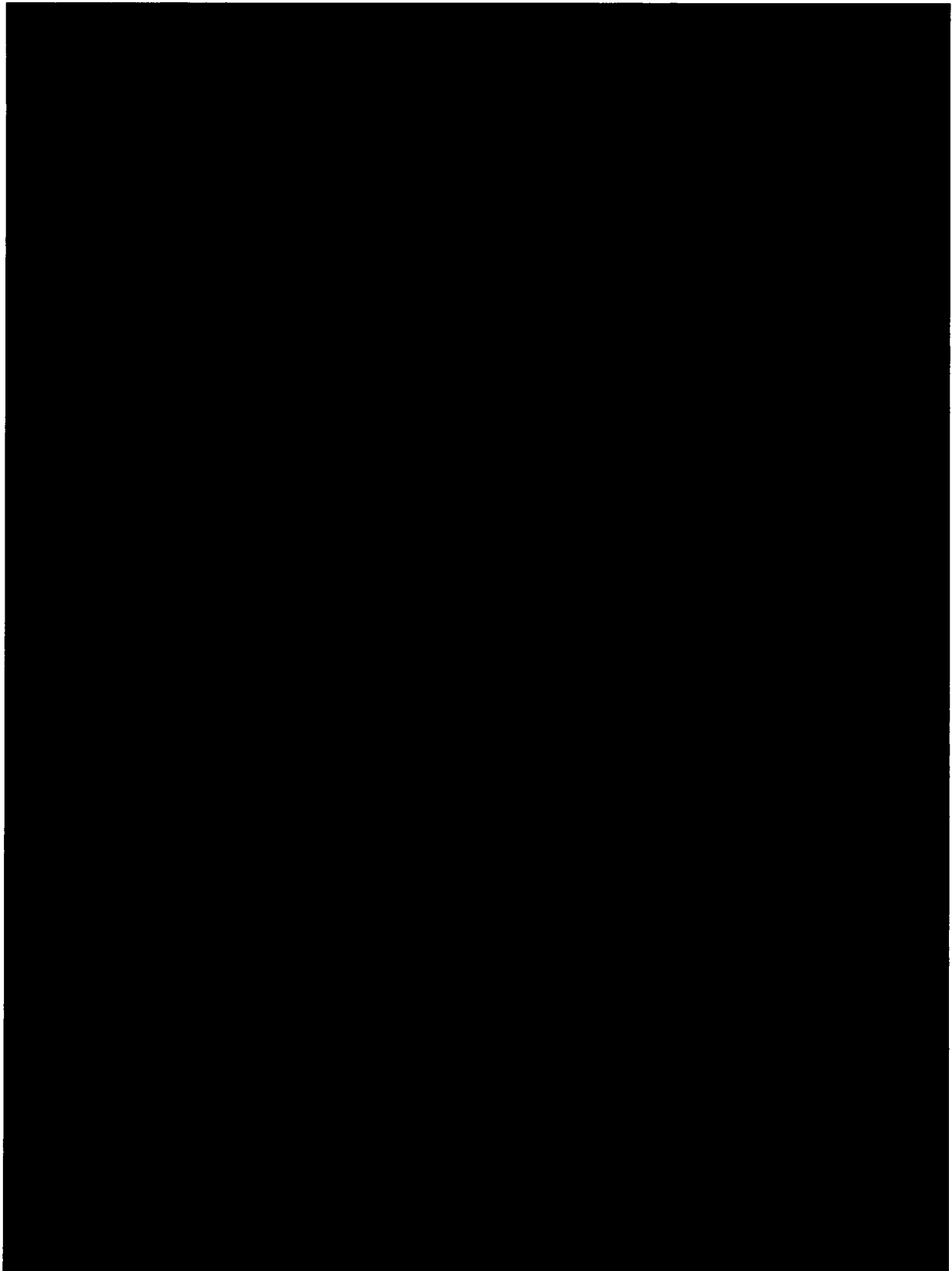


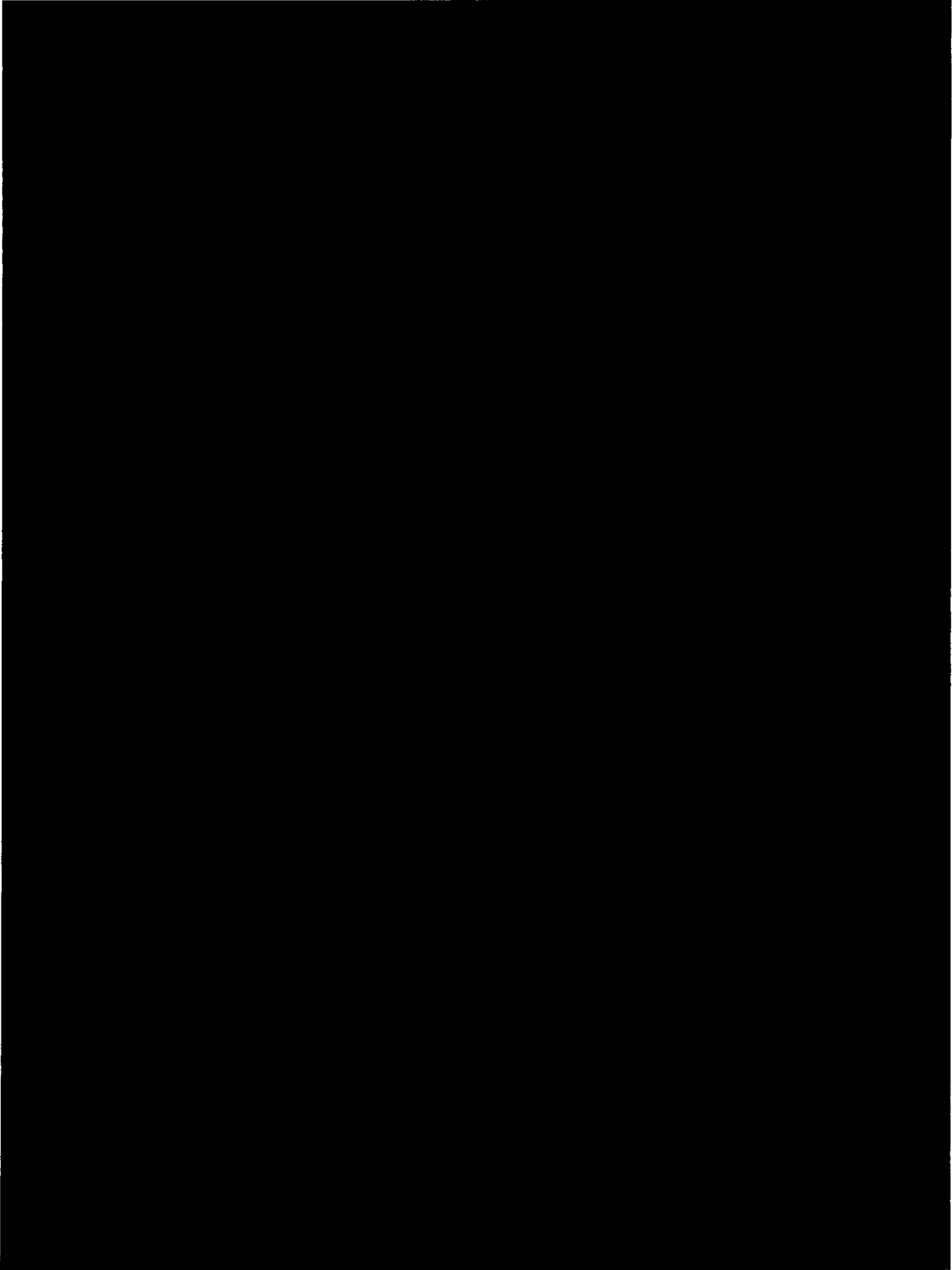


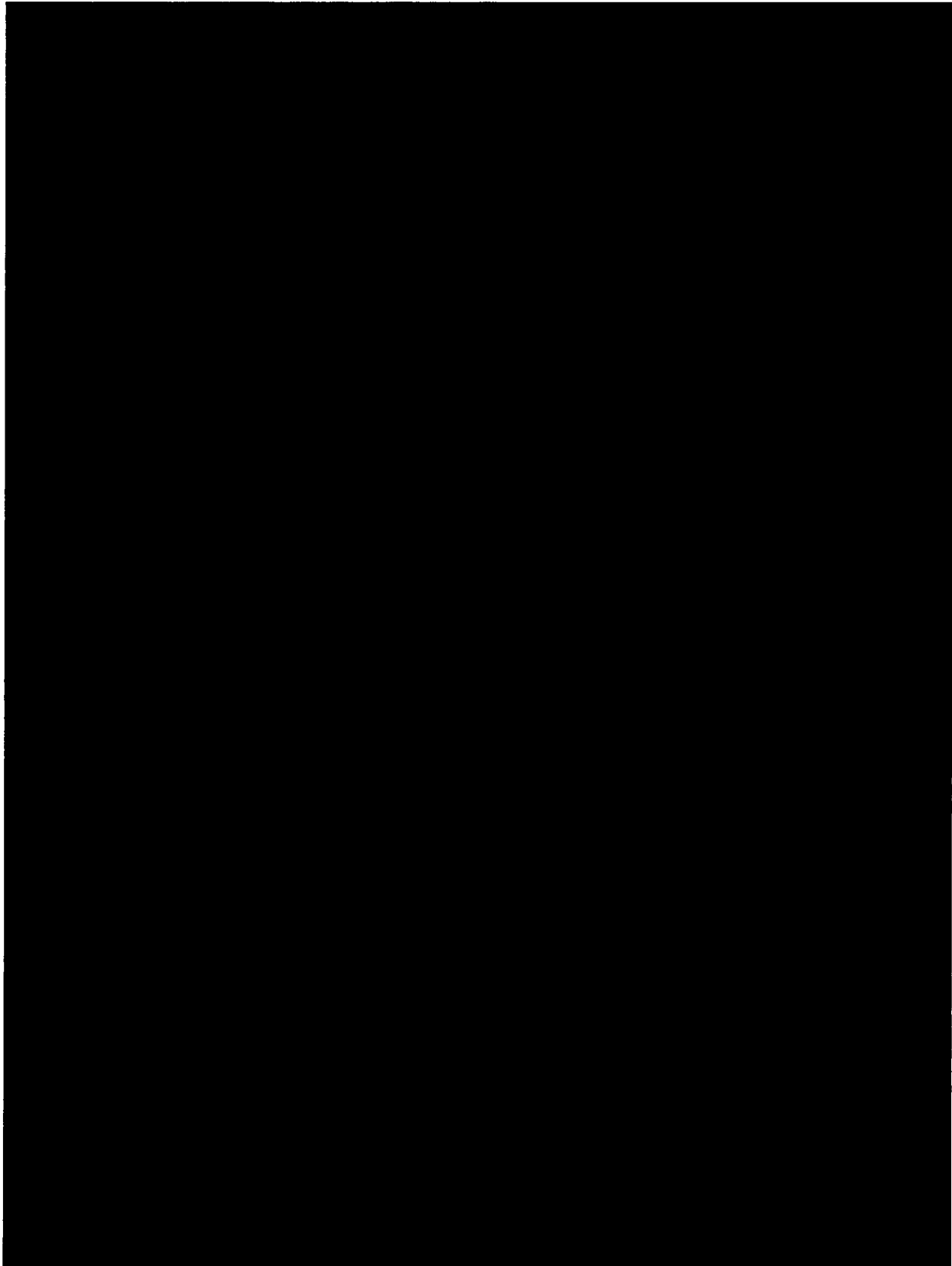


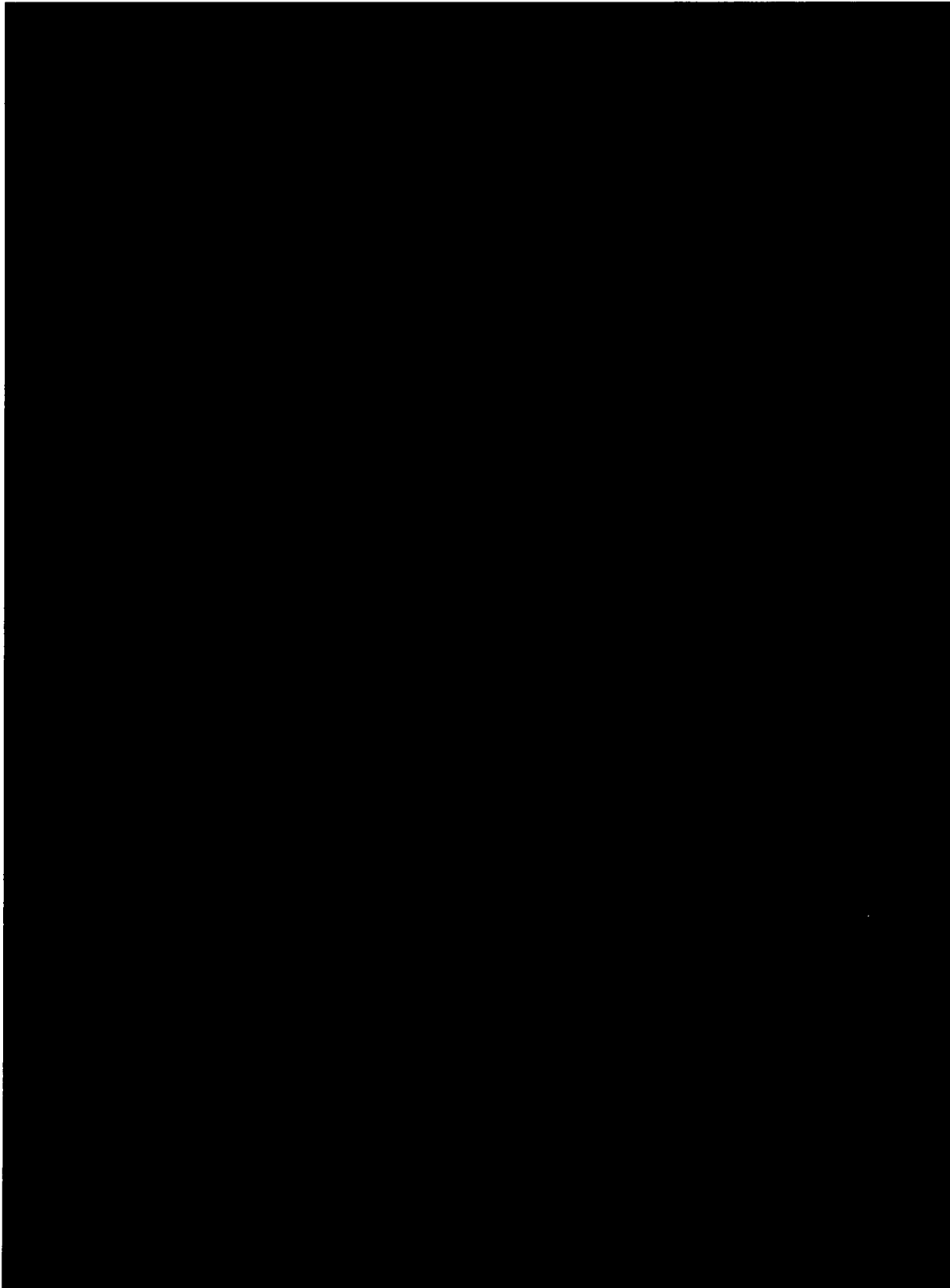


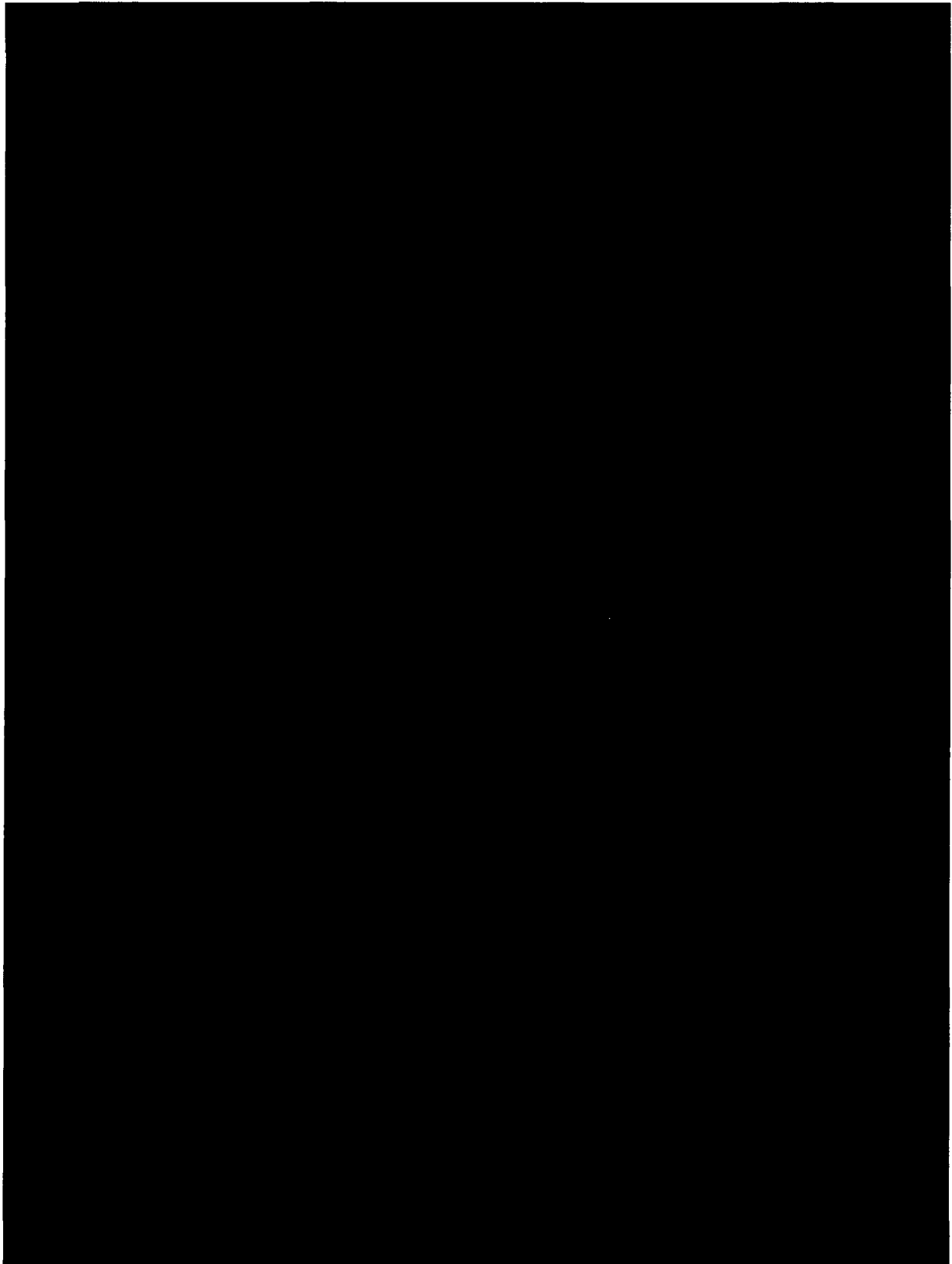


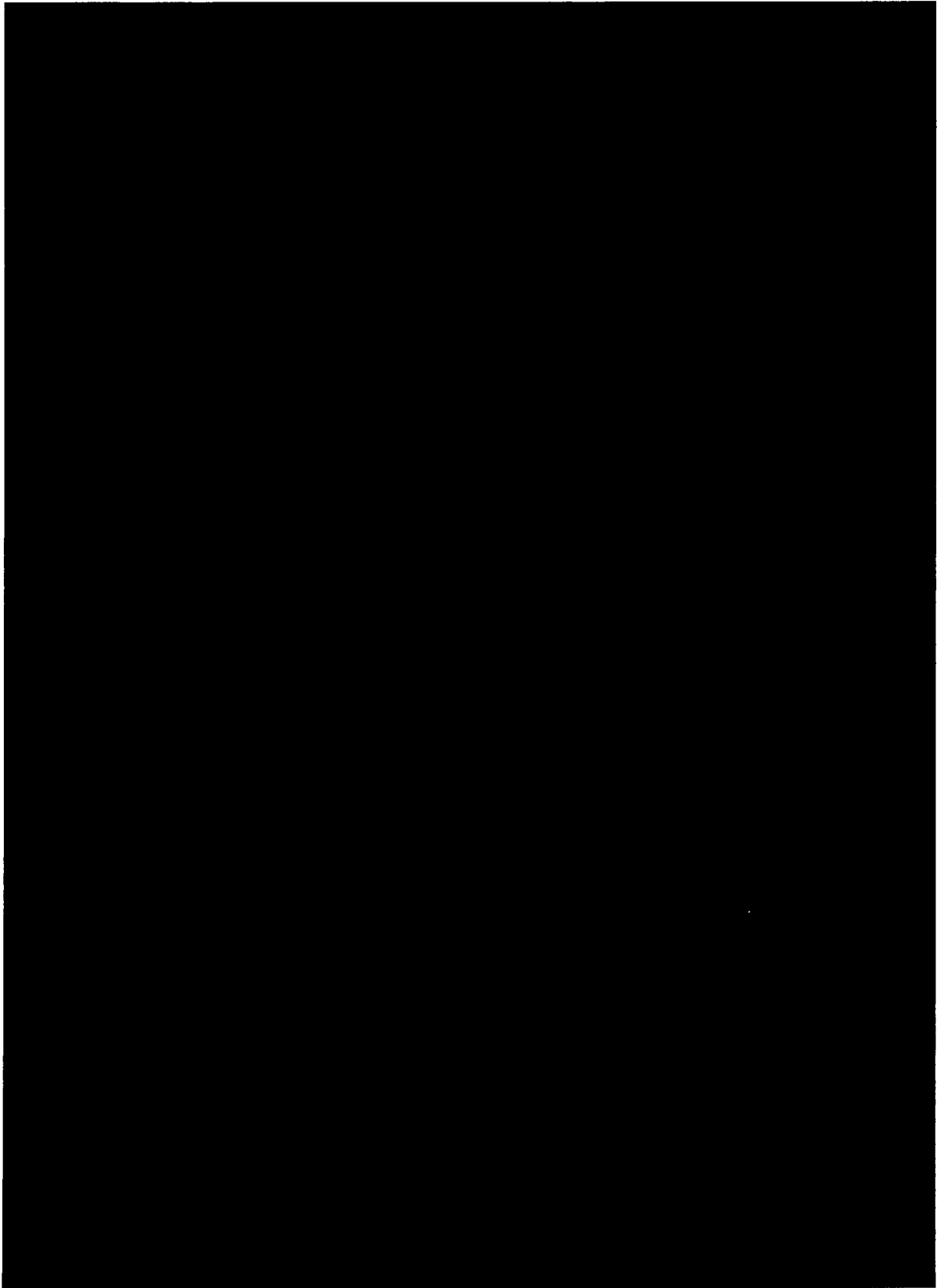




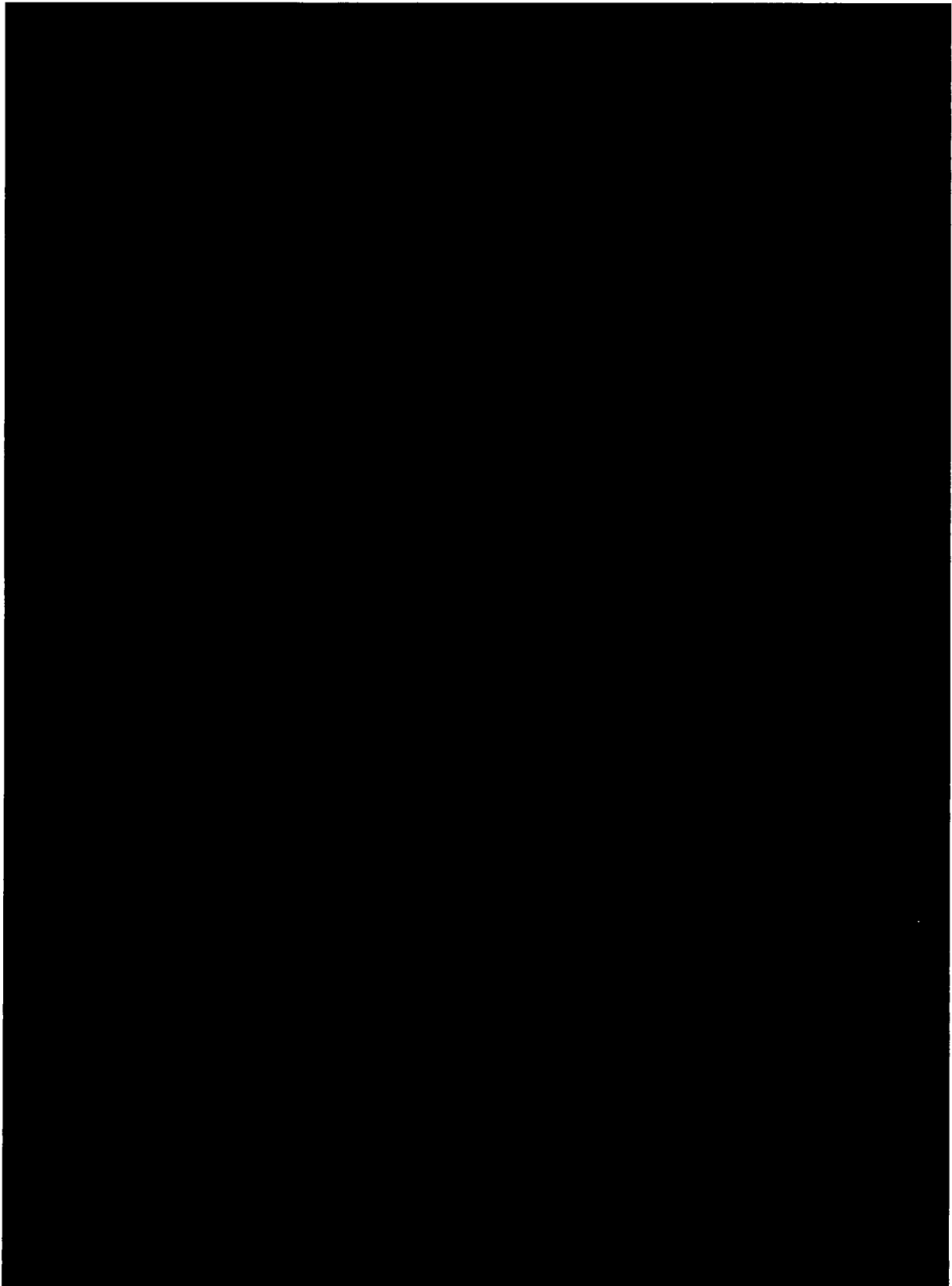


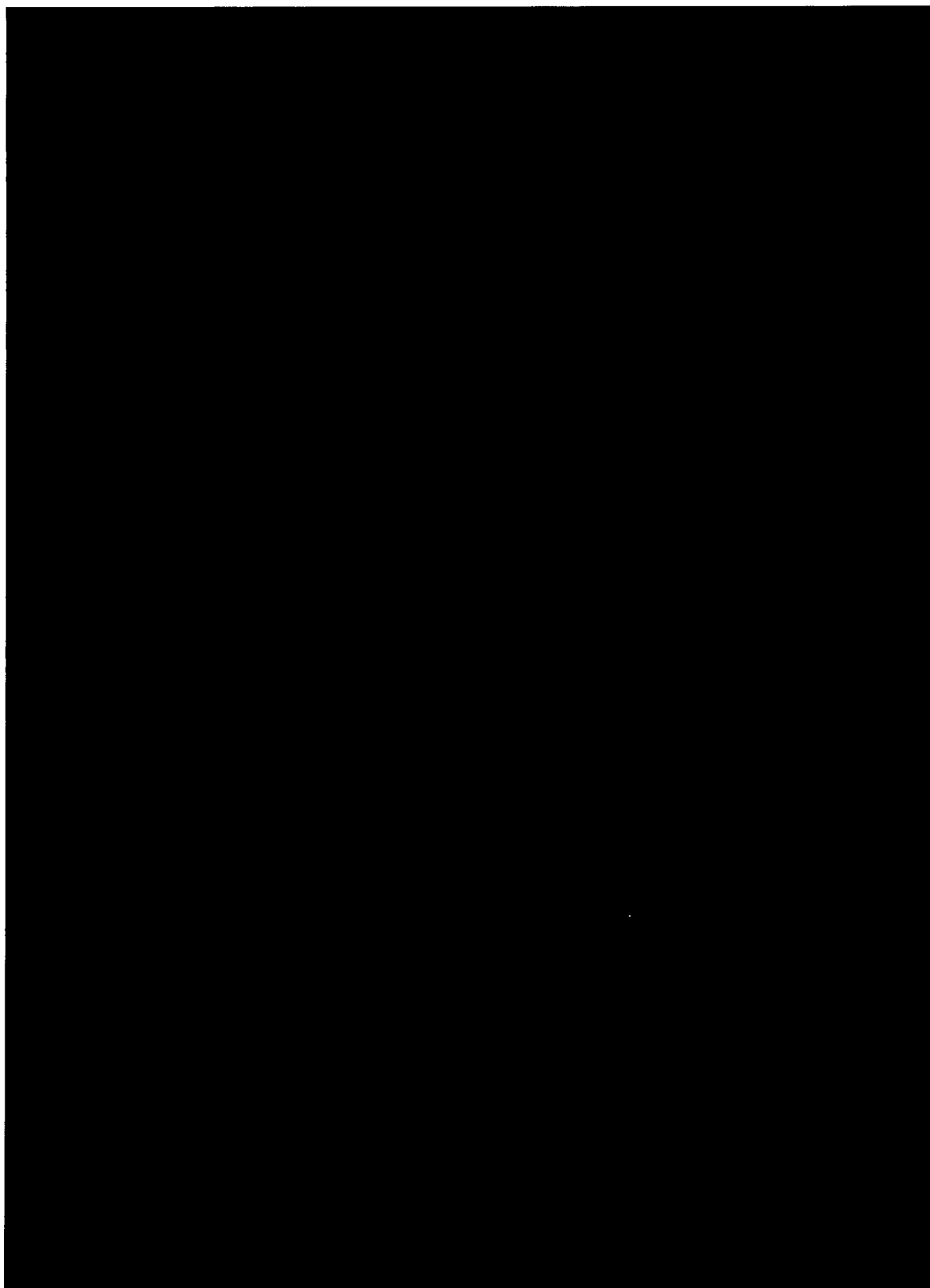


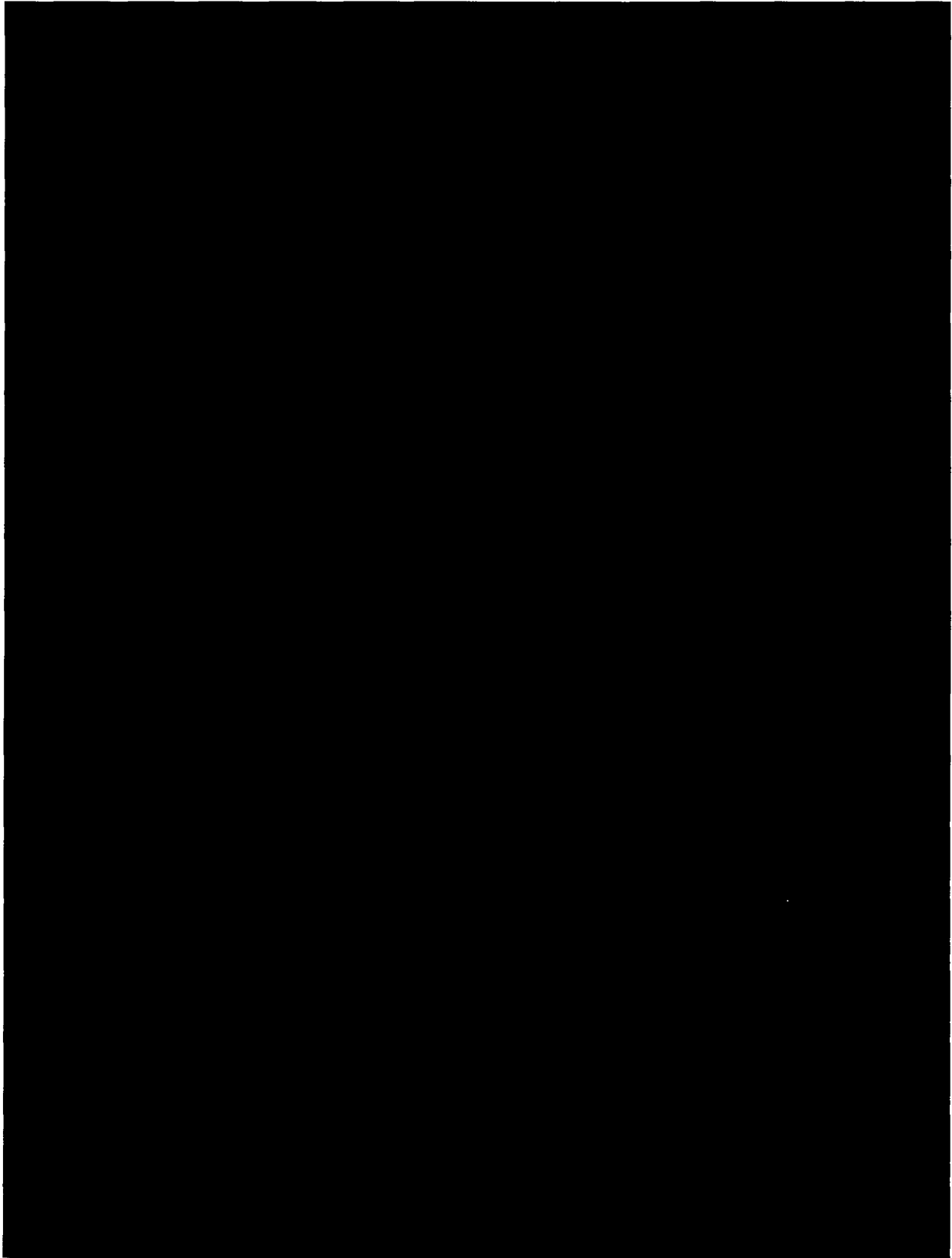


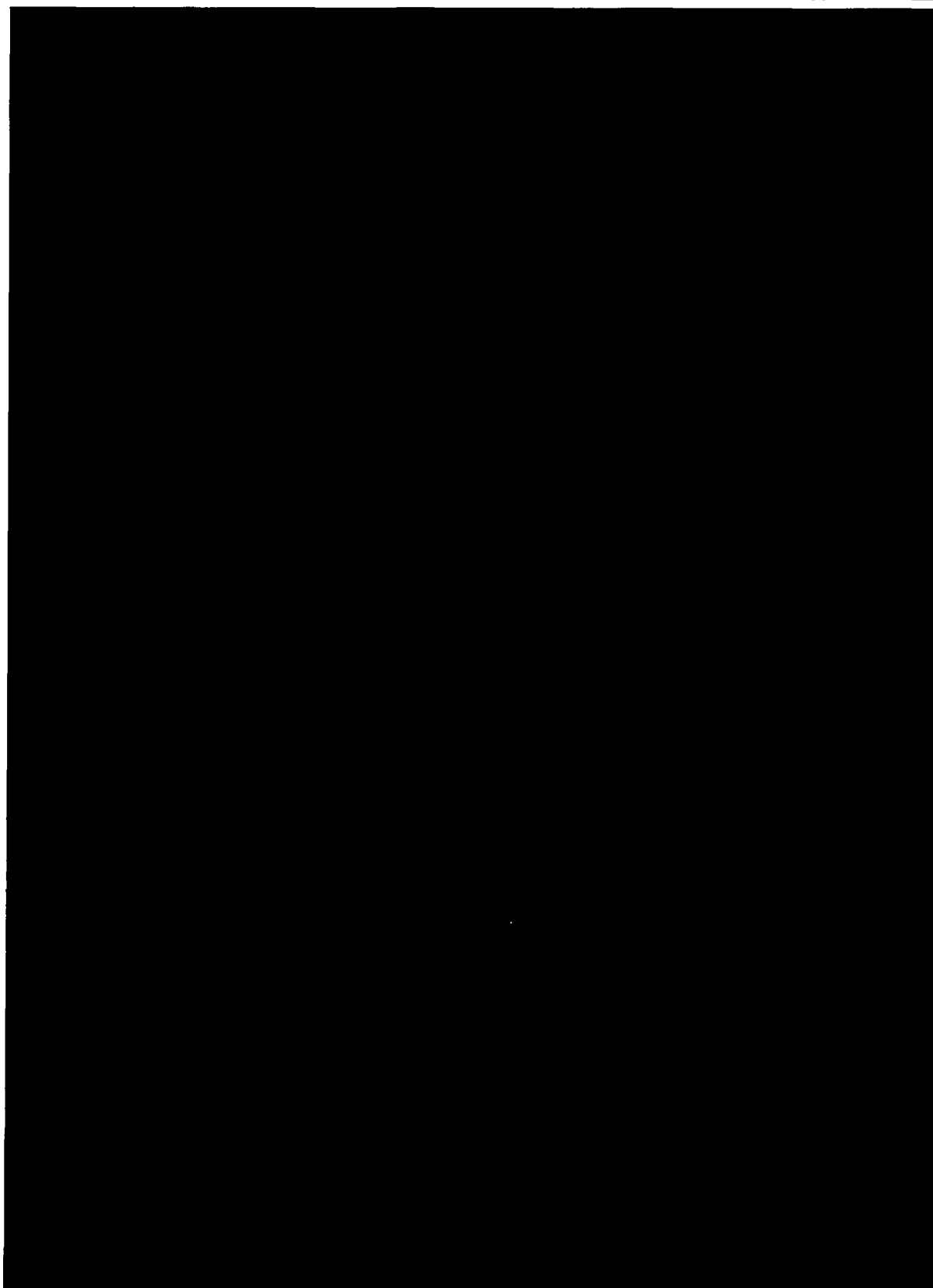


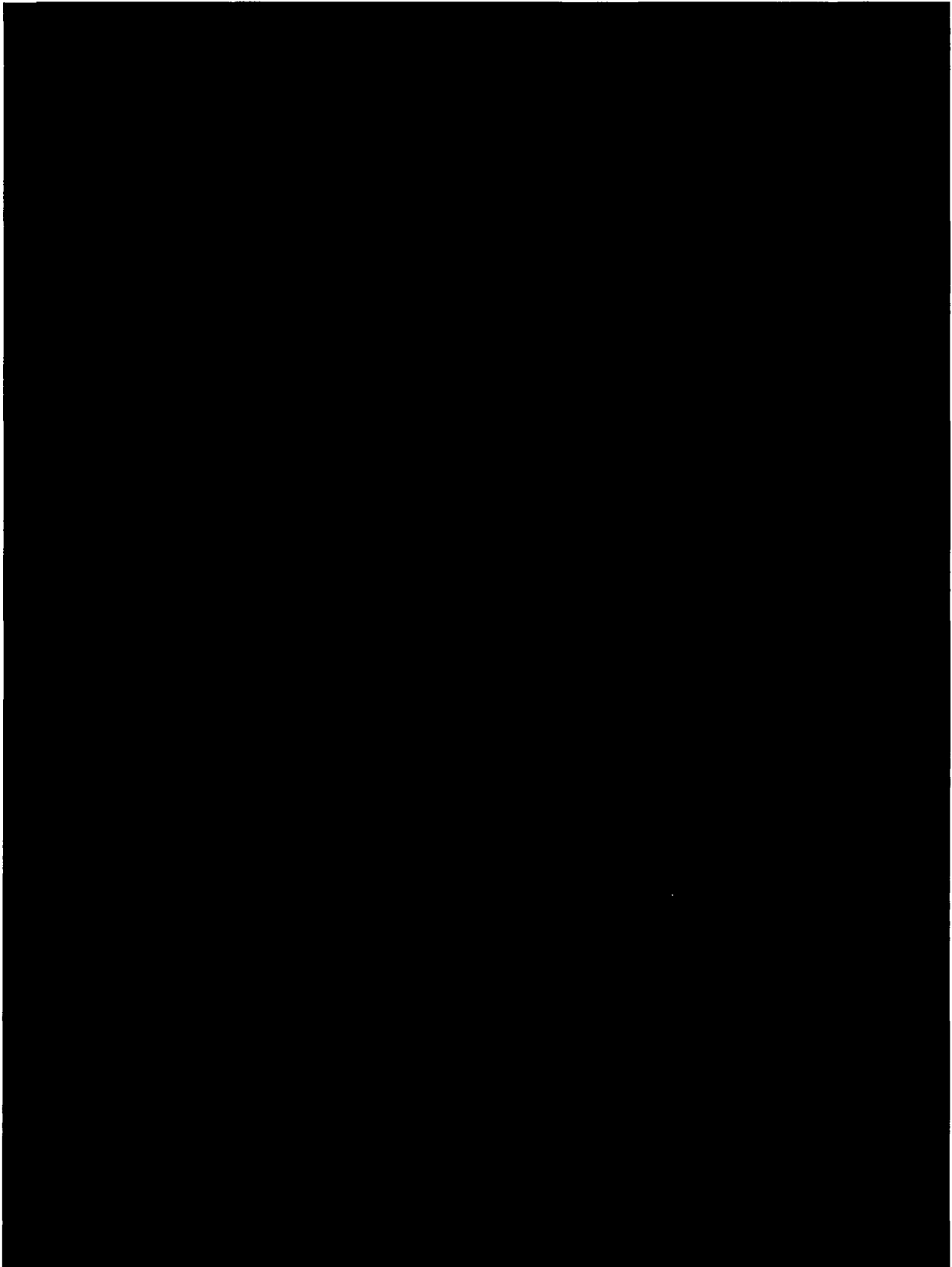


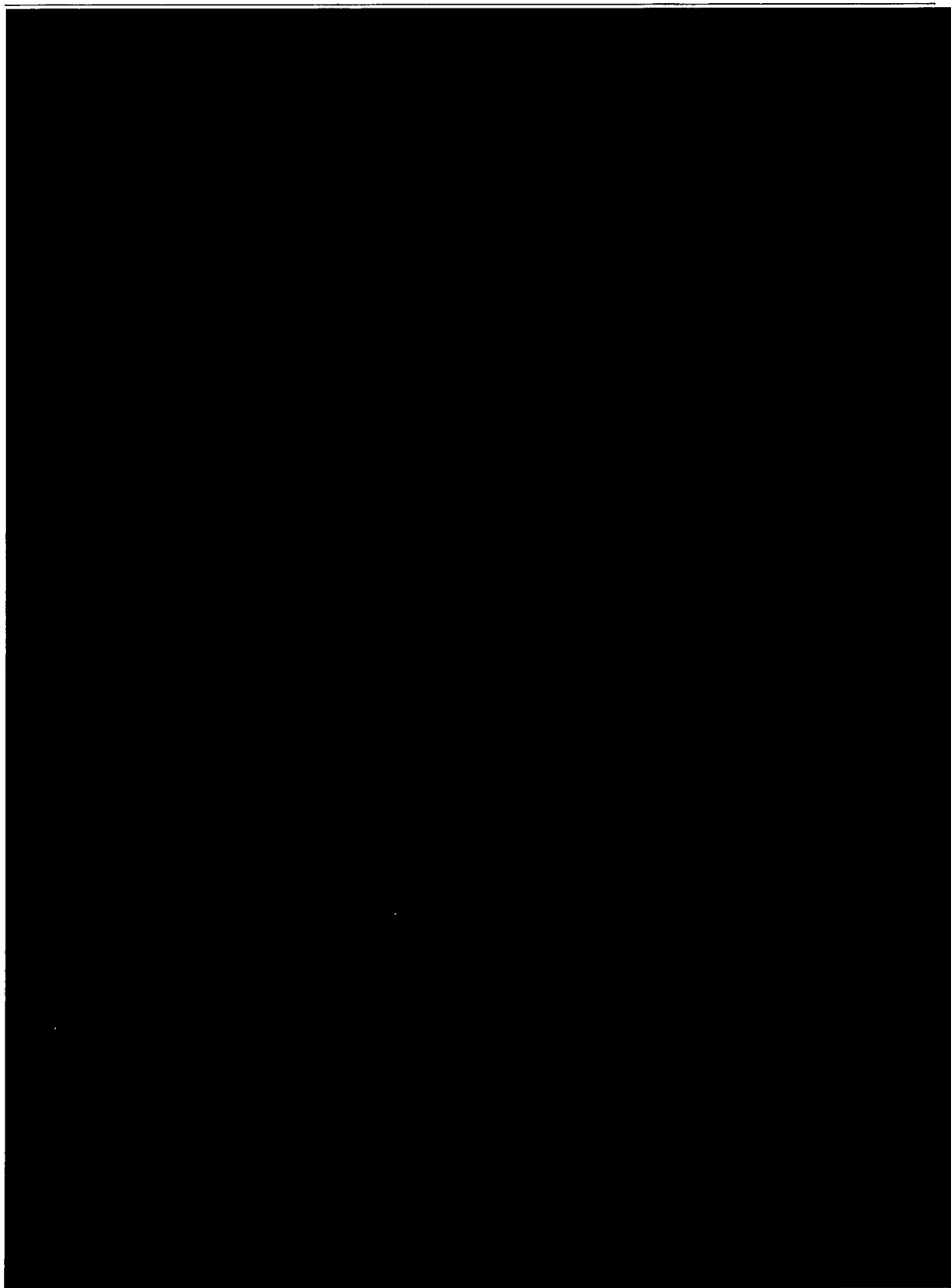


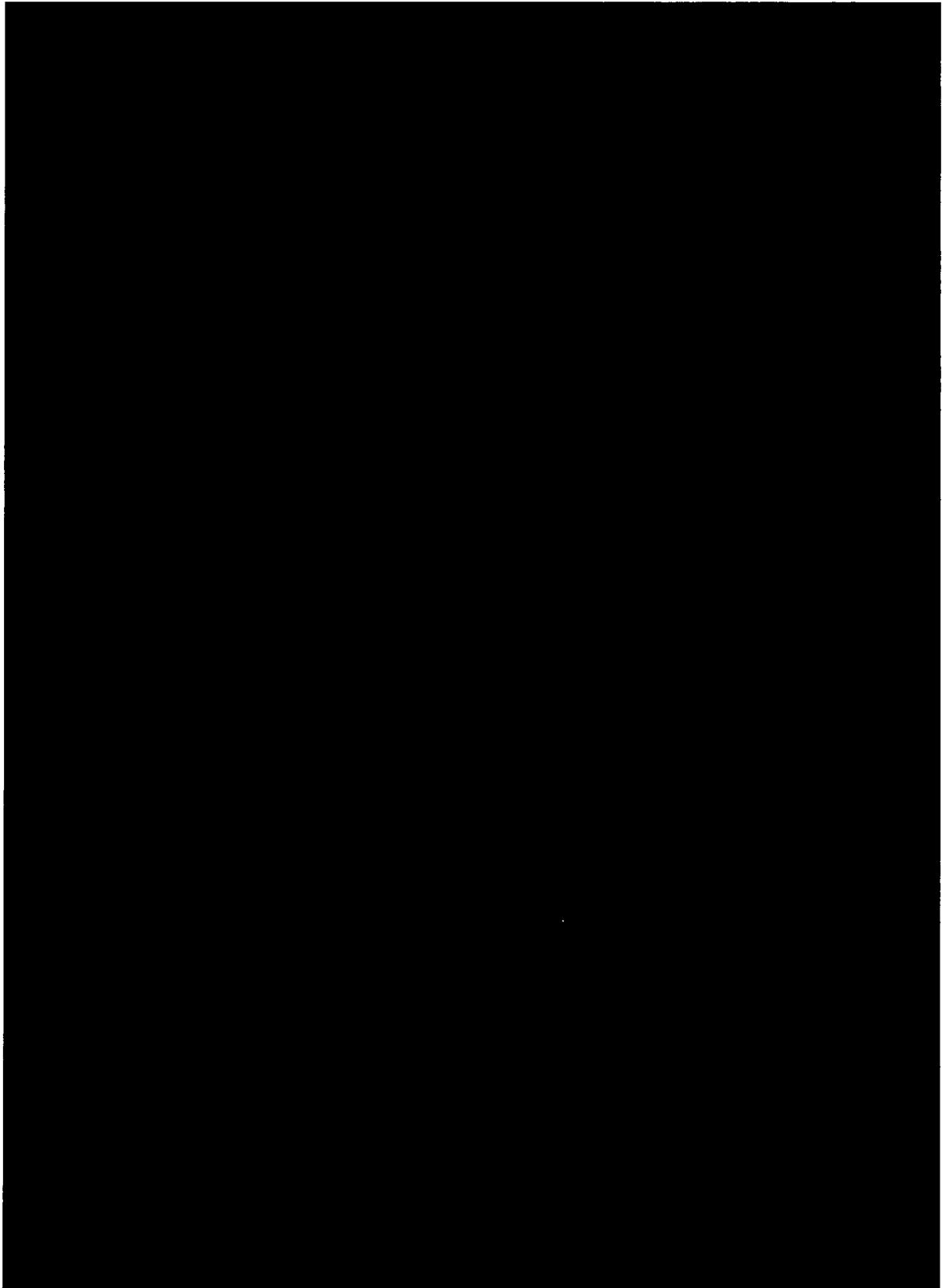


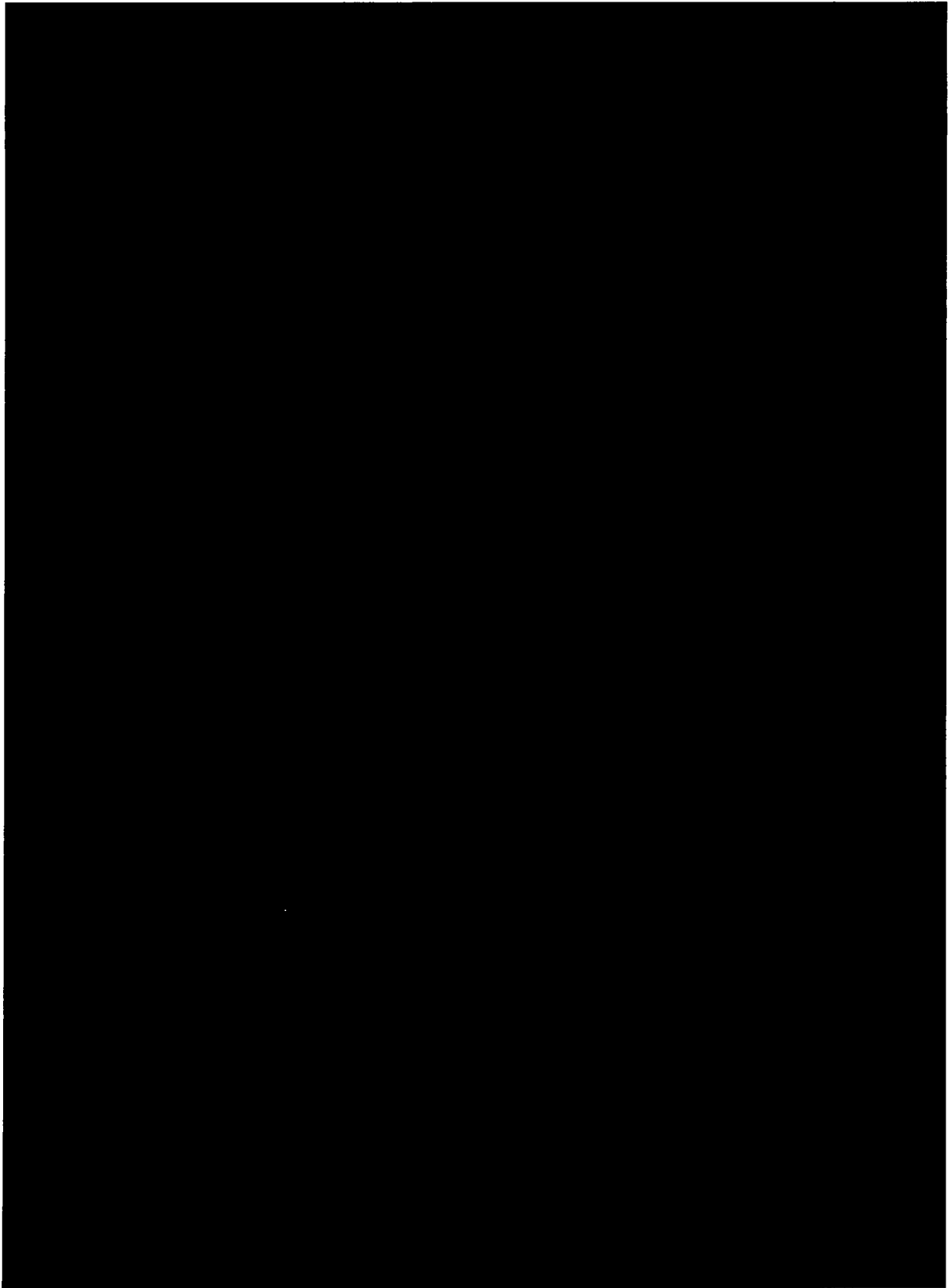




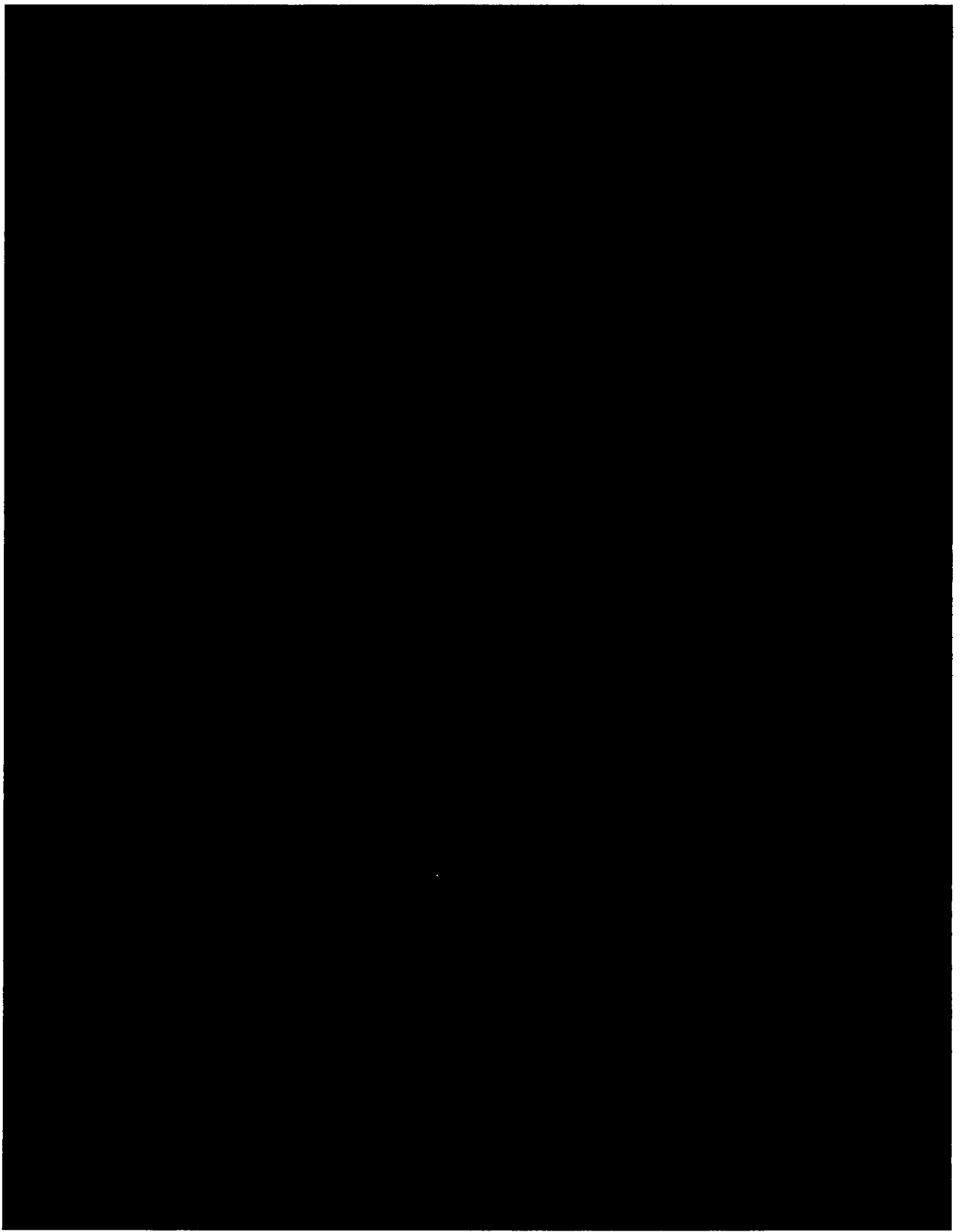


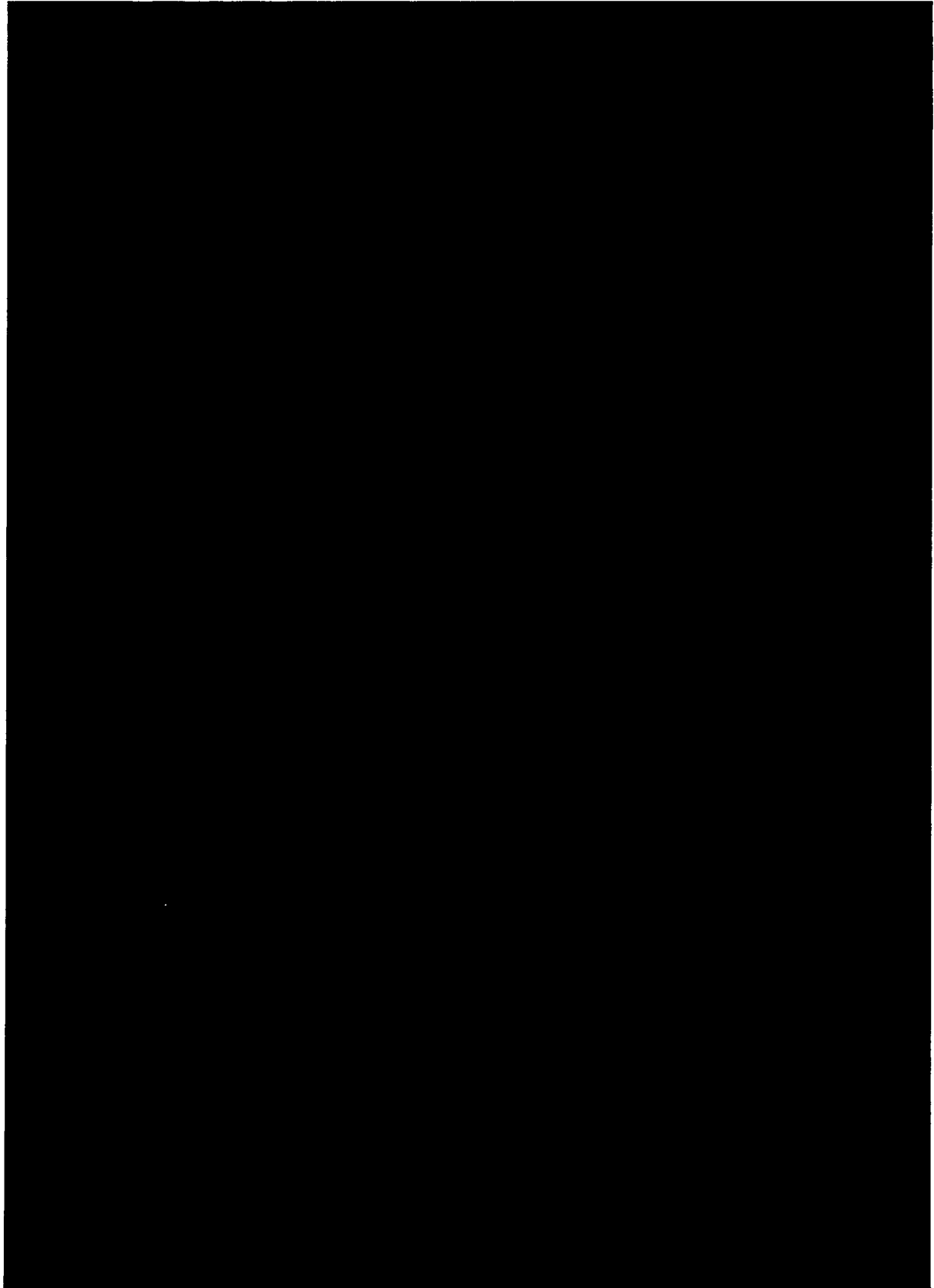


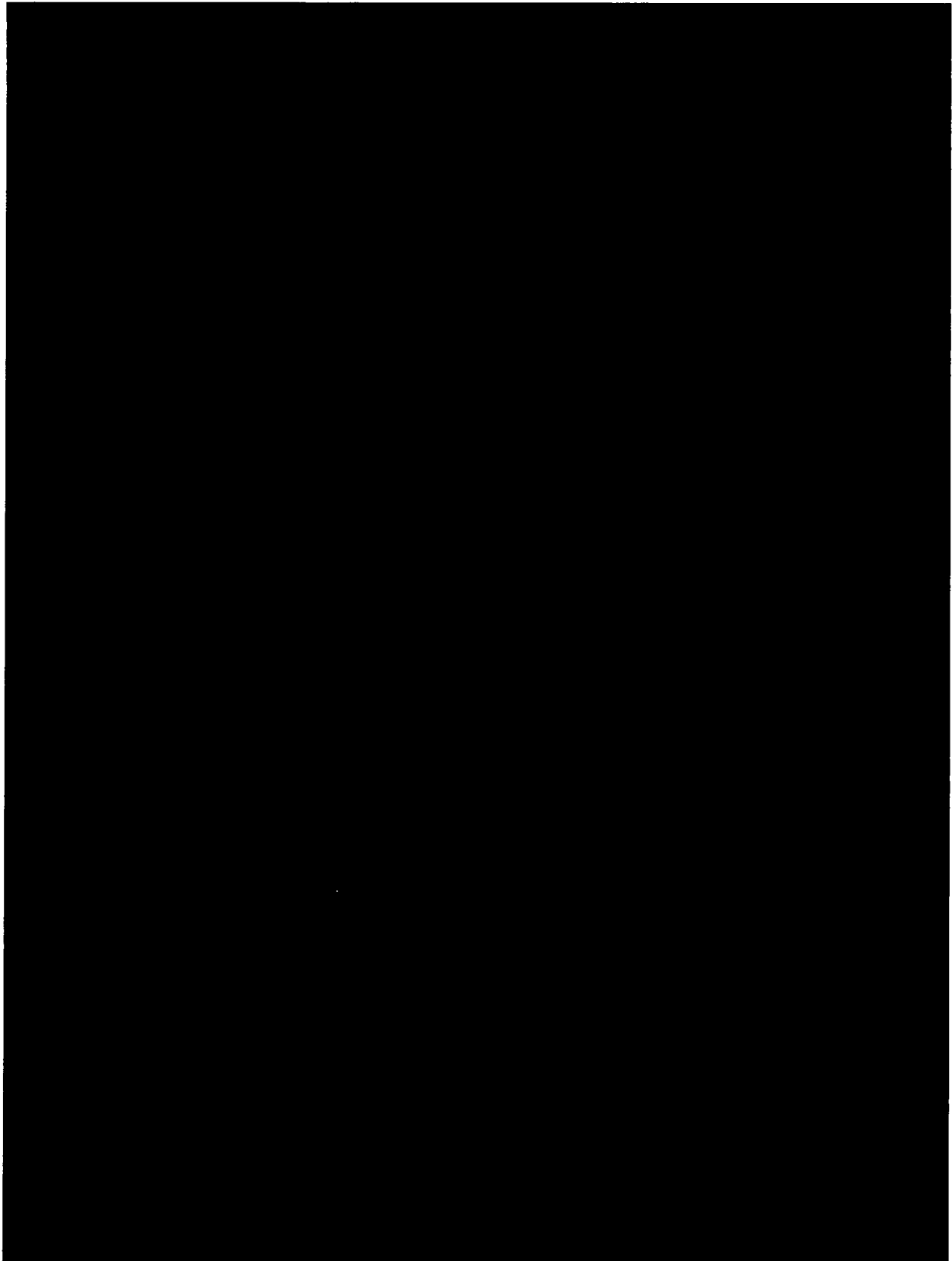


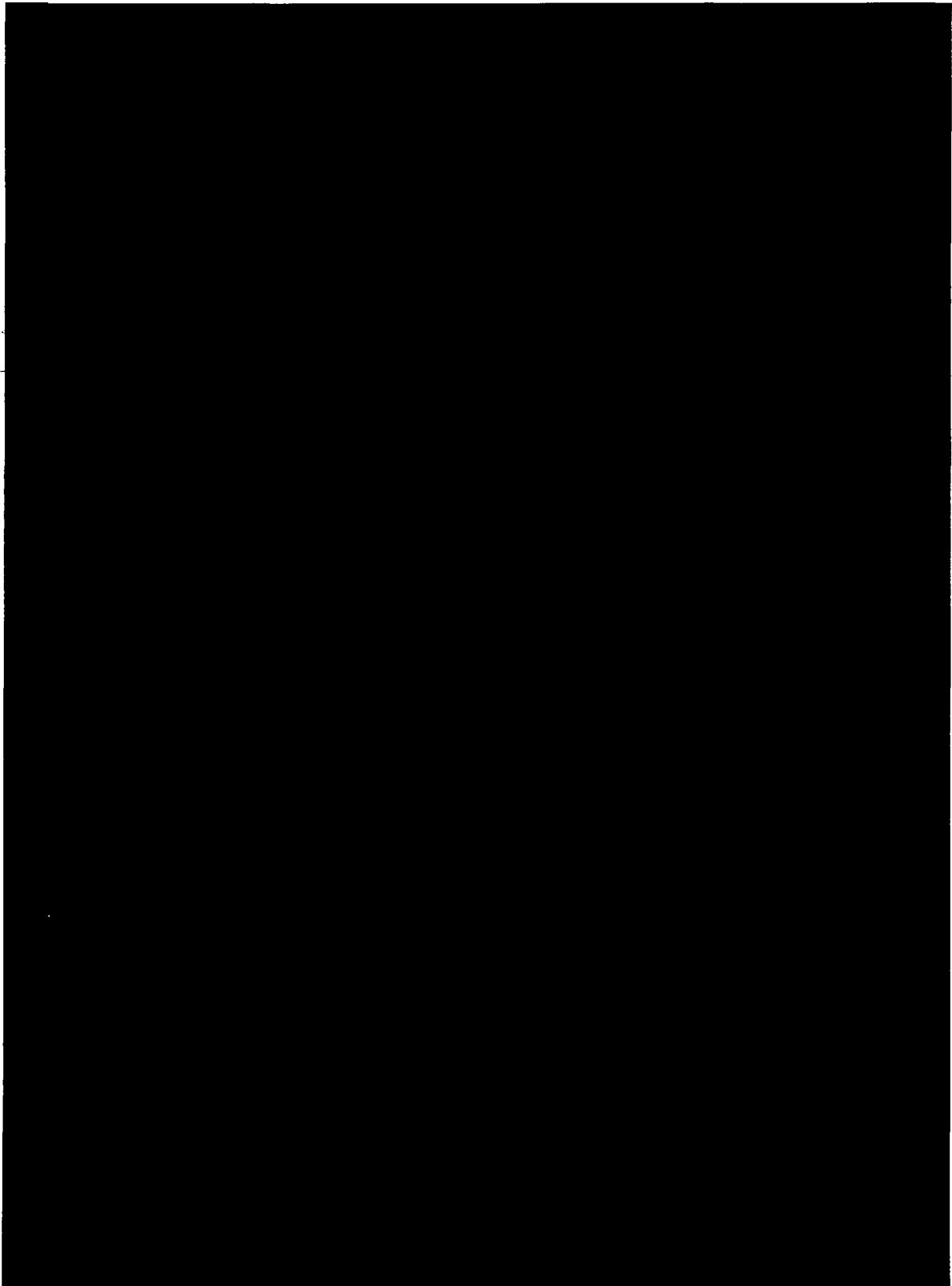


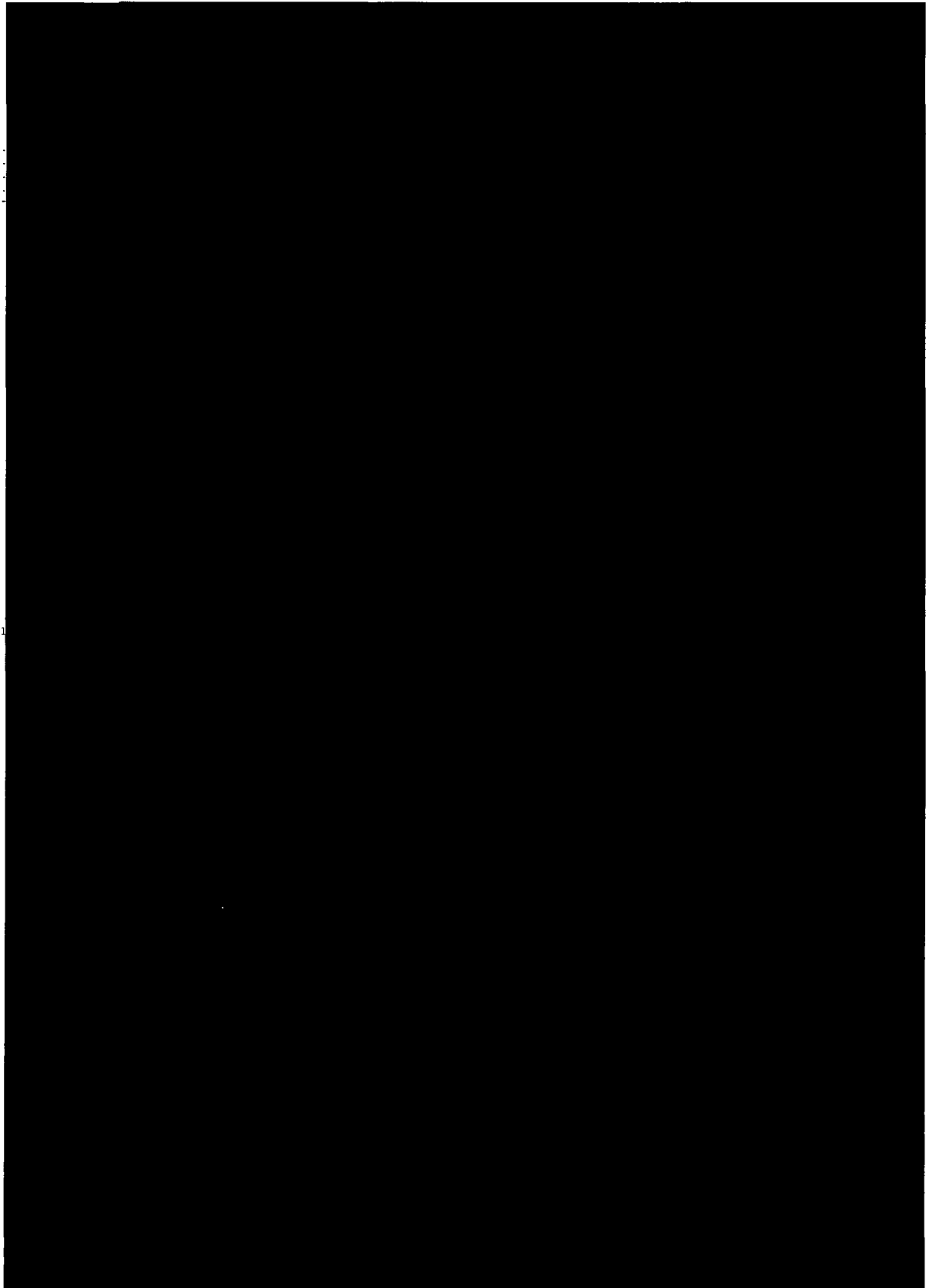


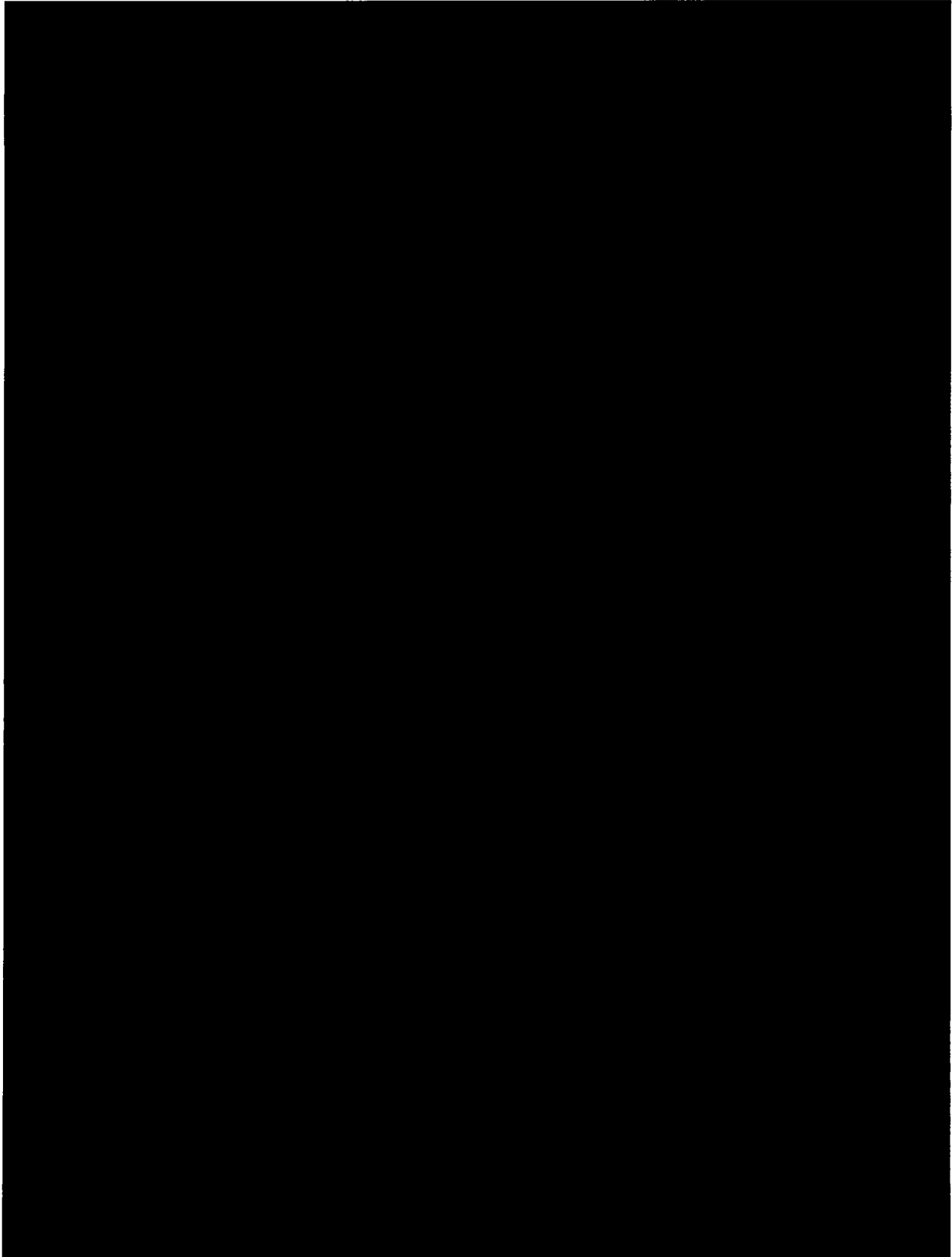


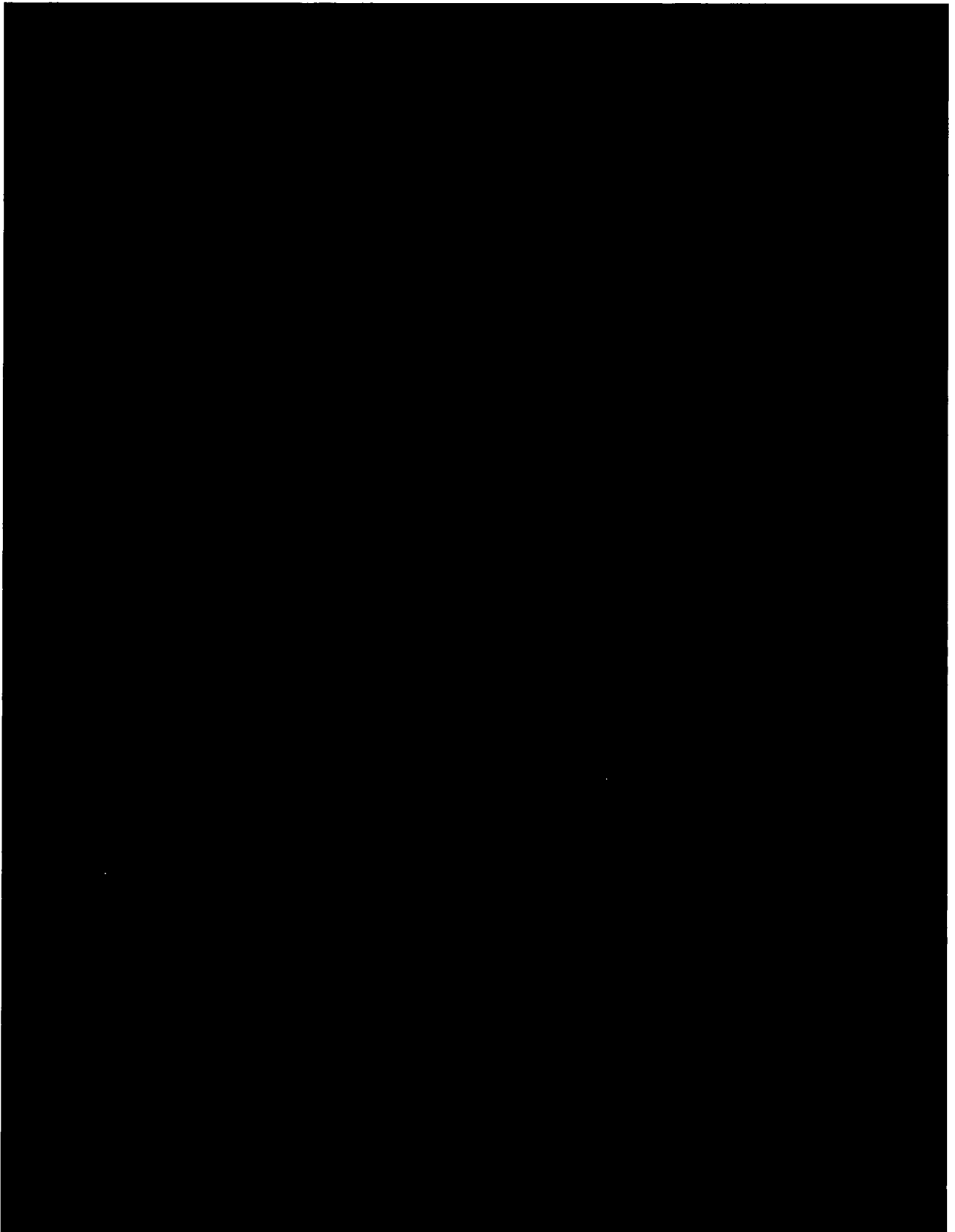


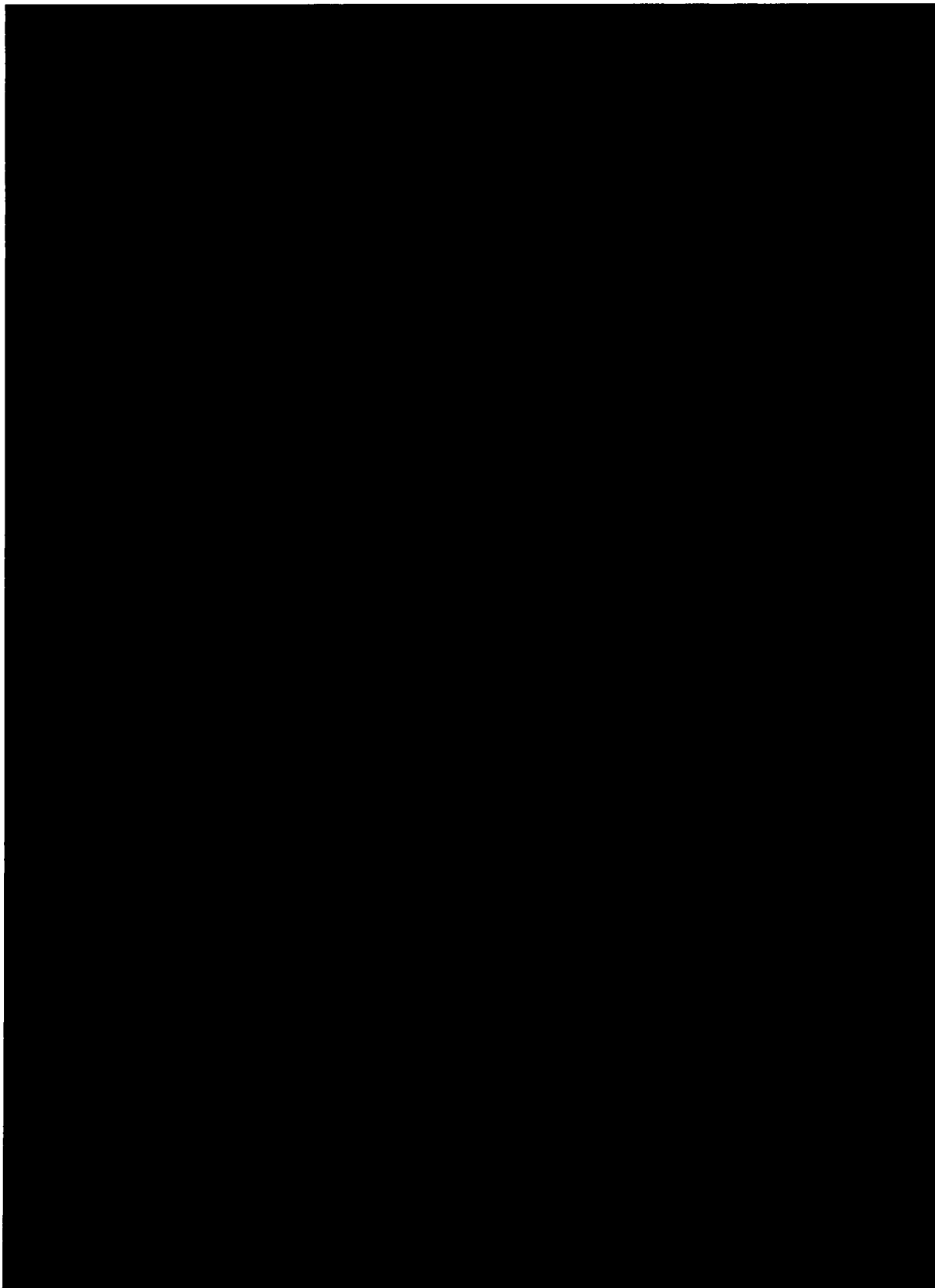




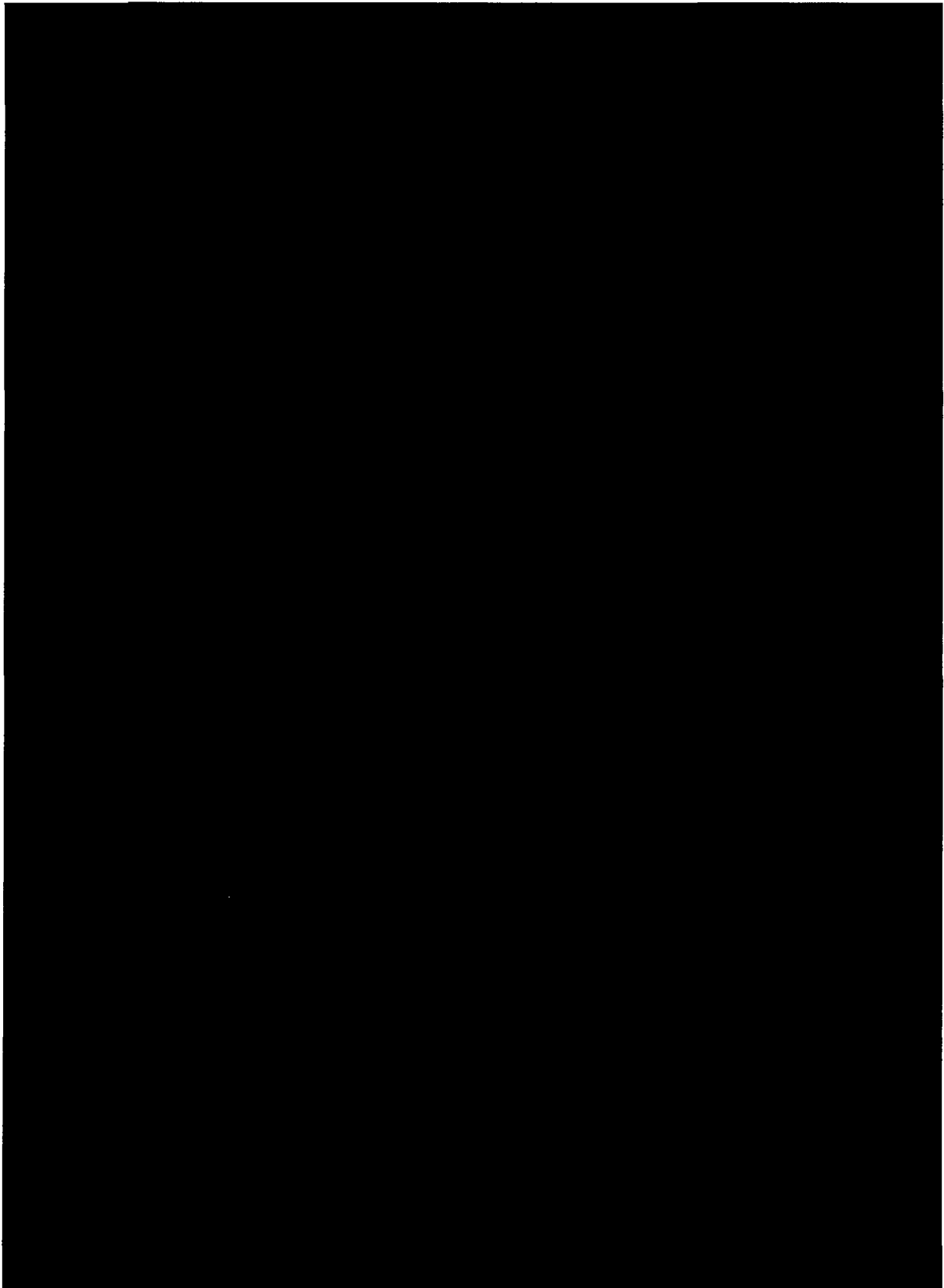












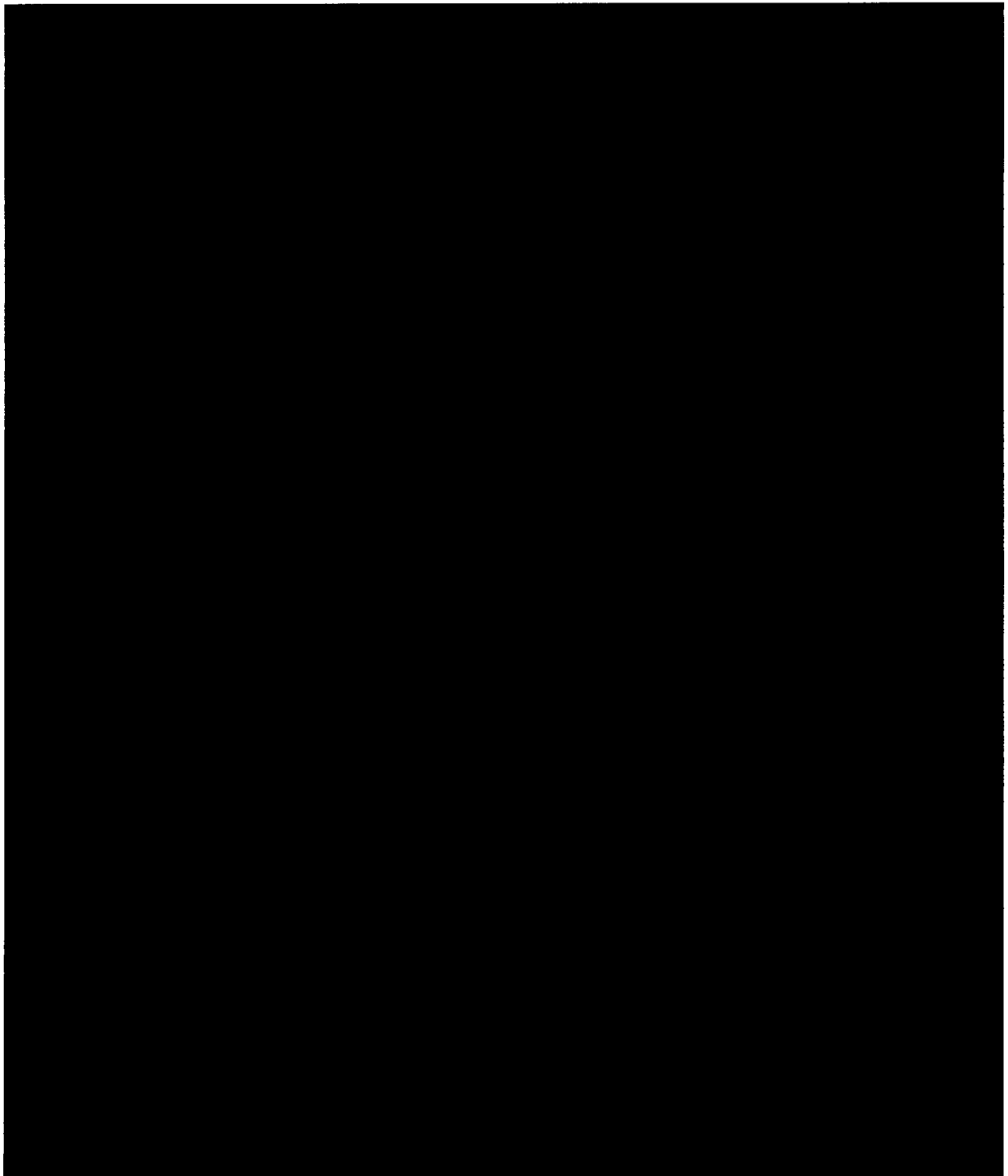


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## 7 OPERATING PROCEDURES

This chapter describes the generic operating procedures for loading, unloading and preparing the NAC-LWT package for transport. These procedures shall be implemented to ensure the package is used in accordance with Certificate of Compliance (CoC) No. 9225 for the NAC-LWT packaging.

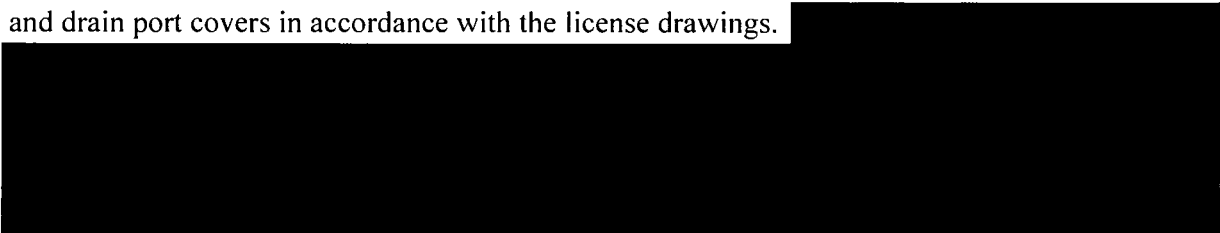
These procedures are based on generic site conditions and assume that the package arrives at the handling site with the appropriate internals installed in the cask. Additional operations and/or modifications (i.e., sequence of operations, use of parallel operations, etc.) to these procedures to address site-specific conditions may be required for each user's facility. These additional operations and/or modifications will be documented in site-specific procedures.

In addition, site-specific procedures may incorporate signoffs for activities or operational sequences as they are performed. Oversight organizations, such as Quality Assurance or Quality Control, may participate in certain package handling operations. The use of signoffs can assist the user in assuring that critical steps are not overlooked, that the package is handled in accordance with the CoC and Safety Analysis Report (SAR), and that appropriate records are retained as required by 10 CFR 71.91.

The NAC-LWT package is designed and certified to transport numerous fissile and radioactive contents, as described in the CoC, as a Type B(U)F-96 package. Certain radioactive contents, as described in the CoC, are required to be transported in a NAC-LWT assembled and tested in a leaktight containment configuration. The leaktight containment can be provided by either the Alternate port cover design with a Viton O-ring seal or by the Alternate B port cover design with a metallic seal.

The NAC-LWT is also certified for the transport of Tritium Producing Burnable Absorber Rod (TPBAR) contents, as described in the CoC, as a Type B(M)-96 package. NAC-LWT cask units designated for the transport of TPBAR contents require both leaktight containment and a high-pressure capable containment barrier. NAC-LWT casks for the leaktight transport of TPBAR contents shall be configured with Alternate B vent and drain port covers in accordance with the license drawings, and subjected to the additional hydrostatic test per the requirements of Section 8.1.2.

NAC-LWT casks for the transport of HEUNL contents shall be configured with Alternate vent and drain port covers in accordance with the license drawings.



consideration of a hypothetical release of HEUNL material from the containers' and the Viton seals' compatibility with the HEUNL nitrate solution.

Loaded shipments received at U.S. Department of Energy (DOE) facilities shall be receipt surveyed and monitored in accordance with DOE regulations. As required, the shipper will be notified of any survey or shipping discrepancy and the shipper will ensure appropriate regulatory notifications are completed.

When the package is handled in accordance with the procedures provided herein, and is loaded within the conditions of the CoC and the SAR, the resulting occupational exposures will be maintained as low as reasonably achievable (ALARA), as required by 10 CFR 20.

### **7.1 Procedures for Loading Packages**

For the shipment of loaded packages, the cavity shall be dry, the contents and nameplate package identification, corresponding to the contents, shall be verified as correct, and the other applicable conditions of the Certificate of Compliance (CoC) shall be verified as met. Site-specific procedures for dry handling, when required, and loading of fuel assemblies and other authorized contents will be prepared to incorporate the dry transfer system components required to safely and efficiently load the NAC-LWT at each loading facility. Dry loading and transfer procedures are not specifically described in the individual loading procedures due to facility and required equipment variations. Content configurations may require spacers, baskets, basket inserts, canisters, etc., to support and/or control the content geometry during transport. The transport configurations identifying the specific contents and components required are specified in the license drawings. Solid, irradiated and contaminated hardware will generally be loaded wet utilizing the procedure guidance of Section 7.1.1. Alternatively, the solid, irradiated and contaminated hardware can be loaded dry utilizing dry loading procedures (i.e., per Section 7.1.2) modified to the requirements of the dry loading facilities.

Two port cover designs are available for use. The alternate port cover has an O-ring along the barrel and a Viton<sup>®</sup> O-ring on the inner end of the port cover. The alternate port cover was developed to provide a leaktight containment boundary and to facilitate ease of installation. The second port cover design is the Alternate B port cover that has two face seals on the inner end of the port cover. The Alternate B port cover was developed to provide a high-pressure and leaktight containment boundary and is required to be installed for the transport of TPBAR contents. Both the Alternate and Alternate B port covers provide the capability to establish a leaktight containment boundary and, therefore, the two port cover designs can be used interchangeably for authorized contents not requiring a high-pressure containment boundary capability, except that Alternate port covers are required to be used for the transport of HEUNL contents as specified on the License Drawing and in the operating procedures.



The alternate port cover bolts are torqued to  $100 \pm 10$  inch-pounds. The Alternate B port cover bolts are torqued to  $285 \pm 15$  inch-pounds to ensure compression of the metallic containment O-ring seal.

As required for the specific contents, applicable procedures will specify the use of the Alternate B port covers. In these loading procedures, the Alternate B port cover helium leakage rate testing is described. For other content loading procedures, either port cover design can be used. However, if the Alternate B port covers are used, the metallic O-ring seal will be replaced for each transport following component removal and the helium maintenance leakage rate test is required to be performed.

For cask loading operations performed under water or when water is introduced into the cask cavity, the cask cavity is required to be blown down to remove the cavity water, vacuum dried, verified as dry, and helium backfilled prior to final closure and leakage testing. The cavity is vacuum dried by attaching a vacuum pump to the vent and/or drain port and evacuating the cavity to a pressure of less than 10 torr (13 mbar), and continuing to vacuum pump for an additional 15 minutes. If the cavity pressure rise is less than 5 torr (6.7 mbar) during a 10-minute isolation and hold period, there is no free water in the cavity and the cask cavity is verified as dry. Final containment closure and leakage testing operations in preparation for transport can proceed. If the pressure rise is  $>5$  torr (6.7 mbar), the vacuum drying will be continued until the dryness verification criteria are met. The successful performance of the dryness verification and backfilling the cavity with helium ensures that there is no free water in the cavity and oxidation of the cask's contents is precluded. When the cask is loaded in a dry cell or under other conditions where no water is introduced into the cask cavity, the procedure sequences for cavity blow down, vacuum drying and dryness verification can be eliminated and the loading sequence can proceed directly to final closure, containment boundary leakage testing and helium backfill operations.

### **7.1.1 Procedures for Wet Loading of LWR Fuel Assemblies and Canistered LWR Fuel Rods**

The procedures for wet loading the NAC-LWT with LWR fuel are as follows:

1. Perform a receipt inspection of the empty cask and trailer/ISO container, inspecting for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting operations. If an ISO container is used, it may be removed from the trailer and secured in the unloading area.

3. Remove the personnel barrier or the roof and roof cross-members from the ISO container.  
Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.
4. Perform a Health Physics survey of the cask and adjacent surfaces of the trailer.  
Note: A receiving survey of the cask and transporter must be performed as soon as practicable after arrival at the site to assure compliance with 10 CFR 20, 10 CFR 71.87(i) and 10 CFR 71.47, and to assure timely reporting of any reportable noncompliance.
5. Remove the top and bottom impact limiters.
6. Remove the cask tie-down strap.
7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to keep the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
8. Place the cask in the cask preparation area or other designated location. Disengage the lifting yoke. Clean cask surfaces of road dirt as required for entry into the spent fuel pool.
9. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage.
10. Remove the vent and drain valve port covers. Prior to reinstallation of the port covers, carefully inspect the valve port cover O-ring seals and, if the O-rings show any damage, replace them with approved spares. Ensure that the replacement O-rings are properly installed and seated. Visually inspect the valved quick-disconnect nipples and replace them, if necessary.  
Note: For Alternate B port covers, replace the metallic O-ring with an approved spare prior to reinstallation.
11. Remove closure lid bolts. Attach the lid lift slings to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to reinstallation of the lid, carefully inspect the Teflon O-ring seal in the underside of the closure lid and, if it shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure that the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged.
12. Visually inspect the inner cavity for foreign material or damage. Install or verify the presence of the proper drain tube and basket assembly.
13. Fill the cask cavity with clean water.
14. Install lift yoke arm guides and remote actuation component on the cask lifting yoke.
15. Engage the cask lifting yoke with the cask lifting trunnions and pick up the cask. Carefully lower the cask to the bottom of the cask loading area. Rinse the cask surfaces with clean water to minimize cask surface contamination.

16. Disengage the lifting yoke from the cask and remove the yoke from the pool, if necessary, to provide fuel loading clearance.
17. Identify the fuel assembly(ies) or canistered LWR fuel rods to be loaded. Verify the identified materials comply with the content conditions and authorized quantities as specified in the CoC.
18. Pick up the fuel assembly or transport canister containing individual fuel rods, using the required grapple system.  
Note: See Section 7.1.8 procedures for instructions for loading and preparing PWR or BWR rods and nonfuel-bearing components in a transport canister.
19. Position the fuel contents over the cask and carefully lower them into the cask to avoid damage to the cask sealing surfaces. Confirm that the fuel assembly (or transport canister and insert, or material container) is fully seated, then release the grapple from the fuel assembly (or transport canister and insert) and raise the grapple to the full up position. Repeat this step as necessary to load multiple assemblies or containers (if required).
20. Position the cask lifting yoke over the cask closure lid. Attach the slings to the closure lid and cask lifting yoke. Lower the yoke over the cask.
21. Position the closure lid over the cask and slowly lower it into place using the cask and lid match marks as guides. Visually confirm that the closure lid is seated.
22. Lower the cask handling yoke to slack the closure lid cables. Engage the cask lifting trunnions with the yoke and begin lifting.  
Note: Visually verify the yoke engagement before lifting the cask.
23. Raise the cask until the lid is slightly above the surface of the pool. At the option of the licensee/user, a number of closure lid bolts (i.e., 4 to 12) may be installed hand tight.
24. Raise the cask clear of the pool, rinsing the yoke and cask with clean water.
25. Transfer the cask to the decontamination pit or other work area. Remove the yoke and lid lift slings.
26. Install and tighten the 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the closure lid.
27. At the option of the licensee/user, a 25 to 50 gallon clean water flush of the cask cavity may be performed by connecting a valved, clean water line to the drain valve and a valved drain line to the vent valve. After the cavity flushing is completed, if performed, disconnect the water supply and drain lines.
28. Connect a gas supply line to the vent valve and the drain line to the drain valve.
29. Open the nitrogen or helium gas supply valve and pressurize the cask cavity (< 30 psig) to force any residual water out the drain line. Continue to supply pressurized gas to the cask for a minimum of five minutes after the last residual free water discharges from the drain. Remove the drain and gas supply lines and attach a vacuum drying system (VDS) to the vent.
30. Evacuate the cask cavity to less than or equal to 10 torr (13 mbar) and continue vacuum pumping for a minimum of 15 minutes.
31. At the end of the vacuum pumping period, isolate the cask cavity from the vacuum pump and stop the vacuum pump. Monitor the cask cavity pressure for a minimum of

- 10 minutes. If the pressure rise is less than 5 torr (6.7 mbar), the cavity is verified as dry of free water. If the pressure rise is >5 torr (6.7 mbar), repeat vacuum drying until the dryness verification results are satisfactory.
32. Backfill the cask cavity with helium to 0 psig (1 atmosphere, absolute), +1, -0 psi and disconnect the VDS from the vent valve.
  33. Perform a helium leakage test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector (He MSLD) in accordance with the procedural requirements of Section 8.1.3.1, Steps 3 through 10.
  34. Install the vent and drain alternate port covers and torque the bolts to  $100 \pm 10$  inch-pounds.
  35. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using a He MSLD in accordance with the requirements of Section 8.1.3.2.2.
  36. If the alternate port cover containment seal was inspected and accepted for reuse, perform a gas pressure drop leakage test on the affected port cover as follows.
    - a. Install a pressure test fixture to the port cover test port, including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
    - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
    - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.
    - d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.

Note: Alternate B port covers, if used, require the satisfactory completion of a helium maintenance leakage rate test. Install the Alternate B port cover and perform the maintenance leakage rate test per the requirements of Section 8.1.3.3.2.
  37. Decontaminate the cask surfaces. Survey the cask for surface contamination and radiation dose rates.

Note: Ensure compliance with 10 CFR 71.87(i) and 10 CFR 71.47.
  38. Remove lift yoke arm guides. Engage the cask lifting yoke to the lifting trunnions.
  39. Lift the cask and position the cask rotation sockets in the rear rotation trunnions of the rear support structure. Carefully lower the cask to the horizontal transport orientation resting on the front saddle by moving the crane and/or the trailer as required to maintain cask engagement to the rear supports.
  40. Disengage the lifting yoke from the lifting trunnions and remove it from the area.
  41. Install the cask tie-down strap. Install the top and bottom impact limiters.
  42. Install tamper-indicating device (TID) to an attachment point on the top impact limiter.
  43. Install ISO container bracing and lid or personnel barrier.
  44. Complete radiation and contamination surveys of the external surfaces of the package and record the data. Ensure removable contamination and radiation dose rate survey results comply with the limits specified in 10 CFR 71.87(i) and (j).

45. Measure the dose rate in millirems per hour at one meter from the package surface to determine the Transport Index (TI). Indicate the TI on the Radioactive Material labels applied to the package in accordance with 49 CFR 172, Subpart E.
46. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the CoC, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.
47. Apply appropriate placards to the transport vehicle in accordance with 49 CFR 172, Subpart F.
48. Complete the shipping documents and provide the carrier with instructions regarding the requirements for maintaining an exclusive use shipment.

### **7.1.2 Procedures for Dry Loading of Metallic Fuel**

The procedures for dry loading the package with metallic fuel are as follows:

1. Perform a receipt inspection of the empty cask and trailer/ISO container, inspecting for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting operations. If an ISO container is used, it may be removed from the trailer and secured in the unloading area.
3. Remove the roof from the ISO container and open the front and rear ISO doors. Remove roof cross-members, if installed.  
Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.
4. Perform a Health Physics survey of the cask and adjacent surfaces of the container.  
Note: A receiving survey of the cask and transporter must be performed as soon as practicable after arrival at the site to ensure compliance with 10 CFR 20, 10 CFR 71.87(i) and 10 CFR 71.47, and to ensure timely reporting of any reportable noncompliance.
5. Remove the top and bottom impact limiters.
6. Remove the cask tie-down strap.
7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to keep the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
8. Place the cask in the dry loading stand. Disengage the lifting yoke.
9. Remove the vent and drain valve port covers. Prior to reinstallation of the port covers, carefully inspect the O-rings and, if the O-rings show any damage, replace them with approved spares. Ensure that the replacement O-rings are properly installed and seated. Visually inspect the valved quick-disconnect nipples and replace them, if necessary.

- Note: For Alternate B port covers, replace the metallic O-ring with an approved spare prior to reinstallation.
10. Remove closure lid bolts. Attach the lid lift slings to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to reinstallation of the lid, carefully inspect the Teflon O-ring seal in the underside of the closure lid and, if it shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure that the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged.
  11. Visually inspect the inner cavity for foreign material or damage. Install, or verify the presence of the proper drain tube assembly and basket, as required.
  12. Install the required dry transfer system components to the top of the cask.
  13. Position the shielded transfer cask system components for fuel loading, as appropriate.
  14. Identify the fuel to be loaded and verify that the fuel contents comply with the content conditions and authorized quantities as specified in the CoC. Up to five sound metallic fuel rods may be placed in an unsealed canister. Damaged rods may be placed in a sealed 2.75-inch or 4.0-inch failed fuel canister (FFC). Up to 10 filters containing oxide powder from severely damaged metallic fuel rods may be placed in one FFC. The FFC(s) containing filters may be loaded with up to two FFCs containing failed fuel rods to fill the three-element basket. The FFCs must be vacuum dried and sealed as described in Section 7.1.3.
  15. Load the shielded transfer cask with the selected fuel contents.
  16. Place the shielded transfer cask, containing a fuel canister, onto the dry transfer system components positioned on the top of the cask.
  17. Lower the fuel canister from the transfer cask into the shipping cask.
  18. Repeat the loading and transfer of fuel canisters until the approved cask loading plan is completed.
  19. Install the closure lid onto the cask. Visually verify that the lid is properly seated.
  20. Remove the dry transfer system components from the top of the cask.
  21. Install and tighten the 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the closure lid.
  22. This step applies only if the cask contains damaged metallic fuel or severely damaged metallic fuel.
    - a. Attach the vacuum pump to the cask vent valve.
    - b. Evacuate the cask cavity to  $\leq 10$  torr (13 mbar) and maintain for a minimum of 15 minutes.
    - c. Stop the vacuum pump and monitor pressure for a minimum of 10 minutes. If the pressure rise is less than 5 torr (6.5 mbar), the cask is adequately dried for shipment. If not, repeat vacuum drying and pressure rise verification.
    - d. Remove the vacuum pump and backfill the cask cavity with helium to 1 atmosphere (absolute) +1, -0 psi.
    - e. Remove the gas supply line.

23. Perform the helium mass spectrometer leakage rate test on the cask lid in accordance with the requirements of Section 8.1.3.1, Steps 3 through 10.
24. Install the vent and drain alternate port covers and torque the bolts to  $100 \pm 10$  inch-pounds.
25. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using a He MSLD in accordance with the requirements of Section 8.1.3.2.2.
26. If the alternate port cover containment seal was inspected and accepted for reuse, perform a gas pressure drop leakage test on the affected port cover as follows.
  - a. Install a pressure test fixture to the port cover test port, including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
  - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
  - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.
  - d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.

Note: Alternate B port covers, if used, require the satisfactory completion of a helium maintenance leakage rate test. Install the Alternate B port cover and perform the maintenance leakage rate test per the requirements of Section 8.1.3.3.2.
27. Decontaminate the cask. Survey the cask for surface contamination and radiation dose rates.

Note: Ensure compliance with 10 CFR 71.87(i) and 10 CFR 71.47.
28. Remove lift yoke arm guides. Engage the cask lifting yoke to the lifting trunnions.
29. Lift the cask and position the cask rotation sockets in the rear rotation trunnions of the rear support structure. Carefully lower the cask to the horizontal transport orientation resting on the front saddle by moving the crane and/or the trailer as required to maintain cask engagement to the rear supports.
30. Disengage the lifting yoke from the lifting trunnions and remove it from the area.
31. Install the cask tie-down strap. Install the top and bottom impact limiters.
32. Install a TID to an attachment point on the top impact limiter.
33. Install ISO container bracing and lid or personnel barrier.
34. Complete radiation and contamination surveys of the external surfaces of the package and record the data. Ensure removable contamination and radiation dose rate survey results comply with the limits specified in 10 CFR 71.87(i) and (j).
35. Measure the dose rate in millirems per hour at one meter from the package surface to determine the Transport Index (TI). Indicate the TI on the Radioactive Material labels applied to the package in accordance with 49 CFR 172, Subpart E.
36. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the CoC, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.

37. Apply appropriate placards to the transport vehicle in accordance with 49 CFR 172, Subpart F.
38. Complete the shipping documents and provide the carrier with instructions regarding the requirements for maintaining an exclusive use shipment.

**7.1.3 Procedures for Loading Metallic Fuel and Filters Containing Severely Damaged Metallic Fuel into Damaged Fuel Canisters**

**7.1.3.1 Small Diameter Canisters (Damaged Metallic Fuel)**

1. Examine the small diameter failed fuel canister (FFC) and check it for damage.
2. Place the FFC inside the containment barrier portion of the pool. Position the FFC in the failed rod loading station.
3. After verifying the accountability records, place the designated failed fuel rod into the FFC. If the rod is broken into two or more pieces, verify that the lid thread and seal area is not fouled during rod insertion.
4. When the can is loaded, install the lid using the FFC Lid Installation Tool.
5. Using the FFC handling tool, move the loaded FFC through the containment barrier door and place the FFC horizontally into the upender.
6. Operate the hand winch to move the FFC to the vertical position.
7. Torque the FFC lid to  $100 \pm 10$  ft-lb for the small canister.
8. Connect the nitrogen supply line to the vent valve.
9. Open nitrogen supply valve and pressurize the FFC to force out the water. Blow gas through the FFC for at least 5 minutes after the first visible bubbles appear. Remove the gas supply line.
10. Invert the FFC in the upender and install the pipe plug.
11. Reinvert the FFC in the upender.
12. Attach the vacuum pump to the FFC vent valve. Evacuate the FFC to a pressure below 25 torr (33 mbar) for a minimum of 15 minutes. Remove the vacuum pump and backfill with nitrogen.
13. Remove the FFC from the upender and place it into temporary storage.

**7.1.3.2 Large Diameter Canisters (Damaged Metallic Fuel)**

1. Examine the large diameter FFC and check it for damage.
2. Place the FFC inside the containment barrier portion of the pool. Position the FFC in the failed rod loading station.
3. This step is to be used when loading up to three uncanned or canned fuel rods into the large diameter canister. After verifying the accountability records, remove the ceramic filter from the top of the original failed rod can. Position the can plug with aluminum screen onto the open can. Install the plug.
4. Verify the accountability records for the fuel to be loaded.



5. Place the designated fuel into the FFC. If the rod is broken into two or more pieces, verify that the lid thread and seal area is not fouled during rod or can insertion. If more than one failed rod is to be installed, repeat steps 3 through 5.
6. After the canister is loaded with fuel, install the lid using the FFC Lid Installation Tool.
7. Using the FFC handling tool, move the loaded FFC through the containment barrier door and place the FFC horizontally into the upender.
8. Operate the hand winch to move the FFC to the vertical position.
9. Torque the FFC lid to  $130 \pm 10$  ft-lb for the large canister.
10. Connect the nitrogen supply line to the vent valve.
11. Open the nitrogen supply valve and pressurize the FFC to force out the water. Blow gas through the FFC for at least 5 minutes after the first visible traces of bubbles appear. Remove the gas supply line.
12. Invert the FFC in the upender and install the pipe plug.
13. Reinvert the FFC in the upender.
14. Attach the vacuum pump to the FFC vent valve. Evacuate the FFC to a pressure below 25 torr (33 mbar) for a minimum of 15 minutes. Remove the vacuum pump and backfill with nitrogen.
15. Remove the FFC from the upender and place it into temporary storage.

#### **7.1.3.3 Large Diameter Canisters (Severely Damaged Metallic Fuel)**

1. Examine the large diameter FFC and check it for damage.
2. Place the FFC inside the containment barrier portion of the pool. Position the FFC in the failed rod loading station.
3. Verify the accountability records for the fuel in the filter set (up to 10 filters) to be loaded into the FFC.
4. After verifying the accountability records, load the filter set into the FFC and place aluminum wool on top of the last filter.
5. Verify that the lid thread and seal area is not fouled during insertion of the filter set.
6. After the canister is loaded with fuel, insert the lid using the FFC Lid Installation Tool.
7. Using the FFC handling tool, move the loaded FFC through the containment barrier door and place the FFC horizontally into the upender.
8. Operate the hand winch to move the FFC to the vertical position.
9. Torque the FFC lid to  $130 \pm 10$  ft-lb for the large canister.
10. Connect the nitrogen supply line to the vent valve.
11. Open the nitrogen supply valve and pressurize the FFC to force out the water. Continue to blow gas through the FFC for at least 5 minutes after the first visible traces of bubbles appear. Remove the gas supply line.
12. Invert the FFC in the upender and install the pipe plug.
13. Reinvert the FFC in the upender.

14. Attach the vacuum pump to the FFC vent valve. Evacuate the FFC to a pressure below 25 torr (33 mbar) for a minimum of 15 minutes. Remove the vacuum pump and backfill with nitrogen.
15. Remove the FFC from the upender and place it into temporary storage.

#### **7.1.4 Procedures for Dry Loading of DIDO, Spiral, MOATA and MTR Fuel Elements in Basket Modules into the NAC-LWT Cask**

This procedure presents the steps for dry loading of fuel basket modules into the NAC-LWT cask using a transfer cask, which can contain various types of aluminum clad reactor fuel elements such as MTR, DIDO, spiral and plate assemblies (i.e., MOATA elements). Aluminum clad fuel elements shall be transported in a leaktight NAC-LWT cask. The design, materials, use and function of the various modular fuel basket assemblies such as MTR, DIDO and ANSTO are similar, and all can be loaded into the NAC-LWT utilizing these procedures.

The modular fuel basket assemblies all consist of three types of modules: a base module, intermediate modules, and a top module. Each basket module contains seven fuel element locations, consisting of a center cell and six peripheral cells. The top basket module interfaces with the cask lid to limit the axial movement of the basket assembly. The base module interfaces with the bottom of the cask cavity. The base and intermediate modules are provided with guide pins to provide for and maintain the proper alignment between basket modules. Each of the basket module types is provided with a guide bar assembly to provide for the proper interface of the basket assembly with the drain tube assembly.

Depending on the fuel type, the basket assembly may consist of 4, 5 or 6 modules, with a varying number of intermediate modules. For the DIDO, MOATA and spiral fuel types, the DIDO basket assembly, the ANSTO basket assembly (the basket assembly identification for MOATA and spiral fuel types) and the ANSTO-DIDO combination basket assemblies consist of a top module, four intermediate modules and a base module. For the ANSTO-DIDO combination basket assembly, the top module is an ANSTO module and the remaining five modules are DIDO modules.

In the case of MTR fuel elements, the basket assembly can include 2, 3 or 4 intermediate modules, depending on the length and conditions of the fuel contents. Axial fuel spacers and plates may be used as dunnage to axially position the MTR fuel elements in the basket module to facilitate fuel unloading operations. Degraded clad of MTR elements shall be limited to a maximum of 5% of fuel element surface area.

The fuel content condition (i.e., heat load, fissile mass, minimum cool time, etc.) limits for the various fuel types are discussed or referenced in the following paragraphs.

MTR fuel elements shall be selected and loaded in accordance with the MTR General and Preferential Loading Procedures in Section 7.1.5. The MTR plate canister, if required, shall be loaded in accordance with Section 7.1.4.1.

DIDO fuel elements shall meet the following loading conditions:

- The maximum decay heat for DIDO fuel shall not exceed 25 W per element and 1.05 kW per loaded DIDO basket assembly when a top spacer is utilized (see NAC Drawing No. 315-40-113).
- The maximum decay heat for DIDO fuel elements loaded in a DIDO top module without a lid spacer installed shall not exceed 18 W per element.
- The maximum decay heat load for DIDO fuel elements loaded into an ANSTO top basket module with or without a damaged fuel can (DFC) shall not exceed 10 W.
- The heat load for each DIDO fuel element shall be verified by use of cool time versus burnup (MWd/MTU) curves in Figure 7.1-8 (LEU fuel), Figure 7.1-9 (MEU fuel), and Figure 7.1-10 (HEU fuel) or by use of minimum cool time versus  $^{235}\text{U}$  depletion curves in Figure 7.1-11 (generic for LEU, MEU and HEU fuels), or by facility decay heat calculations. Note that significantly lower uranium content for a loaded assembly compared to the design basis assembly may result in a loaded assembly calculated burnup higher than that included in Figure 7.1-8 through Figure 7.1-10. Use of Figure 7.1-11  $^{235}\text{U}$  depletion curves is required for fuel assemblies in this category.
- Spiral, MOATA and DIDO fuel elements with corrosion and/or mechanically damaged cladding (i.e., degraded ANSTO fuel elements) may be loaded, provided that the total surface area of through-clad corrosion and/or mechanical damage does not exceed 5% per element, and the elements, or disassembled plates, are placed in an ANSTO DFC in the upper ANSTO basket module of an ANSTO basket assembly or ANSTO-DIDO combination basket assembly.

Spiral, MOATA and DIDO fuel elements shall meet the content conditions specified in the CoC for loading into the ANSTO basket assembly and the ANSTO-DIDO combination basket assembly. In ANSTO basket assemblies, full spiral fuel loads or mixed spiral, MOATA and DIDO fuel loads are authorized. DIDO fuel elements are limited to loading into the top ANSTO basket module. MOATA, spiral and DIDO fuel elements with degraded cladding or disassembled elements shall be placed into damaged fuel cans (DFCs) prior to loading into an ANSTO top basket module. DFCs containing MOATA, spiral or DIDO fuel elements may be loaded into the top ANSTO module of either an ANSTO basket assembly or an ANSTO-DIDO combination basket assembly. The maximum heat load of spiral or DIDO fuel elements to be placed in DFCs is 10 W per element. The procedures for loading degraded clad or disassembled MOATA, spiral or DIDO fuel elements in DFCs prior to loading into the basket modules are provided in Section 7.1.4.2. The remaining basket modules in the ANSTO basket assembly may

only be loaded with intact MOATA and/or spiral fuel elements. The remaining basket modules in the ANSTO-DIDO combination basket may only be loaded with intact DIDO fuel elements.

The procedures for loading the NAC-LWT cask with MTR, DIDO or ANSTO fuel baskets in a dry configuration or using a dry transfer system are as follows:

1. Perform a receipt inspection of the empty cask and trailer/ISO container, inspecting for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting operations. If an ISO container is used, it may be removed from the trailer and secured in the unloading area.
3. Remove the personnel barrier or the roof and roof cross-members from the ISO container.

Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.

4. Perform a Health Physics survey of the cask and adjacent surfaces of the trailer.

Note: A receiving survey of the cask and transporter must be performed as soon as practicable after arrival at the site to assure compliance with 10 CFR 20, 10 CFR 71.87(i) and 10 CFR 71.47, and to assure timely reporting of any reportable noncompliance.

5. Remove the top and bottom impact limiters.
6. Remove the cask tie-down strap.
7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to keep the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
8. Place the cask onto the dry loading station/stand. Disengage the lifting yoke and move clear.
9. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage.
10. Remove the vent and drain valve port covers. Prior to reinstallation of the port covers, carefully inspect the O-ring seals and, if the O-rings show any damage, replace them with approved spares. Ensure that the replacement O-rings are properly installed and seated. Visually inspect the valved quick-disconnect nipples and replace them, if necessary.  
Note: For Alternate B port covers, replace the metallic O-ring with an approved spare prior to reinstallation.
11. Remove closure lid bolts. Attach the lid lift slings to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to reinstallation of the lid, carefully

inspect the Teflon O-ring seal in the underside of the closure lid and, if it shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure that the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged.

12. Visually inspect the inner cavity for foreign material or damage. Install or verify presence of a proper drain tube including drain tube alignment ring, as required.
13. Install the required dry transfer system components on the top of the cask.
14. Position the shielded transfer cask system components for fuel loading, as appropriate.
15. Identify the fuel to be loaded into each fuel basket module. Fuel elements loaded into each basket and/or module shall comply with the approved content conditions specified in Condition 5.(b)(1) and 5.(b)(2) of CoC No. 9225. Specific guidance on fuel selection, use of loading diagrams and preferential loading procedures is provided in Section 7.1.5. Perform an independent verification of the loading diagrams and fuel loading operations per Section 7.1.5.3. MTR plate canister loading shall be in accordance with Section 7.1.4.1 and ANSTO DFC loading shall be in accordance with Section 7.1.4.2.

Note: If a basket module is to be loaded with a LEU MTR fuel element having  $^{235}\text{U}$  content  $>490\text{ g}$  ( $>23.5\text{ g }^{235}\text{U}$  per plate), cell block spacers, as shown on Drawing 315-40-085, shall be installed in basket module cell positions 1, 2 and 3 to prevent inadvertent loading of more than four LEU MTR fuel elements.

Note: For the loading of HEU MTR fuel elements having  $^{235}\text{U}$  content  $>380\text{ g}$ , a minimum of 2.0 cm of nonfuel hardware and /or spacer plates shall be provided at both ends of the fuel element to meet criticality control analysis requirements.

16. Load the shielded transfer cask and basket module with the selected fuel contents.
17. Place the shielded transfer cask containing a loaded fuel basket module onto the dry transfer system components positioned on the top of the cask.
18. Lower the loaded basket module from the transfer cask into the shipping cask.
19. Repeat the loading and transfer of loaded basket modules until the approved cask loading plan is completed.
20. Install the closure lid onto the cask using the dry transfer system. Visually verify that the lid is properly seated.
21. Remove the dry transfer system components from the top of the cask.
22. Install and tighten the 12 closure bolts to  $260 \pm 20\text{ ft-lb}$  in three passes, using the sequence stamped on the lid.
23. Connect a gas supply line to the vent valve and the drain line to the drain valve.
24. Open the air, nitrogen or helium gas supply valve and pressurize the cask cavity ( $< 30\text{ psig}$ ) to force any residual water out the drain line. Continue to supply pressurized gas to the cask for a minimum of five minutes after the last residual free water discharges from the drain. Remove the drain and gas supply lines and attach a vacuum drying system (VDS) to the vent.
25. Evacuate the cask cavity to less than or equal to 10 torr (13 mbar) and continue vacuum pumping for a minimum of 15 minutes.

26. At the end of the vacuum pumping period, isolate the cask cavity from the vacuum pump and stop the vacuum pump. Monitor the cask cavity pressure for a minimum of 10 minutes. If the pressure rise is less than 5 torr (6.7 mbar), the cavity is verified as dry of free water. If pressure rise is >5 torr (6.7 mbar), repeat vacuum drying until the dryness verification results are satisfactory.
  27. Backfill the cask cavity with helium to 0 psig (1 atmosphere, absolute), +1, -0 psi and disconnect the VDS from the vent valve.
  28. Perform a helium leakage test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector (He MSLD) in accordance with the procedural requirements of Section 8.1.3.1, Steps 3 through 10.
  29. Install the vent and drain alternate port covers and torque the bolts to  $100 \pm 10$  inch-pounds.
  30. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using a He MSLD in accordance with the requirements of 8.1.3.2.2.
  31. If the alternate port cover containment seal was inspected and accepted for reuse, perform a gas pressure drop leakage test on the affected port cover as follows.
    - a. Install a pressure test fixture to the port cover test port including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
    - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
    - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.
    - d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.
- Note: Alternate B port covers, if used, require the satisfactory completion of a helium maintenance leakage rate test to confirm a leaktight seal condition for each loaded transport. Install the Alternate B port cover and perform the maintenance leakage rate test per the requirements of Section 8.1.3.3.2.
32. Decontaminate the cask surfaces. Survey the cask for surface contamination and radiation dose rates.

Note: Ensure compliance with 10 CFR 71.87(i) and 10 CFR 71.47
  33. Remove lift yoke arm guides. Engage the cask lifting yoke to the lifting trunnions.
  34. Lift the cask and position the cask rotation sockets in the rear rotation trunnions of the rear support structure. Carefully lower the cask to the horizontal transport orientation resting on the front saddle by moving the crane and/or the trailer as required to maintain cask engagement to the rear supports.
  35. Disengage the lifting yoke from the lifting trunnions and remove it from the area.
  36. Install the cask tie-down strap. Install the top and bottom impact limiters.
  37. Install a TID to an attachment point on the top impact limiter.
  38. Install ISO container bracing and lid, or personnel barrier.

39. Complete radiation and contamination surveys of the external surfaces of the package and record the data. Ensure removable contamination and radiation dose rate survey results comply with the limits specified in 10 CFR 71.87(i) and (j).
40. Measure the dose rate in millirems per hour at one meter from the package surface to determine the Transport Index (TI). Indicate the TI on the Radioactive Material labels applied to the package in accordance with 49 CFR 172, Subpart E.
41. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the CoC, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.
42. Apply appropriate placards to the transport vehicle in accordance with 49 CFR 172, Subpart F.
43. Complete the shipping documents and provide the carrier with instructions regarding the requirements for maintaining an exclusive use shipment.

#### **7.1.4.1 Procedure for Loading MTR Fuel Plates into MTR Plate Canister**

1. Examine the MTR plate canister and inspect for damage. Visually verify that one end of the canister is installed, the six associated bolts are installed and the other end is removed.
2. Place the can in the loading fixture.
3. Load the fuel plates into the canister. Verify that the number of fuel plates in the canister is no more than the maximum number of plates in an intact MTR fuel element of its type.
4. Install the lid and lid bolts.

#### **7.1.4.2 Procedure for Loading MOATA, Spiral and DIDO Fuel Elements into ANSTO Damaged Fuel Can (DFC)**

1. Examine the ANSTO DFC per Figure 1.2.3-18, and inspect for damage. Visually verify that the bottom ring with aluminum mesh screen is installed in the base of the DFC tube.
2. Place the DFC in a facility loading fixture.
3. Load the MOATA fuel plates, spiral fuel plates or DIDO fuel plates/element into the DFC. Ensure that the fuel elements or plates loaded into the DFC comply with the fuel quantity and heat load conditions of the CoC.
4. Install the lid with aluminum mesh screen and rotate the lid into the locked position.
5. At the appropriate point in the NAC-LWT cask loading process, load the loaded DFC into the top ANSTO fuel basket module.
6. Position loaded ANSTO module onto the ANSTO basket assembly or the ANSTO-DIDO combination basket assembly.

#### **7.1.5 MTR General and Preferential Loading Procedures**

Up to 42 LEU, MEU, and HEU MTR fuel elements may be loaded into the NAC-LWT MTR Fuel Basket, i.e., 7 fuel elements per basket module × 6 basket modules per fuel basket, except

for LEU MTR fuel elements with greater than 490 g  $^{235}\text{U}$  (or greater than 23.5 g  $^{235}\text{U}$  per plate), which are limited to 4 elements per basket module as detailed in the following paragraphs. Each MTR basket module has 7 fuel element positions. The MTR basket module loading diagram presented in Figure 7.1-1 has a center position (Position 1), two exterior positions (Positions 2 and 3) that are in line with the center position, and four exterior positions (Positions 4, 5, 6, and 7) that are adjacent to the center row positions. The basket module's fuel element locations are specifically identified to ensure loading of each location with the appropriate fuel element. Ensuring MTR fuel loadings are performed in strict accordance with the procedures presented herein will ensure that the MTR fuel content conditions of the CoC are met and that the analyses presented in this SAR are bounding.

MTR fuel elements are selected for loading into specific fuel element locations based on the decay heat of each individual fuel element at the time of loading. Figure 7.1-2 through Figure 7.1-5 and Figure 7.1-12 through Figure 7.1-13 are provided to assist in determining the acceptability of a MTR fuel element for loading in a 30 W uniform loading pattern depending on enrichment (i.e., LEU, MEU or HEU) or  $^{235}\text{U}$  content (i.e. 380 or 460 grams). For determining the acceptability of higher heat load HEU fuel elements, Figure 7.1-6 and Figure 7.1-7 are provided for 380 and 460 grams of  $^{235}\text{U}$ , respectively. For determining the acceptability of higher heat load LEU fuel elements, Figure 7.1-13 is provided for 490 grams of  $^{235}\text{U}$ . Curves are provided in this figure at 10, 20, 30, and 40 W maximum heat load for maximum flexibility in the preferentially loaded basket. The use of the fuel element cool time versus fuel burnup figures are described in Section 7.1.5.4. LEU MTR fuel elements with a  $^{235}\text{U}$  content greater than 23.5 grams per plate (490 g  $^{235}\text{U}$  per element), but not exceeding 32 grams  $^{235}\text{U}$  per plate (640 g  $^{235}\text{U}$  per element), are restricted to baskets containing a maximum of four fuel elements (or an equivalent number of fuel plates per opening). The four element per basket module is in effect even if only one LEU MTR assembly exceeds 23.5 grams  $^{235}\text{U}$  per plate (490 g  $^{235}\text{U}$  per element). Specific basket locations and restrictions for the high load LEU elements are described in Section 7.1.5.1.

The procedural steps and sequence to ensure the MTR fuel loading and content condition limits are met are: 1) determine  $^{235}\text{U}$  content weight per element; 2) determine fuel element decay heat load per Section 7.1.5.4; 3) determine basket module loading position for each element and overall basket loading pattern; and 4) individual basket module loading and assembly of the fuel basket in the NAC-LWT. Each of these steps shall be independently verified.

Attention to the overall cask loading pattern allows the decay heat load of the cask to be maintained as uniform, as is practical, and within CoC total heat load limits. Loading diagrams for each individual module and the complete cask assembly shall be developed and used during the basket module and cask loading operations. After the decay heat load of each of the MTR



fuel elements to be loaded and transported is calculated or determined and verified, the loading and content considerations of Sections 7.1.5.1 through 7.1.5.3 shall be met or complied with to establish the final acceptable loading pattern and sequence.

#### 7.1.5.1 General Loading Requirements

1. The maximum decay heat load per MTR fuel basket module shall not exceed 210 W and the maximum decay heat load per cask (package) shall not exceed 1.26 kW. A MTR fuel element with a decay heat greater than 120 W shall not be loaded. The minimum allowed cool time for an MTR element/plate shall be 90 days.
2. LEU, MEU and HEU MTR fuel elements with decay heat not exceeding 30 W per element may be loaded in any basket module fuel element location in any combination.
3. HEU MTR fuel elements with decay heats exceeding 30 W shall be preferentially loaded in a basket module in decreasing decay heat order according to the loading diagram in Figure 7.1-1, with the highest heat load element loaded in fuel location one. Fuel elements with heat loads of up to 120 W shall only be loaded in the center fuel element location of any MTR fuel basket module. The decay heat of the fuel element in either of the two fuel element locations (i.e., number 2 or 3), in line with the center fuel element location of a MTR fuel basket module, shall not exceed 70 W.
4. LEU MTR fuel elements (or canistered fuel plates) with a  $^{235}\text{U}$  content greater than 23.5 g per plate ( $>490\text{ g }^{235}\text{U}$  per element), and not exceeding 32 g per plate ( $\leq 640\text{ g }^{235}\text{U}$  per element), shall only be loaded into basket positions 4, 5, 6 and 7 shown in Figure 7.1-1. In order to ensure that baskets containing the high fissile mass LEU MTR elements ( $>23.5\text{ g }^{235}\text{U}$  per plate,  $>490\text{ g }^{235}\text{U}$  per element) will not be loaded with fuel elements (or fuel plates) in basket opening positions 1, 2 and 3, a cell block spacer shall be installed in each of these three basket openings. The cell block spacer, as shown on Drawing 315-40-085, is of sufficient height and diameter to ensure that LEU MTR fuel elements are prevented from being placed in these openings. The capacity limitation of a maximum of four MTR fuel elements per module is in effect even if a single LEU MTR fuel elements (or canistered fuel plates) having  $>23.5\text{ g }^{235}\text{U}$  per plate ( $>490\text{ g }^{235}\text{U}$  per element) is to be loaded.
5. LEU MTR fuel elements with decay heats exceeding 30 W shall be preferentially loaded in a basket module in decreasing decay heat order according to the loading diagram in Figure 7.1-1. The total decay heat load of any individual basket with 40 W preferentially loaded assemblies is 210 W.
6. An MTR plate canister may be loaded into any fuel basket module fuel element location. The contents of each plate canister shall be limited to the number of fuel plates, dimensions and masses of an equivalent intact MTR fuel element.
7. MTR fuel elements with corrosion and/or mechanically damaged cladding may be loaded, provided that the total surface area of through-clad corrosion and/or mechanical damage does not exceed 5% of the elements cross-sectional area.

### **7.1.5.2 Determination of Basket Module Loading Pattern**

1. Perform an evaluation of the full inventory of fuel elements to be loaded into the NAC-LWT cask(s) and develop an overall loading plan that minimizes overall dose rates to minimize general population dose and operator dose. The loading of LEU MTR fuel elements with greater than 23.5 g  $^{235}\text{U}$  per plate (>490 g  $^{235}\text{U}$  per element) shall be governed by the loading restrictions in item 4 of Section 7.1.5.1, and cell block spacers shall be placed in basket loading positions 1, 2 and 3 to prevent inadvertent loading of more than four high fissile mass LEU MTR elements.
2. Select up to seven MTR fuel elements to be loaded in a basket module meeting the general loading requirements of Section 7.1.5.1. Identify if spacers or spacer plates are required to properly position the MTR elements axially in the basket module.
3. Rank the fuel elements in order of decreasing decay heat load from 1 to 7. (i.e., the assembly with the highest decay heat is designated number 1.)
4. Generate loading diagrams for each basket module based on Figure 7.1-1, by placing the numbered assemblies in the matching numbered basket module positions, except that fuel elements ranked 4,5,6 or 7 may be loaded in any of the outer (i.e., 4-7) basket module positions.
5. Repeat steps 1 through 4 for all of the basket modules to be loaded.
6. Independently verify the basket module loading diagrams.
7. The loading diagrams shall be used to direct the loading of the basket modules per Section 7.1.5.3.

Once the basket module loading charts are complete, they are used to direct the loading of the basket modules.

### **7.1.5.3 Basket Loading Procedure**

1. Locate the MTR fuel element to be loaded into the basket module per the loading diagram prepared for that module type (i.e., base, intermediate or top).
2. Independently verify the element identification.
3. Load the element into the predetermined fuel basket module fuel element location using the loading diagram. Ensure spacers are installed in positions 1, 2 and 3 of any basket module containing a high fissile mass LEU MTR element (>23.5 g  $^{235}\text{U}$  per plate, >490 g  $^{235}\text{U}$  per element).
4. Independently verify that the fuel element and spacer loading in the basket module complies with the loading diagram.
5. Repeat steps 1 through 4 until all identified fuel elements have been loaded into basket modules in compliance with the loading diagrams.

### **7.1.5.4 Estimating Assembly Decay Heat**

When the decay heat of a fuel element is not known, the assembly burnup (MWd/MTU) and cooling time (years) can be used to define the allowable basket module positions using Figure

7.1-2 through Figure 7.1-7 and Figure 7.1-12 through Figure 7.1-13, depending on fuel enrichment (i.e., LEU, MEU or HEU) or  $^{235}\text{U}$  content.

When using the load curves, placing the data point above a curve results in the fuel element being acceptable for loading at the heat load for which the curve was generated. Fuel elements with characteristics locating the point below the curve results in the fuel element not being acceptable for loading at the heat load for which the curve was generated. Uncertainties associated with burnup/depletion assignment for use with the load curves must be taken into account. Should an element be near the minimum load time determined by the load curves, or maximum burnup applicable to the curve, uncertainties in reading the curves must be taken into account.

HEU MTR fuel elements may be loaded with heat loads greater than 30 W. HEU elements exceeding 30 W shall be preferentially loaded, and Figure 7.1-6 and Figure 7.1-7 identify the appropriate cooling times and burnup limits for 120 W, 70 W and 20 W HEU elements, having a  $^{235}\text{U}$  mass of up to 380 grams and a  $^{235}\text{U}$  mass of up to 460 grams, respectively. The following steps are used to develop the appropriate loading patterns.

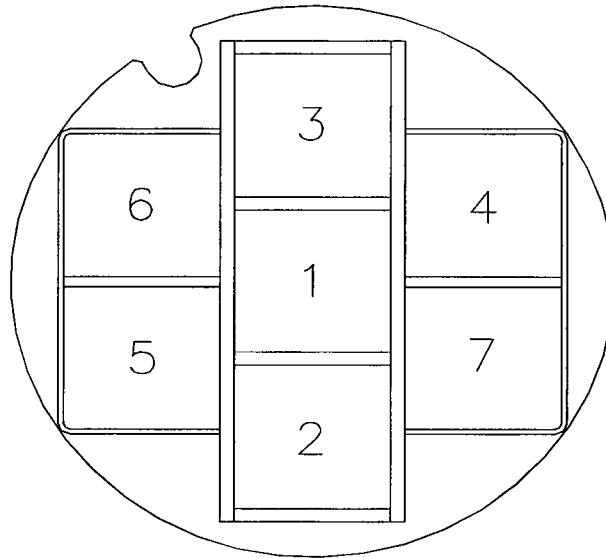
1. Locate the point on Figure 7.1-6 or Figure 7.1-7 for the fuel element burnup and cooling time, and  $^{235}\text{U}$  content.
2. If the located point is above the 20 W line, there are no restrictions on fuel element placement in the basket module.
3. If the located point is between the 20 W and 70 W lines, the element is loaded as a 70 W element.
4. If the located point is between the 70 W and 120 W lines, the element is loaded as a 120 W element.
5. If the located point is below the 120 W line, the element shall not be loaded in the NAC-LWT cask.
6. The maximum total decay heat load for a preferentially loaded basket module shall not exceed 210 W and 1.26 kW for a loaded NAC-LWT cask.
7. Each shipper shall ensure that the Certificate of Compliance maximum decay heat load limits of 210 W per basket module and 1.26 kW per cask are not exceeded.

LEU MTR fuel elements may be loaded with heat loads greater than 30 W. LEU elements exceeding 30 W but not exceeding 40 W shall be preferentially loaded, and Figure 7.1-13 identifies the appropriate cooling times and burnup limits for 40 W, 30 W, 20 W and 10 W LEU elements, having a  $^{235}\text{U}$  mass of up to 490 grams (up to 23.5  $^{235}\text{U}$  gram per plate). The following steps are used to develop the appropriate loading patterns.

1. Locate the point on Figure 7.1-13 for the fuel element burnup and cooling time.
2. If the located point is above the 10 W line, there are no restrictions on fuel element placement in the basket module.
3. If the located point is between the 10 W and 20 W lines, the element is loaded as a 20 W element. If the located point is above the 20 W line and beyond the 10 W line (i.e.,

- element has a higher depletion than plotted for the 10 W line) the element is loaded as a 20 W element.
4. If the located point is between the 20 W and 30 W lines, the element is loaded as a 30 W element.
  5. If the located point is between the 30 W and 40 W lines, the element is loaded as a 40 W element.
  6. If the located point is below the 40 W line, the element shall not be loaded in the NAC-LWT cask.
  7. The maximum total decay heat load for a LEU preferentially loaded basket module shall not exceed 210 W and 1.26 kW for a loaded NAC-LWT cask.
  8. Each shipper shall ensure that the Certificate of Compliance maximum decay heat load limits of 210 W per basket module and 1.26 kW per cask are not exceeded.

Figure 7.1-1 MTR Fuel Basket Module Loading Pattern (Top View)



Loading Diagram

Figure 7.1-2 LEU MTR Fuel Basket Loading Guidelines for 30 W Uniform Loading –  
Maximum 470 grams <sup>235</sup>U

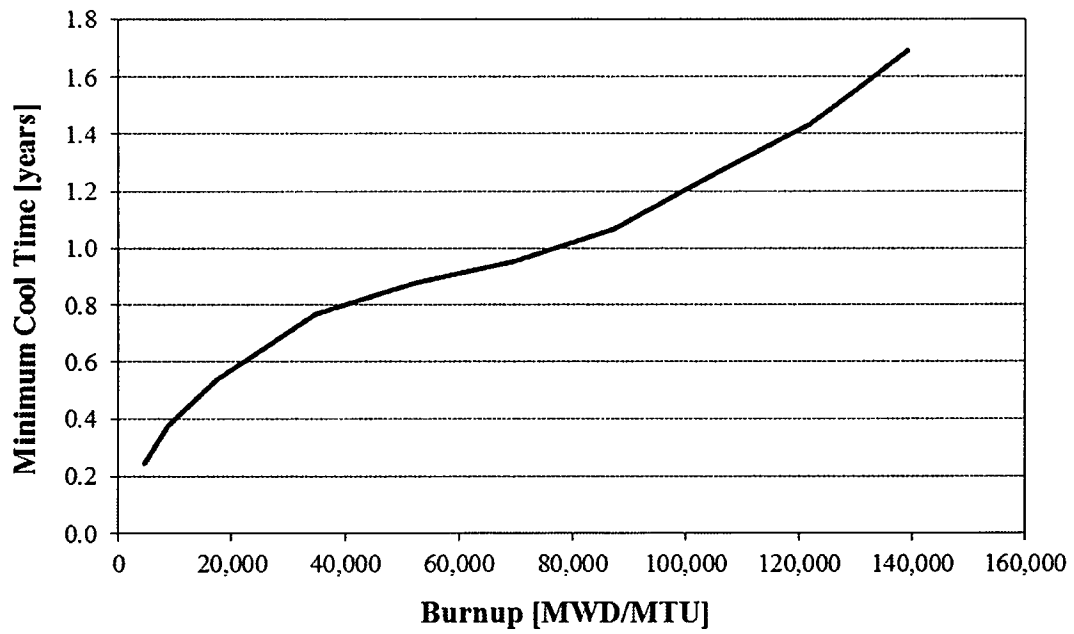


Figure 7.1-3 MEU MTR Fuel Basket Loading Guidelines for 30 W Uniform Loading

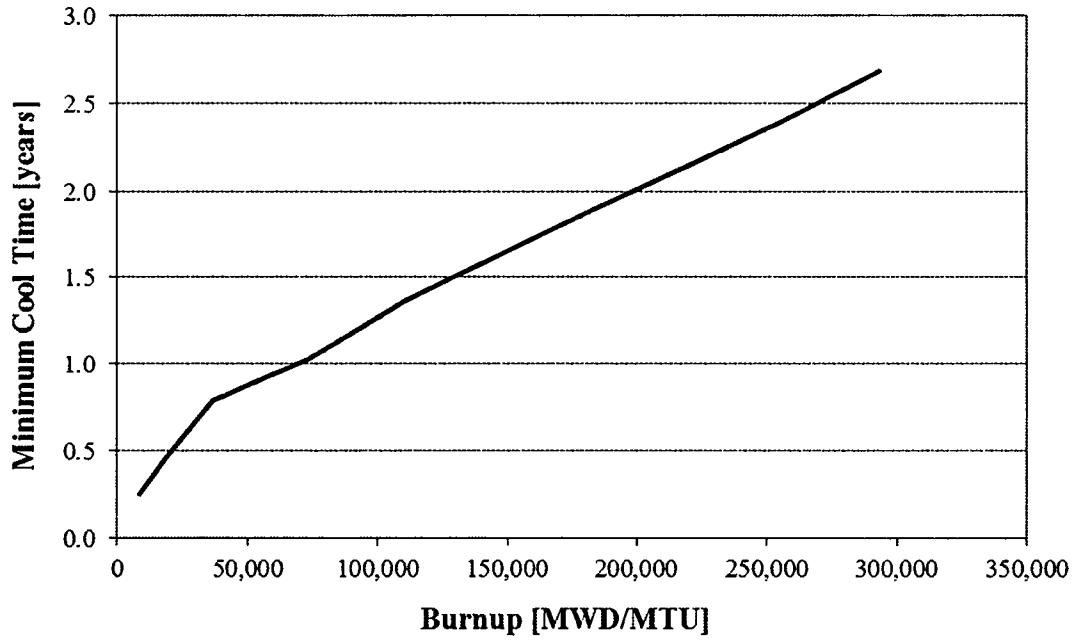


Figure 7.1-4 HEU MTR Fuel Basket Loading Guidelines for 30 W Uniform Loading –  
Maximum 380 grams <sup>235</sup>U

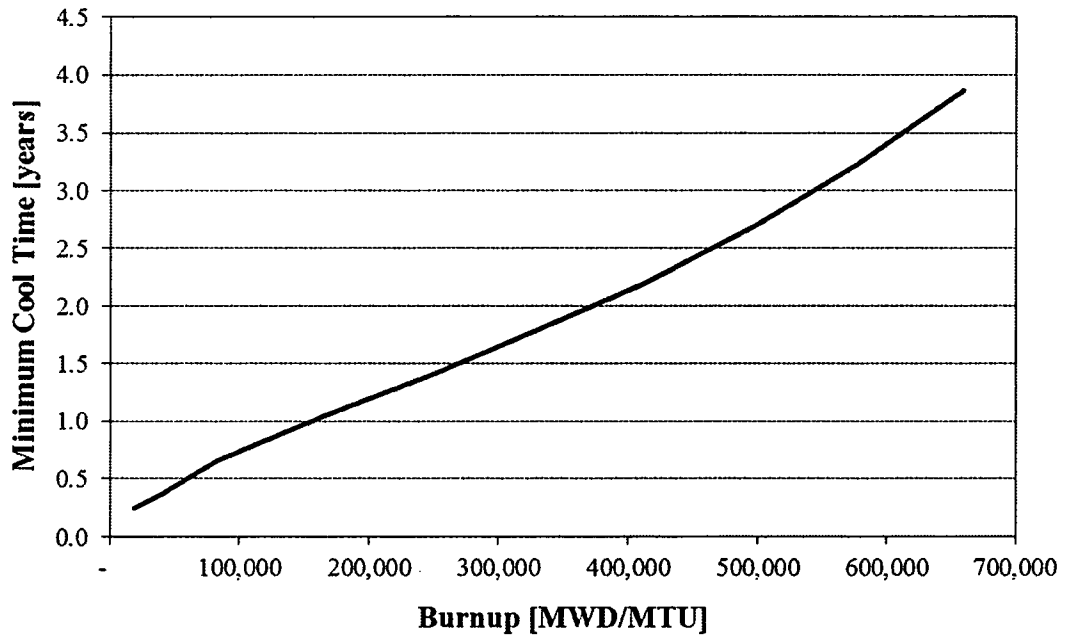




Figure 7.1-5 HEU MTR Fuel Basket Loading Guidelines for 30 W Uniform Loading –  
Maximum 460 grams <sup>235</sup>U

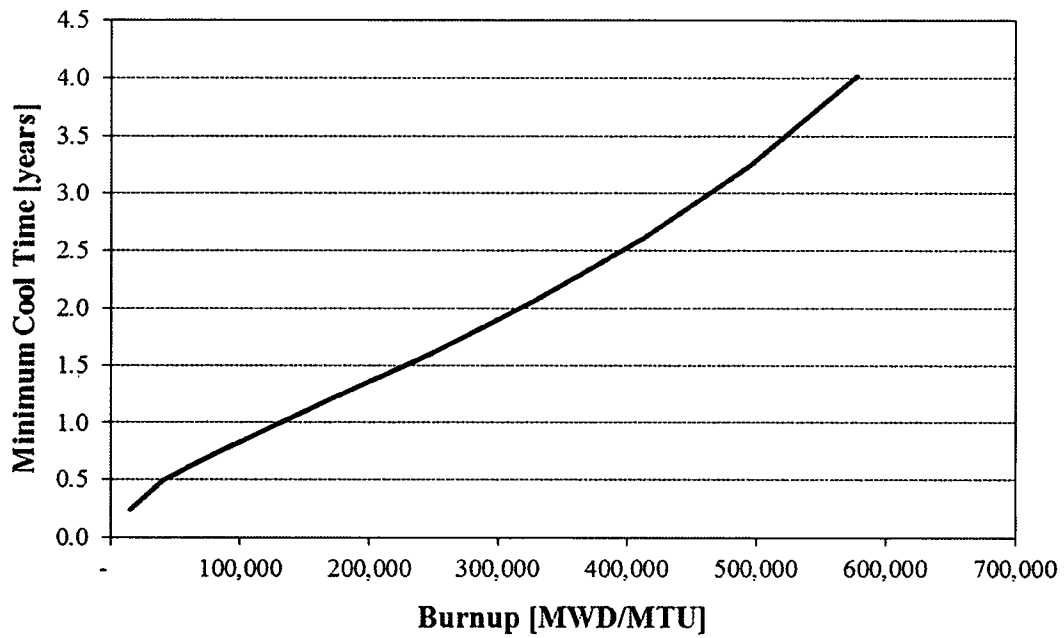


Figure 7.1-6 HEU MTR Fuel Basket Loading Guidelines for Preferential Loading – Maximum 380 grams <sup>235</sup>U

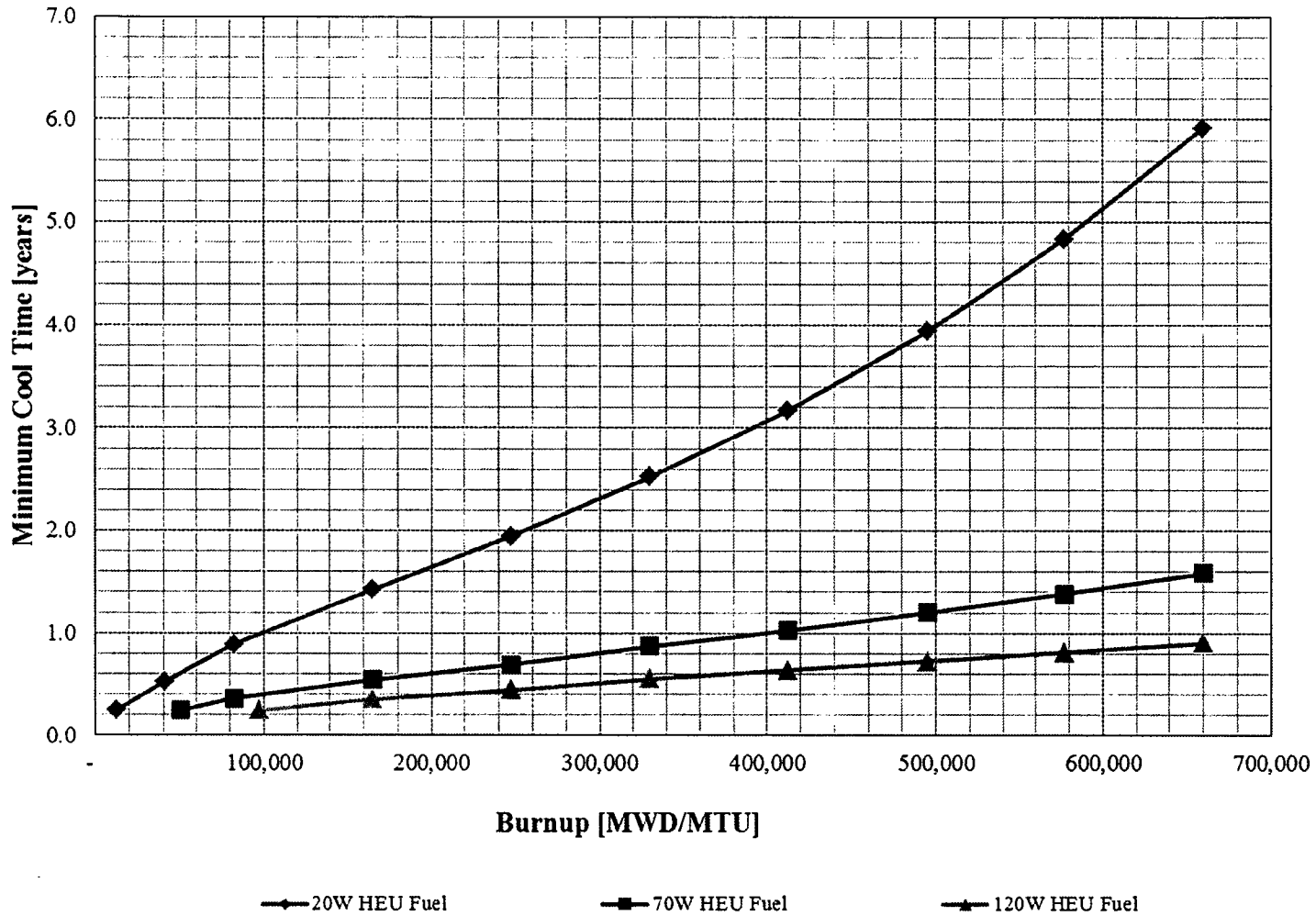


Figure 7.1-7 HEU MTR Fuel Basket Loading Guidelines for Preferential Loading – Maximum 460 grams <sup>235</sup>U

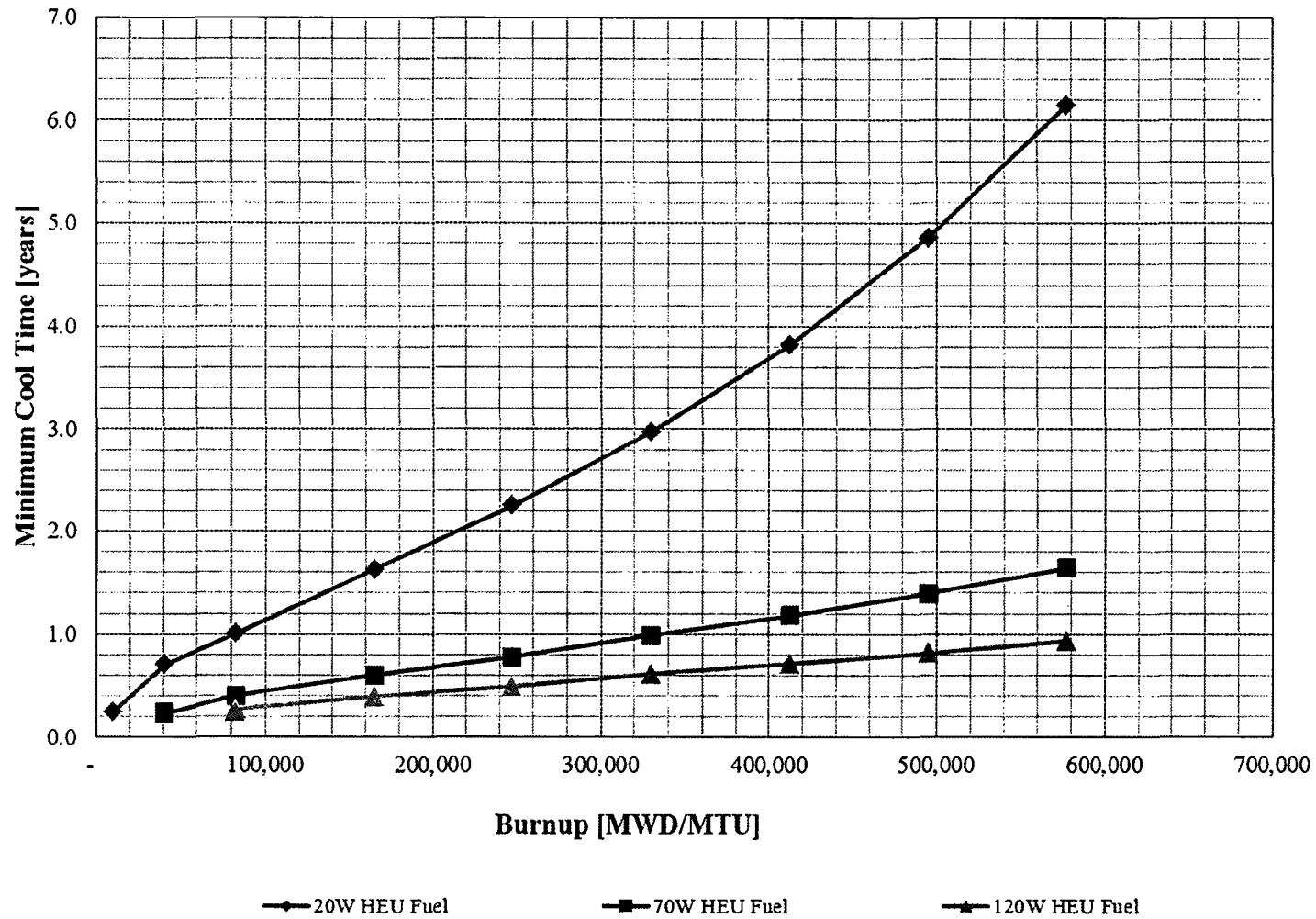


Figure 7.1-8 DIDO LEU Cooling Time vs. Fuel Burnup Basket Module Loading Guidelines for Uniform Loading

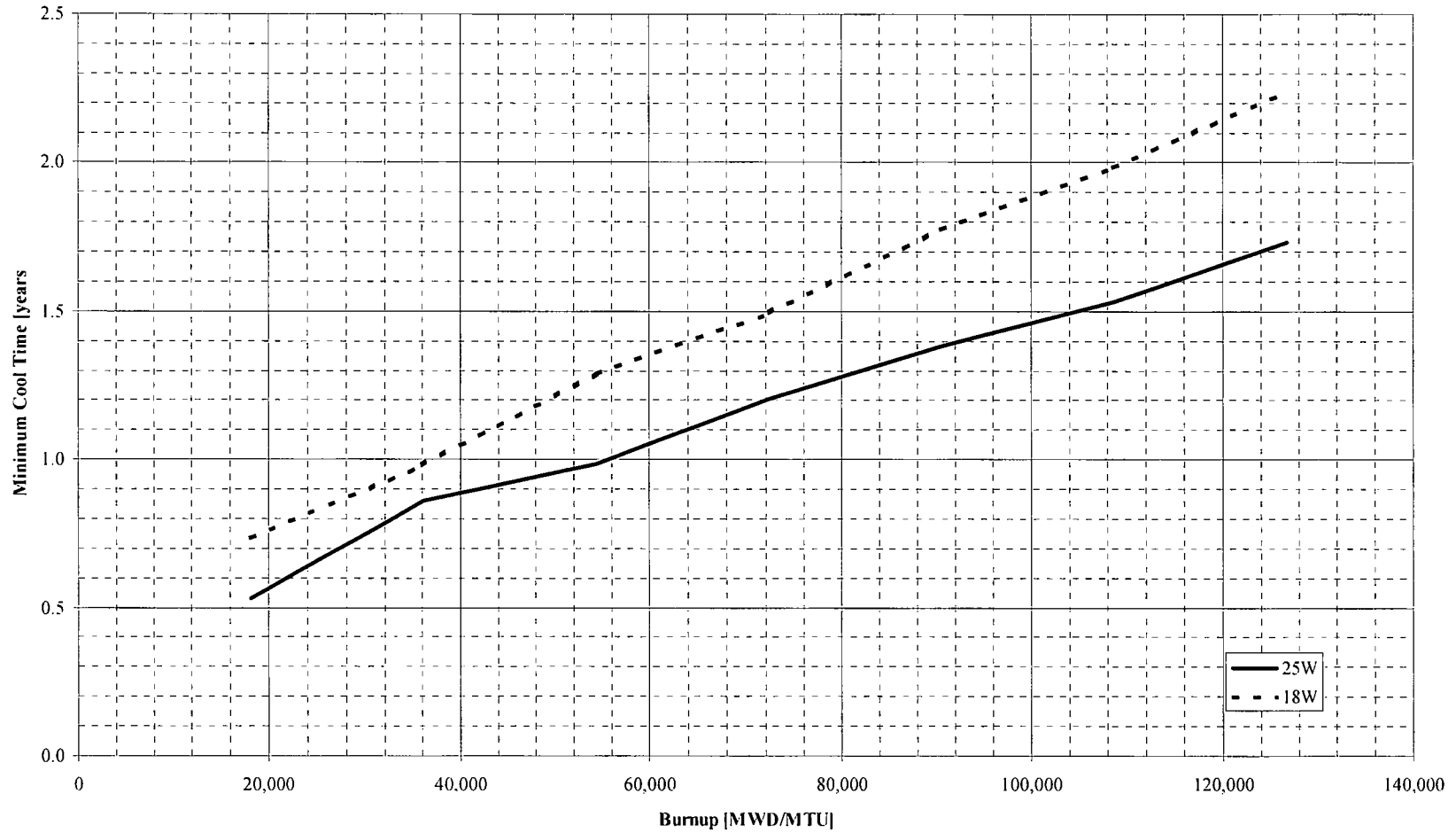


Figure 7.1-9 DIDO MEU Cooling Time vs. Fuel Burnup Basket Module Loading Guidelines for Uniform Loading

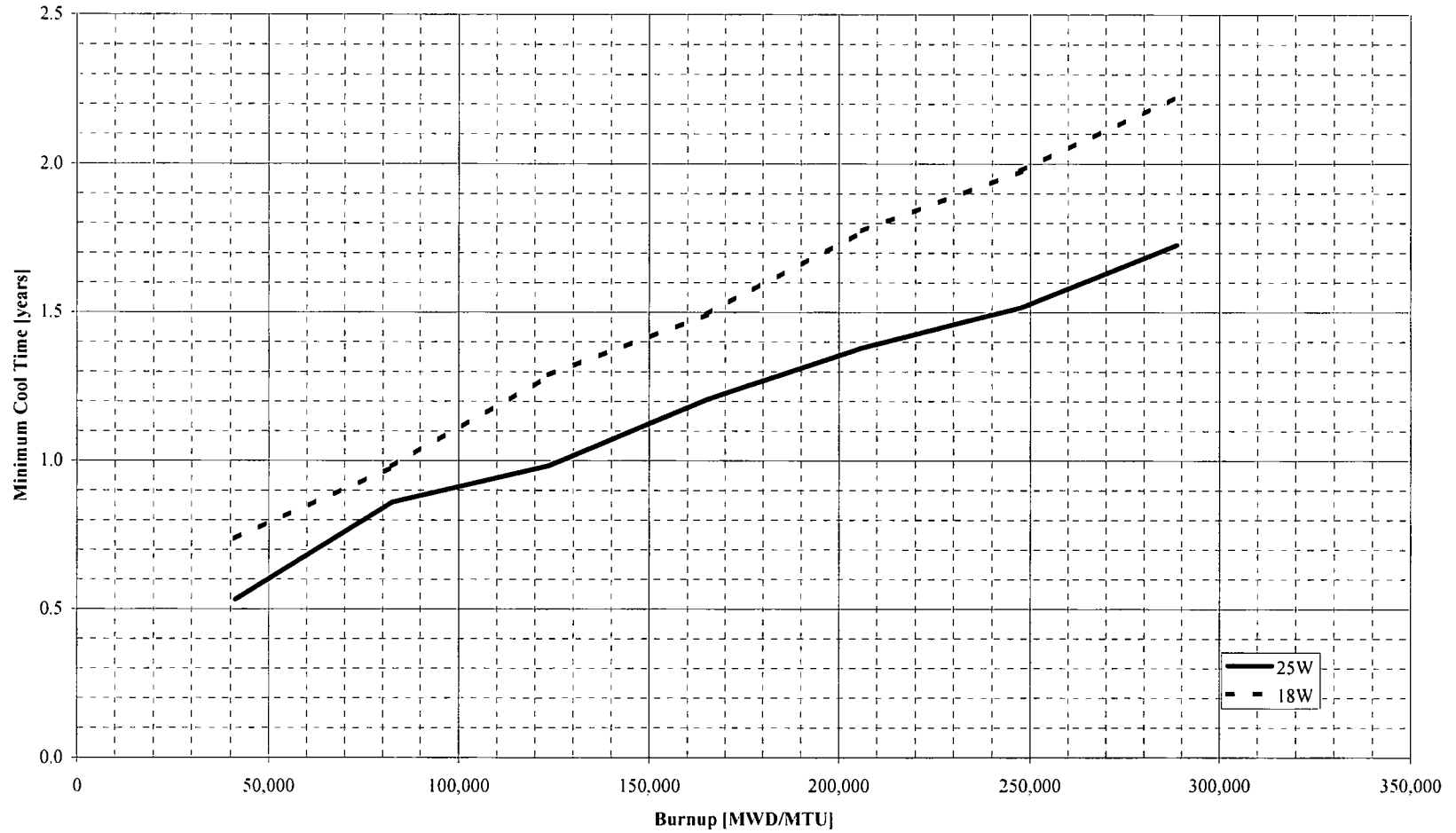


Figure 7.1-10 DIDO HEU Cooling Time vs. Fuel Burnup Basket Module Loading Guidelines for Uniform Loading

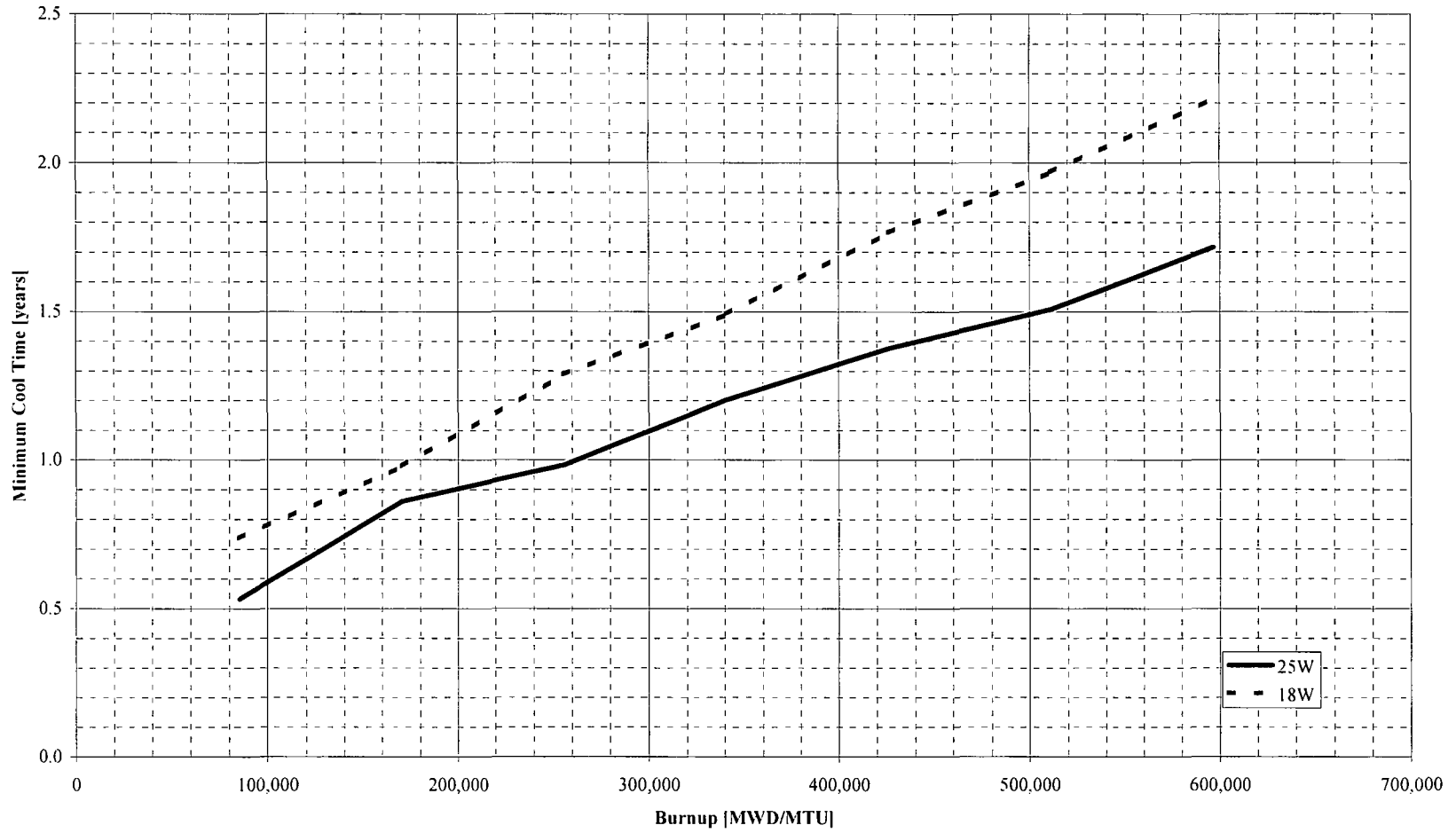


Figure 7.1-11 Bounding DIDO Element Minimum Cool Time vs. wt % <sup>235</sup>U Depletion

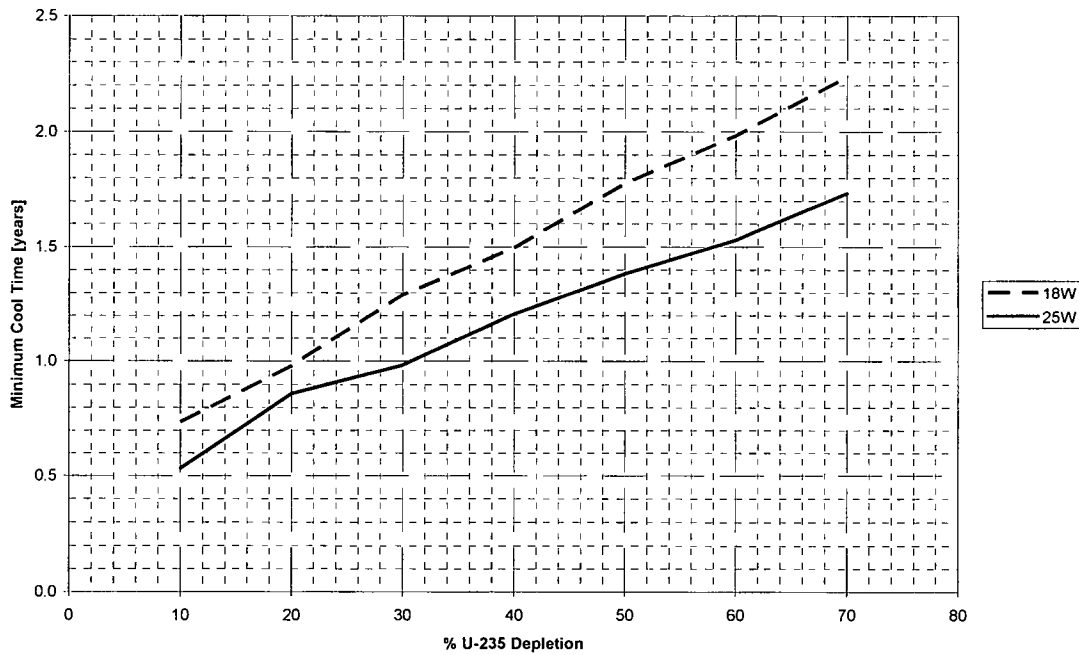


Figure 7.1-12 LEU MTR Fuel Basket Loading Guidelines for 30 W Uniform Loading - Maximum 640 grams <sup>235</sup>U

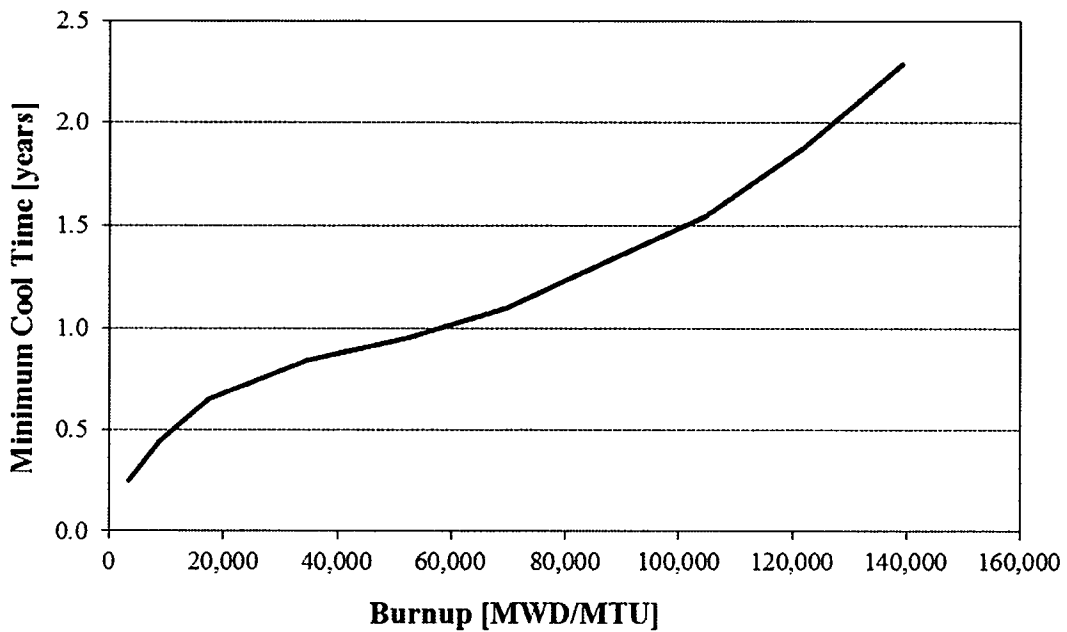
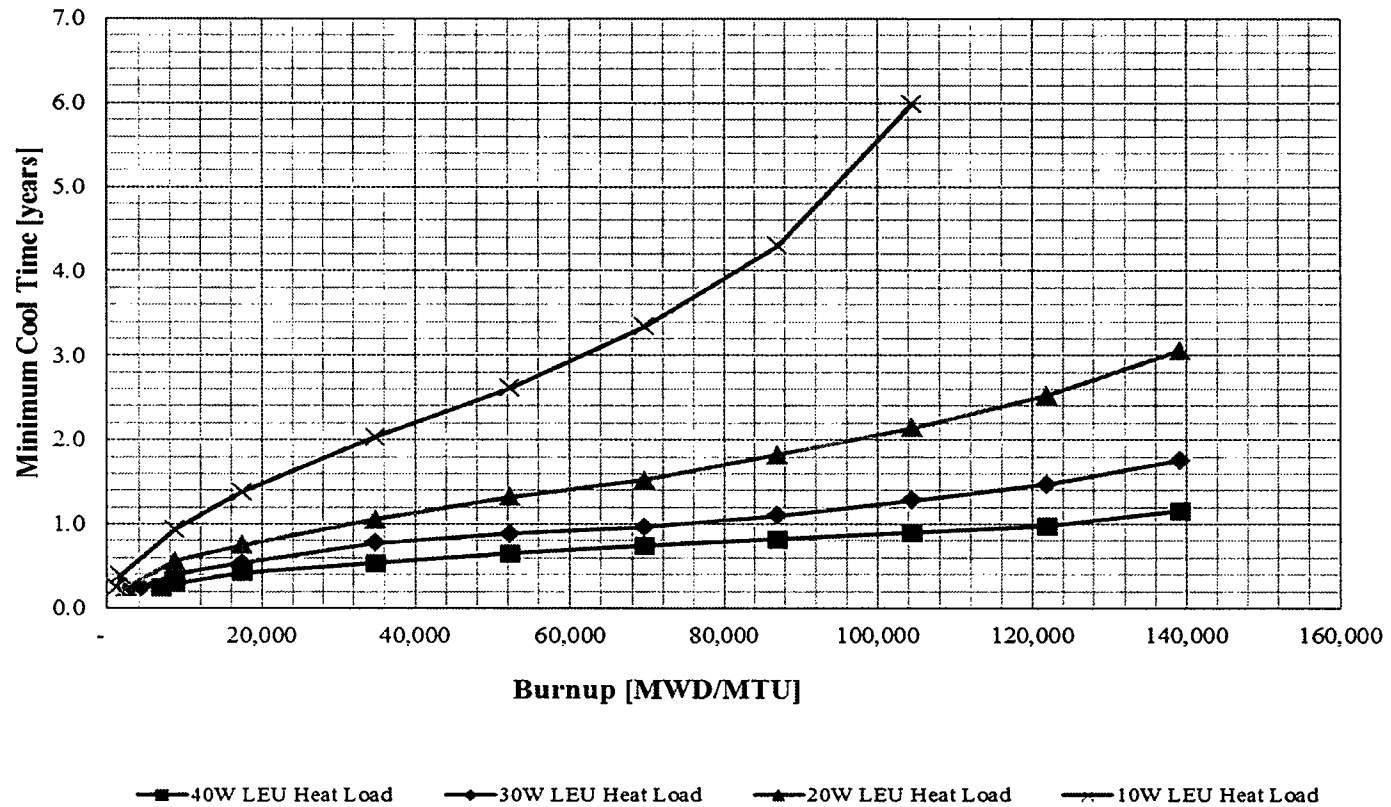


Figure 7.1-13 LEU MTR Fuel Basket Loading Guidelines for 40 W Preferential Loading  
- Maximum 490 grams <sup>235</sup>U



Note: Maximum burnup allowed is 139.3 Gwd/MTU and minimum cool time is 90 days



### 7.1.6 Procedure for Dry Loading of TRIGA Fuel Basket Modules and GA IFM Modules into the NAC-LWT Cask

This procedure presents the steps for dry loading, using a transfer cask, of the nonpoisoned or poisoned TRIGA fuel basket modules into the NAC-LWT. For transport, five TRIGA fuel basket modules, consisting of a top module, a base module, and three intermediate modules must be loaded into the NAC-LWT. An alternative loading option is available for the poisoned TRIGA basket modules. This configuration, Configuration 2, consists of 1 base module and 4 intermediate modules. A spacer attached to the underside of the NAC-LWT lid is used with Configuration 2. Each basket module consists of seven cells, a center cell, and six peripheral cells. The center cell of the nonpoisoned basket design is blocked and cannot be loaded. Each unblocked cell may contain up to four TRIGA fuel elements, or up to 16 TRIGA fuel cluster rods within a fuel rod insert placed into the cell prior to loading. The maximum decay heat load of any TRIGA fuel element is 7.5 watts, while the maximum decay heat load of a TRIGA fuel cluster rod is 1.875 watts. An alternative loading option is available for the General Atomics (GA) Irradiated Fuel Material (IFM) Fuel Handling Units (FHU). This configuration consists of one GA IFM top module and one GA IFM spacer. The GA IFM top module, based on the TRIGA basket design, has two canister storage tubes that hold the GA IFM FHU.

TRIGA fuel elements may be transported directly in the basket module cell, or in a sealed damaged fuel can (DFC). TRIGA fuel cluster rods may be transported within the fuel rod insert in a basket cell, or a sealed DFC. The sealed DFCs fit in a module cell. The sealed DFC holds up to two equivalent TRIGA elements as damaged fuel or fuel debris, or up to six equivalent TRIGA fuel cluster rods as damaged rods or fuel debris. Damaged TRIGA fuel and fuel debris are contained in sealed DFCs.

When loading TRIGA fuel elements directly into the basket cells of a TRIGA basket module, the fuel elements may be loaded with either 4 elements per cell, or one element per cell, without shoring. If a basket cell is loaded with 2 or 3 intact elements, dummy rods will be inserted as necessary to fill the remaining space in the cell.

Each nonpoisoned basket module may contain up to 24 TRIGA fuel elements for a total of 120 elements, up to 96 TRIGA fuel cluster rods for a total of 480 rods per basket assembly, or a mixed loading in separate cells of the basket module of TRIGA fuel elements and TRIGA fuel cluster rods.

For the loading of the following TRIGA fuel elements, a maximum of three intact fuel elements are authorized for loading in each cell of a nonpoisoned top or bottom basket module. A dummy TRIGA spacer tube, as shown on Drawing No. 315-40-085, shall be inserted into the open

position prior to fuel element loading to ensure that the maximum number of three TRIGA fuel elements is not exceeded:

- TRIGA Stainless Steel (SS) LEU fuel elements having  $> 169 \text{ g }^{235}\text{U} < 275 \text{ g }^{235}\text{U}$ ; or
- TRIGA SS HEU fuel elements having  $> 138 \text{ g }^{235}\text{U} < 175 \text{ g }^{235}\text{U}$

The licensee's approved fuel loading plan shall ensure compliance with all fuel loading restrictions.

Each poisoned basket module may contain up to 28 TRIGA fuel elements for a total of 140 elements, or up to 112 TRIGA fuel cluster rods for a total of 560 rods per basket assembly.

Damaged TRIGA fuel elements and cluster rods and fuel debris are required to be loaded into sealed DFCs. The sealed DFCs are provided in two lengths. The short sealed DFC may be used in the base or top basket module. The long sealed DFC may be used in only the top module. The sealed DFCs are vacuum dried prior to loading into a TRIGA fuel basket (see sealed DFC loading procedure in Section 7.1.7).

There are two separate GA IFM FHU designs. One FHU is designed to hold research reactor fuel and the other is designed to hold High-Temperature Gas-Cooled Reactor fuel pellets. Each FHU consists of a sealed inner canister within a sealed outer canister. Each FHU contains irradiated fuel materials as described in Chapter 1. When loading the GA IFM FHUs, each individual sealed FHU will be loaded separately into a single GA IFM basket. This single basket containing two GA IFM FHUs and a spacer will comprise the entire cask load. Loading of the GA IFM basket into the NAC-LWT cask will utilize the TRIGA dry configuration loading procedure that is described in the following paragraphs.

TRIGA fuel elements that can be loaded into the cask are limited to a maximum decay heat of 7.5 watts per element, as discussed in Section 1.2.3. The decay heat load of the element must be calculated, and verified to be equal to or less than 7.5 watts per element prior to loading. TRIGA fuel cluster rods that can be loaded into the cask are limited to a maximum decay heat of 1.875 watts per element, as discussed in Section 1.2.3 (by reference to Table 5.1.1). The decay heat load of the fuel cluster rod must be calculated, and verified to be equal to or less than 1.875 watts per element prior to loading.

The procedure for loading the package with TRIGA fuel in a dry configuration is as follows:

1. Perform a receipt inspection of the empty cask and trailer/ISO container, inspecting for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting

- operations. If an ISO container is used, it may be removed from the trailer and secured in the unloading area.
3. Remove the personnel barrier or the roof and roof cross-members from the ISO container.  
Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.
  4. Perform a Health Physics survey of the cask and adjacent surfaces of the trailer.  
Note: A receiving survey of the cask and transporter must be performed as soon as practicable after arrival at the site to assure compliance with 10 CFR 20, 10 CFR 71.87(i) and 10 CFR 71.47, and to assure timely reporting of any reportable noncompliance.
  5. Remove the top and bottom impact limiters.
  6. Remove the cask tie-down strap.
  7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to keep the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
  8. Place the cask onto the dry loading station. Disengage the lifting yoke and move clear.
  9. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage.
  10. Remove the vent and drain valve port covers. Prior to reinstallation of the port covers, carefully inspect the O-rings and, if the O-rings show any damage, replace them with approved spares. Ensure that the replacement O-rings are properly installed and seated. Visually inspect the valve quick-disconnect nipples and replace them, if necessary.  
Note: For Alternate B port covers, replace the metallic O-ring with an approved spare prior to reinstallation.
  11. Remove closure lid bolts. Attach the lid lift slings to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to reinstallation of the lid, carefully inspect the Teflon O-ring seal in the underside of the closure lid and, if it shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure that the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged.
  12. Visually inspect the inner cavity for foreign material or damage. Install, or verify the presence of the proper drain tube and drain alignment ring.
  13. Install the required dry transfer system components on the top of the cask.
  14. Position the shielded transfer cask system components for fuel loading, as appropriate.
  15. Identify the TRIGA fuel basket modules to be loaded. Modular baskets consisting of one base unit, three intermediate units, and one top unit, may be loaded into the cask cavity. The base unit must be the first unit loaded and the top unit must be the last unit loaded. The intermediate modules may be loaded in any of the other loading

operations. If the poisoned basket Configuration 2 is used, ensure that the TRIGA spacer is bolted and torqued to 40 ft-lbs to the underside of the NAC-LWT lid. If TRIGA fuel cluster rods are to be transported, ensure that fuel rod inserts are placed into each cell location that will contain fuel cluster rods. For the GA IFM basket load, install the GA IFM spacer, shown on NAC drawing 315-40-123, prior to inserting the loaded GA IFM top module.

- Notes:
- When utilizing nonpoisoned TRIGA baskets, visually verify that the center blocking plate is welded in place on each basket module.
  - When utilizing poisoned TRIGA baskets, visually inspect each cell of each basket module for foreign material or damage and verify the presence of the neutron poison material (borated stainless steel plates) as shown on NAC Drawings 315-40-080, -081, and -082.
  - When utilizing the GA IFM top module, follow the TRIGA loading procedure below, noting that this is a single basket load.

- Identify the TRIGA fuel elements and TRIGA fuel cluster rods to be loaded into each fuel basket module. Fuel elements and rods to be loaded into each basket module shall comply with the applicable approved content conditions specified in Condition 5.(b)(1) and 5.(b)(2) of CoC No. 9225.

If a top or bottom basket module cell is to be loaded with a TRIGA LEU SS fuel element having  $> 169 \text{ g } ^{235}\text{U}$ , or a TRIGA HEU SS fuel element  $> 138 \text{ g } ^{235}\text{U}$ , a dummy TRIGA spacer tube, as shown on NAC Drawing 315-40-085, shall be preinstalled in the module cell prior to fuel loading to prevent inadvertent loading of more than three high  $^{235}\text{U}$  content TRIGA fuel elements per cell. High  $^{235}\text{U}$  content TRIGA fuel elements are further restricted to loading in the top and bottom basket modules of a nonpoisoned basket only.

- Perform an independent verification that the TRIGA fuel elements, fuel cluster rods and dummy TRIGA spacer tubes loaded in the basket module comply with the approved loading plan and the CoC content conditions including fuel parameters, heat load, enrichment, minimum cooling period, etc.
- Load a TRIGA fuel basket module into the shielded transfer cask.
- Place the shielded transfer cask containing the loaded basket module onto the dry transfer system components positioned on the top of the cask.
- Lower the fuel basket from the shielded transfer cask into the shipping cask.
- Repeat the loading and transfer of loaded basket modules until the approved cask loading plan is completed.
- Install the closure lid onto the cask. Visually verify that the lid is properly seated.
- Remove the dry transfer system components from the top of the cask.
- Install and tighten the 12 closure bolts to  $260 \pm 20 \text{ ft-lbs}$  in three passes, using the torque sequence stamped on the closure lid.
- Connect a gas supply line to the vent valve and the drain line to the drain valve.
- Open the air, nitrogen or helium gas supply valve and pressurize the cask cavity ( $< 30 \text{ psig}$ ) to force any residual water out the drain line. Continue to supply pressurized gas to the cask for a minimum of five minutes after the last residual free

- water discharges from the drain. Remove the drain and gas supply lines and attach a vacuum drying system (VDS) to the vent.
27. Evacuate the cask cavity to less than or equal to 10 torr (13 mbar) and continue vacuum pumping for a minimum of 15 minutes.
  28. At the end of the vacuum pumping period, isolate the cask cavity from the vacuum pump and stop the vacuum pump. Monitor the cask cavity pressure for a minimum of ten minutes. If the pressure rise is less than 5 torr (6.7 mbar), the cavity is verified as dry of free water. If pressure rise is >5 torr (6.7 mbar), repeat vacuum drying until the dryness verification results are satisfactory.
  29. Backfill the cask cavity with helium to 0 psig (1 atmosphere, absolute), +1, -0 psi and disconnect the VDS from the vent valve.
  30. Perform a helium leakage test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector (He MSLD) in accordance with the procedural requirements of Section 8.1.3.1, Steps 3 through 10.
  31. Install the vent and drain alternate port covers and torque the bolts to 100 ±10 inch-pounds.
  32. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using a He MSLD in accordance with the requirements of 8.1.3.2.2.
  33. If the alternate port cover containment seal was inspected and accepted for reuse, perform a gas pressure drop leakage test on the affected port cover as follows.
    - a. Install a pressure test fixture to the port cover test port including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
    - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
    - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.
    - d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.

Note: Alternate B port covers, if used, shall have a helium maintenance leakage rate test performed to confirm a leaktight containment closure. Install the Alternate B port cover and perform the maintenance leakage rate test per the requirements of Section 8.1.3.3.2.
  34. Decontaminate the cask surfaces. Survey the cask for surface contamination and radiation dose rates.

Note: Ensure compliance with 10 CFR 71.87(i) and 10 CFR 71.47.
  35. Engage the cask lifting yoke to the lifting trunnions.
  36. Lift the cask and position the cask rotation sockets in the rear rotation trunnions of the rear support structure. Carefully lower the cask to the horizontal transport orientation resting on the front saddle by moving the crane and/or the trailer as required to maintain cask engagement to the rear supports.

37. Disengage the lifting yoke from the lifting trunnions and remove it from the area. Install the cask tie-down strap. Install the top and bottom impact limiters. Install a TID to an attachment point on the top impact limiter.
38. Install ISO container bracing and lid, or personnel barrier.
39. Complete radiation and contamination surveys of the external surfaces of the package and record the data. Ensure removable contamination and radiation dose rate survey results comply with the limits specified in 10 CFR 71.87(i) and (j).
40. Measure the dose rate in millirems per hour at one meter from the package surface to determine the Transport Index (TI). Indicate the TI on the Radioactive Material labels applied to the package in accordance with 49 CFR 172, Subpart E.
41. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the CoC, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.
42. Apply appropriate placards to the transport vehicle in accordance with 49 CFR 172, Subpart F.
43. Complete the shipping documents and provide the carrier with instructions regarding the requirements for maintaining an exclusive use shipment.

**7.1.7 Procedure for Loading TRIGA Damaged Fuel or Fuel Debris into a TRIGA Sealed Damaged Fuel Can (DFC)**

1. Examine the sealed damaged fuel can (DFC) body and inspect for damage. Verify that the lid sealing surface is clean and free of defects. Visually verify that the drain plug seal is installed and the drain plug is partially threaded into the drain plug adapter to allow for draining.
2. Lower the DFC into the pool and position it for fuel loading.
3. Load the damaged TRIGA fuel cluster rods or fuel debris into the DFC. Verify that no more than the equivalent of 2 design base fuel elements, or 6 fuel cluster rods, as damaged fuel or fuel debris are loaded into the sealed DFC as specified in the CoC. Visually verify that there is no debris in the lid sealing surface and thread areas.
4. Examine the DFC lid and inspect for damage. Visually verify that the sealing surface is clean and free of defects. Lubricate the lid bolts, install the lid seal and verify that the lid valve is in the open position and the valve lock set screw is retracted.
5. Attach the testing hose to the lid test connection and ensure that the fitting is properly seated.
6. Install the lid and torque the lid bolts to  $150 \pm 10$  inch-pound.  
Note: Torque any two diametrically opposed bolts first, then torque the remaining two bolts. Complete the torque sequence by verifying the torque of all four bolts in a clockwise direction.
7. Pressurize the sealed DFC with air or helium to 5-15 psig to remove the water. Continue the purge for at least 5 minutes after bubbles appear from the base of the DFC.
8. Access and torque the DFC drain plug to  $50 \pm 2$  ft-lbs.

9. Evacuate the DFC to a pressure below 10 torr (13 mbar) and continue vacuum pumping for 10 minutes.
10. Stop and isolate the vacuum pump and monitor the DFC vacuum pressure for a minimum of 10 minutes. If the pressure rise is <5 torr (6.7 mbar) in 10 minutes, the DFC is verified as dry of free water. If the pressure rise is >5 torr (6.7 mbar) in 10 minutes or less, the DFC is not considered dry of free water. Repeat vacuum drying and pressure rise testing until the dryness verification results are satisfactory.
11. Backfill the DFC with helium to a pressure of 1 atmosphere (0 psig), +1, -0 psi.
12. Shut and lock the lid diaphragm valve. The DFC is now sealed, dried and backfilled.
13. Disconnect the testing hose from the lid test connection.
14. The sealed DFC is now ready for loading into a TRIGA basket module.

#### **7.1.8 Procedure for Wet Loading of PWR/BWR Fuel Rods or TPBARs into the PWR/BWR Transport Canister**

For the shipment of PWR and BWR fuel rods and nonfuel-bearing components (e.g., PWR guide tubes or BWR water rods), the PWR/BWR transport canister has three configurations: sealed canister, screened canister, and free-flow canister. All three canister configurations may be used to contain either intact or damaged fuel rods, or a combination of both damaged and intact fuel rods. The loaded transport canisters are loaded into the NAC-LWT cask containing a LWT PWR basket assembly with an appropriate bottom weldment spacer. For transport canisters containing any damaged fuel rod contents, a can and an insert spacer are required to be installed and bolted to the underside of the closure lid to limit the axial movement of the canister. The use of the can and insert spacer requires the use of the PWR basket assembly fitted with the Alternate B spacer. Transport canisters containing intact rods may be placed in any of the three types of PWR basket assemblies. For the transport of a mixed loading of PWR or BWR fuel rods with nonfuel-bearing components, a modified 5×5 insert with 21 fuel rod locations and a larger tube position for the larger diameter nonfuel-bearing component (up to a nominal diameter of 1.3 inches) is required to be used with the PWR/BWR transport canister.

For the shipment of TPBARs, only the screened or free flow PWR/BWR Rod Transport Canister containing the 5 × 5 rod insert may be used.

Upon completion of loading the transport canister, the canister and the insert spacer are loaded, either together or individually, into the basket assembly in a manner similar to loading a PWR assembly.

1. If the transport canister is to be shipped in a sealed configuration, verify the five drain plugs are installed and torqued to  $50 \pm 2$  foot-pound. If the transport canister is to be shipped in the free flow configuration, verify the five drain plugs are not installed. If the transport canister is to be shipped in the screened configuration, verify the screened plugs are installed and torqued to  $50 \pm 2$  foot-pound in the bottom of the canister.

2. Lower the transport canister (and insert) into the fuel pool for loading.
3. Load the spent fuel rods into the transport canister in accordance with site-specific procedures. Separate failed fuel rod capsules may be used to contain either intact or damaged fuel rods within the canister. The capsules are intended to limit dispersal of radioactive material to the canister internals. Visually upon completion of loading, verify that there is no debris on the lid sealing surface and threaded areas.
4. Using the appropriate lid (sealed, screened or free-flow), examine and inspect for damage. Visually verify that the sealing surface is clean and free of defects. Lubricate the lid bolts.
5. Install the lid and torque the lid bolts to  $35 \pm 5$  inch-pound.  
Note: Torque any two diametrically opposed bolts first, then torque the remaining six bolts. Complete the torque sequence by verifying the torque of all eight bolts in a clockwise direction.
6. If the transport canister is being shipped in either the screened or free-flow configuration, it is now ready for shipment. To ship PWR and BWR rods and nonfuel-bearing components, the transport canister shall be loaded into the NAC-LWT cask in accordance with Section 7.1.1, Procedures for Wet Loading of LWR Fuel Assemblies and Canistered LWR Fuel Rods. To ship TPBARs, the transport canister shall be loaded in accordance with Section 7.1.9, Procedure for Wet Loading of TPBAR Consolidation Canister or PWR/BWR Rod Transport Canister into the NAC-LWT Cask. If the transport canister is being shipped in the sealed configuration, complete steps 7-14 of this section.
7. Connect vent and drain lines to the respective quick-disconnect fittings on the sealed transport canister lid. The drain hose discharge should be directed to the plant drain system for radiological wastewater or another appropriate collection point.
8. Pressurize and purge the transport canister using helium. (Caution do not exceed 25 psig. while dewatering the transport canister.) Secure the purge once no fluid is observed exiting the discharge for at least 10 minutes.
9. Connect the vent line to a suitable vacuum pump. Maintain connection of drain line to the can, but isolate the line to allow vacuum drying of the sealed failed fuel can.
10. Evacuate the can to a pressure below 10 torr (13 mbar) and continue vacuum pumping for 10 minutes.
11. Stop and isolate the vacuum pump and monitor the cask cavity vacuum pressure for a minimum of 10 minutes. If the pressure rise is less than 5 torr (6.7 mbar), the cavity is verified as dry of free water. If the pressure rise is  $>5$  torr (6.7 mbar), repeat vacuum drying until the dryness verification results are satisfactory.
12. Backfill the transport canister cavity with helium to 1 atmosphere (absolute), +1, -0 psi.
13. Disconnect the vent and drain lines from the transport canister.
14. The sealed transport canister is now ready for shipment and may be loaded into the NAC-LWT cask in accordance with Section 7.1.1.



**7.1.9 Procedure for Wet Loading of TPBAR Consolidation Canister or PWR/BWR Rod Transport Canister into the NAC-LWT Cask**

This section describes the procedures for loading the NAC-LWT with a TPBAR consolidation canister or with a screened or free flow PWR/BWR Rod Transport Canister. The consolidation canister can contain up to 300 TPBARs, two of which may be prefailed. Dunnage (i.e., spacer grids, stainless steel tubes, etc.) may be used in consolidation canisters containing fewer than 300 TPBARs. The total weight and volume of the contents (i.e., dunnage and reduced number of TPBARs) must be less than, or equal to, the weight and volume of the full load of 300 TPBARs.

The PWR/BWR Rod Transport Canister may contain up to 25 TPBARs.

Appropriate radiological controls and procedures addressing tritium shall be utilized by the licensee, including appropriate personnel monitoring for tritium exposure.

NAC-LWT casks to be used to transport the TPBAR consolidation canisters shall be configured as shown on Drawing No. 315-40-128, including Alternate B port covers. NAC-LWT casks to be used to transport a PWR/BWR Rod Transport Canister shall be configured as shown on Drawing No. 315-40-104, Assembly 95, including Alternate B port covers.

1. Perform a receiving survey of the empty cask and inspect for damage. Verify, by cask serial number, that the cask is approved for TPBAR shipment.
2. Position a trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting operations. If an ISO is used, it may be removed from the trailer and secured in the unloading area.
3. Remove the roof from the ISO container and open the front and rear ISO doors. Remove roof cross-members, if installed.

Note: Verify that the package nameplate displays the package identification number, USA/9225/B(M)-96, as required by the CoC for TPBAR contents.

4. Perform a Health Physics survey of the cask and adjacent surfaces of the trailer.

Note: A receiving survey of the cask and transporter must be performed as soon as practical after arrival at the site to assure compliance with 10 CFR 71.87(i) and 10 CFR 71.47, and to assure timely reporting of any reportable noncompliance.

5. Remove the top and bottom impact limiters.
6. Remove the cask tie-down strap.
7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to keep the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.

8. Place the cask in the decontamination pit or other designated area. Disengage the lifting yoke. Clean cask surfaces of road dirt as required for entry into the spent fuel pool.
9. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage.
10. Remove the Alternate B vent and drain valve port covers. Prior to reinstallation of the port covers, replace the metallic O-ring seal with an approved spare and inspect the Viton® O-ring seal for each port cover. If the Viton® O-ring shows any damage, replace it. Ensure that the replacement O-rings are properly installed and seated. Store the port covers to protect the seal surfaces. Visually inspect the valved quick-disconnect nipples and replace them, if necessary.
11. Remove closure lid bolts. Attach the lid lift slings to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to reinstallation of the lid, carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure that the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged. Ensure that the TPBAR spacer is installed on the bottom of the cask lid for consolidation canister transports and not damaged when the lid is set down.
12. Visually inspect the inner cavity for foreign material or damage. Install or verify the presence of the standard drain tube and the TPBAR basket assembly (Drawing No. 315-40-10, Assembly 96 or Assembly 95) for loading of the consolidation canister; or the standard drain tube, TPBAR basket assembly (Drawing No. 315-40-10, Assembly 95), and the PWR Insert (Drawing No. 315-40-105, Assembly 99) for the loading of the PWR/BWR Rod Transport Canister containing TPBARs.  
Note: The PWR inset may be installed during the placement of the loaded PWR/BWR Rod Transport Canister into the NAC-LWT cask.
13. Fill the cask cavity with clean water. Install lift yoke arm guides and remote actuation components on the cask lifting yoke.
14. Engage the cask lifting yoke with the cask lifting trunnions and pick up the cask. Carefully lower the cask to the bottom of the cask loading area while spraying the cask down with clean water.
15. Disengage the lifting yoke from the cask and remove the yoke from the pool.
16. Identify the TPBAR consolidation canister or the PWR/BWR Rod Transport Canister containing TPBARs to be loaded.
17. Pick up the consolidation canister or the PWR/BWR Rod Transport Canister using the required grapple system.
18. Position the container over the cask and then carefully lower it into the cask to avoid damage to the cask sealing surfaces. Orient the consolidation canister bail so that it is aligned with the drain tube location. Confirm that the container is fully seated, then release and raise the grapple to the full up position.
19. Position the cask lifting yoke over the cask closure lid. Attach the slings to the closure lid and cask lifting yoke. Lower the yoke over the cask.

20. Position the closure lid over the cask and slowly lower it into place. For the consolidation canister, ensure the bail is properly aligned to the TPBAR spacer on the bottom of the lid. Use the cask and lid match marks as guides to properly align the lid. Visually confirm that the closure lid is seated.
21. Lower the cask handling yoke to slack the closure lid cables. Engage the lift yoke to the lifting trunnions and begin lifting.  
Note: Visually verify the yoke engagement before lifting the cask.
22. Raise the cask until the lid is slightly above the surface of the pool. At the option of the licensee/user, a number of closure lid bolts (4 to 12) may be installed hand tight.
23. Raise the cask clear of the pool, rinsing the yoke and cask with clean water.
24. Transfer the cask to the decontamination pit or other work area. Remove the yoke and lid lift slings.
25. Install and tighten the 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the closure lid.
26. At the option of the licensee/user, a 25 to 50 gallon clean water flush of the cask cavity may be performed by connecting a valved clean water line to the drain valve and a valved drain line to the vent valve. After the cavity flushing is completed, if performed, disconnect the water supply and drain lines.
27. Connect a gas supply line to the vent valve and the drain line to the drain valve.
28. Open the air, nitrogen or helium gas supply valve and pressurize the cask cavity (<30 psig) to force out the water. Continue to supply pressurized gas to the cask for a minimum of five minutes after the last residual free water discharges from the drain line. Remove the drain and gas supply lines and attach a vacuum drying system (VDS) to the cask vent valve.
29. Evacuate the cask cavity to a vacuum pressure of less than 10 torr (13 mbar) and continue vacuum pumping for a minimum of 15 minutes.
30. At the end of the vacuum pumping period, isolate the cask cavity from the vacuum pump and stop the pump. Monitor the cask cavity pressure for a minimum of ten (10) minutes. If the pressure rise is less than 5 torr (6.7 mbar), the cavity is verified as dry of free water. If the pressure rise >5 torr (6.7 mbar), repeat vacuum drying until the dryness verification results are satisfactory.
31. Backfill the cask cavity with helium to 0 psig (1 atmosphere, absolute), +1, -0 psi. Disconnect the VDS.
32. Perform the helium leakage test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector (He MSLD) in accordance with the requirements of Section 8.1.3.1, Steps 3 through 10.
33. Install and helium leakage test the Alternate B vent and drain port covers to leaktight criteria in accordance with Section 8.1.3.3.2.
34. Decontaminate the cask. Survey the cask for surface contamination and radiation dose rates.  
Note: Ensure compliance with 10 CFR 71.87(i) and 10 CFR 71.47.
35. Remove lift yoke arm guides. Engage the cask lifting yoke to the lifting trunnions.

36. Lift the cask and position the cask rotation sockets in the rear rotation trunnions of the rear support structure. Carefully lower the cask to the horizontal transport orientation resting on the front saddle by moving the crane and/or trailer, as required, to maintain cask engagement to the rear supports.
37. Disengage the cask lifting yoke from the cask lifting trunnions and remove it from the area.
38. Install the cask tie-down strap. Install the top and bottom impact limiters.
39. Install a TID to an attachment point of the top impact limiter.
40. Install roof cross-members, close ISO container doors, and replace ISO container roof.
41. Complete radiation and contamination surveys of the external surfaces of the package and record the data. Ensure removable contamination and radiation dose rate survey results comply with the limits specified in 10 CFR 71.87(i) and (j).
42. Measure the dose rate in millirems per hour at one meter from the package surface to determine the Transport Index (TI). Indicate the TI on the Radioactive Material labels applied to the package in accordance with 49 CFR 172, Subpart E.
43. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the CoC, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.
44. Apply appropriate placards to the transport vehicle in accordance with 49 CFR 172, Subpart F.
45. Complete the shipping documents and provide the carrier with instructions regarding the requirements for maintaining an exclusive use shipment.

#### **7.1.10 Procedure for the Dry Loading of PULSTAR Fuel Into the NAC-LWT Cask**

This section describes the procedures for loading the NAC-LWT cask with intact PULSTAR fuel assemblies, intact PULSTAR fuel rods in fuel rod inserts, and intact or damaged PULSTAR fuel assemblies, fuel rods, fuel debris, and nonfuel components of PULSTAR fuel assemblies in either sealed or screened PULSTAR cans. Up to 28 PULSTAR fuel assemblies, rod inserts, and sealed or screened cans can be loaded in the 28 MTR (four module × seven cells/module) basket assembly. The 28 MTR basket assembly consists of a base module, two intermediate modules, and a top module.

Damaged PULSTAR fuel assemblies, damaged fuel rods, fuel debris, and nonfuel components of fuel assemblies are required to be loaded in either a sealed failed fuel or screened PULSTAR can. Intact PULSTAR fuel rods may be loaded into either one of the cans at the option of the licensee. The PULSTAR cans are limited to being loaded in any cell in either the top or the base module. The top and base basket modules can also contain intact PULSTAR fuel assemblies and fuel rod inserts containing intact PULSTAR fuel rods.

The NAC-LWT cask will be loaded dry, utilizing a transfer cask for loading each of the four basket modules. The basket modules will be preloaded with the PULSTAR fuel contents. The damaged fuel cans will be preloaded, closed, drained and dried, if applicable, prior to loading in either the top or base basket module. The PULSTAR cans shall be loaded and prepared for transport in accordance with the applicable steps of Section 7.1.7.

The NAC-LWT dry PULSTAR fuel loading and preparation for transport procedures are as follows.

1. Perform a receipt inspection of the empty cask and trailer/ISO container, inspecting for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting operations. If an ISO container is used, it may be removed from the trailer and secured in the unloading area.
3. Remove the lid/top of the ISO container and remove any bracing.  
Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.
4. Perform a Health Physics survey of the cask and adjacent surfaces of the trailer.  
Note: A receiving survey of the cask and transporter must be performed as soon as practical after arrival at the site to assure compliance with 10 CFR 71.87(i) and 10 CFR 71.47, and to assure timely reporting of any reportable noncompliance.
5. Remove the top and bottom impact limiters.
6. Remove the cask tie-down strap.
7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to keep the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
8. Place the cask into the dry loading station.
9. Disengage the lift yoke.
10. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage.
11. Remove the vent and drain port covers. Prior to reinstallation of the port covers, carefully inspect the port cover O-ring seals and, if the O-rings show any damage, replace them with approved spares. Ensure that the replacement O-rings are properly installed and seated. Visually inspect the vent and drain quick-disconnect nipples and replace them, if necessary.  
Note: For Alternate B port covers, replace the metallic O-ring with an approved spare prior to reinstallation.

12. Remove closure lid bolts. Attach the lid lift slings to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to reinstallation of the lid, carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure that the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged.
13. Visually inspect the cask cavity for foreign material or damage. Clean as necessary. Install or verify the presence of a correct drain tube assembly including alignment ring.
14. Install the required dry transfer system components to the top of the cask.
15. Position the shielded transfer cask components for basket module loading, as appropriate.
16. Identify the PULSTAR fuel assemblies, fuel rod holders, and fuel cans to be loaded, and verify that the PULSTAR fuel contents comply with the authorized content, heat load and quantity conditions of the CoC. Four basket modules (e.g., one base module, two intermediate modules, and a top module) constitute the 28 MTR basket assembly. Spacers will be used as provided to position the PULSTAR fuel contents, as required.
17. Each module is capable of containing up to seven intact fuel assemblies, fuel rod inserts or a PULSTAR fuel can. Fuel cans are restricted to being loaded into the top and base modules, where the cans may be loaded with intact fuel assemblies or fuel rod holders without loading preference. There are no limitations on loading location for intact fuel assemblies or fuel rod holders in any of the four basket modules. The base module is loaded into the cask first, followed by the two intermediate modules and the top module is loaded last.
18. Load the shielded transfer cask with the loaded base basket module.
19. Place the shielded transfer cask containing the base module unit onto the dry transfer system components positioned on the top of the cask.
20. Lower the fuel basket from the transfer cask into the NAC-LWT cask cavity.
21. Repeat the loading and transfer of loaded basket modules until the approved cask loading plan is completed.
22. Install the closure lid onto the cask using the dry transfer system. Visually verify that the lid is properly seated.
23. Remove the dry transfer cask system components from the top of the cask.
24. Install and torque the 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes using the torquing sequence stamped on the lid.
25. Connect a gas supply line to the vent valve and a drain line to the drain valve.
26. Open the nitrogen or helium gas supply valve and pressurize the cask cavity (< 30 psig) to force any residual water out the drain line. Continue to supply pressurized gas to the cask for a minimum of five minutes after the last residual free water discharges form the drain. Remove the drain and gas supply lines and attach a vacuum drying system (VDS) to the vent.

27. Evacuate the cask cavity to less than or equal to 10 torr (13 mbar) and continue vacuum pumping for a minimum of 15 minutes.
  28. At the end of the vacuum pumping period, isolate the cask cavity from the vacuum pump and stop the vacuum pump, and monitor the cask cavity pressure for a minimum of 10 minutes. If the pressure rise is less than 5 torr (6.7 torr), the cavity is verified dry of free water. If the pressure rise is >5 torr (6.7 mbar), continue vacuum drying until the dryness verification is completed satisfactorily.
  29. Backfill the cask cavity with helium to 0 psig (1 atmosphere, absolute), +1, -0 psi. Disconnect the VDS from the vent valve.
  30. Perform the helium leakage test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector (He MSLD) in accordance with the requirements of Section 8.1.3.1, Steps 3 through 10.
  31. Install the vent and drain alternate port covers and torque the bolts to  $100 \pm 10$  inch-pounds.
  32. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using a He MSLD in accordance with the requirements of Section 8.1.3.2.2.
  33. If the alternate port cover containment seal was inspected and accepted for reuse, perform an air pressure drop leakage test on the affected port cover as follows.
    - a. Install a pressure test fixture to the port cover test port, including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
    - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
    - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.
    - d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.
- Note: Alternate B port covers, if used, require the satisfactory completion of a helium maintenance leakage rate test for each loaded transport. Install the Alternate B port cover and perform the maintenance leakage rate test per the requirements of 8.1.3.3.2.
34. Decontaminate the cask. Survey the cask for surface contamination and radiation dose rates.

Note: Ensure compliance with 10 CFR 71.87(i) and 10 CFR 71.47.
  35. Engage the cask lifting yoke to the lifting trunnions.
  36. Lift the cask and position the cask rotation sockets in the rear rotation trunnions of the rear support structure. Carefully lower the cask to the horizontal transport orientation resting on the front saddle by moving the crane and/or the trailer as required to maintain cask engagement to the rear supports.
  37. Disengage the lifting yoke from the lifting trunnions and remove it from the area.
  38. Install the cask tie-down strap. Install the top and bottom impact limiters.
  39. Install a TID to an attachment point on the top impact limiter.

40. Install ISO container bracing and lid.
41. Complete radiation and contamination surveys of the external surfaces of the package and record the data. Ensure removable contamination and radiation dose rate survey results comply with the limits specified in 10 CFR 71.87(i) and (j).
42. Measure the dose rate in millirems per hour at one meter from the package surface to determine the Transport Index (TI). Indicate the TI on the Radioactive Material labels applied to the package in accordance with 49 CFR 172, Subpart E.
43. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the Certificate of Compliance, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.
44. Apply appropriate placards to the transport vehicle in accordance with 49 CFR 172, Subpart F.
45. Complete the shipping documents and provide the carrier with instructions regarding the requirements for maintaining an exclusive use shipment.

#### **7.1.11 Procedure for Dry Loading of TPBAR Waste Container**

This section describes the procedure for the loading of a TPBAR Waste Container into a NAC-LWT cask in a dry loading facility. Appropriate radiological controls and procedures addressing tritium shall be utilized by the licensee, including appropriate monitoring for tritium exposure.

NAC-LWT casks to be used for the transport of TPBARs shall be configured as shown on Drawing No. 315-40-128, including Alternate B port covers.

1. Perform a receiving survey of the ISO and trailer, and inspect for damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release the brakes and remove the chocks when required to complete the uprighting operations. If necessary, the ISO container may be removed from the trailer and secured in the unloading area.
3. Licensees shall receive and survey the package for radiation and removable contamination (for both gross beta-gamma and tritium) per 10 CFR 20 and 49 CFR 173. Record the survey results. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the licensee shall notify the shipper and ensure the appropriate notifications are completed.
4. Remove the roof from the ISO container and open the front and rear ISO doors. Remove the ISO roof cross members, if installed.
5. Remove the top and bottom impact limiters.
6. Remove the cask tie-down strap. Complete the radiation and contamination surveys of the package as additional surfaces become accessible. Clean the cask surfaces as required for entry into the dry loading facility.
7. Using the cask lifting yoke with lift yoke arm guides removed, engage the lifting trunnions of the front end of the cask. Raise the cask to a vertical position on the rear



- cask supports, moving the crane and/or trailer, as required, to keep the cask engaged in the rear cask supports and the crane cable vertical. When the cask is vertical, block the trailer wheels and lift the cask from the container.
8. Place the cask in a transfer cart or a loading fixture. Disengage the lifting yoke.
  9. Remove the Alternate B vent and drain valve port covers. Replace the metallic seal with an approved spare and inspect the Viton<sup>®</sup> O-ring seal on each cover. If the Viton<sup>®</sup> O-ring shows any damage, replace it. Ensure the replacement O-rings are properly installed and seated. Store the port cover to protect the seal surfaces. Visually inspect the vent and drain valved quick-disconnect nipples and replace, if necessary.
  10. Loosen and remove all closure lid bolts.
  11. Attach the lid removal fixture to the closure lid.
  12. Use a transfer cart or loading fixture and move the cask into the loading position.
  13. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged. Verify that the TPBAR spacer is installed on the bottom of the cask lid and not damaged when the lid is set down.
  14. Install the seal surface protector in the lid cavity, if required.
  15. Load the TPBAR Waste Container into the TPBAR basket positioned in the cask cavity using the required grapple or handling system. Verify the contents of the Waste Container comply with the CoC content conditions.
  16. Remove the cask seal surface protector, if used, and install the cask closure lid.
  17. Use the transfer cart or loading fixture and remove the cask from the loading area.
  18. Inspect, install and tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated on the closure lid.
  19. Connect a vacuum pump to the cask vent valve.
  20. Perform the helium mass spectrometer maintenance leakage rate test on the cask lid to leaktight criteria in accordance with the requirements of Section 8.1.3.1, Steps 3 through 10.
  21. Following successful completion of the helium backfill and helium leak testing of the lid seal, monitor the cavity volume for tritium and record the results.  
Note: Tritium monitoring system shall have a minimum sensitivity of  $5 \times 10^{-3}$  micro curies/cc.
  22. Install Alternate B port covers on the vent and drain openings and torque each port cover bolt to  $285 \pm 15$  in-lbs. Perform a helium leakage rate test on each port cover to leaktight criteria in accordance with Section 8.1.3.2.
  23. Decontaminate the cask. Survey the cask surface for gross beta-gamma and tritium removable contamination levels, and radiation dose rates.  
Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.

24. Using the cask lifting yoke with the guide arms removed, lift and position the cask in the rear cask supports on the ISO/trailer. Engage the trunnion pockets in the bottom end of the cask with the rotation trunnions. Lower the cask to rest on the front tiedown saddle, moving the crane, and/or trailer, as required, to keep the crane cables vertical. Disengage the cask lifting yoke from the cask lifting trunnions and set it aside.
25. Install and attach the cask tiedown strap. Install the cask top and bottom impact limiters.
26. Install a TID to an attachment point on the top impact limiter.
27. Install roof cross members, close ISO container doors, and replace ISO container roof.
28. Complete a Health Physics survey on the external surface of the package and record the results. Complete dose rate measurements at the cask surface, at 1 meter from the cask surface, and at 2 meters from the vertical plane of the side of the transport vehicle. The maximum dose rate at 1 meter from the cask is the transport index (TI). Ensure compliance with 10 CFR 71.87(i) and observe the following criteria.
  - If the dose rate is less than 2 mSv/h (200 mrem/hr) at all accessible points on the external surface of the cask, and the TI is less than 10, the package must meet the requirements of 10 CFR 71.47 (a).
  - If the dose rate is greater than 2 mSv/h (200 mrem/hr), but is less than 10 mSv/h (1000 mrem/hr) at any point on the external surface of the package, or the TI is greater than 10, the package must be shipped as “exclusive use” and meet the requirements of 10 CFR 71.47 (b), (c) and (d). If the dose rate and shipping requirements of 10 CFR 71.47 (b), (1), (2), (3) and (4) cannot be met, the package cannot be shipped.

Note: 10 CFR 71.47 (c) and (d) require the shipper to provide the carrier with written instructions for maintenance of the exclusive use shipment. The instructions must be included with the shipping paper information. The instructions must be sufficient so that, when followed, they cause the carrier to avoid actions that unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public.

  - If the dose rate is  $> 10$  mSv/h (1000 mrem/hr) at any point on the external surface of the cask, the cask exceeds the limits of 10 CFR 71.47 and cannot be shipped.
29. Complete the shipping document, carrier instructions (if required), and apply appropriate placards and labels.

#### **7.1.12 Procedure for Wet Loading PWR MOX Fuel Rods in a Transport Canister Into the NAC-LWT Cask**

PWR MOX fuel rods (or combinations of PWR MOX and UO<sub>2</sub> PWR fuel rods) are required to be loaded into a screened or free flow PWR/BWR Rod Transport Canister prior to loading into the NAC-LWT cask for transport. Although a maximum quantity of 16 MOX fuel rods may be shipped, it is required that the 5 × 5 rod insert be used to position the rods in the transport canister (i.e., the 4 × 4 insert is not authorized for use for the transport of MOX fuel rods).

In order to satisfy the increased potential for release of significant quantities of radioactive materials, and as recommended by NUREG-1617, Supplement 1, the NAC-LWT cask assembly specified for the transport of PWR MOX fuel rods contained in a transport canister provides a leaktight containment boundary.

The screened or free flow transport canister with a 5 × 5 rod insert will be loaded with up to 16 PWR MOX fuel rods (or a combination of up to 16 PWR MOX and UO<sub>2</sub> PWR fuel rods). In addition to the 16 PWR MOX fuel rods, up to 9 zirconium alloy-based burnable poison rods (BPRs) may be loaded into the unused insert openings.

NAC-LWT casks to be used for the transport of MOX fuel rods shall be configured as shown on Drawing No. 315-40-104, Assembly 97.

1. Perform a receiving survey of the empty cask and inspect for damage.
2. Position a trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting operations. If an ISO is used, it may be removed from the trailer and secured in the unloading area.
3. Remove the roof from the ISO container and open the front and rear ISO doors. Remove roof cross-members, if installed.  
Note: Verify that the package nameplate displays the package identification number, USA/9225/B(U)F-96, as required by the CoC for PWR MOX fuel rods.
4. Perform a Health Physics survey of the cask and adjacent surfaces of the trailer.  
Note: A receiving survey of the cask and transporter must be performed as soon as practical after arrival at the site to assure compliance with 10 CFR 71.87(i) and 10 CFR 71.47, and to assure timely reporting of any reportable noncompliance.
5. Remove the top and bottom impact limiters.
6. Remove the cask tie-down strap.
7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to maintain the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
8. Place the cask in the decontamination pit or other designated area. Disengage the lifting yoke. Clean cask surfaces of road dirt, as required, for entry into the spent fuel pool.
9. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage.
10. Remove the vent and drain valve port covers. Prior to reinstallation of the port covers, carefully inspect the valve port cover O-ring seals and, if the O-rings show any

damage, replace them with approved spares. Ensure that the replacement O-rings are properly installed and seated. Visually inspect the valved quick-disconnect nipples and replace them, if necessary.

Note: For Alternate B port covers, replace the metallic O-ring with an approved spare prior to reinstallation.

11. Remove closure lid bolts. Attach the lid lift slings to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to reinstallation of the lid, carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure that the replacement O-ring(s) is properly installed and seated. Inspect the lid bolts and replace any that are damaged. Ensure that the Rod Transport Canister spacer is not damaged when the lid is set down.
12. Visually inspect the inner cavity for foreign material or damage. Install or verify the presence of the drain tube and the PWR basket assembly.
13. Fill the cask cavity with clean water. Install lift yoke arm guides and remote actuation components on the cask lifting yoke.
14. Engage the cask lifting yoke with the cask lifting trunnions and pick up the cask. Carefully lower the cask to the bottom of the cask loading area while spraying the cask down with clean water.
15. Disengage the lifting yoke from the cask and remove the yoke from the pool.
16. Identify the PWR/BWR Rod Transport Canister to be loaded and verify that a  $5 \times 5$  rod insert is located in the canister.
17. Identify the PWR MOX fuel rods (and standard PWR rods and BPRs, as applicable) to be loaded into the PWR/BWR Rod Transport Canister. Verify that the fuel rods and BPRs comply with the content type, form, heat load, minimum cooling time and quantity conditions of the NAC-LWT CoC. Load the screened or free flow PWR/BWR transport canister with up to 16 PWR MOX fuel rods, a combination of MOX and standard PWR rods, and up to 9 BPRs in the open tube locations in the  $5 \times 5$  insert. Perform an independent verification of the fuel rod selection and loading process.
18. Install the transport canister lid and torque the lid bolts to  $35 \pm 5$  inch-pounds.
19. Position the loaded PWR/BWR Rod Transport Canister over the cask and then carefully lower it into the cask to avoid damage to the cask sealing surfaces. Note that the transport canister may be loaded into the cask with the PWR basket insert.
20. Position the cask lifting yoke over the cask closure lid. Attach the slings to the closure lid and cask lifting yoke. Lower the yoke over the cask.
21. Position the closure lid over the cask and verify that the appropriate lid spacer is installed per the approved PWR MOX fuel rod transport arrangement in Drawing 315-40-104, Section 1.4. Lower the closure lid into the lid recess using the lid match marks as guides to align the lid. Visually confirm that the closure lid is flush with the top of the cask and properly seated.
22. Lower the cask handling yoke to slack the closure lid cables. Engage the lift yoke to the lifting trunnions and begin lifting the cask.

Note: Visually verify the yoke engagement before lifting the cask.

23. Raise the cask until the lid is slightly above the surface of the pool. At the option of the licensee/user, a number of closure lid bolts (4 to 12) may be installed hand tight.
24. Raise the cask clear of the pool, rinsing the yoke and cask with clean water and transfer the cask to the decontamination pit or other work area. Remove the yoke and lid lift slings.
25. Install and tighten the 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the closure lid.
26. At the option of the licensee/user, a 25 to 50 gallon clean water flush of the cask cavity may be performed by connecting a valved clean water line to the drain valve and a valved drain line to the vent valve. After the cavity flushing is completed, if performed, disconnect the water supply and drain lines.
27. Connect a nitrogen or helium gas supply line to the vent valve and the drain line to the drain valve.
28. Open the nitrogen or helium gas supply valve and pressurize the cask cavity (<30 psig) to force out the water. Continue to supply pressurized helium to the cask for a minimum of five minutes after the last residual free water discharges from the drain line. Remove the drain and gas supply lines and attach a vacuum drying system (VDS) to the cask vent valve.
29. Evacuate the cask cavity to a vacuum pressure of less than 10 torr (13 mbar) and continue vacuum pumping for a minimum of 15 minutes.
30. At the end of the vacuum pumping period, isolate the cask cavity from the vacuum pump and stop the pump. Monitor the cask cavity pressure for a minimum of 10 minutes. If the pressure rise is less than 5 torr (6.7 mbar), the cavity is verified as dry of free water. If the pressure rise is greater than 5 torr (6.7 mbar), repeat vacuum drying until the dryness verification results are satisfactory.
31. Backfill the cask cavity with helium to 0 psig (1 atmosphere, absolute), +2, -0 psi. Disconnect the VDS.
32. Perform the helium leakage test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector (He MSLD) in accordance with the requirements of Section 8.1.3.1, Steps 6 through 10.
33. Install the vent and drain port covers and torque the bolts to  $100 \pm 10$  inch-pounds.
34. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using a He MSLD in accordance with the requirements of Section 8.1.3.2.2.
35. If the alternate port cover containment seal was inspected and accepted for reuse, perform a gas pressure drop leakage test on the affected port cover as follows.
  - a. Install a pressure test fixture to the port cover test port, including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
  - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
  - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.

- d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.  
Note: Alternate B port covers, if used, require the satisfactory completion of a helium maintenance leakage rate test to confirm a leaktight seal condition for each loaded transport. Install the Alternate B port cover and perform the maintenance leakage rate test per the requirements of Section 8.1.3.3.2.
36. Decontaminate the cask. Survey the cask for surface contamination and radiation dose rates.  
Note: Ensure compliance with 10 CFR 71.87(i) and 10 CFR 71.47.
37. Remove lift yoke arm guides. Engage the cask lifting yoke to the lifting trunnions.
38. Lift the cask and position the cask rotation sockets in the rear rotation trunnions of the rear support structure. Carefully lower the cask to the horizontal transport orientation resting on the front saddle by moving the crane and/or trailer, as required, to maintain cask engagement to the rear supports.
39. Disengage the cask lifting yoke from the cask lifting trunnions and remove it from the area.
40. Install the cask tie-down strap. Install the top and bottom impact limiters.
41. Install a TID to an attachment point on the top impact limiter.
42. Install roof cross-members, close ISO container doors, and replace ISO container roof.
43. Complete radiation and contamination surveys of the external surfaces of the package and record the data. Ensure removable contamination and radiation dose rate survey results comply with the limits specified in 10 CFR 71.87(i) and (j).
44. Measure the dose rate in millirems per hour at one meter from the package surface to determine the Transport Index (TI). Indicate the TI on the Radioactive Material labels applied to the package in accordance with 49 CFR 172, Subpart E.
45. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the CoC, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.
46. Apply appropriate placards to the transport vehicle in accordance with 49 CFR 172, Subpart F.
47. Complete the shipping documents and provide the carrier with instructions regarding the requirements for maintaining an exclusive use shipment.

**7.1.13 Procedures for Dry Loading of MTR-28 Basket Modules Containing SLOWPOKE Fuel Canisters into the NAC-LWT Cask**

This section presents the steps for dry loading, using a transfer cask, of the MTR-28 basket modules containing SLOWPOKE Fuel Canisters into the NAC-LWT cask. For transport, two MTR-28 basket modules, consisting of a top module and upper intermediate module, and two empty MTR-28 modules (lower intermediate and bottom modules) must be loaded into the NAC-LWT cask. Only the top and upper intermediate MTR-28 basket modules can each contain up to a maximum of four (4) SLOWPOKE Fuel Canisters. The three central fuel cells of these

two modules are blocked with cell block spacers. Therefore, the maximum payload for a single NAC-LWT cask is a maximum of eight SLOWPOKE Fuel Canisters. The two empty lower MTR-28 basket modules are used to ensure proper axial positioning of the complete basket assembly in the NAC-LWT cavity.

For the transport of SLOWPOKE Fuel Canisters, the NAC-LWT package shall be assembled for transport and identified as specified on NAC License Drawing 315-40-158.

The maximum decay heat load of a single SLOWPOKE Fuel Canister is 0.625 Watts and the maximum package decay heat load is 5 Watts.

The procedure for loading the NAC-LWT package with AECL SLOWPOKE Fuel Rods in a dry configuration is as follows:

1. Perform a receiving survey of the ISO and trailer, and inspect for damage. The cask user shall verify by reference to the NAC provided Certificate of Conformance(s) that the identified NAC-LWT cask and associated lift yoke are within the allowable annual maintenance period specified on the certificate(s) prior to loading and release for transport.
2. Position the trailer in the designated cask unloading area. Level the trailer. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release the brakes, and remove the chocks when required to complete the uprighting operations. Prior to cask removal, the ISO container may be removed from the trailer and secured in the unloading area, if required.
3. Licensees shall receive and survey the NAC-LWT cask for radiation and removable contamination (for both gross beta-gamma and alpha) per 10 CFR 20 and 49 CFR 173. Open the ISO container front and/or rear doors and record the survey results. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the user/licensee shall notify the shipper, NAC, and ensure the appropriate notifications are completed.
4. Undo tiedowns and remove the roof from the ISO container. Remove the ISO roof cross members, if installed.
5. Remove the top and bottom impact limiters; collect any TIDs that may be present.
6. Remove the cask tie-down strap. Complete the radiation and contamination surveys of the cask as additional surfaces become accessible. Clean the cask surfaces, as required.
7. Remove the Alt. vent valve port cover. Store the Alt port cover to protect the seal surfaces. Visually inspect the vent valve quick-disconnect nipple and replace if necessary. Prior to installation, inspect the Viton<sup>®</sup> O-ring seal on the Alt. port cover, and if the O-ring shows any damage, replace it.
8. Install the cask lifting yoke to a crane of sufficient capacity in accordance with the user facilities' heavy lifting program and engage the two lifting trunnions at the front end of the cask. Raise and rotate the cask to a vertical position on the rear cask

- supports, moving the crane and/or trailer, as required, to maintain the cask engaged in the rear cask supports. When the cask is vertical, lift the cask from the ISO container.
9. Move and place the cask on a base plate, if required. Connect the base plate to the cask's attachment points using chains and take up slack with the tensioners. Disengage the lifting yoke.
  10. Loosen and remove all closure lid bolts. Prior to installation, inspect the lid bolts and replace any that are damaged.
  11. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to installation, carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring from the groove and discard. Clean and visually inspect the groove and lid recess seating surfaces for cleanliness, damage, or degradation. If the groove and lid recess seating surfaces are acceptable, install a new metallic O-ring with an approved spare. Ensure the replacement O-rings are properly installed and seated.
  12. Visually inspect the inner cavity for foreign material, free water, or damage. Note deficiencies and correct as required. Remove any shipping dunnage as necessary. Clean all accessible surfaces to include lid sealing surface. Install, or verify the presence of the drain tube and drain alignment ring.
  13. Install the LWT internal shield ring.
  14. Lift and install the Dry Transfer System (DTS) transfer cask adapter onto the cask. Attach the four retention clamps around the LWT lift trunnions.
  15. Verify the proper installation, or install, the empty bottom and lower intermediate MTR-28 basket modules.
  16. Identify the top and upper intermediate MTR-28 basket modules to be loaded with SLOWPOKE Fuel Canisters. The mandatory basket module loading sequence is as follows: load or verify installed empty bottom and lower intermediate MTR-28 basket modules; load upper intermediate basket module containing up to four (4) SLOWPOKE Fuel Canisters; and, finally, load the top basket module containing up to four (4) SLOWPOKE Fuel Canisters. The top and upper intermediate MTR-28 basket modules shall each have three (3) cell block spacers installed in the three central fuel cells to prevent inadvertent fuel canister loading. All transports shall consist of all four MTR-28 basket modules assembled in accordance with the mandatory loading sequence.
  17. For the initial SLOWPOKE Fuel Canister basket module loading, place the upper intermediate basket module in the Intermediate Transfer System (ITS) inner shield.
  18. Move the ITS inner shield into position in the hot cell for the transfer of the loaded SLOWPOKE Fuel Canisters (loaded in accordance with the procedures of Section 7.1.14).
  19. Lift the SLOWPOKE Fuel Canister using the handle and lower the Fuel Canister into one of the open (unblocked) fuel cells of the MTR-28 basket module in the ITS inner shield. Disengage the Fuel Canister handling tool. Repeat as required to load up to four (4) SLOWPOKE Fuel Canisters into the basket module.
  20. Install the inner shield lid.



21. Move the ITS inner shield assembly containing the loaded MTR-28 basket module to the pre-staged transfer system location.
22. Lift the inner shield assembly containing the loaded MTR-28 basket module and place it through the ITS shield assembly adapter and into the outer shield of the ITS.
23. Disengage the inner shield lid. Lift and remove the inner shield lid through the shield assembly adapter and close the shield assembly adapter gate.
24. Place the DTS transfer cask onto the ITS shield assembly adapter.
25. Open the DTS transfer cask gate.
26. Open the ITS shield assembly adapter gate.
27. Lower the transfer cask grapple into the ITS and engage the MTR-28 basket module.
28. Retract grapple and loaded MTR-28 basket module into the transfer cask.
29. Close the DTS transfer cask shield gate.
30. Lift the DTS transfer cask and place it on the cask adapter assembly positioned on top of the NAC-LWT cask.
31. Open the cask adapter shield gate.
32. Open the DTS transfer shield cask gate and lower the loaded MTR-28 basket module into the NAC-LWT cask cavity.
33. Disengage grapple and retract back into the transfer cask.  
Note: Grapple release can be verified by checking cable for tension.
34. Verify grapple is fully retracted.  
Note: Indication will be physical indicator attached to cable.
35. Close cask adapter shield gate.
36. Repeat steps 17-35 for the top MTR-28 basket module.
37. Perform an independent verification that the loaded AECL fuel rod contents loaded are in full compliance with the NAC-LWT CoC content conditions.
38. Install shield plug and remove shield ring/plug assembly through the cask adapter.
39. Carefully lower the closure lid into position through the cask adapter and visually verify that it is properly seated.
40. Inspect and install lid bolts hand tight.
41. Remove four retention clamps from the cask trunnions and carefully remove transfer cask adapter and position for subsequent decontamination.
42. Tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated on the closure lid.  
Note: If water was introduced to cask cavity during dry loading operations (due to weather conditions, i.e. snow rain, etc), the NAC LWT cask may be “blown-down” using compressed air or gas in the vertical orientation.  
Note: At the option of the user, the NAC-LWT cask can be placed in a horizontal position in the ISO at this point in the procedure in accordance with Step 49.
43. Connect a vacuum pump to the cask vent valve and evacuate the cask cavity to less than or equal to 10 torr (13 mbar) and continue vacuum pumping for a minimum of 15 minutes.

44. At the end of the vacuum pumping period, isolate the cask cavity from the vacuum pump and stop the vacuum pump. Monitor the cask cavity pressure for a minimum of 10 minutes. If the pressure rise is less than 5 torr (6.7 mbar), the cavity is verified as dry of free water. If the pressure rise is greater than 5 torr (6.7 mbar), repeat the vacuum drying until the dryness verification results are satisfactory.
45. Backfill the cask cavity with helium to 0 psig (1 atmosphere, absolute), +1, -0 psi and disconnect the VDS from the vent valve.
46. Perform a helium leakage rate test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector in accordance with the procedural requirements of Section 8.1.3.1, Steps 3 through 10.
47. Install Alt. port cover in the vent port and torque each port cover bolt to 100, +10,-0 in-lbs.
48. Survey the cask surface for gross beta-gamma and tritium removable contamination levels, and radiation dose rates. Decontaminate the cask, if required.  
Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.
49. Using the cask lifting yoke, lift, and position the cask in the rear cask supports on the ISO/trailer. Engage the trunnion pockets in the bottom end of the cask with the rotation trunnions. Lower the cask to rest on the front tie-down saddle, moving the crane, and/or trailer, as required. Disengage the cask lifting yoke from the cask lifting trunnions and set it aside.
50. Install and attach the cask tie-down strap. Install the cask top and bottom impact limiters.
51. Install a tamper-indicating seal to one of the top impact limiter ball lock pins.
52. Install roof cross-members, if used; replace ISO container roof and close ISO container doors.
53. Complete a Health Physics survey on the external surface of the package and record the results. Complete dose rate measurements at the cask surface, at 1 meter from the cask surface, and at 2 meters from the vertical plane of the side of the transport vehicle. The maximum dose rate at 1 meter from the cask is the transport index (TI). Ensure compliance with 10 CFR 71.87(i) and observe the following criteria.
  - If the dose rate is less than 2 mSv/h (200 mrem/hr) at all accessible points on the external surface of the cask, and the TI is less than 10, the package meets the requirements of 10 CFR 71.47 (a).
  - If the dose rate is greater than 2 mSv/h (200 mrem/hr), but is less than 10 mSv/h (1000 mrem/hr) at any point on the external surface of the package, or the TI is greater than 10, the package must be shipped as “exclusive use” and meet the requirements of 10 CFR 71.47 (b), (c) and (d). If the dose rate and shipping requirements of 10 CFR 71.47 (b), (1), (2), (3) and (4) cannot be met, the package cannot be shipped.

Note: 10 CFR 71.47 (c) and (d) require the shipper to provide the carrier with written instructions for maintenance of the exclusive use shipment. The instructions must be included with the shipping paper information. The instructions must be sufficient so that, when followed, they cause the carrier to avoid actions that unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public.

- If the dose rate is  $> 10$  mSv/h (1000 mrem/hr) at any point on the external surface of the cask, the cask exceeds the limits of 10 CFR 71.47 and cannot be shipped.
54. Complete the shipping document, carrier instructions (if required), and apply appropriate placards and labels.

#### **7.1.14 Procedure for the Dry Loading of NRU/NRX Fuel Into the NAC-LWT Cask**

This section describes the procedures for loading the NAC-LWT cask with NRU or NRX fuel assemblies/rods. Up to a maximum of 18 NRU or NRX fuel assemblies or the equivalent number of loose fuel rods may be loaded into an NRU/NRX basket assembly (one basket  $\times$  18 cells/basket). The NRU/NRX basket assembly consists of a NRU/NRX basket with 18 fuel cell openings and a bolted lid, and a bottom basket spacer to position the basket at the top of the cask cavity.

All NRX fuel assemblies/rods are required to be placed into a fuel assembly/rod caddy assembly within each basket cell. Loose NRU fuel rods may also be placed into fuel caddy assemblies for handling.

NRU and NRX fuel types shall not be loaded in the same basket (e.g., only a single fuel type is to be loaded into a NAC-LWT packaging).

The maximum decay heat load of a loaded NRU/NRX basket shall be  $\leq 640$  Watts.

The maximum content weight (fuel rods and fuel caddy assembly) per basket cell shall be  $\leq 20$  lbs.

The NAC-LWT cask will be loaded dry, utilizing a transfer cask to place each loaded NRU/NRX basket into the NAC-LWT cask cavity. The bottom basket spacer will be preloaded into the cask cavity prior to loading a NRU/NRX fuel basket.

The procedure for dry-loading and preparation for transport of the NAC-LWT with NRU/NRX fuel is as follows:

1. Perform a receiving survey of the ISO and trailer, and inspect for damage. The cask user shall verify by reference to the NAC provided Certificate(s) of Conformance that the identified NAC-LWT cask and associated lift yoke are within the allowable annual

maintenance period specified on the certificate(s) prior to loading and release for transport.

2. Position the trailer in the designated cask unloading area. Level the trailer. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release the brakes, and remove the chocks when required to complete the uprighting operations. Prior to cask removal, the ISO container may be removed from the trailer and secured in the unloading area, if required.  

Note: Lifting loaded containers from the top corner fitting with forces applied other than vertically is not permitted; use of an approved container lifting spreader, frame or bottom lift container slings is required.
3. Licensees shall receive and survey the NAC-LWT cask for radiation and removable contamination (for both gross beta-gamma and alpha) per 10 CFR 20 and 49 CFR 173. Open the ISO container front and/or rear doors and record the survey results. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the user/licensee shall notify the shipper, NAC, and ensure the appropriate notifications are completed.  

Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.
4. Remove the roof from the ISO container and cross members, if installed.
5. Remove the top and bottom impact limiters, and remove any TIDs that may be present.
6. Remove the cask tie-down strap. Complete the radiation and contamination surveys of the cask as additional surfaces become accessible. Clean the cask surfaces, as required.
7. Remove the alternate vent and drain port covers. Store the alternate port covers to protect the seal surfaces. Visually inspect the vent valve quick-disconnect nipples and replace if necessary. Prior to installation, inspect the Viton® O-ring seals on the alternate port covers, and if any O-ring shows any damage, replace it.
8. Install the cask lifting yoke with the guides removed to a crane of sufficient capacity in accordance with the user facilities' heavy lifting program and engage the two lifting trunnions at the front end of the cask. Raise and rotate the cask to a vertical position on the rear cask supports, moving the crane and/or trailer, as required, to maintain the cask engaged in the rear cask supports. When the cask is vertical, lift the cask from the ISO container.
9. Move and place the cask on a base plate, if required, at the intended loading station. Connect the base plate to the cask's attachment points using chains and take up slack with the tensioners. Disengage the lifting yoke.
10. Visually inspect the neutron shield tank fill, drain, and level inspection plugs for signs of neutron shield fluid leakage. If leakage is detected or suspected, verify shield tank fluid level and correct, as required.
11. Loosen and remove all closure lid bolts. Prior to installation, inspect the lid bolts and replace any that are damaged.

12. Attach lid lifting slings, or equivalent lid removal fixture, to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to installation, carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring from the groove and discard. Clean and visually inspect the groove and lid recess seating surfaces for cleanliness, damage, or degradation. If the groove and lid recess seating surfaces are acceptable, install a new metallic O-ring with an approved spare. Ensure the replacement O-rings are properly installed and seated.
13. Visually inspect the inner cavity for foreign material, free water, or damage. Note deficiencies and correct as required. Remove any shipping dunnage as necessary. Clean all accessible surfaces, including the lid sealing surface. Install, or verify the presence of the drain tube and drain alignment ring.
14. Verify the proper installation of, or install, the NRU/NRX bottom basket spacer.
15. Install the required dry transfer system components on the top of the cask.
16. Position the Dry Transfer System (DTS) components for fuel loading, as appropriate.
17. Identify the NRU or NRX fuel assemblies/rods to be loaded, and verify that they comply with the authorized content, heat load and quantity conditions of the CoC.
18. Load the basket module with up to 18 fuel assemblies or the equivalent number or fuel rods of either NRU or NRX fuel (NRU and NRX fuel types shall not be loaded in the same basket). All NRX fuel assemblies/rods are required to be placed into fuel rod caddy assemblies within each basket cell, while loose NRU fuel rods may also be placed into caddies for handling.
19. Perform an independent verification of the fuel selection and loading process.
20. Install the NRU/NRX basket lid assembly and torque bolts to 20 +/- 2 ft-lbs.
21. Load the shielded transfer cask with the loaded basket.
22. Place the transfer cask containing the basket onto the dry transfer system components positioned on the top of the cask.
23. Lower the loaded NRU/NRX fuel basket from the transfer cask into the NAC-LWT cask cavity.
24. Remove the transfer cask from the dry transfer system adapter.
25. Using the dry transfer system adapter components, install temporary shield plug. Remove shield ring/plug assembly through the dry transfer system adapter.
26. Install the closure lid onto the cask using the dry transfer system. Visually verify that the lid is properly seated.
27. Install lid bolts hand tight.
28. Remove dry transfer system components from the top of the cask.
29. Tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated on the closure lid.
30. Connect a gas supply line to the vent valve and the drain line to the drain valve.

31. Open the air, nitrogen, or helium gas supply valve and pressurize the cask cavity (< 30 psig) to force any residual water out the drain line. Continue to supply pressurized gas to the cask for a minimum of five minutes after the last residual free water discharges from the drain. Remove the drain and gas supply lines and attach a vacuum drying system (VDS) to the vent.  
Note: At the option of the user, the NAC-LWT cask can be placed in a horizontal position in the ISO at this point in the procedure in accordance with Step 40.
32. Connect the Vacuum Drying System (VDS) to the cask vent valve and evacuate the cask cavity by vacuum pump to less than or equal to 10 torr (13 mbar) and continue vacuum pumping for a minimum of 15 minutes.
33. At the end of the evacuation period, isolate the cask cavity from the vacuum pump and monitor the cask cavity pressure for a minimum of 10 minutes. If the pressure rise is less than 5 torr (6.7 mbar), the cavity is verified as dry of free water. If the pressure rise is greater than 5 torr (6.7 mbar), resume vacuum drying until the dryness verification results are satisfactory.
34. Backfill the cask cavity with helium to 0 psig (1 atmosphere, absolute), +1, -0 psi and disconnect the VDS from the vent valve.
35. Perform a helium leakage test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector (MSLD) in accordance with the requirements of SAR Section 8.1.3.1.
36. Install the vent and drain alternate port covers and torque the bolts to 100 ±10 inch-pounds.
37. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using a He MSLD in accordance with the requirements of SAR Section 8.1.3.2.2.
38. If the alternate port cover containment seal was inspected and accepted for reuse, perform an air pressure drop leakage test on the affected port cover as follows.
  - a. Install a pressure test fixture to the port cover test port, including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
  - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
  - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.
  - d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.
39. Survey the cask surface for removable contamination and radiation dose rates. Decontaminate the cask, if required.  
Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.

40. Using the cask lifting yoke with guides removed, lift and position the cask in the rear cask supports on the ISO/trailer. Engage the trunnion pockets in the bottom end of the cask with the rotation trunnions. Lower the cask to rest on the front tie-down saddle, moving the crane, and/or trailer, as required.
41. Disengage the cask lifting yoke from the cask lifting trunnions and set it aside.
42. Install and attach the cask tie-down strap. Install the cask top and bottom impact limiters.
43. Install a TID to one of the top impact limiter ball lock pins. Record TID identification number on the loading/shipping documentation.
44. Install roof cross-members, if used and replace ISO container roof.
45. Complete a Health Physics survey on the external surfaces of the package and record the results. Complete dose rate measurements at the package surface, at 1 meter from the package surface, and at 2 meters from the vertical plane of the side of the transport vehicle. The maximum dose rate at 1 meter from the package is the transport index (TI). Ensure compliance with 10 CFR 71.87(i) and observe the following criteria.
  - a. If the dose rate is less than 2 mSv/h (200 mrem/hr) at all accessible points on the external surface of the package, and the TI is less than 10, the package meets the requirements of 10 CFR 71.47 (a).
  - b. If the dose rate is greater than 2 mSv/h (200 mrem/hr), but is less than 10 mSv/h (1000 mrem/hr) at any point on the external surface of the package, or the TI is greater than 10, the package must be shipped as "exclusive use" and meet the requirements of 10 CFR 71.47 (b), (c) and (d). If the dose rate and shipping requirements of 10 CFR 71.47 (b), (1), (2), (3) and (4) cannot be met, the package cannot be shipped.
  - c. If the dose rate is > 10 mSv/h (1000 mrem/hr) at any point on the external surface of the package, the package exceeds the limits of 10 CFR 71.47 and cannot be shipped.
46. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the CoC, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.
47. Complete the shipping documents, carrier instructions (as required), and apply appropriate placards and labels.

#### **7.1.15 Procedure for Loading AECL SLOWPOKE Fuel Rod Contents Into the SLOWPOKE Fuel Canister**

The following general procedures provide guidance for the loading of AECL SLOWPOKE fuel rod contents into individual fuel can inserts, which are then subsequently placed into a SLOWPOKE Fuel Canister. The Fuel Canister is subsequently loaded into a MTR-28 upper intermediate or top basket module for dry transferred into the NAC-LWT cask using the Dry Transfer System (DTS).

The SLOWPOKE Fuel Canister includes a welded fuel canister body into which four (4) 5 x 5 inserts (assembled of 0.40 inch nominal internal diameter insert tubes for intact SLOWPOKE

Fuel Rods) and/or four (4) 4 x 4 inserts (assembled of 0.53 inch nominal internal diameter insert tubes for damaged SLOWPOKE Fuel Rods) are stacked to allow for the placement of up to 100 fuel rods in each SLOWPOKE Fuel Canister. The Fuel Canister is closed by a lockable, spring-loaded lid assembly, which incorporates a lid handle for loaded Fuel Canister handling. The lid assembly incorporates two lid latch bolts with lock washers and torque to  $30 \pm 5$  in-lbs, which prevent inadvertent lid removal during shipment and handling. The SLOWPOKE Fuel Canister is provided with an aluminum bottom screened opening and two upper side aluminum screened openings to allow for the self-draining of the Fuel Canister if stored in water at the receiving facility prior to final processing. Each of the insert tubes is notched at the base of the tube to facilitate draining of each insert tube through the bottom screened opening. The screened openings and tight fitting lid retains fuel debris and minimizes the potential for release of fuel debris from the SLOWPOKE Fuel Canister to the NAC-LWT internal cavity.

The SLOWPOKE Fuel Canisters are visually inspected, load tested, and the welds examined following fabrication prior to acceptance for use. The AECL SLOWPOKE fuel rod contents shall be verified as meeting the quantity, decay heat and fissile content limits of the NRC Certificate of Compliance (CoC) prior to loading. The radioactive materials to be loaded in each SLOWPOKE Fuel Canister shall be identified and recorded as part of the packaging manifest for the cask shipment. Independent confirmation of the identification and location of the radioactive materials shall be made during the loading operations.

The procedure for loading AECL SLOWPOKE fuel rod contents into the Fuel Canister is as follows:

1. Verify the specific AECL SLOWPOKE Fuel Rod contents to be loaded into the 5 x 5 or 4 x 4 canister insert meet the content condition limits of the CoC for quantity, maximum mass, maximum decay heat, maximum fissile content and waste form. Damaged fuel rods shall be placed in 4 x 4 rod insert assemblies, as required.
2. Verify the SLOWPOKE Fuel Canister and insert assemblies comply with the requirements of NAC Drawing 315-40-156.
3. Visually inspect the Fuel Canister, Lid and rod insert assemblies and verify the components condition do not show signs of damage—e.g., bulging or buckling, breaching, and does not have rips, tears, holes or pointed dents that could affect packaging or transport operations. Record the SLOWPOKE Fuel Canister serial number and the results of the visual inspection on the Cask Loading Report.
4. Position the appropriate 5 x 5 or 4 x 4 insert assembly in the hot cell.
5. Individually load the AECL SLOWPOKE fuel rods into the designated insert assembly.
6. After completion of loading the designated fuel rods, lift and place the loaded fuel rod insert into the SLOWPOKE Fuel Canister.
7. Repeat Steps 5 through 7 until a total of four (4) fuel rod insert assemblies are loaded and positioned in the SLOWPOKE Fuel Canister.



8. With the spring plunger in the unlocked position, insert the self-locking lid assembly into the top of the Fuel Canister. Torque the two lid latch bolts and lock washers to  $30 \pm 5$  inch-pounds.
9. Lift the filled SLOWPOKE Fuel Canister and place it into the MTR-28 upper intermediate or top basket module per the procedures in 7.1.13.

#### **7.1.16 Procedure for the Dry Loading of HEUNL Contents into the NAC-LWT Cask**

This section describes the procedural steps required to load and prepare the NAC-LWT cask for transport with HEUNL contents. Four HEUNL containers are to be loaded into a NAC-LWT, configured as shown on Drawing No. 315-40-180, using empty HEUNL containers as spacers if four (4) filled HEUNL containers are not loaded into the cask.

Depending on facility capabilities and/or site restrictions, the HEUNL containers shall be filled and prepared for transport in accordance with the operating procedures in Section 7.1.17. The filled and tested HEUNL containers will then be loaded in the NAC-LWT cask in either a vertical or horizontal orientation utilizing a facility-specific Dry Transfer and Loading System. The operating procedures in this section are based on the vertical and horizontal loading of the HEUNL containers into the NAC-LWT cask cavity.

##### **7.1.16.1 Vertical Dry Loading of HEUNL Containers into the NAC-LWT**

1. Perform a receiving survey of the cask ISO container and inspect for damage.
2. Open the front and rear ISO doors and perform a Health Physics survey of the cask and adjacent surfaces of the trailer for radiation and removable contamination per 10 CFR 20 and 49 CFR 173. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the user/licensee shall notify the shipper, NAC, and ensure the appropriate notifications are completed.  
Note: Verify that the package nameplate displays the package identification number, in accordance with the CoC.
3. Remove the roof from the ISO container. Remove roof cross-members, if installed.
4. Remove the top impact limiter and tamper indicating device (TID), if installed.
5. Remove the bottom impact limiter.
6. Remove the cask tie-down strap.
7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to maintain the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
8. Place the cask in a cask baseplate or other designated loading area. Disengage the lifting yoke. Clean cask surfaces of road dirt, as required.

9. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage. If leakage is detected, verify shield tank fluid level and correct, as required.
10. Remove the vent and drain valve port covers. Prior to reinstallation of the port covers, carefully inspect the valve port cover O-ring seals. If the O-rings show any damage, replace them with approved spares. Ensure that the replacement O-rings are properly installed and seated. Visually inspect the valved quick-disconnect nipples and replace them, if necessary.
11. Loosen and remove all closure lid bolts.
12. Attach the lid removal rigging to the closure lid.
13. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged.
14. Remove the four empty HEUNL containers and place them into the facility for loading of HEUNL material in accordance with Section 7.1.17, if the received NAC-LWT cask contained empty containers.
15. Verify that the HEUNL Container Spacer is installed properly in the bottom of the cask cavity. If required, install or verify the presence of the HEUNL container guide. Visually inspect the inner cavity for foreign material or damage. Clean all accessible surfaces, including the lid sealing surface.
16. Install the seal surface protector in the lid cavity, if required.
17. Load the first HEUNL container into the cask cavity using the vertical Dry Transfer System and utilizing the HEUNL container guide to align and rotationally orient the HEUNL container within the cask cavity.
18. Record and verify the identification number of the HEUNL container and independently verify the HEUNL contents comply with the CoC content conditions.
19. Repeat the loading and independent verification of the HEUNL containers into the cask cavity until four (4) HEUNL containers are loaded into the cask. If required, an empty HEUNL container shall be loaded to bring the total number of HEUNL containers in the cask cavity to four.
20. Remove the cask seal surface protector, if used, and install the cask closure lid.
21. Inspect, install and tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated on the closure lid.
22. Connect a vacuum pump to the cask vent valve.
23. Perform the helium mass spectrometer maintenance leakage test on the closure lid to leaktight criteria in accordance with the requirements of Section 8.1.3.1, Steps 3 through 10.
24. Install alternate port covers on the vent and drain openings and torque each port cover bolt to  $100 \pm 10$  inch-pounds.

25. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using a He MSLD in accordance with the requirements of Section 8.1.3.2.2.
26. If the alternate port cover containment seal was inspected and accepted for reuse, perform a gas pressure drop leakage test on the port cover as follows.
  - a. Install a pressure test fixture to the port cover test port, including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
  - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
  - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.
  - d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.
27. Decontaminate the cask. Survey the cask for surface contamination and radiation dose rates and decontaminate the cask as required.

Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.
28. Using the cask lifting yoke with the guide arms removed, lift and position the cask in the rear cask supports on the ISO/trailer. Engage the trunnion pockets in the bottom end of the cask with the rotation trunnions. Lower the cask to rest on the front tiedown saddle, moving the crane, and/or trailer, as required, to keep the crane cables vertical. Disengage the cask lifting yoke from the cask lifting trunnions and set it aside.
29. Install and attach the cask tie-down strap. Install the cask top and bottom impact limiters.
30. Install a TID to an attachment point on the top impact limiter.
31. Install roof cross-members; close ISO container doors, and replace ISO container roof.
32. Complete a Health Physics survey on the external surfaces of the package and record the results. Complete dose rate measurements at the package surface, at 1 meter from the package surface, and at 2 meters from the vertical plane of the side of the transport vehicle. The maximum dose rate at 1 meter from the package is the transport index (TI). Ensure compliance with 10 CFR 71.87(i) and observe the following criteria.
  - a. If the dose rate is less than 2 mSv/h (200 mrem/hr) at all accessible points on the external surface of the package, and the TI is less than 10, the package meets the requirements of 10 CFR 71.47 (a).
  - b. If the dose rate is greater than 2 mSv/h (200 mrem/hr), but is less than 10 mSv/h (1000 mrem/hr) at any point on the external surface of the package, or the TI is greater than 10, the package must be shipped as "exclusive use" and meet the requirements of 10 CFR 71.47 (b), (c) and (d). If the dose rate and shipping requirements of 10 CFR 71.47 (b), (1), (2), (3) and (4) cannot be met, the package cannot be shipped.

Note: 10 CFR 71.47 (c) and (d) require the shipper to provide the carrier with written instructions for maintenance of the exclusive use shipment. The instructions must be sufficient so that, when followed, they cause the carrier to avoid actions that unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public.

- c. If the dose rate is  $> 10$  mSv/h (1000 mrem/hr) at any point on the external surface of the cask, the cask exceeds the limits of 10 CFR 71.47 and cannot be shipped.
33. Complete the shipping documents, carrier instructions (if required), and apply appropriate placards and labels.

#### **7.1.16.2 Horizontal Dry Loading of HEUNL Containers into the NAC-LWT**

1. Perform a receiving survey of the cask ISO container and inspect for damage.
2. Open the front and rear ISO doors and perform a Health Physics survey of the cask and adjacent surfaces of the trailer for radiation and removable contamination per 10 CFR 20 and 49 CFR 173. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the user/licensee shall notify the shipper, NAC, and ensure the appropriate notifications are completed.

Note: Verify that the package nameplate displays the package identification number in accordance with the CoC.

3. Remove the roof from the ISO container. Remove roof cross-members, if installed, as required to remove the top impact limiter.
4. Remove the top impact limiter and tamper indicating device (TID), if installed.
5. Attach the horizontal lid removal tool to the closure lid. Remove closure lid bolts. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Prior to reinstallation of the lid, carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Ensure that the replacement O-ring(s) is properly installed and seated. Inspect the lid bolts and replace any that are damaged.
6. Remove the four empty HEUNL containers and place them into the facility for loading of HEUNL material in accordance with Section 7.1.14, if the received NAC-LWT cask contained empty containers.
7. Visually inspect the inner cavity for foreign material or damage. Clean all accessible surfaces, including the lid sealing surface.
8. If required, install or verify the presence of the HEUNL container guide.
9. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage. If leakage is detected, verify shield tank fluid level and correct, as required.
10. Remove the vent and drain valve port covers. Prior to reinstallation of the port covers, carefully inspect the valve port cover O-ring seals. If the O-rings show any damage, replace them with approved spares. Ensure that the replacement O-rings are

- properly installed and seated. Visually inspect the valved quick-disconnect nipples and replace them, if necessary.
11. Install the seal surface protector in the lid cavity, if required.
  12. Install or verify the HEUNL container spacer is secured to the bottom HEUNL container. Load the first HEUNL container into the cask cavity using a horizontal Dry Transfer System.
  13. Record and verify the identification number of the HEUNL container and independently verify the HEUNL contents comply with the CoC content conditions.
  14. Repeat the loading and independent verification of the HEUNL containers into the cask cavity until four (4) HEUNL containers are loaded into the cask. If required, an empty HEUNL container shall be loaded to bring the total number of HEUNL containers in the cask cavity to four.
  15. Remove the cask seal surface protector, if used,
  16. Position the closure lid in the cask using the lid match marks as guides to align the lid. Visually confirm that the closure lid is flush with the top of the cask and properly seated. Install lid bolts hand tight and remove the horizontal tool.
  17. Tighten the 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the closure lid.
  18. Connect a vacuum pump to the cask vent valve.
  19. Perform the helium leakage test of the closure lid containment O-ring using a Helium Mass Spectrometer Leak Detector (He MSLD) in accordance with the requirements of Section 8.1.3.1.
  20. Install the vent and drain port covers and torque the bolts to  $100 \pm 10$  inch-pounds.
  21. If an alternate port cover containment O-ring seal was replaced, perform a helium leakage test on the affected port cover using an MSLD in accordance with the requirements of Section 8.1.3.2.2.
  22. If the alternate port cover containment seal was inspected and accepted for reuse, perform a gas pressure drop leakage test on the port cover as follows.
    - a. Install a pressure test fixture to the port cover test port, including a calibrated pressure gauge with a minimum sensitivity of 0.25 psi.
    - b. Pressurize the port cover seal annulus to 15 psig, +1, -0 psi.
    - c. Isolate the gas supply and observe the pressure gauge for a minimum of five minutes.
    - d. The acceptance criterion for the test is no measurable drop in pressure during the minimum test time. An acceptable test assures that the minimum assembly verification leakage test sensitivity is achieved.
  23. Decontaminate the cask. Survey the cask for surface contamination and radiation dose rates and decontaminate the cask as required.

Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.
  24. Verify the correct installation of the cask tie-down strap. Install the top impact limiter and verify the correct installation of the bottom impact limiter.

25. Install a TID to one of the top impact limiter ball lock pins.
26. Replace roof cross-members if installed, and replace ISO container roof.  
Complete a Health Physics survey on the external surfaces of the package and record the results. Complete dose rate measurements at the package surface, at 1 meter from the package surface, and at 2 meters from the vertical plane of the side of the transport vehicle. The maximum dose rate at 1 meter from the package is the transport index (TI). Ensure compliance with 10 CFR 71.87(i) and observe the following criteria.
  - a. If the dose rate is less than 2 mSv/h (200 mrem/hr) at all accessible points on the external surface of the package, and the TI is less than 10, the package meets the requirements of 10 CFR 71.47 (a).
  - b. If the dose rate is greater than 2 mSv/h (200 mrem/hr), but is less than 10 mSv/h (1000 mrem/hr) at any point on the external surface of the package, or the TI is greater than 10, the package must be shipped as “exclusive use” and meet the requirements of 10 CFR 71.47 (b), (c) and (d). If the dose rate and shipping requirements of 10 CFR 71.47 (b), (1), (2), (3) and (4) cannot be met, the package cannot be shipped.
  - c. If the dose rate is  $> 10$  mSv/h (1000 mrem/hr) at any point on the external surface of the package, the package exceeds the limits of 10 CFR 71.47 and cannot be shipped.
27. Determine the appropriate Criticality Safety Index (CSI) assigned to the package contents in accordance with the CoC, and indicate the correct CSI on the Fissile Material label applied to the package per 49 CFR 172, Subpart E.
28. Complete the shipping documents, carrier instructions (as required), and apply appropriate placards and labels.

#### **7.1.17 Procedures for the Vertical Filling of HEUNL Contents into HEUNL Containers**

This section describes the procedural steps required to load and prepare a HEUNL Container for transport in a NAC-LWT cask. Four HEUNL containers, as shown on Drawing 315-40-181 are to be loaded into a NAC-LWT, using empty HEUNL containers as spacers if four (4) filled HEUNL containers are not loaded into the cask. The total fill time and lifetime for utilization of a HEUNL container is limited by the CoC to 15 months. The total fill time is determined by recording the date of filling of the HEUNL container with material, recording the date that the HEUNL material is emptied/flushed from the container and tracking the cumulative time the HEUNL container is filled. This allowable fill duration is identified as “HEUNL Container Content Fill Time” and is controlled utilizing a HEUNL Container Fill Log for each individual HEUNL container maintained for its identification number. Each HEUNL Container Fill Log shall record the actual “HEUNL Container Content Fill Time” for each loaded transport based on date and time of filling and emptying of HEUNL material from the HEUNL container, replacement of any removable components, and the results of all loading and unloading

inspections and tests. In addition, each NAC-LWT transport is controlled to limit the total transport duration from time of cask loading to  $\leq 3$  months. Verification will be performed prior to filling to ensure that the filled HEUNL container does not violate the HEUNL container total fill time if the maximum transport duration is applied (e.g., no HEUNL container shall be filled if the total "HEUNL Container Content Fill Time" is  $> 12$  months).

#### **7.1.17.1 Preparation of HEUNL Container Prior to Filling**

The HEUNL container must be filled with HEUNL material with the container positioned in a vertical orientation, disconnect valves up. The following steps and procedures shall be performed on each empty HEUNL container prior to filling:

1. Record the HEUNL container identification number in the HEUNL Container Fill Log.
2. Confirm that a minimum of 3 months of HEUNL Container Content Fill Time remains for the container.
3. Remove the HEUNL container lid bolts and remove the lid.
4. Visually inspect the installed Viton inner and outer O-rings and lid bolts for damage. If damage to the inner O-ring is identified the container shall be taken out of service until the inner O-ring seal can be replaced and the helium pressure boundary verification test of the replaced seal is performed in accordance with Section 8.1.4.4.C.3. (Note that the non-pressure boundary outer O-ring seal and lid screws can be replaced without the need to re-perform the containment maintenance leakage test.) The component replacement and testing shall be recorded in the HEUNL Container Fill Log.
5. Store the HEUNL container lid and bolts for later installation following HEUNL material filling.
6. Verify the fill/drain & vent (Type I container) or vent/drain & fill (Type II container) quick disconnect valves are operational and undamaged, including verification of sealing at container interface to quick disconnect nipple and nipple poppet. The verification of the quick disconnect sealing will be performed by a vacuum pressure rise test utilizing the fill system interface device and will confirm no detected leakage past the nipple to container interface or nipple poppet valve when tested to a sensitivity of at least  $1 \times 10^{-3}$  ref-cm<sup>3</sup>/sec. If damage to the drain/fill & vent or vent/drain & fill quick disconnect valves is identified, the valves and seals will be replaced. The quick disconnect valve visual leakage testing inspection results, and component replacements, shall be recorded in the HEUNL Container Fill Log.
7. Visually inspect the externals of the empty HEUNL container for transport and corrosion damage, and record any identified issues for further evaluation prior to filling (for previously filled HEUNL containers only).

8. Empty HEUNL containers that are confirmed as acceptable may be released for filling.
9. Lift and place the empty HEUNL container into the appropriate vertical filling system.

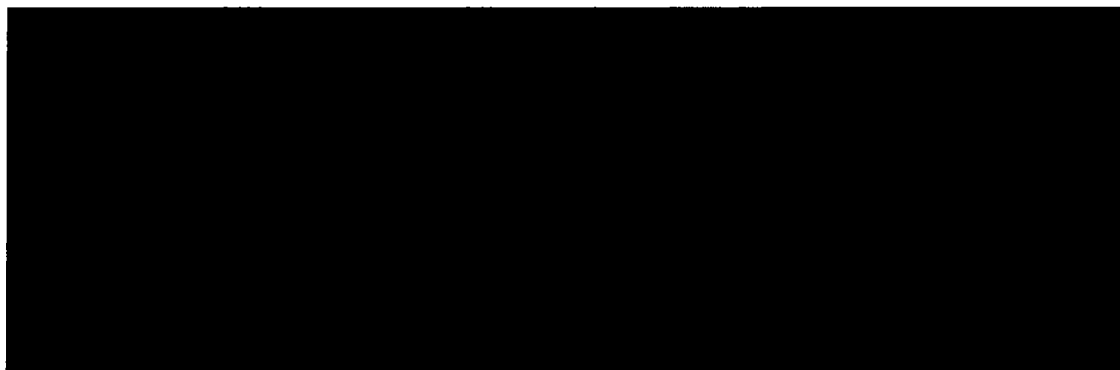
**7.1.17.2 Filling of HEUNL Container**

1. Ensure accepted HEUNL container is properly positioned in the vertical HEUNL material filling station.
2. Allow the HEUNL container to reach an acceptable temperature for material filling of between 60°F and 90°F as verified with a surface pyrometer or equivalent instrument. Record the container surface temperature in the HEUNL Container Fill Log.
3. Connect HEUNL material fill line to the fill/drain (Type I) or fill (Type II) quick disconnect valve and the HEUNL material vent line to the vent (Type I) or vent/drain (Type II) quick disconnect valve.
4. Verify that the minimum liquid temperature of HEUNL material is  $\geq 68^{\circ} \text{F}$  ( $20^{\circ} \text{C}$ ) and, if acceptable, initiate the HEUNL material filling process until discharge of liquid material from the vent line. Follow liquid filling process with air/inert gas purge to clear fill and vent lines. Vent container to atmospheric pressure. Close/disconnect the fill and vent lines. Note the height of the vent/siphon line ensures that a minimum void volume of 1 gallon is achieved when following this procedure.

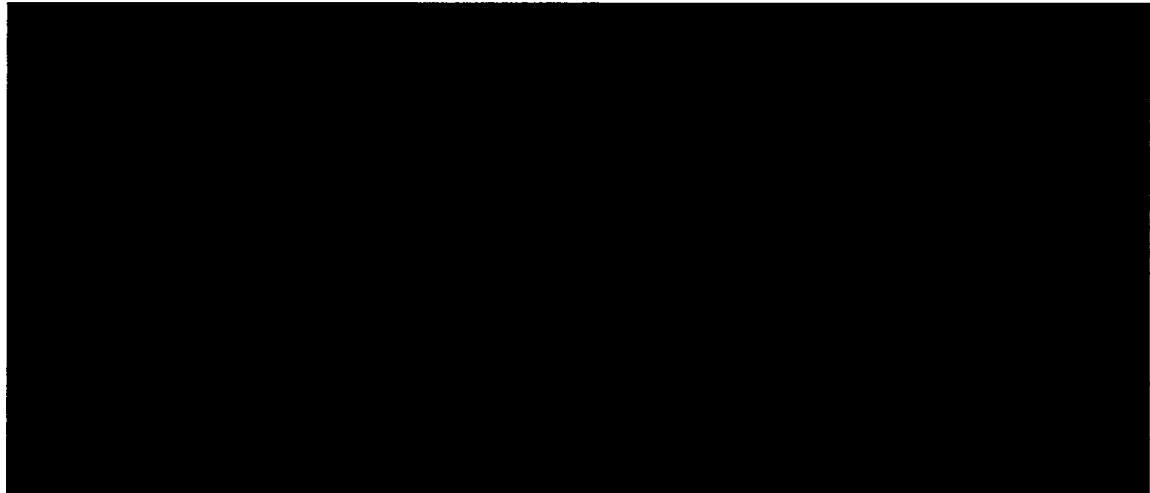
Note: For the last HEUNL filling operation, sufficient HEUNL material may not be available to completely fill the container such that material discharges from the vent line (Type I) or vent/drain (Type II). The loading and transport of a partially filled HEUNL container is authorized.

Note: All pre-shipment leakage testing procedures of the HEUNL container pressure boundary shall be performed in accordance with written procedures prepared and approved by personnel certified by the American Society of Nondestructive Testing (ASNT) as a Level III examiner for leakage testing. All leakage test results shall be documented.

5.







6. Remotely install the HEUNL container closure lid. Apply Never-Seez to the closure lid screws and torque them to 20, +/-0.5 ft-lbs.
7. If the container closure lid plug was removed to test the quick disconnect valves, reinstall the plug and torque to 60, ± 6 in-lbs and perform a vacuum pressure rise preshipment leakage test of the lid plug and seal as follows:

Note: It is not necessary to perform this preshipment leakage test if the lid port plug has not been removed since the last completed assembly leak test or was tested prior to filling the canister. The requirement for performance of the preshipment leakage test is to be confirmed using the HEUNL Container Fill Log.

- a. Verify lid plug and seal has been torqued to 60, ± 6 in-lbs.
- b. Install a vacuum test bell and leak test system over the plug.
- c. Leak test system to include a vacuum pump, isolation and vent valves, and calibrated vacuum gauge with minimum readability of 5 torr. The test equipment volume and the readability of the vacuum gauge shall be selected to ensure a preshipment leakage test sensitivity of  $\leq 1 \times 10^{-3}$  ref-cm<sup>3</sup>/sec per ANSI N14.5-1997 is achieved.
- d. Start vacuum test system by starting the vacuum pump.
- e. Close vent valve.
- f. Open vacuum pump isolation valve and evacuate the leak test bell volume until vacuum pressure as read on the vacuum gauge is  $\leq 10$  torr.
- g. Isolate and turn off vacuum pump. Record test starting time and vacuum pressure.
- h. Observe vacuum pressure gauge for pressure rise for a minimum of 10 minutes.
- i. At the end of the minimum 10 minute test period, record the final vacuum pressure and test time completion. If the change in vacuum pressure is less than the readability of the vacuum gauge, the preshipment leakage test confirms that there is no detected leakage when tested to a sensitivity of  $\leq 1 \times 10^{-3}$  ref-cm<sup>3</sup>/sec.
- j. Record the time and results of the satisfactory completion of the lid port leakage test in the HEUNL Container Fill Log.



## 7.2 Procedures for Unloading Package

In general, the procedure for unloading the package is the reverse of that presented for loading the package (Section 7.1). Specific generic procedures are provided in this section for the wet and dry unloading of various authorized contents from the NAC-LWT cask. As required to accommodate specific facilities and equipment, site-specific procedures shall be prepared and utilized for the unloading operations as appropriate to the contents.

### 7.2.1 Procedures for Wet Unloading of LWR Fuel and PWR, PWR MOX and BWR Fuel Rods in Transport Canisters

The procedures for unloading the package are as follows:

1. Perform a receipt inspection of the cask and trailer/ISO container, inspecting for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting operations. If an ISO container is used, it may be removed from the trailer and secured in the unloading area.
3. Remove the lid/top of the ISO container and remove any bracing, or the personnel barrier.  
Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.
4. Licensees shall monitor the package for radioactive contamination and radiation levels in accordance with 10 CFR 20.1906. If contamination levels exceed 10 CFR 71.87(i) or radiation levels exceed the limits of 10 CFR 71.47, the licensee shall notify the NRC Operations Center.
5. Verify the TID identification number on the top impact limiter and confirm tampering with the package did not occur.
6. Remove the top and bottom impact limiters.
7. Remove the cask tie-down strap.
8. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to keep the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
9. Place the cask in the decontamination pit or other designated area. Disengage the lifting yoke. Clean cask surfaces of road dirt as required for entry into the spent fuel pool.

10. Remove the vent and drain valve port covers. Connect a pressure gauge and isolation valve assembly to the cask vent valve.
11. Connect vent and clean water fill lines to the vent and drain valves.
12. Open the water supply valve to allow water to slowly enter the cask cavity.  
Note: The hot gases exiting from the vent valve could be highly radioactive. The exhaust gases must, therefore, be routed to an off-gas process system. The cask cavity does not contain a relief valve; therefore, any system for cooling down the package must be provided with a pressure relief device set so that the maximum pressure in the cask cavity does not exceed 100 psig. Coolant flow rates should be controlled to avoid thermal shock to the cask internals.
13. Continue the filling procedure until the cask cavity is filled with water. Remove fill and vent lines.
14. Loosen and remove the closure lid bolts. At the option of licensee/user, some bolts (i.e., 4-12) may be left installed hand tight for the cask movement to the spent fuel pool.
15. Engage the cask lifting yoke (with slings, yoke arm guides and remote actuation system components attached) with the cask lifting trunnions and connect the closure lid to the lifting yoke slings.
16. Position the cask over the spent fuel pool and lower the cask until the top of the cask is at an elevation that permits access to the closure lid bolts.
17. Remove any remaining closure lid bolts.
18. Carefully lower the cask to rest on the bottom of the cask unloading area while spraying the cask's exterior surfaces with clean water to minimize contamination.
19. Disengage the lifting yoke from the cask and slowly raise the yoke until the closure lid is raised clear of the cask. Remove the yoke from the vicinity of the cask to provide clearance for unloading the cask.
20. Unload the contents of the cask cavity (i.e., fuel assemblies or Rod Transport Canister containing PWR or BWR fuel rods and nonfuel-bearing components, if applicable) using the required grapple system. Verify that the unloaded contents conform to the contents described in the cask loading report. Place the fuel assemblies or transport canisters into storage or prepare them for further processing.
21. Position the cask lifting yoke with the cask closure lid over the cask cavity and slowly lower it into place using the cask and closure lid match marks as guides. Visually confirm that the closure lid is seated.
22. Engage the cask lifting yoke with the cask trunnions and raise the cask.  
Note: Verify yoke engagement before lifting the cask.
23. Raise the cask until the lid is slightly above the surface of the pool. At the option of the licensee/user, several of the closure lid bolts (i.e., 4-12) may be installed hand tight.
24. Raise the cask clear of the pool, rinsing the yoke and cask with clean water.

25. Transfer the cask to the decontamination pit or other work area. Remove the yoke and lid lift slings.
26. Install and tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the closure lid.
27. At the option of the licensee/user, a 25 to 50 gallon clean water flush of the cask cavity may be performed by connecting a valved, clean water line to the drain valve and a valved drain line to the vent valve. After the cavity flushing is completed, if performed, disconnect the water supply and drain lines.
28. Connect a gas (air, nitrogen or helium) supply line to the vent valve and the drain line to the drain valve.
29. Open the gas supply valve and pressurize the cask cavity ( $<30$  psig) to force out the water. Continue to supply gas to the cask cavity for a minimum of five minutes after the last residual free water discharges from the drain line.
30. Remove the gas supply and drain lines.
31. Install the alternate port covers over the vent and drain valves and tighten the port cover bolts to  $100 \pm 10$  inch-pounds. For Alternate B port covers, install and torque the high-strength bolts to  $285 \pm 15$  inch-pounds.

Note: It is not necessary to inspect or replace the port cover seals. Seal inspection and replacement, if required, will be performed prior to the next loaded transport.

### **7.2.2 Procedures for Wet Unloading of Metallic Fuel**

The procedure for unloading the metallic fuel from the package in a spent fuel pool is as follows.

1. Perform a receipt inspection of the cask and trailer/ISO container, inspecting for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release brakes and remove the chocks when required to complete uprighting operations. If an ISO container is used, it may be removed from the trailer and secured in the unloading area.
3. Remove the lid/top of the ISO container and remove any bracing, or the personnel barrier.

Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.

4. Licensees shall monitor the package for radioactive contamination and radiation levels in accordance with 10 CFR 20.1906. If contamination levels exceed 10 CFR 71.87(i) or radiation levels exceed the limits of 10 CFR 71.47, the licensee shall notify the NRC Operations Center.
5. Verify the TID identification number on the top impact limiter to confirm tampering with the package did not occur.

6. Remove the top and bottom impact limiters.
7. Remove the cask tie-down strap.
8. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to keep the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
9. Place the cask in the decontamination pit or other designated area. Disengage the lifting yoke. Clean cask surfaces of road dirt as required for entry into the spent fuel pool.
10. Remove the vent valve and drain valve port covers. Connect a pressure gauge and isolation valve assembly to the cask vent valve. Open the isolation valve and record the internal pressure reading (if any). Using a suitable air line and the gauge/valve assembly, vent the cask cavity to an off-gas handling unit.
11. Connect vent and clean water fill lines to the vent and drain valves.
12. Open the water supply valve to allow water to slowly enter the cask cavity.  
Note: The hot gases exiting from the vent valve could be highly radioactive. The exhaust gases must, therefore, be routed to an off-gas process system. The cask cavity does not contain a relief valve; therefore, any system for cooling down the package must be provided with a pressure relief device set so that the maximum pressure in the cask cavity does not exceed 100 psig. Coolant flow rates should be controlled to avoid thermal shock to the cask internals.
13. Continue the filling procedure until the cask cavity is filled with water. Remove fill and vent lines.
14. Loosen and remove the 12 closure lid bolts. At the option of licensee/user, some bolts (i.e., 4-12) may be left installed hand tight for the cask movement to the spent fuel pool.
15. Engage the cask lifting yoke (with slings, lift yoke arm guides and remote actuation system components attached) with the cask lifting trunnions and connect the closure lid to the lifting yoke slings.
16. Position the cask over the spent fuel pool and lower the cask until the top of the cask is at an elevation, which permits access to the closure lid bolts.
17. Remove any remaining closure lid bolts, inspect and store.
18. Carefully lower the cask to rest on the bottom of the cask unloading area while spraying the exterior surfaces of the cask with clean water to minimize contamination.
19. Disengage the lifting yoke from the cask and slowly raise the yoke until the closure lid is raised clear of the cask. Remove the yoke from the vicinity of the cask to provide clearance for unloading the cask.  
Note: Closure lid may be brought out of the pool and later assembled to the empty cask.
20. Unload the contents of the cask cavity using the required grapple system.

21. Position the cask lifting yoke with the cask closure lid over the cask cavity and slowly lower it into place using the cask and closure lid match marks as guides. Visually confirm that the closure lid is seated.
22. Engage the cask lifting yoke with the cask trunnions and raise the cask.
23. Raise the cask until the lid is slightly above the surface of the pool. At the option of the licensee/user, several of the closure lid bolts (i.e., 4-12) may be installed hand tight.
24. Raise the cask clear of the pool, rinsing the yoke and cask with clean water.
25. Transfer the cask to the decontamination pit or other work area. Remove the yoke and lid lift slings.
26. Install and tighten the 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the closure lid.
27. At the option of the licensee/user, a 25 to 50 gallon clean water flush of the cask cavity may be performed by connecting a valved, clean water line to the drain valve and a valved drain line to the vent valve. After the cavity flushing is completed, if performed, disconnect the water supply and drain lines.
28. Connect a gas (air, nitrogen or helium) supply line to the vent valve and the drain line to the drain valve.
29. Open the gas supply valve and pressurize the cask cavity (<30 psig) to force out the water. Continue to supply gas to the cask cavity for a minimum of five minutes after the last residual free water discharges from the drain line.
30. Remove the gas supply and drain lines.
31. Install the alternate port covers over the vent and drain valves and tighten the port cover bolts to  $100 \pm 10$  in-lb. For Alternate B port covers, install and torque the high-strength bolts to  $285 \pm 15$  inch-pound.

Note: It is not necessary to inspect or replace the port cover seals. Seal inspection and replacement, if required, will be performed prior to the next loaded transport.

### **7.2.3 Procedure for Wet Unloading of MTR, TRIGA, DIDO, ANSTO, PULSTAR, or SLOWPOKE Fuel Basket Contents**

The procedure for the unloading of MTR, TRIGA, DIDO, ANSTO, ANSTO-DIDO, PULSTAR, or SLOWPOKE fuel basket contents from the package in a spent fuel pool is as follows:

1. Perform a receiving survey of the cask and inspect for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release the brakes and remove the chocks when required to complete the uprighting operations. If an ISO container is used, it may be removed from the trailer and secured in the loading area.
3. Remove the roof from the ISO container, and open the front and rear ISO doors. Remove roof cross-members, if installed.

- Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.
4. Licensees shall monitor the package for radioactive contamination and radiation levels in accordance with 10 CFR 20.1906. If contamination levels exceed 10 CFR 71.87(i) or radiation levels exceed the limits of 10 CFR 71.47, the licensee shall notify the NRC Operations Center.
  5. Verify the TID identification number on the top impact limiter to confirm tampering with the package did not occur.
  6. Remove the top and bottom impact limiters.
  7. Remove the cask tie-down strap.
  8. Using the cask lifting yoke with left yoke arm guides removed, engage the lifting trunnions of the front end of the cask. Raise the cask to a vertical position on the rear cask support, moving the crane as necessary to keep the cask engaged in the rear rotation supports and the crane cable vertical. When the cask is vertical, lift the cask from the container supports.
  9. Place the cask in the decontamination pit or other site designated area. Disengage the lifting yoke. Clean cask surfaces of road dirt as required for entry into the spent fuel pool.
  10. Remove the vent valve and drain valve port covers. Connect a pressure gauge and isolation valve assembly to the cask vent valve. Open the isolation valve and record the internal pressure reading (if any). Using a suitable air line and the gauge/valve assembly, vent the cask cavity to an off-gas handling unit.
  11. Connect vent and clean water fill lines to the vent and drain valves.
  12. Open the water supply valve to allow water to slowly enter the cask cavity.  
Note: Gases or steam exiting the vent may be radioactive. The vent line should be routed to an off-gas process system or a HEPA filter. The system for cooling down the package shall contain a pressure relief device set to ensure that the cask internal pressure is maintained below 100 psig. Coolant flow rates are to be controlled to avoid thermal shock to the fuel contents.
  13. Continue the filling procedure until the cask cavity is filled with water. Remove fill and vent lines.
  14. Loosen and remove the 12 closure lid bolts. At the option of licensee/user, some bolts (i.e., 4-12) may be left installed hand tight for the cask movement to the spent fuel pool.
  15. Engage the cask lifting yoke (with slings, yoke arm guides and remote actuation system components attached) with the cask lifting trunnions and connect the closure lid to the lifting yoke slings.
  16. Position the cask over the spent fuel storage pool and lower the cask until the top of the cask is at an elevation which allows access for the removal of the closure lid bolts.
  17. Remove any remaining closure lid bolts, inspect and store.
  18. Carefully lower the cask to rest on the bottom of the cask unloading area while spraying the exterior surfaces of the cask with clean water to minimize contamination.



Disengage the lifting yoke from the lifting trunnions and slowly raise the yoke until the closure lid is raised clear of the cask. Remove the yoke from the vicinity of the cask to provide for clearance for unloading the cask.

Note: The closure lid may be brought out of the pool and later assembled to the empty cask.

19. Unload the MTR, TRIGA, DIDO, spiral, MOATA plate, PULSTAR, or SLOWPOKE fuel assemblies, plate canisters or fuel canisters from the top basket module using the appropriate grapple or handling system. As required, remove empty basket modules from the cask cavity to allow access to the next basket module. Continue fuel unloading operations until all fuel assemblies, plate canisters, fuel canisters and empty basket modules are removed from the cavity. Alternatively, each basket module containing fuel assemblies, plate canisters or fuel canisters may be unloaded from the cask cavity and stored in the spent fuel pool. Continue unloading until all basket modules have been removed.
20. Position the cask lifting yoke with guide arms and remote actuation components installed over the cask closure lid. Attach the slings to the cask closure lid and cask lifting yoke.
21. Position the cask lifting yoke and closure lid over the cask cavity and slowly lower it into place using the cask and closure lid match marks as guides. Visually confirm that the closure lid is seated.  

Note: The closure lid may be installed separately after the empty cask is removed from the spent fuel pool.
22. Engage the cask lifting yoke with the cask trunnions and raise the cask.
23. Raise the cask until the lid is slightly above the surface of the pool. At the option of the licensee/user, several of the closure lid bolts (i.e., 4-12) may be installed hand tight.
24. Raise the cask clear of the pool, rinsing the yoke and cask with clean water.
25. Transfer the cask to the decontamination pit or other work area. Remove the yoke and lid lift slings.
26. Install and tighten four closure lid bolts to  $100 \pm 10$  ft-lb using the torque sequence stamped on the closure lid.
27. At the option of the licensee/user, a 25 to 50 gallon clean water flush of the cask cavity may be performed by connecting a valved, clean water line to the drain valve and a valved drain line to the vent valve. After the cavity flushing is completed, if performed, disconnect the water supply and drain lines.
28. Connect a gas (air, nitrogen or helium) supply line to the vent valve and the drain line to the drain valve.
29. Open the gas supply valve and pressurize the cask cavity (<30 psig) to force out the water. Continue to supply gas to the cask cavity for a minimum of five minutes after the last residual free water discharges from the drain line.
30. Remove the gas supply and water drain lines.
31. Remove the four closure lid bolts and lift the lid clear of the cask.

Note: It is not necessary to inspect or replace the closure lid metallic seal. A new metallic seal will be installed and tested prior to the next loaded transport.

32. Remove the drain tube assembly and drain tube alignment ring from the cask cavity.
33. Reinstall the closure lid and install the 12 closure lid bolts. Torque the bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated in the closure lid.
34. Install the alternate port covers over the vent and drain valves and tighten the port cover bolts to  $100 \pm 10$  in-lb. For Alternate B port covers, install and torque the high-strength bolts to  $285 \pm 15$  inch-pound.

Note: It is not necessary to inspect or replace the port cover seals. Seal inspection and replacement, if required, will be performed prior to the next loaded transport.

#### **7.2.4 Procedure for Dry Unloading of MTR, TRIGA, DIDO, ANSTO, PULSTAR, SLOWPOKE, or NRU/NRX Fuel Contents**

This section describes the procedure for unloading of MTR, TRIGA, DIDO, ANSTO, ANSTO-DIDO, PULSTAR, SLOWPOKE, or NRU/NRX fuel basket contents from the NAC-LWT in a cell or a dry unloading fixture.

1. Perform a receiving survey of the cask and inspect for transport damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release the brakes and remove the chocks when required to complete the uprighting operations. If an ISO container is used, the ISO container may be removed from the trailer and secured in the unloading area.
3. Remove the roof from the ISO container and open the front and rear ISO doors. Remove roof cross members, if installed.  
Note: Verify that the package nameplate displays the correct package identification number in accordance with the CoC.
4. Licensees shall monitor the package for radioactive contamination and radiation levels in accordance with 10 CFR 20.1906. If contamination levels exceed 10 CFR 71.87(i) or radiation levels exceed the limits of 10 CFR 71.47, the licensee shall notify the NRC Operations Center.
5. Verify the TID identification number on the top impact limiter to confirm tampering with the package did not occur. Remove TID.
6. Remove the top and bottom impact limiters.
7. Remove the cask tie-down strap. Clean the cask surfaces as required for entry into the hot cell.
8. Using the cask lifting yoke with lift yoke arm guides removed, engage the lifting trunnions of the front end of the cask. Raise the cask to a vertical position on the rear cask support, moving the crane and/or trailer, as required, to keep the cask engaged in the rear rotation supports and the crane cable vertical. When the cask is vertical, block the trailer wheels and lift the cask from the container.

9. Place the cask in the cell transfer cart or unloading fixture. Disengage the lifting yoke.
10. Remove the vent valve port cover.
11. Connect vent line to the vent valve.  
Note: The hot gases exiting from the vent may be highly radioactive and the exhaust gas should be routed to an off-gas process system or to a HEPA filter.
12. Allow the cask to vent. Remove vent line.
13. Loosen and remove the 12 closure lid bolts. Visually inspect and store the bolts.
14. Attach the lid removal fixture.
15. Using the hot cell transfer cart or unloading fixture, move the cask into the unloading position.
16. Remove the cask lid.  
Note: It is not necessary to inspect or replace the closure lid metallic seal. A new metallic seal will be installed and tested prior to the next loaded shipment.
17. Install the seal surface protector in the lid cavity, if required.
18. Unload the MTR, TRIGA, DIDO, ANSTO, PULSTAR, SLOWPOKE, or NRU/NRX fuel basket modules from the cask cavity using the required grapple or dry transfer handling system.
19. Remove the cask seal surface protector, if installed, and replace the cask lid.
20. Using the cell transfer cart or unloading fixture, remove the cask.
21. Remove the lid from the cask and remove the drain tube and drain tube alignment ring.
22. Replace the cask lid and remove the lid removal fixture.
23. Install and tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated on the closure lid.
24. Install the port covers over the vent and drain valves and tighten the port cover bolts to  $100 \pm 10$  inch-pounds. For Alternate B port covers, install and torque the high-strength bolts to  $285 \pm 10$  inch-pounds.  
Note: It is not necessary to inspect or replace the port cover seals. Seal inspection replacement and leak testing will be performed prior to the next loaded transport.

### **7.2.5 Procedure for Dry Unloading of TPBAR Contents**

This section describes the procedure for the unloading of a consolidation canister, a PWR/BWR Rod Transport Canister or waste container that contains TPBARs from the NAC-LWT in a dry unloading facility.

1. Perform a receiving survey of the ISO container and trailer, and inspect for damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release the brakes and remove the chocks when required to complete the uprighting operations. If necessary, the ISO container may be removed from the trailer and secured in the unloading area.

3. Licensees shall receive and survey the package for radiation and removable contamination (for both gross beta-gamma and tritium) per 10 CFR 20 and 49 CFR 173. Record the survey results. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the licensee shall notify the shipper and ensure the appropriate notifications are completed.
4. Remove the roof from the ISO container and open the front and rear ISO doors. Remove the ISO roof cross members, if installed.
5. Verify the TID identification number on the top impact limiter to confirm tampering with the package did not occur.
6. Remove the top and bottom impact limiters.
7. Remove the cask tie-down strap. Complete the radiation and contamination surveys of the package as additional surfaces become accessible. Clean the cask surfaces as required for entry into the dry unloading facility.
8. Using the cask lifting yoke with lift yoke arm guides removed; engage the lifting trunnions of the front end of the cask. Raise the cask to a vertical position on the rear cask support, moving the crane and/or trailer, as required, to keep the cask engaged in the rear rotation supports and the crane cable vertical. When the cask is vertical, block the trailer wheels and lift the cask from the container.
9. Place the cask in a transfer cart or an unloading fixture. Disengage the lifting yoke.
10. Remove the vent valve port covers.
11. Remove the drain valve port cover
12. Connect a tritium monitoring system to the vent and drain quick-disconnect valves, and operate the device in accordance with the manufacturer's instructions. The tritium monitoring system shall have a minimum sensitivity of  $5 \times 10^{-3}$  micro curie/cc.
13. Monitor the cavity gas for tritium. If the gas sample measurement indicates a tritium gas concentration greater than  $1 \times 10^{-2}$  micro curie/cc, the cask internals must be decontaminated after unloading is completed and prior to subsequent use in transporting non-TPBAR contents.  

Note: The gases exiting from the cavity may be radioactive and contaminated with tritium, and at an elevated temperature. Cavity gases should be controlled per the site requirements.
14. Vent the cask cavity. Remove the gas lines and monitoring system from the vent and drain valves.
15. Loosen and remove all closure lid bolts.
16. Attach the lid removal fixture.
17. Use a transfer cart or unloading fixture and move the cask into the unloading position.
18. Remove the cask lid.  

Note: Replacement of the closure lid metallic seal is not required. A new metallic seal will be installed and leak tested prior to the next loaded shipment.
19. Install the seal surface protector in the lid cavity, if required.

20. Unload the TPBAR contents from the cask cavity using the required grapple or handling system.
21. Using the transfer cart or unloading fixture, remove the cask from the unloading area.
22. Collect an ambient air sample near the cask cavity opening. If the measured tritium gas concentration exceeds  $1 \times 10^{-2}$  micro curie/cc, the cask cavity must be decontaminated after unloading and prior to subsequent use in transporting non-TPBAR contents.
23. Survey the accessible inside surfaces of the cask cavity and internal components (i.e., upper 2 feet) for tritium contamination. If measured tritium removable contamination is greater than  $2.2 \times 10^{+4}$  dpm/100 cm<sup>2</sup>, the cask must be decontaminated after unloading is completed and prior to subsequent use in transporting non-TPBAR contents.  
Note: If significantly higher tritium contamination levels and the need for repeated decontamination become indicative of residual tritium contamination in the crystalline structure of the cask interior with potential for weeping, NAC will notify the NRC of the condition and its action.
24. Remove the cask seal surface protector, if used, and install the cask lid.
25. Inspect, install and tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated on the closure lid.  
Note: Replacement of the vent and drain port cover metallic seals is not required. New metallic seals will be installed and leak tested prior to the next loaded shipment.
26. Install the port covers on the vent and drain ports and torque the port cover bolts to  $285 \pm 15$  inch-pounds.

### **7.2.6 Procedure for Dry Unloading of PWR/BWR/MOX Fuel Rod Contents**

This section describes the procedure for the unloading of a PWR/BWR Rod Transport Canister from the NAC-LWT cask in a dry unloading facility.

1. Perform a receiving survey of the ISO container and trailer, and inspect for damage.
2. Position the trailer in the designated cask unloading area. Set the trailer brakes and chock the wheels to prevent unintended movement. If site-specific conditions exist that require the trailer to move to allow the cask to be uprighted on its rotation trunnions, release the brakes and remove the chocks when required to complete the uprighting operations. If necessary, the ISO container may be removed from the trailer and secured in the unloading area.
3. Licensees shall receive and survey the package for radiation and removable contamination per 10 CFR 20 and 49 CFR 173. Record the survey results. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the licensee shall notify the shipper and ensure the appropriate notifications are completed.
4. Remove the roof from the ISO container and open the front and rear ISO doors. Remove the ISO roof cross members, if installed.
5. Verify the TID identification number on the top impact limiter to confirm tampering of the package did not occur.

6. Remove the top and bottom impact limiters.
7. Remove the cask tie-down straps. Complete the radiation and contamination surveys of the package as additional surfaces become accessible. Clean the cask surfaces as required for entry into the dry unloading facility.
8. Using the cask lifting yoke with lift yoke arm guides removed, engage the lifting trunnions of the front end of the cask. Raise the cask to a vertical position on the rear cask support, moving the crane and/or trailer, as required, to keep the cask engaged in the rear rotation supports and the crane cable vertical. When the cask is vertical, block the trailer wheels and lift the cask from the container.
9. Place the cask in a transfer cart or an unloading fixture. Disengage the lifting yoke.
10. Remove the vent and drain valve port covers.
11. Connect the vent line with pressure gauge and isolation valve to the vent port quick disconnect coupling.  

Note: At the discretion of the receiving facility, a gas sample may be taken prior to cavity venting to determine if leakage from the fuel rods occurred during transport.

Note: The gases exiting from the cavity may be radioactive and at an elevated temperature and pressure. Cavity gases should be controlled and vented to radioactive gas treatment systems per site requirements.
12. Vent the cask cavity. Remove the vent line from the vent valves.
13. Attach the lid removal fixture.
14. Loosen and remove all closure lid bolts.
15. Use the transfer cart or unloading fixture and move the cask into the unloading position.
16. Remove the cask lid.  

Note: Replacement of the closure lid metallic seal is not required. A new metallic seal will be installed and leak tested prior to the next loaded shipment.
17. Install the seal surface protector in the lid cavity, if required.
18. Unload the PWR/BWR Rod Transport Canister and/or its contents, including PWR, PWR MOX or BWR fuel rods and nonfuel-bearing components, if applicable, using the appropriate grapple or handling system.
19. Using the transfer cart or unloading fixture, remove the cask from the unloading area.
20. Remove the cask seal surface protector, if used, and install the cask lid.
21. Inspect, install and tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated on the closure lid.  

Note: Inspection or replacement of the vent and drain port cover metallic seals is not required. New metallic seals will be installed and leak tested prior to the next loaded shipment.
22. Install the port covers on the vent and drain ports and torque the port cover bolts to  $100 \pm 10$  inch-pounds for the alternate port covers or  $285 \pm 15$  inch-pounds for the Alternate B port covers.

## 7.2.7 Procedure for Unloading of HEUNL Contents

This section describes the procedural steps required to unload the HEUNL containers and prepare the empty NAC-LWT cask for transport. Four HEUNL containers are to be unloaded from a NAC-LWT, configured as shown on Drawing No. 315-40-180, using either a vertical or horizontal facility-specific Dry Transfer and Unloading System. If four filled HEUNL containers were not loaded, empty HEUNL containers were installed as spacers and are also required to be unloaded.

Depending on facility capabilities and/or site restrictions, the HEUNL containers shall be emptied and prepared for return transport either vertically or horizontally in accordance with the operating procedures in Section 7.2.8. The emptied HEUNL containers will then be placed into the NAC-LWT cask in either a vertical or horizontal orientation for return shipment to the loading facility.

### 7.2.7.1 Vertical Dry Unloading of Filled HEUNL Containers from the NAC-LWT

1. Perform a receiving survey of the cask ISO container and inspect for damage.
2. Open the front and rear ISO doors and perform a Health Physics survey of the cask and adjacent surfaces of the trailer for radiation and removable contamination per 10 CFR 20 and 49 CFR 173. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the user/licensee shall notify the shipper, NAC, and ensure the appropriate notifications are completed.  
Note: Verify that the package nameplate displays the package identification number in accordance with the CoC.
3. Remove the roof from the ISO container. Remove roof cross-members, if installed.
4. Remove the top impact limiter and tamper indicating device (TID). Verify no tampering with seal has occurred during transport.
5. Remove the bottom impact limiter.
6. Remove the cask tie-down strap.
7. Using the lifting yoke with the guides removed, engage the lifting trunnions. Raise the cask to vertical by rotating the cask rotation sockets on the rear cask supports, moving the crane and/or trailer as required to maintain the lift yoke engaged to the trunnions and the cask engaged in the rear supports. When the cask is fully vertical, lift the cask from the supports and remove it from the trailer/container.
8. Place the cask in a cask baseplate or other designated loading area. Disengage the lifting yoke. Clean cask surfaces of road dirt, as required.
9. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage. If leakage is detected, verify shield tank fluid level and correct, as required.

10. Remove the Alternate vent and drain valve port covers. Visually inspect the vent and drain valved quick-disconnect nipples and replace them, if necessary.  
Note: It is not necessary to inspect or replace the Alternate port cover seals. Seal inspection replacement and leak testing will be performed prior to the next loaded transport.
11. Connect cask cavity pressure monitoring system to the cask's vent port quick disconnect. System will include a pressure gauge, isolation valve and connections to radioactive off-gas system.
12. If cask cavity pressure exceeds 15.0 psia, record the pressure and vent the cavity to the radioactive off-gas system prior to closure lid removal.
13. Attach the lid removal rigging to the closure lid
14. Loosen and remove all closure lid bolts.
15. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid.  
Note: It is not necessary to inspect or replace the closure lid metallic seal. A new metallic seal will be installed and tested prior to the next loaded shipment.
16. Install the seal surface protector in the lid cavity, if required.
17. Unload the first HEUNL container from the cask cavity using the vertical Dry Transfer and Unloading System.
18. Record and verify the identification number of the HEUNL container.
19. Place loaded HEUNL containers into site specified shielded interim storage positions for subsequent draining.
20. Repeat the unloading and independent verification of the HEUNL containers from the cask cavity until four (4) HEUNL containers are unloaded from the cask. If required, empty HEUNL container(s) may have been loaded to bring the total number of HEUNL containers in the cask cavity to four.
21. Verify that a HEUNL container spacer is secured to the bottom of the HEUNL container. If not, install the HEUNL container spacer.
22. Load four empty HEUNL containers properly closed in accordance with the procedures provided in Section 7.2.8.
23. Remove the cask seal surface protector, if used, and install the cask closure lid.
24. Inspect, install and tighten all 12 closure lid bolts to  $260 \pm 20$  ft-lbs in three passes using the torque sequence indicated on the closure lid.
25. Install Alternate port covers over the vent and drain openings and torque each port cover bolt to  $100 \pm 10$  inch-pounds.
26. Decontaminate the cask. Survey the cask surface for removable contamination levels and radiation dose rates.  
Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.
27. Using the cask lifting yoke with the guide arms removed, lift and position the cask in the rear cask supports on the ISO/trailer. Engage the trunnion pockets in the bottom end of the cask with the rotation trunnions. Lower the cask to rest on the front tie-



down saddle, moving the crane, and/or trailer, as required, to keep the crane cables vertical. Disengage the cask lifting yoke from the cask lifting trunnions and set it aside.

28. Install and attach the cask tie-down strap. Install the cask top and bottom impact limiters.
29. Re-install roof cross members, close ISO container doors, and replace ISO container roof.
30. Complete a Health Physics survey on the external surface of the packaging and record the results.

Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.

31. Complete the shipping document, carrier instructions (if required), and apply appropriate placards and labels.

#### **7.2.7.2 Horizontal Dry Unloading of Filled HEUNL Containers from the NAC-LWT**

1. Perform a receiving survey of the cask ISO container and inspect for damage.
2. Open the front and rear ISO doors and perform a Health Physics survey of the cask and adjacent surfaces of the trailer for radiation and removable contamination per 10 CFR 20 and 49 CFR 173. If radiation or contamination levels exceed the limits of 49 CFR 173.441 or 173.443, respectively, the user/licensee shall notify the shipper, NAC, and ensure the appropriate notifications are completed.

Note: Verify that the package nameplate displays the package identification number in accordance with the CoC.

3. Remove the roof from the ISO container. Remove roof cross-members, if installed, as required to remove the top impact limiter.
4. Remove the top impact limiter and tamper indicating device (TID). Verify no tampering with seal has occurred during transport.
5. Visually inspect the neutron shield tank fill, drain and level inspection plugs for signs of neutron shield fluid leakage. If leakage is detected, verify shield tank fluid level and correct, as required.
6. Remove the Alternate vent and drain valve port covers. Visually inspect the valved quick-disconnect nipples and replace them, if necessary.

Note: It is not necessary to inspect or replace the Alternate port cover seals. Seal inspection replacement and leak testing will be performed prior to the next loaded transport.

7. Connect cask cavity pressure monitoring system to the cask's vent port quick disconnect. System will include a pressure gauge, isolation valve and connections to radioactive off-gas system.
8. If cask cavity pressure exceeds 15.0 psia, record the pressure and vent the cavity to the radioactive off-gas system prior to closure lid removal.

9. Attach the horizontal lid removal tool to the closure lid.
10. Remove closure lid bolts.
11. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid.  
Note: It is not necessary to inspect or replace the closure lid metallic seal. A new metallic seal will be installed and tested prior to the next loaded shipment.
12. Unload the first filled HEUNL container from the cask cavity using a horizontal Dry Transfer and Unloading System.
13. Record and verify the identification number of the filled HEUNL container.
14. Place filled HEUNL containers into site specified shielded interim storage positions for subsequent draining.
15. Repeat the unloading and independent verification of the HEUNL containers from the cask cavity until four (4) HEUNL containers are unloaded from the cask. If required, empty HEUNL container(s) may have been loaded to bring the total number of HEUNL containers in the cask cavity to four.
16. Verify that a HEUNL container spacer is secured to the bottom HEUNL container. If not, install the HEUNL container spacer.
17. Load four empty HEUNL containers properly closed in accordance with the procedures provided in Section 7.2.8.
18. Position the closure lid in the cask using the lid match marks as guides to align the lid. Visually confirm that the closure lid is flush with the top of the cask and properly seated. Install lid bolts hand tight and remove the horizontal tool.
19. Tighten the 12 closure lid bolts to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the closure lid.
20. Install the Alternate vent and drain port covers and torque the bolts to  $100 \pm 10$  inch-pounds.
21. Decontaminate the cask. Survey the cask for surface contamination and radiation dose rates and decontaminate the cask as required.  
Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.
22. Verify the correct installation of the cask tie-down strap. Install the top impact limiter and verify the correct installation of the bottom impact limiter.
23. Replace roof cross-members, close ISO container doors and install ISO container roof.
24. Complete a Health Physics survey on the external surface of the packaging and record the results.  
Note: Removable contamination levels and radiation levels shall comply with 49 CFR 173.443 and 173.441, respectively.
25. Complete the shipping documents and apply appropriate placards and labels.

### 7.2.8 Procedures for Preparing Empty HEUNL Containers for Return Shipment

Following the unloading of the HEUNL containers, after transport in a NAC-LWT cask, subsequent operations to remove the HEUNL material from the containers shall be performed. Prior to emptying an HEUNL container, the container temperature will be confirmed to be at an acceptable temperature (between 40°F and 100°F) for HEUNL material removal, as verified with a surface pyrometer or equivalent instrument.

As noted previously, the total fill time and lifetime for utilization of a HEUNL container is limited by the CoC to a total of  $\leq 15$  months. Total fill time is determined by recording the date of filling of the HEUNL container with material, recording the date that the HEUNL material is emptied/flushed from the container and tracking the cumulative time the HEUNL container is filled. This allowable fill duration is identified as “HEUNL Container Content Fill Time” and is controlled utilizing a HEUNL Container Fill Log for each individual HEUNL container maintained for its identification number. Each HEUNL Container Fill Log shall record the actual “HEUNL Container Content Fill Time” for each loaded transport based on date and time of filling and draining of HEUNL material and the results of all filling and draining inspections and tests.

The HEUNL container shall be emptied of HEUNL material in accordance with site developed procedures. The operating procedures prepared for the emptying of the HEUNL material from the containers shall include appropriate verification that the approved operating procedures are appropriate for the HEUNL container type (either Type I for vertical unloading or Type II for horizontal unloading).

Continued processing of the HEUNL containers for return shipment and for re-filling shall include a flushing sequence with demineralized water or  $\leq 0.5$  M nitric acid in which any residual contents can be declared as having insignificant radioactive and corrosive properties. Prior to return shipment of empty HEUNL containers to the facility for filling, the empty container shall be verified as having an HEUNL Container Content Fill Time of  $\leq 12$  months.

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## **8**                    **ACCEPTANCE TESTS AND MAINTENANCE PROGRAM**

This chapter discusses the acceptance test and maintenance program to be used for the NAC-LWT cask, in compliance with 10 CFR 71, Subpart H.

Where required, specific procedures for testing will be developed in conjunction with the cask fabricator, in accordance with an approved Quality Assurance program.

### **8.1**                    **Acceptance Tests**

This section discusses the tests to be performed prior to first use of the cask.

Two leaktight port cover designs are available for use. The alternate port cover has a face seal containment boundary Viton® O-ring seal and a secondary test boundary O-ring seal on the barrel of the port cover. The alternate port cover was developed to provide a leaktight configuration and to facilitate operations in the field. The Alternate B port cover has two face seals on the inner end of the port cover, one metallic containment boundary seal and one Viton® test boundary seal. The Alternate B port cover was developed to provide a high pressure containment boundary for TPBAR contents. The Alternate B port covers utilize higher strength bolts and a higher installed torque value. Both port cover designs provide a leaktight containment boundary.

To simplify the testing procedures below, when “port cover” or “port cover O-ring” is mentioned, it is intended to mean the port cover which has been chosen for that specific fabrication or cask configuration, either the alternate or the Alternate B and their respective O-rings. The different testing procedures are described in the applicable sections.

#### **8.1.1**                **Visual Inspection**

All components making up the cask lid, body, and baskets are to be visually inspected. This inspection verifies that all items are properly cleaned, free of nicks, gouges and damage, and are assembled in accordance with the license drawings. Each item is compared to the appropriate drawing to verify that it is in the correct orientation, position, and location.

All dirt, oil residue, metal chips or other forms of debris are removed by appropriate cleaning methods. Any entrapped water is removed. Any component found to deviate from its drawing is re-installed, replaced, or otherwise reworked as necessary in order to bring it into conformance.

Acceptance criteria require complete cask cleanliness, that foreign objects are removed, and that nicks or gouges that might preclude sealing or cask closure are not permitted. Valve and system components are visually inspected for leaks during pressure checks. Leaks are not permitted. Any case of noncompliance shall be corrected prior to final acceptance. All welds are visually

inspected in accordance with the methods of Article 9, Section V of the “ASME Boiler and Pressure Vessel Code.” The acceptance criteria are in accordance with part NB-4424, Section III, and parts UW-35 or UW-36, Section VIII, of the “ASME Boiler and Pressure Vessel Code.”

### **8.1.2        Structural and Pressure Tests**

Following completion of fabrication, a hydrostatic test is performed on the cask cavity in accordance with the “ASME Boiler and Pressure Vessel Code,” Section III, Subsection NB, Article NB-6000, to 209 (+5/-0) psig. This test is performed in accordance with a procedure prepared by the fabricator and approved by NAC International (NAC). For casks intended for transport of TPBARs, an additional post-fabrication hydrostatic test is performed to 450 +15/-0 psig ( $1.5 \times \text{MNOP of } 289 \text{ psig} = 434 \text{ psig}$ ). Alternate B port covers are installed for the 450 +15/-0 psig test. The test requirements and acceptance criteria for both tests are described below.

The cask cavity is hydrostatically tested using demineralized water. The test is conducted with the closure lid and valve port covers installed in accordance with the cask handling procedure for loaded casks, but with the quick-disconnect valves removed. During these two 30-minute pressure tests (conducted alternately with one port cover installed and the other removed for access to the cavity), an inspection is made to detect any visual or other evidence of leakage. Any evidence of leakage, including drop of gauge pressure, is cause for rejection.

Following the hydrostatic test, the cask cavity, lid, and port covers are dried and made ready for visual and dye penetrant testing (PT) inspections.

The cask cavity (containment boundary including lid and port covers) is visually inspected. All accessible welds within the cask cavity are examined by PT in accordance with ASME Code, Section V, Article 6, with acceptance criteria in accordance with ASME Code, Section III, Subsection NB, Article NB-5350. Any evidence of cracking, permanent deformation, or exceeding of material yield strength is cause for rejection.

Following completion of the fabrication pressure test or the postfabrication TPBAR-required pressure test, the cask containment boundary is leakage tested in accordance with the requirements of Section 8.1.3.

The neutron shield tank and the expansion tank are hydrostatically tested simultaneously, since they are joined by a siphon tube. The test is in accordance with the “ASME Boiler and Pressure Vessel Code,” Section VIII, Division 1, to 248 (+5/-0) psig (165 psig maximum hypothetical accident pressure  $\times 1.5$ ). The neutron shield relief valve is replaced by a plug during the test. All tank seams and joints are inspected for evidence of leakage. The pressure is monitored by

use of a pressure gauge. Any evidence of leakage or drop in pressure is cause for rejection. All accessible welds on the neutron shield structure are PT examined following the hydrostatic test.

Each of the two pairs of the cask lift trunnions is load tested. The load test is performed for one pair and, then, repeated for the other pair.

The test consists of applying a vertical load of 159,375 lbs + 3,000 lbs, -0 lbs (300 % of the maximum service load), to each trunnion pair. The load is applied in a vertical direction and equally distributed between the two trunnions.

This test may be carried out by the use of calibrated hydraulic rams combined with a beam, or the cask lifting yoke, and appropriate dead weight attached to the trunnion pair. The load is held for a minimum of 10 minutes.

Following the load test, all welds and material are visually inspected for plastic deformation and cracking and liquid penetrant inspected in accordance with the "ASME Boiler and Pressure Vessel Code," Section V, Article 6, and Section III, Division I, Subsection NF, Article NF-5350, as called for in ANSI N14.6-1993.

Any evidence of permanent deformation or any evidence of cracking, galling, or exceeding of yield strength is cause for rejection of that item.

The rotation sockets at the lower end of the cask are not load tested, being monolithic steel block with a suitably machined opening. Prior to first use, each socket is visually inspected for cleanliness and signs of deformation or other unsuitability. Accessible welds are inspected in accordance with the standards for the cask trunnions.

### **8.1.3        Leak Tests**

The cask containment boundary is subjected to a fabrication leakage rate test, as described in the sections below, to verify containment following fabrication. The test is performed using helium inside the cask cavity and a helium mass spectrometer connected to the test port of the lid or one of the port covers. The mass spectrometer has a minimum sensitivity such that it is capable of detecting a leak rate of at least  $1 \times 10^{-9}$  ref cm<sup>3</sup>/sec and is calibrated before and after the test with a standard having a known leak rate between  $4 \times 10^{-7}$  and  $1 \times 10^{-9}$  ref cm<sup>3</sup>/sec. The procedure is performed between 40°F and 125°F and is temperature corrected. New O-rings are to be used. The basic procedures for the cask lid and for the vent and drain port covers are provided in the following sections.

A required maintenance leakage rate test adheres to the criteria listed above and follows the replacement of any containment component or seal. Containment components having single-use metallic containment seals (i.e., closure lid and Alternate B port covers) require a maintenance

leakage rate test prior to each loaded transport if the component is removed. All containment components shall be subjected to a periodic leakage rate test annually while the cask is in service, or prior to returning the cask to service if the period since the last leakage rate test exceeds 12 months. The acceptance criteria for the fabrication, maintenance, and periodic leakage rate tests appear in the following sections.

### 8.1.3.1 Closure Lid Leakage Rate Test

The following procedure shall be used to perform the fabrication, maintenance, periodic and pre-shipment leakage rate tests on the closure lid. Steps 1 and 2 are not performed for the pre-shipment leakage rate test performed during cask loading operations as described in Chapter 7.

1. Remove the vent and drain port covers and install the closure lid fitted with a new metallic seal on the cask body.
2. Install the 12 lid bolts and torque them to  $260 \pm 20$  ft-lb in three passes, using the torque sequence stamped on the lid.
3. Connect the vacuum pump to the vent valve and evacuate the cask cavity to a pressure  $\leq 100$  torr (130 mbar).
4. Backfill the cask cavity with 99.9% (minimum) pure helium to atmospheric pressure.
5. Re-evacuate the cask cavity to a pressure of  $\leq 100$  torr (130 mbar) and perform final backfill of cask cavity with 99.9% (minimum) pure helium to a pressure of 0 psig, + 2, -0 psig.

Note: This backfill method ensures a minimum helium concentration in the cask cavity of  $> 98\%$ .

6. Remove the test port plug from the lid.
7. Connect a helium mass spectrometer leak detector (MSLD) to the cask lid test port. Start the helium MSLD.

Note: The specific test procedure depends on the helium MSLD used. The test commences when a vacuum is pulled on the test port by the MSLD and the MSLD is placed in the "test" mode.

8. Monitor the test leakage rate until the leakage rate is stable or a minimum of 30 seconds.
9. The acceptance criterion for the closure lid helium leakage test for the NAC-LWT is that the measured leakage rate shall be  $\leq 2 \times 10^{-7}$  cm<sup>3</sup>/s (helium) (i.e., leaktight per ANSI N14.5-1997 under the test conditions).
10. Remove helium MSLD from test port plug and reinstall port plug and torque to  $60 \pm 6$  inch-pounds.



### **8.1.3.2 Alternate Port Cover Leakage Rate Tests**

#### **8.1.3.2.1 Fabrication and Periodic Leakage Rate Tests**

The following procedure shall be used to perform the fabrication and periodic leakage rate tests on the alternate port covers.

1. If the port cover leakage rate tests are not performed immediately following the closure lid leakage rate test of Section 8.1.3.1, evacuate the cask cavity to  $\leq 100$  torr (130 mbar) and backfill to atmospheric pressure with 99.9% (minimum) pure helium. Reevacuate to  $\leq 100$  torr (130 mbar) and perform the final helium backfill to atmospheric pressure.
2. Install new O-rings on the port cover.
3. Remove the port valve (either vent or drain valve) and install the port cover.
4. Install and torque the port cover bolts to  $100 \pm 10$  inch-pounds.
5. Remove the test port plug from the port cover.
6. Connect a helium MSLD to the test port. Start the helium MSLD.
7. Monitor the test leakage rate until the leakage rate is stable or for a minimum of 30 seconds.
8. The acceptance criterion for the helium leakage rate test shall be  $\leq 2 \times 10^{-7}$  cm<sup>3</sup>/s (helium) (i.e., leaktight per ANSI N14.5-1997 under the test conditions).
9. Remove helium MSLD from the test port and reinstall port plug and torque to  $60 \pm 6$  inch-pounds.
10. Repeat Steps 1 through 8 for the second port cover.

#### **8.1.3.2.2 Maintenance Leakage Rate Test**

The following procedure shall be used to perform the maintenance leakage rate test on the alternate port covers following the field replacement of a port cover Viton O-ring containment face seal during cask loading operations.

1. Replace the affected seal(s).
2. Insert port cover in a plastic test bag and seal the bag to the cask body around the port opening using suitable tape.
3. Evacuate test bag and backfill with 99.9% (minimum) pure helium to one atmosphere absolute.
4. Reevacuate test bag and perform final helium backfill to one atmosphere absolute.
5. Without breaking the seal of the plastic bag to the cask body, insert the port cover into the port opening and hand tighten the bolts.
6. Torque the bolts to  $100 \pm 10$  inch-pounds. Remove the plastic bag.
7. Remove the test port plug from the port plug.

8. Attach helium MSLD to the port cover test port and evacuate the volume between the seals.
9. Monitor the test leakage rate until stable or for a minimum of 30 seconds.
10. The test is acceptable if the measured leakage rate is  $\leq 2 \times 10^{-7} \text{ cm}^3/\text{s}$  (helium) (i.e., leaktight per ANSI N14.5-1997 under the test conditions).
11. Remove helium MSLD from test port and reinstall the test port plug and torque to  $60 \pm 6$  inch-pounds.

### **8.1.3.3 Alternate B Port Cover Leakage Rate Tests**

#### **8.1.3.3.1 Fabrication and Periodic Leakage Rate Tests**

The following test procedure shall be used to perform the fabrication and periodic leakage rate tests for the Alternate B port cover. For NAC-LWT casks to be used to transport TPBARS, the fabrication leakage rate test shall be performed immediately following the post-fabrication hydrostatic test to 450 +15/-0 psig required for transport of TPBAR contents. The Alternate B port covers shall be installed for the 450 +15/-0 psig hydrostatic test. The periodic leakage rate test will be performed as part of a cask's annual maintenance and certification program.

1. If the Alternate B port cover leakage rate tests are not performed immediately after the closure lid leakage rate test in Section 8.1.3.1, evacuate the cask cavity to  $\leq 100$  torr (130 mbar) and perform the final helium backfill to atmospheric pressure with 99.9% (minimum) pure helium. Reevacuate to  $\leq 100$  torr (130 mbar) and perform final helium backfill to atmospheric pressure.
2. Install the new metallic O-ring on the Alternate B port cover.
3. Remove the port nipple (either vent or drain valve) and install the Alternate B port cover.
4. Install and torque the port cover bolts to  $285 \pm 15$  inch-pounds.
5. Remove the test port plug from the port cover.
6. Connect a helium MSLD to the test port. Start the helium MSLD.
7. Monitor the test leakage rate until the leakage rate is stable or for a minimum of 30 seconds.
8. The test is acceptable if the measured leakage rate is  $\leq 2 \times 10^{-7} \text{ cm}^3/\text{s}$  (helium) (i.e., leaktight per ANSI N14.5-1997 under the test conditions).
9. Remove helium MSLD from the test port and reinstall the test port plug and torque to  $60 \pm 6$  inch-pounds.
10. Repeat Steps 1 through 8 for the second Alternate B port cover.

### 8.1.3.3.2 Maintenance and Preshipment Leakage Rate Tests

The following maintenance leakage rate test procedure for the Alternate B port cover is used after metallic O-ring replacement during each cask loading operation if the port cover is removed, or if another containment component of an Alternate B port cover is replaced.

1. Replace metallic seal.
2. Insert Alternate B port cover in plastic test bag and seal to cask body around port opening with suitable tape.
3. Evacuate test bag and backfill with 99.9% (minimum) pure helium to one atmosphere absolute.
4. Reevacuate test bag and perform final helium backfill to one atmosphere absolute.
5. Without breaking seal of plastic bag to the cask body, insert the Alternate B port cover into the port opening and tighten bolts hand tight.
6. Remove plastic bag and torque bolts to  $285 \pm 15$  inch-pounds.
7. Remove test port plug from the Alternate B port cover.
8. Attach helium mass spectrometer to the Alternate B port cover test port and evacuate the volume between the seals.
9. Monitor the leakage rate test until stable or a minimum of 30 seconds.
10. The test is acceptable if the measured leakage rate is  $\leq 2 \times 10^{-7}$  cm<sup>3</sup>/s (helium) (i.e., leaktight per ANSI N14.5-1997 under test conditions).
11. Repeat Steps 1 through 10 for the second Alternate B port cover.

### 8.1.4 Component Tests

Tests performed on individual components are designed to ensure that the components meet the design requirements for correct operation of the cask system.

Acceptance criteria are functions of the purpose of the component being tested.

#### 8.1.4.1 Valves, Pressure Relief Device, and Fluid Transport Devices

Overpressurization protection is afforded the neutron shield tank in the form of a relief valve that is designed to open at 165 psig (plus or minus 10 percent), and reseal. The relief valve is removed from the cask and hydraulically pressure tested using a calibrated system to verify relief valve opening and closing pressures. Failure to operate within tolerance is cause for rejection. Rejected valves are rebuilt or replaced and retested prior to use.

The cask cavity does not contain overpressurization protection because the maximum pressures developed in the worst case (fuel or TPBAR rupture) are well below the structural capability of the cask structure, lid, port covers, and seals.

The cask ports for vent/drain operations (two ports) contain valved quick disconnect fittings. These valves do not require testing to verify valved operation, because no credit is taken for these valves in the cask analyses. The valves provide a convenient method of attaching lines and fixtures, but serve no safety-related function.

The NAC-LWT cask package does not use rupture disks.

A siphon tube is used to connect the neutron shield tank to the neutron shield expansion tank. The tube is a passive device and allows expanding fluid to enter the expansion tank and returns the fluid as the liquid cools. It contains no moving parts and cannot be inspected after installation. The tube will be inspected for cleanliness and to verify that its passage is free of debris and clear prior to installation.

#### **8.1.4.2      Gaskets**

Cask closure lid and port cover O-rings will be hydrostatically pressure tested to verify suitability for use and for operation in the Maximum Normal Operating Pressure (MNOP) condition. The O-rings are arranged in pairs with an annulus between them. The annulus is connected by a drilled passageway to a test port. In the acceptance test, each of the three O-ring sets (one closure lid set, one vent port cover set, and one drain port cover set) is pressurized to 209 (+5/-0) psig for 30 minutes. Casks having TPBARs as approved contents are subjected to additional hydrostatic tests at 450 +15/-0 psig (one with the vent cover installed and one with the drain port cover installed). Loss of pressure or any other sign of leakage is cause for rejection.

#### **8.1.4.3      Sealed Canisters**

Prior to underwater application of sealed canisters, each design shall be qualified by testing to demonstrate the ability of the canister to be vacuum dried and to stay sealed during subsequent underwater handling and storage. The qualification tests performed will simulate underwater vacuum drying and subsequent handling/storage. Acceptance criteria include no residual water in, or water ingress to, the sealed canister.

#### 8.1.4.4 HEUNL Container

##### A. Visual and NDE Inspections

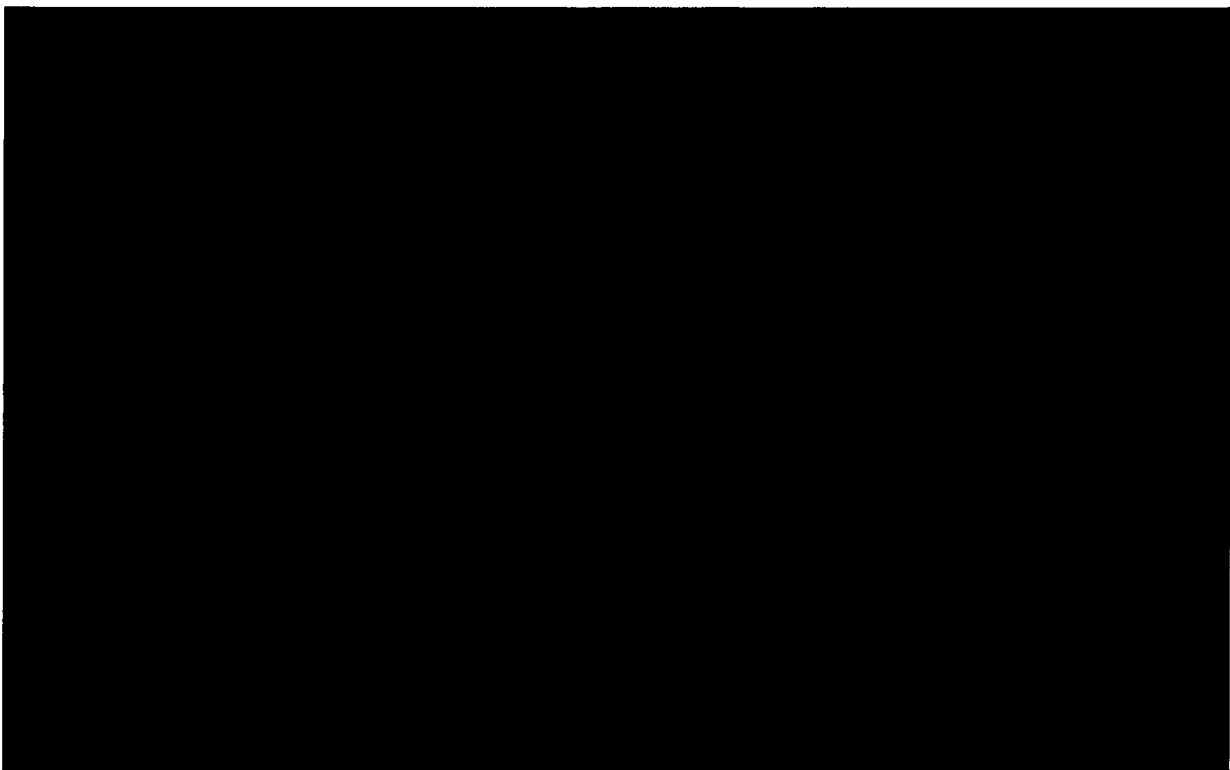
Following completion of fabrication, the structural welds of the HEUNL container will be visually and non-destructively examined as indicated on the License Drawings. The structural welds shall be examined by dye-penetrant examination (PT) and ultrasonic examination (UT) in accordance with ASME Code, Section V, Articles 1, 5 and 6, respectively with acceptance criteria in accordance with ASME Code, Section III, Subsection NB, Articles NB-5350 NB-5330, respectively.

##### B. Pressure Testing

The pressure retaining boundary of the HEUNL container shall be qualified by hydrostatic test prior to first use following fabrication. The pressure boundary of the HEUNL container is defined as the container shell, top end cap, bottom end cap, container lid, lid plug and O-ring seal, and container lid inner O-ring seal. As described in Chapter 2, the HEUNL container pressure boundary is designed, fabricated, examined, and tested in accordance with the requirements of the ASME Code, Section III, Subsection NB, to the maximum practical extent.

A hydrostatic test will be performed in accordance with the ASME Code Section III, Subsection NB, Article NB-6200, to  $140 +10/-0$  psig ( $1.25 \times 100$  psi = 125 psi  $\approx$  140 psig). The test requirements and acceptance criteria for the tests are described below.

The HEUNL container is hydrostatically tested using demineralized water in the vertical (disconnect side up) orientation. The test is performed with the quick disconnect valves removed, and the container lid installed with the inner circumferential O-ring installed and the test port plug between the inner and outer O-rings removed. The pressure test system will be installed in the container lid plug hole to allow container filling, venting and application of the hydrostatic pressure. The HEUNL container shall be pressurized and the hydrostatic pressure shall be maintained for a minimum of 10 minutes. Following the 10 minute minimum hold period a visual inspection of the container to detect any evidence of leakage or structural deformation shall be performed while the pressure is maintained. Any evidence of leakage of the HEUNL container is cause for rejection. Following completion of the visual inspection, the container pressure is vented. Rejected HEUNL containers that are repaired shall be retested to the original test criteria prior to acceptance.



### C. Leakage Testing

#### C.1 Fabrication Acceptance Leakage Testing

At the completion of the pressure boundary hydrostatic testing and post-test inspections, each HEUNL container shall be leakage tested in accordance with the requirements and approved methods of ANSI N14.5-1997 to confirm the total leakage rate is less than, or equal to,  $1 \times 10^{-7}$  ref.  $\text{cm}^3/\text{s}$  (i.e., leaktight). The sensitivity of the test shall be one-half of the acceptance test criteria as specified in ANSI N14.5-1997.

The HEUNL container will be assembled with the container lid and inner O-ring seal installed and the fill/drain and vent quick disconnect valved nipples removed. A test envelope will be installed around the assembled HEUNL container enclosing all of the pressure boundary welds, base metal plates, and the container lid. The vacuum system shall be connected to the lid plug opening for evacuation of the container volume to a pressure of  $\leq 10$  torr. After the container is evacuated, the test envelope will be filled with 99.95% (minimum) pure helium to an acceptable test concentration. The percentage of helium gas in the test envelope shall be accounted for in the determination of the test sensitivity. A mass spectrometer leak detector (MSLD) will be used to sample the evacuated volume for helium.

If helium leakage is detected, the area of leakage shall be identified, repaired and re-examined in accordance with the ASME Code, Section III, Subsection NB, NB-4450 or NB-4130, as appropriate. Following repair, the complete helium leakage test shall be re-performed to the original test acceptance criteria.

In order to ensure the integrity of the HEUNL container lid port plug and O-ring seal (port opening used for evacuation of container for helium leakage test of the pressure boundary), a helium leakage test of the lid port plug and seal is performed. The evacuated HEUNL container is filled with 99.95% (minimum) pure helium, and the port plug and seal are installed and torqued. A test cover is installed over the top of the port plug and the test cover volume is evacuated to a low pressure by a helium MSLD system. The leakage test of the port plug is in accordance with the evacuated envelope method as described in ANSI N14.5. The leakage test is to confirm that the leakage rate for the port plug is  $\leq 1 \times 10^{-7}$  ref.  $\text{cm}^3/\text{s}$  (i.e., leaktight). The sensitivity of the test shall be one-half of the acceptance test criteria as specified in ANSI N14.5-1997. The concentration of helium gas in the HEUNL container shall be accounted for in the determination of the test sensitivity.

If leakage is detected, the area of leakage shall be identified, repaired and re-examined, and the plug O-ring seal replaced. Following repair and seal replacement, the helium leak test shall be re-performed to the original test acceptance criteria.

Leakage testing of the HEUNL container pressure boundary shall be performed in accordance with written procedures prepared and approved by personnel certified by the American Society of Nondestructive Testing (ASNT) as a Level III examiner for leakage testing. All leakage test results shall be documented.

#### C.2 Periodic Leakage Testing

In accordance with ANSI N14.5-1997, if an HEUNL container has been in service longer than 12 calendar months from time of initial loading, the container lid inner O-ring and port plug O-ring seals shall be replaced and periodic helium leakage rate tests of the replaced container lid O-ring seals shall be performed prior to returning the HEUNL container to service. The HEUNL container shall be emptied, flushed, dried, and the O-ring seals replaced. Following O-ring seal replacement, a helium leakage test of the replaced O-ring seal is performed prior to returning the container to service.

Following seal replacement, the HEUNL container shall be reassembled with the lid port plug removed. A helium supply shall be connected to the lid through the lid port opening and the volume under the installed container lid is filled with 99.95% (minimum) pure helium, and the port plug with a new O-ring seal is re-installed. The leakage test of the container lid inner O-ring seal is in accordance with the evacuated envelope method as described in ANSI N14.5. The volume between the container lid inner and outer O-ring seals is evacuated through the O-ring test port opening to a low pressure (approximately  $\leq 1$  torr) by a helium MSLD system. The acceptance criteria for the periodic leakage test is to confirm that the leakage rate for the container lid inner O-ring seal is  $\leq 1 \times 10^{-7}$  ref.  $\text{cm}^3/\text{s}$  (i.e., leaktight). The sensitivity of the test shall be one-half of the acceptance test criteria as specified in ANSI N14.5-1997. The

concentration of helium gas in the HEUNL container shall be accounted for in the determination of the test sensitivity.

Following completion of the container lid inner O-ring test, a test cover is installed over the top of the port plug and the test cover volume is evacuated to a low pressure by a helium MSLD system. The leakage test of the port plug is in accordance with the evacuated envelope method as described in ANSI N14.5. The leakage test is to confirm that the leakage rate for the port plug is  $\leq 1 \times 10^{-7}$  ref.  $\text{cm}^3/\text{s}$  (i.e., leaktight). The sensitivity of the test shall be one-half of the acceptance test criteria as specified in ANSI N14.5-1997. The concentration of helium gas in the HEUNL container shall be accounted for in the determination of the test sensitivity.

If leakage is detected, the area of leakage shall be identified, and the plug O-ring seal replaced. Following seal replacement, the helium leak test shall be re-performed to the original test acceptance criteria.

Periodic leakage testing of the HEUNL container pressure boundary O-ring seals shall be performed in accordance with written procedures prepared and approved by personnel certified by the American Society of Nondestructive Testing (ASNT) as a Level III examiner for leakage testing. All leakage test results shall be documented.

### C.3 Maintenance Leakage Testing

Field replacement of the lid pressure boundary O-ring seals and/or repair of the HEUNL container pressure boundary components shall require the performance of maintenance leakage rate testing of the replaced seal(s) or of the entire HEUNL container pressure boundary depending on the extent of the replacements and/or repairs completed.

HEUNL container lid inner O-ring and port plug O-ring seals identified as leaking or damaged during operational use shall require the HEUNL container to be emptied, flushed and dried, and the applicable seal replaced. Following O-ring seal replacement, helium leakage testing of the replaced O-ring seal(s) is performed prior to returning the container to service. O-ring helium leakage testing shall be performed in accordance with the procedures specified in Section 8.1.4.4, C.2.

In addition, if in-service inspection identifies damage or leakage of an HEUNL container boundary pressure due to container lid and/or shell assembly damage, the HEUNL container shall be emptied, flushed and dried, and the appropriate repairs completed in accordance with approved written procedures. Following HEUNL container repairs, the helium leakage test of the HEUNL container pressure boundary shall be re-performed in accordance with the leakage test procedures specified in Section 8.1.4.4, C.1.



Leakage testing of the HEUNL container pressure boundary shall be performed in accordance with written procedures prepared and approved by personnel certified by the American Society of Nondestructive Testing (ASNT) as a Level III examiner for leakage testing. All leakage test results shall be documented.

#### **8.1.4.5 Miscellaneous**

The cask impact limiter structures contain a two-part, aluminum honeycomb that is fabricated to have dynamic crush strengths of 3,500 psi. (plus 5 percent, minus 10 percent) and 250 psi (plus 10 percent, minus 10 percent), respectively. Sample lots of honeycomb material are subjected to dynamic crush testing to verify the crush strength of the impact limiter material. A dynamic crush strength of a sample outside of the allowable variation is cause for rejection of the batch lot of honeycomb material.

#### **8.1.5 Tests for Shielding Integrity**

A gamma scan inspection of all steel and lead shielding is conducted in order to verify shielding integrity. This inspection is performed on the cask body, including the cask bottom.

The test is conducted by continuous scanning or probing over 100 percent of all accessible surfaces, using a 3-inch detector and a <sup>60</sup>Co source of sufficient strength to produce a count rate that equals or exceeds three times the background count rate.

Scan path spacing is 2.5 inches. Scan speed is 4.5 feet-per-minute or less. All probing is on a 2-inch grid pattern (when using a 3-inch detector) and the count time is a minimum of one minute.

Acceptance is based on a lead and steel mock-up, where the material thicknesses are equivalent to the minimum thicknesses specified by the drawings. The lead and steel mock-up is produced using the same pouring technique as that approved for the cask.

Any area that produces a count rate over that established by the mock-up is considered rejected and must be corrected and retested prior to use.

Test equipment is checked before and after each use to ensure that shield test results are accurate.

#### **8.1.6 Thermal Acceptance Tests**

##### **8.1.6.1 Thermal Test**

A heat transfer acceptance test is conducted to test the integrity of the lead/stainless steel interface and to establish the heat rejection capability of the cask. The test is conducted with the

neutron shield tank full<sup>1</sup> and the pressurized water reactor (PWR) basket located in the dry cask cavity.

The cask is internally heated at a rate of 8,500 BTU per hour ( $\pm 1,000$  BTU per hour). A minimum of 12 internal and 12 external temperatures on the cask are measured with thermocouples. A test closure lid is used to allow penetrations for electric heaters and thermocouples. The steady state heat rate, transient cask temperatures, and ambient temperature are recorded. The test is conducted with the cask 3 feet (approximately) above the ground, horizontal and in still air.

#### **8.1.6.2 Retest**

If any equipment should fail during the test, such that the test must be aborted, the test is repeated.

#### **8.1.6.3 Heat Source**

The heat source for the thermal test is an electrical heater (cal-rod type) with an active length of 144 to 150 inches and is capable of generating at least 2.5 kilowatts.

#### **8.1.7 Neutron Absorber Tests**

##### **8.1.7.1 General**

Neutron absorber material in the form of borated stainless steel sheets is used in the TRIGA poison basket modules. After manufacturing, test samples from each batch of neutron absorber (poison) sheets shall be tested using neutron absorption techniques to verify the presence, proper distribution, and minimum weight percent of enriched boron. The tests shall be performed in accordance with approved written procedures.

##### **8.1.7.2 Preparation of Samples for Spectroscopic Examination**

Detailed written procedures to perform neutron absorption tests of each batch of neutron absorber sheets shall be established by the manufacturer and approved by NAC. For each batch of neutron absorber sheets, a sample shall be taken from each sheet. The samples shall be indelibly marked and recorded for identification.

At least 2 percent of the sheets in a batch shall be tested using a grid pattern of locations covering the entire surface of the sheet. Each of the remaining sheets in a batch shall be tested at one random location to ensure the presence of boron.

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<sup>1</sup> The neutron shield tank is filled with a liquid consisting of 58 weight percent ethylene glycol, 39 weight percent demineralized water and 3 weight percent potassium tetraborate ( $K_2B_4O_7$ ).

### 8.1.7.3 Neutron Absorption Test Performance

An approved facility with a neutron source and neutron detection capability shall be selected to perform the described tests. The tests will assure that the neutron absorption capacity of the material tested is equal to, or higher than, the given reference value and will verify the uniformity of boron distribution of a batch of neutron absorber sheets. The principle of measurement of neutron absorption is that the presence of boron results in a slowing down of neutron flux between the neutron sources, the reflector, and the neutron detector – depending on the material thickness and boron content.

Typical test equipment will consist of a neutron source/neutron detector, a reflector, and a counting instrument. The test equipment is calibrated using approved reference sheet(s), whose  $^{10}\text{B}$  content has been checked and verified by an independent method such as chemical analysis. The highest permissible counting rate is determined from the neutron counting rates of the reference sheet(s), which should be ground to the minimum allowable plate thickness. This calibration process shall be repeated daily (at least once every 24 hours) while tests are being performed.

### 8.1.7.4 Acceptance Criteria

The neutron absorption test shall be considered acceptable if the neutron count determined for each test specimen is less than or equal to the highest permissible neutron count rate determined from the reference sheet(s). The poison sheets shall have a minimum of 1.04 weight-percent enriched boron content, with  $^{10}\text{B}$  being a minimum of 93.88 atom percent. Any specimen not meeting the acceptance criteria for maximum neutron count shall be rejected and all of the sheets from that lot shall be similarly rejected.

## 8.2 Maintenance Program

Each NAC-LWT cask is subjected to a series of tests and inspections prior to each loaded shipment and annually, as shown in the Maintenance Program Schedule (Table 8.2-1).

Prior to each loaded transport, the metallic O-rings of the closure lid and Alternate B port covers, if used, are replaced. The O-ring seals of the alternate port covers are inspected and replaced as necessary. The cask cavity, trunnions, and all removable components (i.e., closure lid, port covers, attachment bolts, impact limiters, etc.) are visually inspected for damage. Following loading, the closure lid and port covers are installed and the bolting torqued. Leakage rate tests are performed on the closure lid and port covers as detailed in the cask loading procedures of Chapter 7.1.

The completion of the annual maintenance and test program is required for each NAC-LWT cask while it is in service. The completion of the annual maintenance is documented on an annual inspection certification document. Each NAC-LWT cask must have a current annual certification before it can be used. The required annual cask maintenance test program is performed during or before the calendar month in which the annual program is due, but it is required to be performed no later than 30 days following the due date. During periods when the cask is not in use, the annual maintenance program may be deferred provided that the annual maintenance is completed and documented prior to the cask's next use.

For NAC-LWT casks to be used to transport TPBAR contents, a one-time post-fabrication hydrostatic test of the cask containment boundary, including Alternate B port covers, shall be performed to a pressure of 450 + 15/-0 psig.

Helium leakage rate testing to the leaktight criteria of ANSI N14.5-1997 is performed on the closure lid, and alternate and Alternate B port cover containment seals.

The annual maintenance program certification documentation shall specifically identify that a NAC-LWT packaging has been qualified by testing for TPBAR contents.

Engineering approval is required prior to making any repairs of damaged areas or areas that need refurbishing as a result of normal wear and tear. All such repairs shall be fully documented in accordance with NAC's approved Quality Assurance program. The replacement of valves, fittings, seals, thread fasteners, or use of calibrated pressure gauges are considered normal maintenance and do not require engineering approval.

Testing of the cask shielding and heat rejection capabilities is conducted during original packaging acceptance testing. The structures that provide shielding and heat rejection are

passive and do not require verification during routine use of the package. Consequently, the efficiency of these systems is not tested during the annual maintenance program. Radiation surveys conducted at the time of cask loading provide verification of continued shielding effectiveness.

Testing of the neutron absorber material utilized in TRIGA poisoned basket modules are conducted prior to fabrication of the basket modules. The neutron absorber material is in the form of borated stainless steel sheets that are visually inspected for wear or damage prior to each use, and do not require routine maintenance.

Following unloading after transport, each HEUNL container shall be visually inspected for damage prior to refilling. Following filling, the HEUNL container fill/drain and vent valves and the HEUNL closure lid seal shall be independently tested to verify proper closure prior to loading in the NAC-LWT cask, in accordance with the operating procedures in Section 7.1.17. Replacement of HEUNL container lid inner O-ring seal or container lid port plug and/or O-ring seal shall require emptying of the container and helium leakage testing of the replaced component in accordance with the procedures described in Section 8.1.4.4.C.3.

Each HEUNL container in service shall be leak tested annually in accordance with the requirements of ANSI N14.5 every twelve (12) months from the point it returned to service, or prior to returning the container to service. Prior to the performance of the helium leak testing of the closure lid inner O-ring and lid port plug seal, the O-rings shall be replaced with approved spares in accordance with Table 8.2-1. Following O-ring seal replacement, the closure lid inner and lid port plug O-ring seals will be leak tested in accordance with the periodic leak testing requirements of Section 8.1.4.4.C.2.

The fill/drain and vent quick disconnect valved nipples and associated seals, and the lid outer O-ring seal shall be replaced annually (every 12 months or prior to returning an HEUNL container to service) in accordance with the Maintenance Table 8.2-1.

## **8.2.1 Authorized Repairs**

Repairs are authorized to correct cracks and blemishes resulting from normal wear and tear of the components of the NAC-LWT packaging. Performance of authorized repairs will result in an as-licensed configuration. The specific weld repair procedure for the impact limiter attachment lugs is described in Section 8.2.1.1.

### **8.2.1.1 Impact Limiter Attachment Lug Repairs**

Impact limiter lugs shall be visually examined prior to each transport to ensure that the impact limiters can be attached to the NAC-LWT cask body in accordance with the Transport Cask

Assembly drawings presented in Chapter 1. During annual NAC-LWT packaging maintenance, the impact limiter attachment lugs and the welds sealing the impact limiter shell to the lugs are visually examined with acceptance criteria in accordance with ANSI/AWS Code D1.2, Paragraph 8.8.1. If defects in the impact limiter shell-to-lug welds or in the lug base material are identified, the weld is repaired in accordance with the applicable License Drawing requirements.

Defects in the shell-to-lug weld are removed by grinding, and the shell is rewelded to the lug. If the lug base material has a defect or is broken in two pieces, the lug base material is prepared to allow completion of a full-penetration weld. The weld repairs shall be performed by qualified welders utilizing approved welding procedures prepared, approved and qualified in accordance with ASME Code, Section IX, or ANSI/AWS D1.2. Approved lug repair welding procedures will validate that the axial load path minimum yield strength and ultimate strength of the completed repair will be 10.0 ksi and 20.0 ksi, respectively, or greater, and that the maximum temperature in the base lug material local (within 0.5 inch) to the weld repaired is maintained less than 350°F during the welding process. Following shell-to-lug weld repairs or completion of the full-penetration welding of the lug base material, the weld shall be examined by liquid penetrant examination in accordance with ASME Code, Section V, Article 6, or ANSI/AWS D1.2. Weld acceptance criteria for the liquid penetrant examination shall be in accordance with the ASME Code, Section VIII, Division 1, Appendix 8, or ANSI/AWS D1.2, Paragraph 6.17, as applicable.

Inspection and weld repair documentation shall be maintained as part of the maintenance records for the specific NAC-LWT packaging.

**Table 8.2-1 Maintenance Program Schedule**

**Cask Cavity (Including Port Cover and Lid Seals)**

Annually	Visual Inspection Lid and Port Cover Seal Replacement Periodic Helium Leak Tests (per Section 8.1.3)
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**Valve Port Covers**

Each Loaded Shipment	Visual Inspection Air Pressure Drop Test at 15 +1/-0 psig (Alternate port covers) Maintenance Helium Leakage Testing (Alternate B port covers) Seal Replacement as Necessary <sup>1</sup>
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**Drain Line Gasket**

Each Shipment	Seal Replacement as Necessary
Annually	Seal Replacement

**Water Jacket and Expansion Tank**

Annually	Visual Inspection Check Fluid Level, Specific Gravity, and Boron Concentration <sup>2</sup>
Each Shipment	Visually Inspect Fill, Drain and Inspection Port Plugs for Leakage

**Cask Lid Bolts**

Each Shipment	Visually Inspect for Damage and Replace, as required.
Long Term Maintenance	Bolt replacement upon reaching 20-year life or 550 operational cycles.

<sup>1</sup> Helium leak testing (per Section 8.1.3.2.2) is required following replacement of alternate port cover containment (i.e., face) O-ring seals. For Alternate B port covers, seal replacement and leak testing are required for each shipment per the requirements specified in the Operating Procedures in Chapter 7 and Section 8.1.3.3.2.

<sup>2</sup> The neutron shield fluid must be verified to contain greater than 1.0 wt % boron and the specific gravity must be such that the solution does not freeze at temperatures above -40°F.

**Table 8.2-1 Maintenance Program Schedule (continued)**

<b>Water Jacket Relief Valve</b>	
Annually	Replace With New Pre-set Valve, or Verify Opening and Reseating Pressure (Allowable variation is $\pm 10$ psig of Nominal Valve Opening Pressure, 165 psig)
<b>Fasteners, Valved Nipples, Washers, Reusable O-rings, and Helicoils</b>	
Each Shipment	Inspect and Replace as necessary
<b>Lid and Alternate B Port Cover Metallic O-rings</b>	
Each Loaded Shipment	Replace and perform helium leakage rate testing to the criteria specified in Section 8.1.3.
<b>HEUNL Container</b>	
Each Loaded Shipment	<p>Test fill/drain and vent quick disconnect valves.</p> <p>Flush with demineralized water or <math>\leq 0.5</math> M nitric acid and visually inspect HEUNL container for damage following discharge of contents and prior to return to service.</p> <p>Perform preshipment leakage test on closure lid inner O-ring seal and lid plug O-ring seal to verify pressure boundary assembly integrity.</p>
After Inner Lid O-ring Seal Replacement or Port Plug and/or O-ring Seal Replacement, or Pressure Boundary Component Replacement or Repair	The container to be emptied and a maintenance helium leakage test to leak tight criteria shall be performed on the replaced seal, or replaced or repaired component.
Annually Every 12 Months or Prior to Returning the Container to Service	<p>The container to be emptied, the inner lid and lid port plug O-ring seals replaced and a periodic helium leakage test to leak tight criteria shall be performed on the closure lid inner O-ring and lid port plug O-ring seals.</p> <p>Replace the container lid outer O-ring seal.</p> <p>Replace fill/drain and vent quick disconnect valved nipples and associated seals</p>



Table 8.2-1 Maintenance Program Schedule (continued)

HEUNL Container (continued)	
After 15 Months of “HEUNL Container Content Fill Time” Usage	Each HEUNL shall be replaced and appropriately disposed of following achieving a total “HEUNL Container Content Fill Time” approaching 15 months. No HEUNL container shall be loaded for transport if $\leq 3$ months are remaining from the 15 month “HEUNL Container Content Fill Time” life limit. [REDACTED]
Following Accident Conditions of Transport	Independent of the remaining service life of an HEUNL container, any HEUNL container exposed to accident conditions shall be recovered, unloaded and replaced/disposed.  Independent of the remaining service life of an HEUNL container, any HEUNL container exposed to accident conditions of transport shall be recovered, unloaded and replaced/disposed.

### **8.3**            **Appendix**

This appendix describes the lead pour procedure used to create the lead wall between the inner and outer shells of the LWT cask. This lead wall provides the gamma shielding in the cask and is subject to tests verifying its shielding integrity.

#### **8.3.1**            **General Description**

Basically, this procedure consists of pouring molten lead in the annular space between the inner and outer shells followed by the controlled cooling of the lead. Electrical heaters and gas burners are used to heat the cask body prior to and during the lead pour. To cool the lead in a controlled manner, water is sprayed on the cask surfaces while simultaneously switching off the electrical heaters and gas burners.

The lead used in this procedure complies with the ASTM Standard B29, chemical copper grade.

#### **8.3.2**            **Preparation**

The cask must be placed in the vertical position (Figure 8.3-1) for the lead pour. It must also be perfectly level and stable.

Stiffening bars are placed inside the cask to prevent distortion of the cask body assembly as a result of the expansion and/or shrinkage expected during the pouring and cooling of the lead. An auxiliary ring is welded on the upper edge of the outer shell to be used as a guide in reaching the required level of lead. This ring is later removed by machining.

The cask body is checked for cleanliness, especially inside the annular space, but also on all outer surfaces. It is important to remove any foreign matter that when heated might be harmful to the surface material.

A Dimensional Verification of the cask body is performed, especially checking the tolerances of the annular space between the inner and outer shells.

The cask body is heated by using a combination of electrical resistances arranged inside the cask and gas burners as rings located at spaced levels surrounding the outer surface of the cask. Prior to the lead pour, the top flange area of the cask is heated with hand burners to approximately 572°F (300°C).

The actual temperatures of the cask walls are measured by thermocouples attached to the inner and outer surfaces of the cask. In addition, the temperature is also measured at random by

contact thermocouples. The temperatures are monitored during the complete operation and recorded on charts.

### **8.3.3 Pouring Procedure**

Approximately 27,533 pounds of lead per cask is melted in the appropriate kettles and kept at a temperature in the range of 698°F (370°C) to 790°F (421°C).

The cask body is heated in a steady and uniform manner at a rate not exceeding 90°F per hour (50°C/hour). Once the cask body reaches the holding temperature of 550°F to 650°F (288°C – 343°C) and this temperature appears stabilized, the lead pouring can begin. Note that particular attention must be given to the method and procedure of heating to ensure that the cask surface does not reach 800°F (427°C) maximum during heating or pouring.

The lead pour should not be interrupted and should take as short a time as possible. The pouring is carried out by using filling tubes of different lengths that are changed in the course of the pouring as the level of molten lead rises in the cask. The open end of the filling tubes is kept below the surface of the lead pool during pouring.

The lead is checked during pouring using steel rods to ensure no solidification occurs.

### **8.3.4 Cooling Process**

Once the required level of lead is reached, it is again checked using steel rods to ensure that no solidification has started anywhere in the molten lead volume.

The cooling is controlled by simultaneously turning off the inside electrical heaters and the gas burners outside the cask. This process begins by switching off the heating band at the lowest end of the cask (while keeping the rest of the heaters and burners on) and continues progressively upwards as the solidification of the lead progresses. Water is injected into the gas burners (rings) and then sprayed on the outside surface of the cask to regulate and accelerate the cooling.

During the solidification, the lead is checked using steel rods to ensure that the difference in height in any part of the solid surface of the annular space is not greater than 2 inches (Figure 8.3-2). To meet this requirement, the heaters and burners (sprayers) must be regulated as necessary. The top surface should be kept molten until the rest of the cask has solidified.

Figure 8.3-1 Lead Pour Configuration

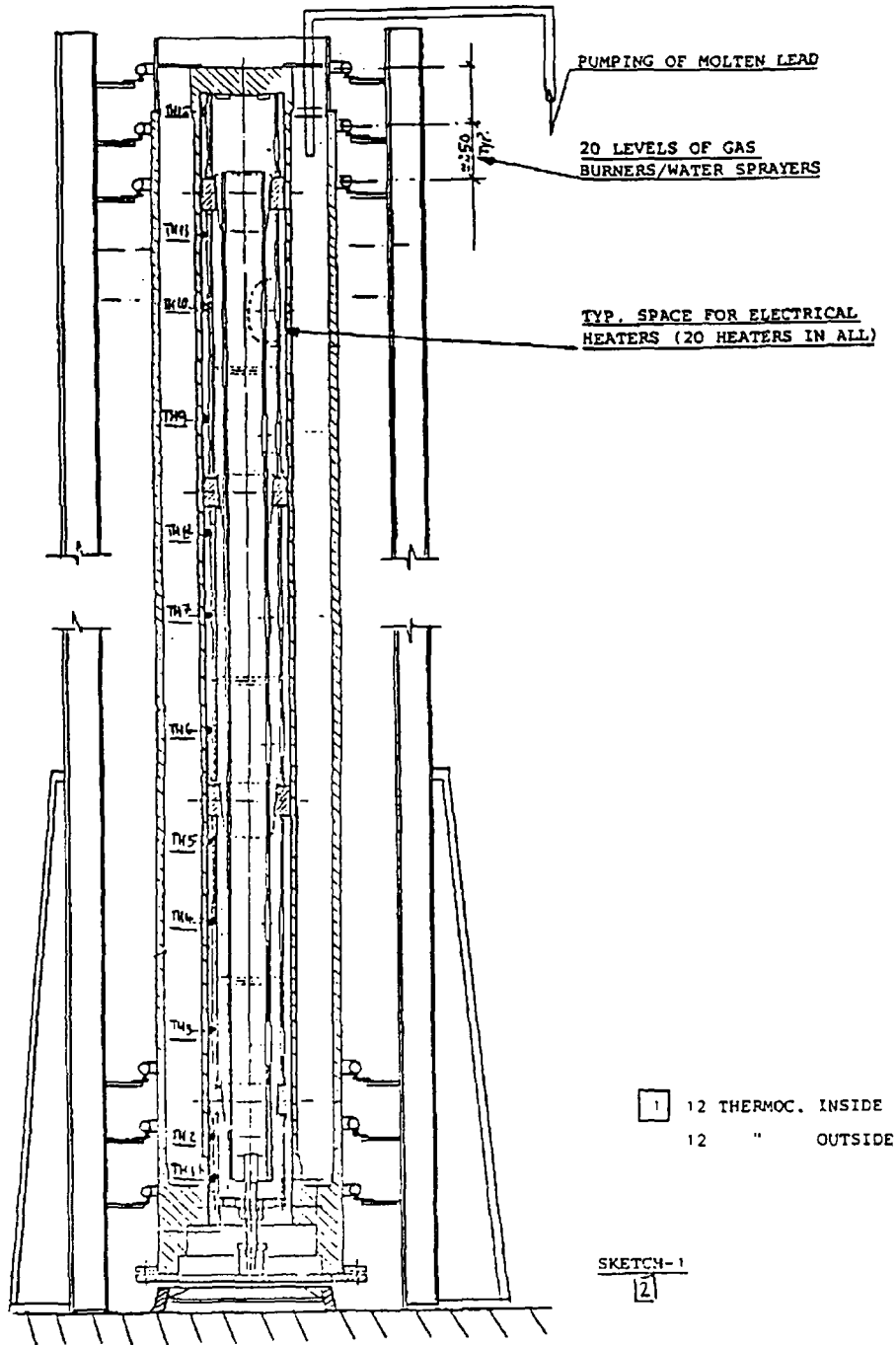
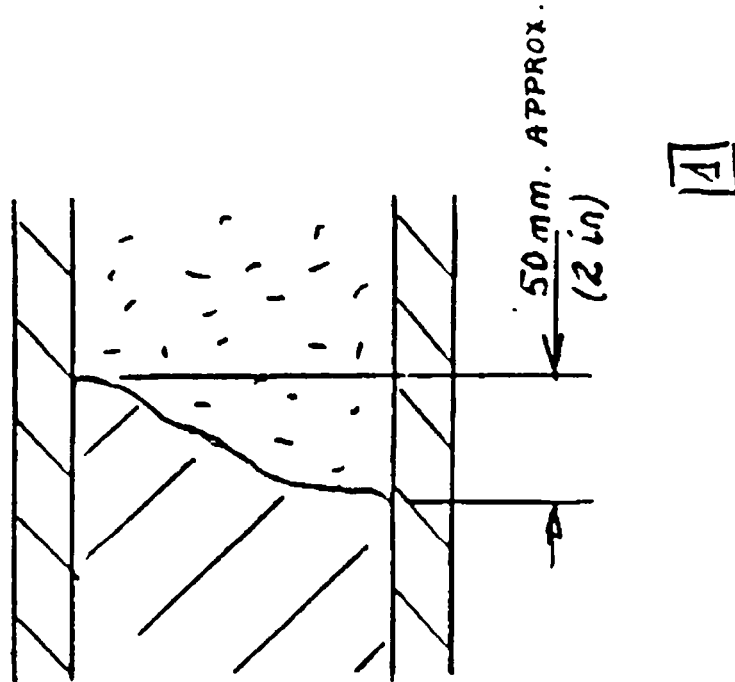


Figure 8.3-2 Allowable Height Difference



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