From:	Cronin,Dan
To:	Hardesty, Duane
Cc:	Shea,Brian C
Subject:	[External_Sender] FW: 30-day ORIGEN Inputs and Outputs - UFTR
Date:	Monday, November 07, 2016 10:34:35 AM
Attachments:	22MHA.out 22MHA.inp

Good Morning Duane,

Attached are the ORIGEN input and output files.

Regards,

--
Daniel J. Cronin
Licensing Engineer | University of Florida Training Reactor
dcronin@ufl.edu | 352-294-2103 | 352-454-0424 Cell

From: Dan Cronin <dcronin@ufl.edu>
Date: Wednesday, September 21, 2016 at 3:12 PM
To: Duane Hardesty <Duane.Hardesty@nrc.gov>
Cc: Brian Shea <bshea@ufl.edu>, David Springfels <dspringfels@gmail.com>, Kelly Jordan <kjordan@mse.ufl.edu>, Alexander Adams <Alexander.Adams@nrc.gov>
Subject: FW: 30-day ORIGEN Inputs and Outputs - UFTR

Please see attached.

--
Daniel J. Cronin
Licensing Engineer | University of Florida Training Reactor
dcronin@ufl.edu | 352-454-0424 Cell

From: David Springfels <dspringfels@gmail.com>
Date: Wednesday, September 21, 2016 at 3:42 PM
To: Dan <dcronin@ufl.edu>
Subject: Inputs and Outputs

This is the input and output files for the 22 bundle MHA calculation.

30 Days @ 100kW
3 Days Decay

--
Regards,

David Springfels

```
*******************************************************************************
*********
 *
*
 *                                  Scale 6.1
*
 *                                  ---------
*
 *                                  June 2011
*
 *
*
 *            Scale:  A Comprehensive Modeling and Simulation Suite
*
 *                    for Nuclear Safety Analysis and Design
*
 *
*
 *                       Reactor and Nuclear Systems Divsion
*
 *                         Oak Ridge National Laboratory
*
 *
*
 *                            http://scale.ornl.gov
*
 *                             scalehelp@ornl.gov
*
 *
*

*******************************************************************************
*********


*******************************************************************************
*********

                  Job Information
                  ---------------
      Job started on DAVIDSPRINGFELS on Tue 23/08/2016 05:47:02
      Working directory:
C:\Users\David\AppData\Local\Temp\scale.David.33572
      Input file name  :
C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA.inp
      Output file name :
C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA.out


*******************************************************************************
```

```
*********
          primary module access and input record ( Scale 6.1 driver )

  The following data cards precede an = card
      'Input generated by GeeWiz SCALE 6.1 Compiled on Mon Jun  6 11:04:33
2011
      'batch_args \-p\-m


    module t6-depl will be called at 05:47:03.842 on 08/23/2016.
    sequence specification record:=t6-depl

    Input Data:

      fuel bundle
      v7-238
      read composition
       wtpt_u3si2-al   1  5.54737  36
                                        92234 0.102238
                                        92235 12.4102
                                        92236 0.0651848
                                        92238 50.3292
                                        14000 4.96633
                                        13027 32.0617
                                        56138 0.000135895
                                        4009 3.39736e-05
                                        5010 1.811928e-05
                                        48000 3.39736e-05
                                        20000 0.00135895
                                        24000 0.0012457
                                        27059 0.000339736
                                        29000 0.00685135
                                        63000 1.35895e-05
                                        64000 1.35895e-05
                                        26000 0.0413459
                                        82000 3.39736e-05
                                        3007 6.79473e-06
                                        12000 0.000679473
                                        25055 0.000588877
                                        42000 0.000203842
                                        28000 0.00294438
                                        7014 0.0037371
                                        15031 0.00135895
                                        62151 1.35895e-05
                                        47107 6.79473e-05
                                        11023 0.000679473
                                        50000 6.79473e-05
                                        74182 0.0003901303
                                        74183 0.00021067
                                        74184 0.000451079
                                        74186 0.000418544
                                        23000 0.000305763
```

```
                                    30000 0.00135895
                                    40000 0.000260465
                               1 323.025   end
       atom_h2o        2  0.99396  2
                                    8016 1
                                    1001 2
                               1 308.4   end
       wtpt_al_clad    3  2.702  16
                                    13027 97.615
                                    14000 0.5
                                    26000 0.354
                                    29000 0.294
                                    25055 0.07
                                    12000 0.924
                                    24000 0.135
                                    30000 0.089
                                    23000 0.01
                                    5010 0.000184
                                    5011 0.000816
                                    27059 0.001
                                    31000 0.005
                                    48000 0.001
                                    3006 6.5e-05
                                    3007 0.000935
                               1 322.975   end
      end composition
      read depletion
        -1  end
          assign 1 1 end
      end depletion
      read burndata
        power=0.00545 burn=5 end
        power=0.00545 burn=5 end
        power=0.00545 burn=5 end
        power=0.00545 burn=5 end
        power=0.00545 burn=5 end
        power=0.00545 burn=5 down=3 end
      end burndata
      read timetable
      end timetable
      read opus
        title="curies"
        symnuc=ag-109 am-241 am-242m am-243 cm-242 cm-243 cm-244 cm-245
cs-133
      eu-153 gd-155 i-129 i-130 i-131 i-132 i-133 i-135 kr-85 kr-85m kr-88
      mo-95 nd-143 nd-145 o-16 pm-147 pu-238 pu-239 pu-240 pu-241 pu-242
      pu-243 rh-103 ru-101 sm-147 sm-149 sm-150 sm-151 sm-152 tc-99 u-234
      u-235 u-236 u-238 xe-131 xe-133 xe-133m xe-135 xe-135m end
        units=curies
        time=days
        title="curies"
        matl=1 end
```

```
       new case
        title="grams"
        symnuc=ag-108m ag-109 am-241 am-242m am-243 cm-242 cm-243 cm-244
      cm-245 cs-133 eu-153 gd-155 i-129 i-130 i-131 i-132 i-133 i-135 kr-85
      kr-85m kr-88 mo-95 nd-143 nd-145 o-16 pu-238 pu-239 pu-240 pu-241
      pu-242 pu-243 ra-222 rh-103 ru-101 sm-147 sm-149 sm-150 sm-151 sm-152
      tc-99 u-234 u-235 u-236 u-238 xe-133 xe-133m xe-135 xe-135m end
        units=grams
        time=days
      end opus
      read model
      read parameter
       gen=103
       npg=20000
       flx=yes
       htm=yes
      end parameter
      read geometry
      unit 1
      com="fuel meat"
       cuboid 1  2.97815  -2.97815   0.0254  -0.0254  30.00375
-30.00375
       cuboid 2  3.61315  -3.61315   0.0635  -0.0635  32.54375
-32.54375
       cuboid 3  3.61315  -3.61315  0.20447  -0.20447  32.54375
-32.54375
       media 1 1 1
       media 3 1 2 -1
       media 2 1 -1 -2 3
       boundary 3
      global unit 2
      com="array unit"
       cuboid 1  3.61315  -3.61315  5.52069  -0.20447  32.54375
-32.54375
       array 1 1  place 1 1 1 0 0 0
       boundary 1
      end geometry
      read array
      ara=1 nux=1 nuy=14 nuz=1 typ=square
       com=''
       fill
          1
          1
          1
          1
          1
          1
          1
          1
          1
          1
          1
          1
```

```
          1
          1
          1  end fill
      end array
      read bnds
        body=1
          surface(1)=h2o
          surface(2)=h2o
          surface(3)=graphite
          surface(4)=graphite
          surface(5)=h2o
          surface(6)=h2o
        end bnds
      read volume
        type=trace
      end volume
      end data
      end model
```

module t6-depl used 9.70 seconds cpu time for the current pass.

secondary module crawdad will be called at 05:47:13.554 on 08/23/2016.

module crawdad is finished. completion code   0. cpu time used 41.73 seconds.

secondary module bonami   will be called at 05:47:55.288 on 08/23/2016.

module bonami   is finished. completion code   0. cpu time used 2.56 seconds.

secondary module worker   will be called at 05:47:57.847 on 08/23/2016.

module worker   is finished. completion code   0. cpu time used 8.03 seconds.

module t6-depl used 0.05 seconds cpu time for the current pass.

secondary module worker   will be called at 05:48:05.928 on 08/23/2016.

module worker   is finished. completion code   0. cpu time used 1.09 seconds.

module t6-depl used 0.05 seconds cpu time for the current pass.

secondary module kenovi   will be called at 05:48:07.066 on 08/23/2016.

module kenovi is finished. completion code 0. cpu time used 183.88 seconds.

secondary module kmart6 will be called at 05:51:10.944 on 08/23/2016.

module kmart6 is finished. completion code 0. cpu time used 0.29 seconds.

module t6-depl used 0.21 seconds cpu time for the current pass.

secondary module couple will be called at 05:51:11.443 on 08/23/2016.

module couple is finished. completion code 0. cpu time used 2.80 seconds.

secondary module origen will be called at 05:51:14.251 on 08/23/2016.

module origen is finished. completion code 0. cpu time used 0.41 seconds.

module t6-depl used 0.16 seconds cpu time for the current pass.

secondary module bonami will be called at 05:51:14.813 on 08/23/2016.

module bonami is finished. completion code 0. cpu time used 2.15 seconds.

secondary module worker will be called at 05:51:16.966 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 3.77 seconds.

module t6-depl used 0.05 seconds cpu time for the current pass.

secondary module worker will be called at 05:51:20.788 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 1.33 seconds.

module t6-depl used 0.04 seconds cpu time for the current pass.

secondary module kenovi will be called at 05:51:22.160 on 08/23/2016.

module kenovi is finished. completion code 0. cpu time used 184.36 seconds.

secondary module kmart6 will be called at 05:54:26.522 on 08/23/2016.

module kmart6 is finished. completion code 0. cpu time used 0.10 seconds.

module t6-depl used 0.12 seconds cpu time for the current pass.

secondary module couple will be called at 05:54:26.740 on 08/23/2016.

module couple is finished. completion code 0. cpu time used 0.63 seconds.

secondary module origen will be called at 05:54:27.364 on 08/23/2016.

module origen is finished. completion code 0. cpu time used 0.36 seconds.

module t6-depl used 0.15 seconds cpu time for the current pass.

secondary module bonami will be called at 05:54:27.879 on 08/23/2016.

module bonami is finished. completion code 0. cpu time used 2.26 seconds.

secondary module worker will be called at 05:54:30.141 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 3.89 seconds.

module t6-depl used 0.04 seconds cpu time for the current pass.

secondary module worker will be called at 05:54:34.072 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 1.49 seconds.

module t6-depl used 0.04 seconds cpu time for the current pass.

secondary module kenovi will be called at 05:54:35.601 on 08/23/2016.

module kenovi is finished. completion code 0. cpu time used 183.21 seconds.

secondary module kmart6 will be called at 05:57:38.803 on

08/23/2016.

module kmart6 is finished. completion code 0. cpu time used 0.09 seconds.

module t6-depl used 0.12 seconds cpu time for the current pass.

secondary module couple will be called at 05:57:39.021 on 08/23/2016.

module couple is finished. completion code 0. cpu time used 0.61 seconds.

secondary module origen will be called at 05:57:39.629 on 08/23/2016.

module origen is finished. completion code 0. cpu time used 0.27 seconds.

module t6-depl used 0.40 seconds cpu time for the current pass.

secondary module bonami will be called at 05:57:40.300 on 08/23/2016.

module bonami is finished. completion code 0. cpu time used 2.59 seconds.

secondary module worker will be called at 05:57:42.890 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 3.59 seconds.

module t6-depl used 0.05 seconds cpu time for the current pass.

secondary module worker will be called at 05:57:46.525 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 1.45 seconds.

module t6-depl used 0.04 seconds cpu time for the current pass.

secondary module kenovi will be called at 05:57:48.022 on 08/23/2016.

module kenovi is finished. completion code 0. cpu time used 183.84 seconds.

secondary module kmart6 will be called at 06:00:51.853 on 08/23/2016.

module kmart6 is finished. completion code 0. cpu time used 0.10 seconds.

module t6-depl used 0.13 seconds cpu time for the current pass.

secondary module couple will be called at 06:00:52.087 on 08/23/2016.

module couple is finished. completion code 0. cpu time used 0.61 seconds.

secondary module origen will be called at 06:00:52.695 on 08/23/2016.

module origen is finished. completion code 0. cpu time used 0.37 seconds.

module t6-depl used 0.14 seconds cpu time for the current pass.

secondary module bonami will be called at 06:00:53.210 on 08/23/2016.

module bonami is finished. completion code 0. cpu time used 3.53 seconds.

secondary module worker will be called at 06:00:56.736 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 3.59 seconds.

module t6-depl used 0.06 seconds cpu time for the current pass.

secondary module worker will be called at 06:01:00.386 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 1.57 seconds.

module t6-depl used 0.05 seconds cpu time for the current pass.

secondary module kenovi will be called at 06:01:02.009 on 08/23/2016.

module kenovi is finished. completion code 0. cpu time used 185.24 seconds.

secondary module kmart6 will be called at 06:04:07.243 on 08/23/2016.

module kmart6 is finished. completion code 0. cpu time used 0.09 seconds.

module t6-depl used 0.14 seconds cpu time for the current pass.

secondary module couple   will be called at 06:04:07.477 on 08/23/2016.

module couple   is finished. completion code   0. cpu time used 0.62 seconds.

secondary module origen   will be called at 06:04:08.101 on 08/23/2016.

module origen   is finished. completion code   0. cpu time used 0.25 seconds.

module t6-depl used 0.16 seconds cpu time for the current pass.

secondary module bonami   will be called at 06:04:08.507 on 08/23/2016.

module bonami   is finished. completion code   0. cpu time used 2.65 seconds.

secondary module worker   will be called at 06:04:11.159 on 08/23/2016.

module worker   is finished. completion code   0. cpu time used 3.85 seconds.

module t6-depl used 0.05 seconds cpu time for the current pass.

secondary module worker   will be called at 06:04:15.059 on 08/23/2016.

module worker   is finished. completion code   0. cpu time used 1.09 seconds.

module t6-depl used 0.03 seconds cpu time for the current pass.

secondary module kenovi   will be called at 06:04:16.182 on 08/23/2016.

module kenovi   is finished. completion code   0. cpu time used 183.09 seconds.

secondary module kmart6   will be called at 06:07:19.264 on 08/23/2016.

module kmart6   is finished. completion code   0. cpu time used 0.07 seconds.

module t6-depl used 0.15 seconds cpu time for the current pass.

secondary module couple will be called at 06:07:19.483 on 08/23/2016.

module couple is finished. completion code 0. cpu time used 0.60 seconds.

secondary module origen will be called at 06:07:20.091 on 08/23/2016.

module origen is finished. completion code 0. cpu time used 0.27 seconds.

module t6-depl used 0.14 seconds cpu time for the current pass.

secondary module bonami will be called at 06:07:20.497 on 08/23/2016.

module bonami is finished. completion code 0. cpu time used 3.13 seconds.

secondary module worker will be called at 06:07:23.632 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 3.61 seconds.

module t6-depl used 0.03 seconds cpu time for the current pass.

secondary module worker will be called at 06:07:27.267 on 08/23/2016.

module worker is finished. completion code 0. cpu time used 1.09 seconds.

module t6-depl used 0.05 seconds cpu time for the current pass.

secondary module kenovi will be called at 06:07:28.406 on 08/23/2016.

module kenovi is finished. completion code 0. cpu time used 184.52 seconds.

secondary module kmart6 will be called at 06:10:32.923 on 08/23/2016.

module kmart6 is finished. completion code 0. cpu time used 0.09 seconds.

module t6-depl used 0.12 seconds cpu time for the current pass.

secondary module couple will be called at 06:10:33.141 on

08/23/2016.

    module couple   is finished. completion code   0. cpu time used 0.61 seconds.

    secondary module origen   will be called at 06:10:33.750 on 08/23/2016.

    module origen   is finished. completion code   0. cpu time used 0.89 seconds.

    module t6-depl used 0.20 seconds cpu time for the current pass.

    secondary module opus   will be called at 06:10:34.842 on 08/23/2016.

    module opus   is finished. completion code   0. cpu time used 0.24 seconds.

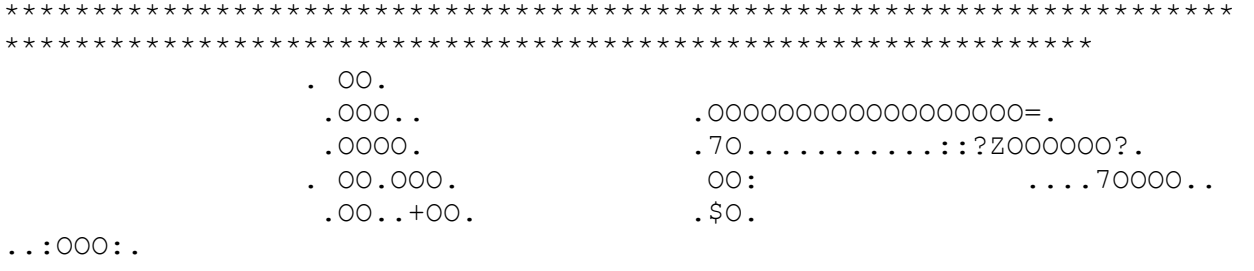
    module t6-depl used 0.03 seconds cpu time for the current pass.

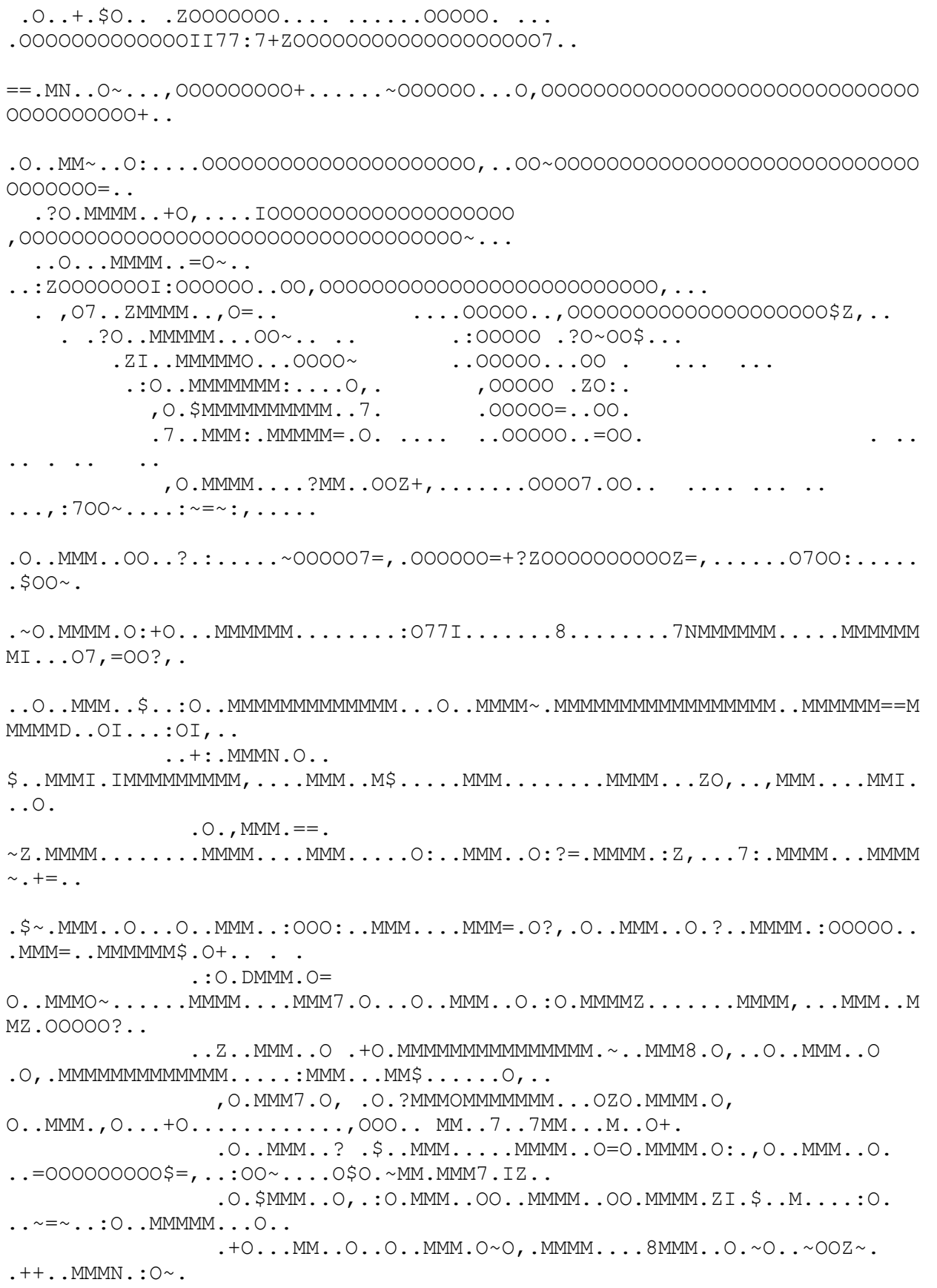
    secondary module opus   will be called at 06:10:35.107 on 08/23/2016.

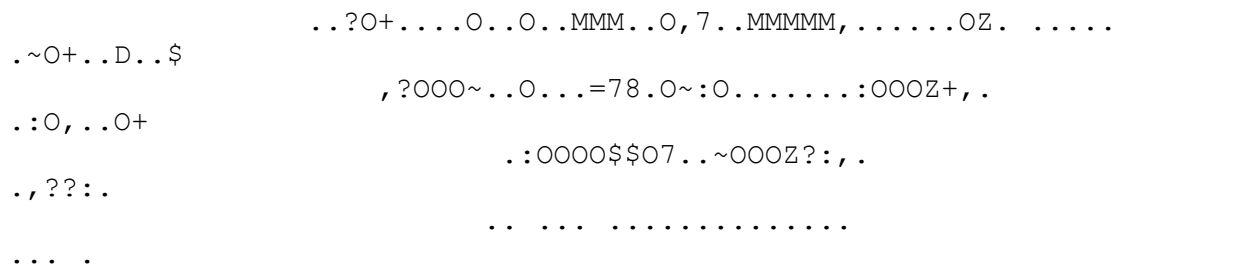
    module opus   is finished. completion code   0. cpu time used 0.05 seconds.

    module t6-depl is finished. completion code   0. total cpu time used 23.54 minutes.

    Scale is finished at 06:10:36.495 on 08/23/2016
_plot00000000000000000.plt copied to C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA.00000000000000000.plt.
_plot00000000000000001.plt copied to C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA.00000000000000001.plt.
_vol000000000000000000.volumes copied to C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA.000000000000000000.volumes.
22MHA.html copied to C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA.html.
1







****

1

```
   TTTTTTTTTTTT     666666666666                    DDDDDDDDDDDD
EEEEEEEEEEEEE   PPPPPPPPPPPP    LL
   TTTTTTTTTTTT    6666666666666                    DDDDDDDDDDDDD
EEEEEEEEEEEEE   PPPPPPPPPPPPP   LL
        TT         66                               DD         DD   EE
PP         PP   LL
        TT         66                               DD         DD   EE
PP         PP   LL
        TT         66                               DD         DD   EE
PP         PP   LL
        TT         666666666666    -------------   DD         DD
EEEEEEEEE       PPPPPPPPPPPPP   LL
        TT         6666666666666   -------------   DD         DD
EEEEEEEEE       PPPPPPPPPPPP    LL
        TT         66         66                    DD         DD   EE
PP              LL
        TT         66         66                    DD         DD   EE
PP              LL
        TT         66         66                    DD         DD   EE
PP              LL
        TT         6666666666666                    DDDDDDDDDDDDD
EEEEEEEEEEEEE   PP              LLLLLLLLLLLL
        TT          66666666666                     DDDDDDDDDDDD
EEEEEEEEEEEEE   PP              LLLLLLLLLLLL
```

```
   DDDDDDDDDDDD      AAAAAAAAA     VV          VV  IIIIIIIIIII
DDDDDDDDDDDD
   DDDDDDDDDDDDD    AAAAAAAAAA    VV          VV  IIIIIIIIIII
DDDDDDDDDDDDD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA   VV          VV       II         DD
DD
```

```
   DD          DD   AAAAAAAAAAAAA    VV         VV         II          DD
DD
   DD          DD   AA          AA      VV     VV          II          DD
DD
   DD          DD   AA          AA       VV   VV           II          DD
DD
   DD          DD   AA          AA        VV VV            II          DD
DD
   DDDDDDDDDDDDD   AA          AA         VVV       IIIIIIIIIIII
DDDDDDDDDDDDD
   DDDDDDDDDDDD    AA          AA          V        IIIIIIIIIIII
DDDDDDDDDDDD
```

```
      0000000       88888888888                //   22222222222
33333333333               //        11          666666666666
     000000000     8888888888888              //   2222222222222
3333333333333             //        111         6666666666666
    00       00    88         88             //    22         22   33
33             //        1111        66
   00         00   88         88            //                22
33            //           11        66
   00         00   88         88           //                 22
33           //            11        66
   00         00    88888888888           //                22
333          //             11        666666666666
   00         00    88888888888          //                22
333          //              11        6666666666666
   00         00   88         88         //              22
33        //               11        66         66
   00         00   88         88       //            22
33       //                11        66         66
    00       00    88         88      //            22            33
33      //                 11        66         66
     000000000     8888888888888     //           2222222222222
3333333333333    //               11111111     6666666666666
      0000000       88888888888     //           2222222222222
33333333333    //                11111111     66666666666
```

```
      0000000      5555555555555                            44
7777777777777                      0000000              44
     000000000     5555555555555                          444
777777777777                     000000000            444
    00       00    55                   :::              4444     77
77          :::       00       00           4444
   00         00   55                   :::             44 44
77           :::       00         00         44 44
   00         00   55                   :::            44  44
77            :::       00         00        44  44
```

```
   00          00   555555555555                          44   44
77                        00          00        44   44
   00          00   5555555555555                        44    44
77                        00          00       44    44
   00          00              55          :::         444444444444
77               :::        00           00    444444444444
   00          00              55          :::        4444444444444
77               :::        00           00   4444444444444
    00        00    55          55          :::                 44
77                ::::         00        00              44
     000000000     5555555555555                          44
77                           000000000               44
      0000000       55555555555                           44
77                           0000000                 44
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAA    LL
EEEEEEEEEEEEE
   SS          SS   CC          CC   AA          AA   LL              EE
   SS               CC               AA          AA   LL              EE
   SS               CC               AA          AA   LL              EE
   SSSSSSSSSSS    CC               AAAAAAAAAAAAA   LL
EEEEEEEEE
    SSSSSSSSSSS   CC               AAAAAAAAAAAAA   LL
EEEEEEEEE
              SS   CC               AA          AA   LL              EE
              SS   CC               AA          AA   LL              EE
   SS          SS   CC          CC   AA          AA   LL              EE
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA          AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA          AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

```
**************************************************************************
**************************************************

**************************************************************************
**************************************************

**************************************************************************
**************************************************
        *****
*****
        *****                                          program
verification information                                          *****
```

```
        *****
*****
        *****                                          code system:  SCALE
version:  6.1                                              *****
        *****
*****

********************************************************************************
************************************************

********************************************************************************
************************************************
        *****
*****
        *****
*****
        *****               program:  triton6
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  05:47:04.87
*****
        *****
*****
        *****
```

```
*****

************************************************************************
************************************************

************************************************************************
************************************************

************************************************************************
************************************************
1
     fuel bundle

     **** problem parameters ****

     lib v7-238n      library

     mxx            3 maximum mixture number in problem
     msc            3 composition specifications

     ncell          1 total number of cells


     **** problem composition description ****

     sc  wtpt_u3si2-al    standard composition
     mx              1     mixture no.
     vf         1.0000     volume fraction
     roth       5.5474     specified density
     nel            36     no. elements
     icp             0     0/1 mixture/compound
     temp        323.0     deg kelvin
                 92234     0.102 wt%
                 92235    12.410 wt%
                 92236     0.065 wt%
                 92238    50.329 wt%
                 14000     4.966 wt%
                                  14028    91.866 wt%
                                  14029     4.834 wt%
                                  14030     3.300 wt%
                 13027    32.062 wt%
                 56138     0.000 wt%
                  4009     0.000 wt%
                  5010     0.000 wt%
                 48000     0.000 wt%
                                  48106     1.178 wt%
                                  48108     0.854 wt%
                                  48110    12.211 wt%
                                  48111    12.628 wt%
                                  48112    24.021 wt%
                                  48113    12.274 wt%
                                  48114    29.111 wt%
```

		48116	7.723 wt%
20000	0.001 wt%		
		20040	96.662 wt%
		20042	0.677 wt%
		20043	0.145 wt%
		20044	2.288 wt%
		20046	0.005 wt%
		20048	0.224 wt%
24000	0.001 wt%		
		24050	4.174 wt%
		24052	83.699 wt%
		24053	9.674 wt%
		24054	2.453 wt%
27059	0.000 wt%		
29000	0.007 wt%		
		29063	68.479 wt%
		29065	31.521 wt%
63000	0.000 wt%		
		63151	47.481 wt%
		63153	52.519 wt%
64000	0.000 wt%		
		64152	0.193 wt%
		64154	2.134 wt%
		64155	14.581 wt%
		64156	20.297 wt%
		64157	15.617 wt%
		64158	24.946 wt%
		64160	22.232 wt%
26000	0.041 wt%		
		26054	5.646 wt%
		26056	91.902 wt%
		26057	2.160 wt%
		26058	0.293 wt%
82000	0.000 wt%		
		82204	1.378 wt%
		82206	23.955 wt%
		82207	22.074 wt%
		82208	52.592 wt%
3007	0.000 wt%		
12000	0.001 wt%		
		12024	77.950 wt%
		12025	10.280 wt%
		12026	11.770 wt%
25055	0.001 wt%		
42000	0.000 wt%		
		42092	14.149 wt%
		42094	9.034 wt%
		42095	15.729 wt%
		42096	16.674 wt%
		42097	9.657 wt%
		42098	24.686 wt%
		42100	10.070 wt%

```
            28000     0.003 wt%
                              28058    67.198 wt%
                              28060    26.776 wt%
                              28061     1.183 wt%
                              28062     3.835 wt%
                              28064     1.008 wt%
             7014     0.004 wt%
            15031     0.001 wt%
            62151     0.000 wt%
            47107     0.000 wt%
            11023     0.001 wt%
            50000     0.000 wt%
                              50112     0.914 wt%
                              50114     0.633 wt%
                              50115     0.329 wt%
                              50116    14.196 wt%
                              50117     7.563 wt%
                              50118    24.055 wt%
                              50119     8.604 wt%
                              50120    32.907 wt%
                              50122     4.755 wt%
                              50124     6.043 wt%
            74182     0.000 wt%
            74183     0.000 wt%
            74184     0.000 wt%
            74186     0.000 wt%
            23000     0.000 wt%
            30000     0.001 wt%
            40000     0.000 wt%
                              40090    50.706 wt%
                              40091    11.181 wt%
                              40092    17.278 wt%
                              40094    17.891 wt%
                              40096     2.944 wt%
end


sc  atom_h2o          standard composition
mx              2     mixture no.
vf         1.0000     volume fraction
roth       0.9940     specified density
nel             2     no. elements
icp             1     0/1 mixture/compound
temp        308.4     deg kelvin
             8016      1.00 atom/molecule
             1001      2.00 atoms/molecule
end


sc  wtpt_al_clad      standard composition
mx              3     mixture no.
vf         1.0000     volume fraction
```

```
roth      2.7020     specified density
nel           16     no. elements
icp            0     0/1 mixture/compound
temp       323.0     deg kelvin
           13027    97.615 wt%
           14000     0.500 wt%
                            14028    91.866 wt%
                            14029     4.834 wt%
                            14030     3.300 wt%
           26000     0.354 wt%
                            26054     5.646 wt%
                            26056    91.902 wt%
                            26057     2.160 wt%
                            26058     0.293 wt%
           29000     0.294 wt%
                            29063    68.479 wt%
                            29065    31.521 wt%
           25055     0.070 wt%
           12000     0.924 wt%
                            12024    77.950 wt%
                            12025    10.280 wt%
                            12026    11.770 wt%
           24000     0.135 wt%
                            24050     4.174 wt%
                            24052    83.699 wt%
                            24053     9.674 wt%
                            24054     2.453 wt%
           30000     0.089 wt%
           23000     0.010 wt%
            5010     0.000 wt%
            5011     0.001 wt%
           27059     0.001 wt%
           31000     0.005 wt%
                            31069    59.420 wt%
                            31071    40.580 wt%
           48000     0.001 wt%
                            48106     1.178 wt%
                            48108     0.854 wt%
                            48110    12.211 wt%
                            48111    12.628 wt%
                            48112    24.021 wt%
                            48113    12.274 wt%
                            48114    29.111 wt%
                            48116     7.723 wt%
            3006     0.000 wt%
            3007     0.001 wt%
end
```

****

WARNING WARNING WARNING WARNING WARNING WARNING WARNING WARNING

```
   all compositions will be treated as infinite homogeneous medium
 ****************************************************************


1
********************************************************************************
*****************************************
        ***
***
        ***                                 fuel bundle
***
        ***
***

********************************************************************************
*****************************************

********************************************************************************
*****************************************
        ***
***
        ***                                   ********** data library
information **********                                  ***
        ***
***
        ***          unit
***
        ***         number                 data set name
unit function                      ***
        ***         ------                 -------------
-------------                      ***
        ***
***
        ***            89     C:\SCALE\data\scale.rev35.sclib
standard composition library       ***
        ***
***
        ***            88     C:\SCALE\data\scale.rev07.xn238v7
cross section library              ***
        ***
***
        ***            11
->Data\Local\Temp\scale.David.33572\ft11f001             short cross
section library        ***
        ***
***
        ***            91
->Data\Local\Temp\scale.David.33572\xfile091             input data
direct access           ***
        ***
***
```

```
********************************************************************************
*****************************************

********************************************************************************
*****************************************
        ***
***
        ***
***
        ***                                          standard composition
library data                                           ***
        ***
---------------------------------
***
        ***
***
        ***             unit number  :  89
***
        ***
***
        ***             dataset name :  C:\SCALE\data\scale.rev35.sclib
***
        ***
***
        ***             library title:  scale-6 standard composition
library                                              ***
        ***                                729 standard compositions,
3312 nuclides                                          ***
        ***                                 91 elements with variable
isotopic distributions        created on 04/28/11   ***
        ***
***
        ***             creation date:  04/28/11
***
        ***
***
        ***
***
        ***
***
        ***                                             cross section
library data                                            ***
        ***
---------------------------
***
        ***
***
        ***             unit number  :  88
***
        ***
***
        ***             dataset name :
```

```
C:\SCALE\data\scale.rev07.xn238v7
***
        ***
***
        ***             library title:  238-group ENDF/B-VII.0 Library
***
        ***                             Developed by M.E. Dunn  and D.
Wiarda                                                  ***
        ***                                 Updated:  12/17/09
***
        ***
***
        ***
***
        ***
***
        ***
***
        ***
***
        ***
***
```

****
****

****
****

**** H/X data ****

mixture	H/92233	H/92235	H/94239	H/94241
1	0.00000E+00	5.66933E-18	1.00000E+00	1.00000E+00

****
****

Based on the supplied burnup history, triton will use the following time history to perform depletion calculations. This breakdown has been calculated so as to permit burn steps of no more than 40 days, and decay times using the rule of threes with a maximum first decay period of no more than 75 days.

****
****

7 time-dependent libraries will be created

```
  Sub-Interval   Depletion   Sub-interval    Specific      Burn Length
Decay Length   Library Burnup
       No.       Interval     in interval  Power(MW/MTIHM)     (d)
(d)           (MWd/MTIHM)

-------------------------------------------------------------------------
-----------------------------
         0     ****Initial Bootstrap Calculation****
0.00000E+00
         1           1                1         0.545E-02      5.00
0.00          1.36250E-02
         2           2                1         0.545E-02      5.00
0.00          4.08750E-02
         3           3                1         0.545E-02      5.00
0.00          6.81250E-02
         4           4                1         0.545E-02      5.00
0.00          9.53750E-02
         5           5                1         0.545E-02      5.00
0.00          1.22625E-01
         6           6                1         0.545E-02      5.00
3.00          1.49875E-01

-------------------------------------------------------------------------
-----------------------------
 NOTE: Library Burnup is the cumulative burnup computed at the midpoint
of the depletion sub-interval.
       Specific Power and Library Burnup depend on basis material(s)
selected in DEPLETION block.


                                ........ finished reading the keno-vi
parameter data    ........


                               *************** data reading completed
***************

                                ........ finished preparing the keno-vi
input data    ........

                                ........ finished loading the data
........

                                ........ finished checking the keno-vi
geometry data    ........
                                *****  restart data has been written on
unit 95  *****

                                ........ finished writing the keno-vi -
triton6 data    ........
*************************************************************************
**********
```

```
** System total mass is 8.6518E+02 grams heavy metal.
**
** Masses will be normalized by a factor of 1.1558E+03 to obtain a total
**
** system mass of 1.0000E+06 g of heavy metal
**
**********************************************************************
**********

    Mix  Heavy Metal    Normalized HM  Fractional HM  Heavy Metal
Mixture
    No.   Mass (g)        Mass (g)       Mass (g)     Dens. (g/cc)
Dens. (g/cc)    Depletion Mode
      1    8.651789E+02   1.000000E+06     1.000000     3.489674E+00
5.547370E+00  Depleted by power
      2    0.000000E+00   0.000000E+00     0.000000     0.000000E+00
9.939600E-01  Not depleted
      3    0.000000E+00   0.000000E+00     0.000000     0.000000E+00
2.702000E+00  Not depleted
 System    8.651789E+02   1.000000E+06     1.000000     3.212956E-01
1.790836E+00

**********************************************************************
**********************************************
 Warning:  Depletion materials contain nuclides that will not be depleted.


 The following 2 nuclides of depletion material 1 will not be depleted:
 ID:     23000 (v           )
 ID:     30000 (zn          )

**********************************************************************
**********************************************



                                  *****  modified keno-vi data has been
rewritten on unit 95  *****
0**********************************************************************
************************************************************
  All flags indicate GO for launch
  Calculation will proceed...

**********************************************************************
************************************************************
```

```
     0$ array      5 entries read

     1$ array      7 entries read

     0t

     2$ array    199 entries read

     3$ array    199 entries read

     4* array    199 entries read

     0t


   --- Material powers for depletion pass no.   0 (MW/MITHM) ---
       Time =     0.00 days (   0.000 y), Burnup = 0.00     GWd/MTIHM,
Transport k= 0.7664

                    Total    Fractional  Mixture     Mixture
Mixture
         Mixture    Power      Power      Power    Thermal Flux  Total
Flux
          Number (MW/MTIHM)     (---)    (MW/MTIHM)  n/(cm^2*sec)
n/(cm^2*sec)
             1 *     0.005    0.99647      0.005    7.1691E+08
2.8064E+09
             2       0.000    0.00231     N/A       7.8663E+08
2.5077E+09
             3       0.000    0.00122     N/A       7.5297E+08
2.3707E+09
         Total       0.005    1.00000

         * - Power normalized to this mixture.

    NOTE:    Total Power is the Mixture Power per 1 metric ton of HM of
the initial  system mass.
           Mixture Power is the Mixture Power per 1 metric ton of HM of
the initial mixture mass.
           Mixture Thermal Flux determined using 0.625 eV cutoff: Groups
200 through 238.
   ------------------------------------------------------------------
```

***** modified keno-vi data has been rewritten on unit 95 *****

0$ array 5 entries read

1$ array 7 entries read

0t

2$ array 199 entries read

3$ array 199 entries read

4* array 199 entries read

0t

--- Material powers for depletion pass no. 1 (MW/MITHM) ---
Time = 2.50 days (0.007 y), Burnup =1.363E-05 GWd/MTIHM, Transport k= 0.7655

Mixture Number	Total Power (MW/MTIHM)	Fractional Power (---)	Mixture Power (MW/MTIHM)	Mixture Thermal Flux n/(cm^2*sec)	Mixture Total Flux n/(cm^2*sec)
1 *	0.005	0.99647	0.005	7.1655E+08	2.8089E+09
2	0.000	0.00231	N/A	7.8801E+08	2.5117E+09
3	0.000	0.00122	N/A	7.5410E+08	2.3739E+09
Total	0.005	1.00000			

* - Power normalized to this mixture.

NOTE: Total Power is the Mixture Power per 1 metric ton of HM of the initial system mass.
Mixture Power is the Mixture Power per 1 metric ton of HM of the initial mixture mass.
Mixture Thermal Flux determined using 0.625 eV cutoff: Groups

200 through 238.

***** modified keno-vi data has been rewritten on unit 95 *****

0$ array 5 entries read

1$ array 7 entries read

0t

2$ array 199 entries read

3$ array 199 entries read

4* array 199 entries read

0t

--- Material powers for depletion pass no. 2 (MW/MITHM) ---
Time = 7.50 days (0.021 y), Burnup =4.087E-05 GWd/MTIHM, Transport k= 0.7653

Mixture Number	Total Power (MW/MTIHM)	Fractional Power (---)	Mixture Power (MW/MTIHM)	Mixture Thermal Flux n/(cm^2*sec)	Mixture Total Flux n/(cm^2*sec)
1 *	0.005	0.99647	0.005	7.1645E+08	2.8061E+09
2	0.000	0.00231	N/A	7.8708E+08	2.5090E+09
3	0.000	0.00122	N/A	7.5340E+08	2.3726E+09
Total	0.005	1.00000			

* - Power normalized to this mixture.

NOTE: Total Power is the Mixture Power per 1 metric ton of HM of the initial system mass.
Mixture Power is the Mixture Power per 1 metric ton of HM of the initial mixture mass.
Mixture Thermal Flux determined using 0.625 eV cutoff: Groups 200 through 238.

***** modified keno-vi data has been rewritten on unit 95 *****

0$ array 5 entries read

1$ array 7 entries read

0t

2$ array 199 entries read

3$ array 199 entries read

4* array 199 entries read

0t

--- Material powers for depletion pass no. 3 (MW/MITHM) ---
Time = 12.50 days (0.034 y), Burnup =6.812E-05 GWd/MTIHM, Transport k= 0.7659

Mixture Number	Total Power (MW/MTIHM)	Fractional Power (---)	Mixture Power (MW/MTIHM)	Mixture Thermal Flux n/(cm^2*sec)	Mixture Total Flux n/(cm^2*sec)
1 *	0.005	0.99647	0.005	7.1649E+08	2.8101E+09
2	0.000	0.00231	N/A	7.8670E+08	2.5109E+09
3	0.000	0.00122	N/A	7.5247E+08	

2.3727E+09
         Total   0.005   1.00000

         * - Power normalized to this mixture.

    NOTE: Total Power is the Mixture Power per 1 metric ton of HM of the initial system mass.
           Mixture Power is the Mixture Power per 1 metric ton of HM of the initial mixture mass.
           Mixture Thermal Flux determined using 0.625 eV cutoff: Groups 200 through 238.

                                  ***** modified keno-vi data has been rewritten on unit 95 *****

     0$ array   5 entries read

     1$ array   7 entries read

     0t

     2$ array   199 entries read

     3$ array   199 entries read

     4* array   199 entries read

     0t

   --- Material powers for depletion pass no.   4 (MW/MITHM) ---
       Time =   17.50 days (0.048 y), Burnup =9.537E-05 GWd/MTIHM, Transport k= 0.7654

                     Total   Fractional Mixture   Mixture   Mixture
        Mixture   Power   Power   Power   Thermal Flux Total Flux
          Number (MW/MTIHM)   (---)   (MW/MTIHM) n/(cm^2*sec)   n/(cm^2*sec)

```
             1 *     0.005    0.99647      0.005    7.1654E+08
2.8089E+09
             2       0.000    0.00231     N/A       7.8702E+08
2.5096E+09
             3       0.000    0.00122     N/A       7.5344E+08
2.3732E+09
         Total       0.005    1.00000

         * - Power normalized to this mixture.

    NOTE:    Total Power is the Mixture Power per 1 metric ton of HM of
the initial  system mass.
           Mixture Power is the Mixture Power per 1 metric ton of HM of
the initial mixture mass.
           Mixture Thermal Flux determined using 0.625 eV cutoff: Groups
200 through 238.
   ---------------------------------------------------------------------




                                  *****  modified keno-vi data has been
rewritten on unit 95  *****




     0$ array      5 entries read

     1$ array      7 entries read

     0t

     2$ array    199 entries read

     3$ array    199 entries read

     4* array    199 entries read

     0t


   --- Material powers for depletion pass no.   5 (MW/MITHM) ---
       Time =    22.50 days (   0.062 y), Burnup =1.226E-04 GWd/MTIHM,
Transport k= 0.7667

                    Total    Fractional  Mixture     Mixture
```

Mixture
Mixture Power Power Power Thermal Flux Total Flux
Number (MW/MTIHM) (---) (MW/MTIHM) n/(cm^2*sec) n/(cm^2*sec)
1 * 0.005 0.99647 0.005 7.1642E+08 2.8064E+09
2 0.000 0.00231 N/A 7.8660E+08 2.5081E+09
3 0.000 0.00122 N/A 7.5266E+08 2.3706E+09
Total 0.005 1.00000

* - Power normalized to this mixture.

NOTE: Total Power is the Mixture Power per 1 metric ton of HM of the initial system mass.
Mixture Power is the Mixture Power per 1 metric ton of HM of the initial mixture mass.
Mixture Thermal Flux determined using 0.625 eV cutoff: Groups 200 through 238.

***** modified keno-vi data has been rewritten on unit 95 *****

0$ array 5 entries read

1$ array 7 entries read

0t

2$ array 199 entries read

3$ array 199 entries read

4* array 199 entries read

0t

--- Material powers for depletion pass no. 6 (MW/MITHM) ---
Time = 27.50 days (0.075 y), Burnup =1.499E-04 GWd/MTIHM, Transport k= 0.7663

Mixture Number	Total Power (MW/MTIHM)	Fractional Power (---)	Mixture Power (MW/MTIHM)	Mixture Thermal Flux n/(cm^2*sec)	Mixture Total Flux n/(cm^2*sec)
1 *	0.005	0.99648	0.005	7.1659E+08	2.8047E+09
2	0.000	0.00231	N/A	7.8631E+08	2.5065E+09
3	0.000	0.00122	N/A	7.5191E+08	2.3689E+09
Total	0.005	1.00000			

* - Power normalized to this mixture.

NOTE: Total Power is the Mixture Power per 1 metric ton of HM of the initial system mass.
Mixture Power is the Mixture Power per 1 metric ton of HM of the initial mixture mass.
Mixture Thermal Flux determined using 0.625 eV cutoff: Groups 200 through 238.

***** modified keno-vi data has been rewritten on unit 95 *****
*** Depletion calculations completed. Processing ORIGEN libraries. ***

29 time dumps found on this set of libraries.
File ft71f001 contains origen/opus-formatted binary data for 29 time dumps
from each of 1 depletion materials, plus a final set for the sum of all
depletion materials. Isotopic data locations are listed according to the following table.
(Note that there are two data records present for each time step.)

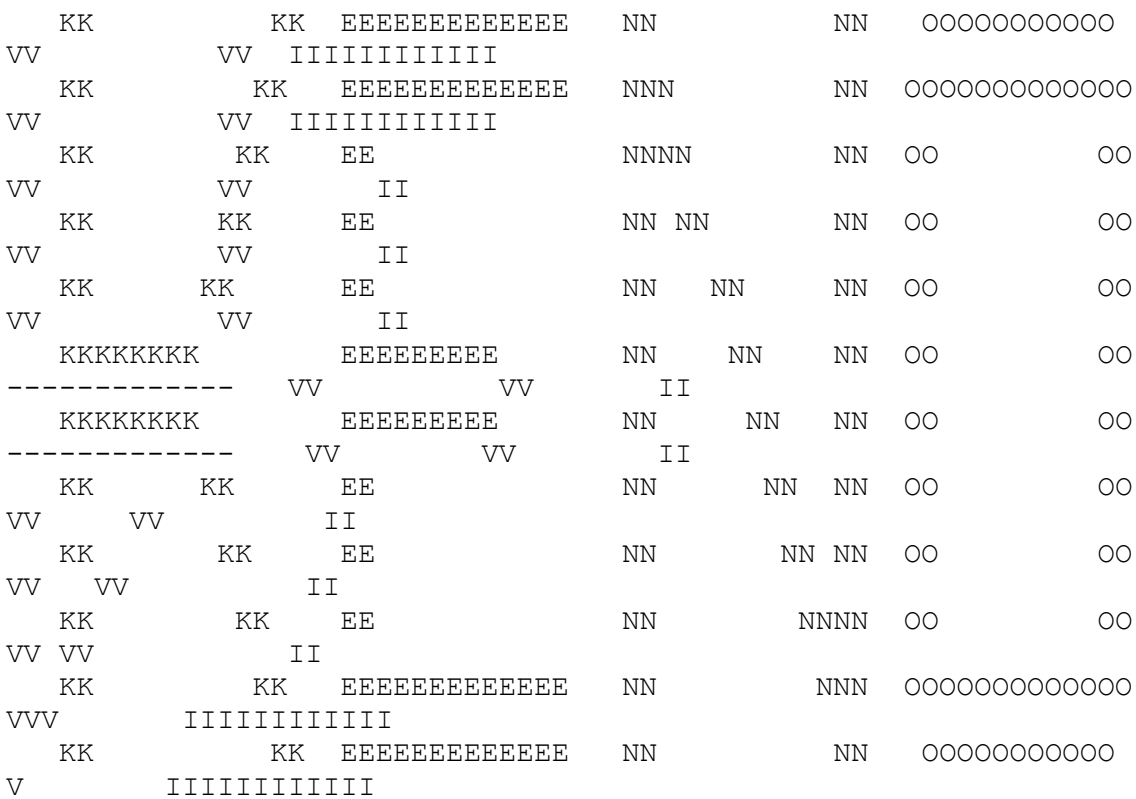
Position	Time Step	Cycle Time (d)	Cumulative Time (y)	Case Name
1	1	0.0000E+00	0.0000E+00	Pass no. 1 First depletion calculation, mixture no. 1
2	2	1.2500E+00	3.4223E-03	
3	3	2.5000E+00	6.8446E-03	
4	4	3.7500E+00	1.0267E-02	
5	5	5.0000E+00	1.3689E-02	
6	6	1.2500E+00	1.7112E-02	Pass no.

```
2 First depletion calculation, mixture no.   1
         7          7       2.5000E+00      2.0534E-02
         8          8       3.7500E+00      2.3956E-02
         9          9       5.0000E+00      2.7379E-02
        10         10       1.2500E+00      3.0801E-02        Pass no.
3 First depletion calculation, mixture no.   1
        11         11       2.5000E+00      3.4223E-02
        12         12       3.7500E+00      3.7645E-02
        13         13       5.0000E+00      4.1068E-02
        14         14       1.2500E+00      4.4490E-02        Pass no.
4 First depletion calculation, mixture no.   1
        15         15       2.5000E+00      4.7912E-02
        16         16       3.7500E+00      5.1335E-02
        17         17       5.0000E+00      5.4757E-02
        18         18       1.2500E+00      5.8179E-02        Pass no.
5 First depletion calculation, mixture no.   1
        19         19       2.5000E+00      6.1602E-02
        20         20       3.7500E+00      6.5024E-02
        21         21       5.0000E+00      6.8446E-02
        22         22       1.2500E+00      7.1869E-02        Pass no.
6 First depletion calculation, mixture no.   1
        23         23       2.5000E+00      7.5291E-02
        24         24       3.7500E+00      7.8713E-02
        25         25       5.0000E+00      8.2136E-02
        26         26       1.1111E-01      8.2440E-02        Pass no.
6 Decay calculation, mixture no.   1
        27         27       3.3333E-01      8.3048E-02
        28         28       1.0000E+00      8.4873E-02
        29         29       3.0000E+00      9.0349E-02
        59          1       0.0000E+00      0.0000E+00        Weighted
sum of concentrations for selected materi
        60          2       1.2500E+00      3.4223E-03
        61          3       2.5000E+00      6.8446E-03
        62          4       3.7500E+00      1.0267E-02
        63          5       5.0000E+00      1.3689E-02
        64          6       1.2500E+00      1.7112E-02
        65          7       2.5000E+00      2.0534E-02
        66          8       3.7500E+00      2.3956E-02
        67          9       5.0000E+00      2.7379E-02
        68         10       1.2500E+00      3.0801E-02
        69         11       2.5000E+00      3.4223E-02
        70         12       3.7500E+00      3.7645E-02
        71         13       5.0000E+00      4.1068E-02
        72         14       1.2500E+00      4.4490E-02
        73         15       2.5000E+00      4.7912E-02
        74         16       3.7500E+00      5.1335E-02
        75         17       5.0000E+00      5.4757E-02
        76         18       1.2500E+00      5.8179E-02
        77         19       2.5000E+00      6.1602E-02
        78         20       3.7500E+00      6.5024E-02
        79         21       5.0000E+00      6.8446E-02
        80         22       1.2500E+00      7.1869E-02
```

81	23	2.5000E+00	7.5291E-02
82	24	3.7500E+00	7.8713E-02
83	25	5.0000E+00	8.2136E-02
84	26	1.1111E-01	8.2440E-02
85	27	3.3333E-01	8.3048E-02
86	28	1.0000E+00	8.4873E-02
87	29	3.0000E+00	9.0349E-02

****
****
TRITON execution completed with zero errors.
****
****

1



```
   DDDDDDDDDDDD      AAAAAAAAA     VV          VV  IIIIIIIIIIII
DDDDDDDDDDDD
   DDDDDDDDDDDDD    AAAAAAAAAAA    VV          VV  IIIIIIIIIIII
DDDDDDDDDDDDD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA    VV        VV        II         DD
DD
   DD         DD   AA         AA      VV     VV         II         DD
DD
   DD         DD   AA         AA       VV   VV          II         DD
DD
   DD         DD   AA         AA        VV VV           II         DD
DD
   DDDDDDDDDDDDD   AA         AA         VVV       IIIIIIIIIIII
DDDDDDDDDDDDD
   DDDDDDDDDDDD    AA         AA          V        IIIIIIIIIIII
DDDDDDDDDDDD



      0000000       88888888888                //   22222222222
33333333333               //        11          666666666666
     000000000     8888888888888              //   2222222222222
3333333333333             //        111         6666666666666
    00       00    88         88             //    22         22   33
33             //        1111         66
   00         00   88         88            //                22
33            //           11         66
   00         00   88         88           //                 22
33           //            11         66
   00         00    88888888888           //                22
333          //             11         666666666666
   00         00    88888888888          //                22
333          //             11         6666666666666
   00         00   88         88         //              22
33        //               11         66         66
   00         00   88         88       //             22
33       //               11         66         66
    00       00    88         88      //            22            33
33      //                11         66         66
     000000000     8888888888888     //           2222222222222
3333333333333     //              11111111     6666666666666
```

```
      0000000       88888888888     //             2222222222222
33333333333     //                 11111111      66666666666



      0000000      5555555555555                              44
88888888888                       0000000      7777777777777
     000000000     5555555555555                            444
8888888888888                     000000000     777777777777
    00       00    55                     :::               4444     88
88         :::        00       00    77         77
   00          00   55                     :::              44 44     88
88         :::       00         00            77
   00          00   55                     :::             44  44     88
88         :::       00         00           77
   00          00   555555555555                          44   44
88888888888                     00         00          77
   00          00   5555555555555                         44    44
88888888888                     00         00          77
   00          00              55         :::        444444444444   88
88         :::       00         00         77
   00          00              55         :::       4444444444444   88
88         :::       00         00         77
    00       00    55         55         :::                44     88
88         :::        00       00         77
     000000000     5555555555555                              44
8888888888888                     000000000          77
      0000000       55555555555                              44
88888888888                       0000000           77
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAA    LL
EEEEEEEEEEEE
   SS         SS   CC         CC   AA         AA   LL             EE
   SS              CC              AA         AA   LL             EE
   SS              CC              AA         AA   LL             EE
   SSSSSSSSSSS    CC              AAAAAAAAAAAAA   LL
EEEEEEEE
    SSSSSSSSSSS   CC              AAAAAAAAAAAAA   LL
EEEEEEEE
              SS   CC              AA         AA   LL             EE
              SS   CC              AA         AA   LL             EE
   SS         SS   CC         CC   AA         AA   LL             EE
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

```
************************************************************************
************************************************

************************************************************************
************************************************

************************************************************************
************************************************
        *****
*****
        *****                                                 program
verification information                                          *****
        *****
*****
        *****                                           code system:  SCALE
version:  6.1                                              *****
        *****
*****

************************************************************************
************************************************

************************************************************************
************************************************
        *****
*****
        *****
*****
        *****               program:  kenovi
*****
        *****
*****
        *****         creation date:  21_jun_2011
*****
        *****
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
```

```
        *****
*****
        *****          machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  05:48:07.50
*****
        *****
*****
        *****
*****

**************************************************************************
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**************************************************************************
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1

**************************************************************************
********************************************
        ***
***
        ***                                fuel bundle
***
        ***
***

**************************************************************************
********************************************
        ***                                    ******       numeric
parameters       ******                                    ***
        ***
***
        ***
***
        ***                    tme         maximum problem time  (min)
0.00                  ***
        ***
***
        ***                    tba         time per generation  (min)
10.00                  ***
        ***
***
```

```
        ***                     gen         number of generations
123                     ***
        ***
***
        ***                     npg         number per generation
20000                     ***
        ***
***
        ***                     nsk         number of generations to be
skipped                   23                      ***
        ***
***
        ***                     beg         beginning generation number
1                       ***
        ***
***
        ***                     res         generations between
checkpoints                      103                      ***
        ***
***
        ***                     x1d         number of extra 1-d cross
sections                     1                       ***
        ***
***
        ***                     nbk         neutron bank size
20025                     ***
        ***
***
        ***                     xnb         extra positions in neutron
bank                       0                      ***
        ***
***
        ***                     nfb         fission bank size
20000                     ***
        ***
***
        ***                     xfb         extra positions in fission
bank                       0                      ***
        ***
***
        ***                     sig         cut off standard deviation
0.0000                     ***
        ***
***
        ***                     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
000015714D98EE96                     ***
        ***
***
        ***                      nb8         number of d.a. blocks on unit
8                       1000                   ***
        ***
***
        ***                      nl8         length of d.a. blocks on unit
8                        512                   ***
        ***
***
        ***                      nqd         quadrature order for angular
fluxes                     0                     ***
        ***
***
        ***                      pnm         highest order of flux
moments                     0                      ***
        ***
***
        ***                      msh         mesh size for mesh flux tally
0.0000                    ***
        ***
***
        ***                      adj         mode of calculation
forward                     ***
        ***
***
        ***                      tps         sampling sites per track
length                       5                     ***
        ***
***
        ***                      cgs         number of secondary groups
to sampl                    0                    ***
        ***
***
        ***                      cas         number of secondary angles
to sampl                    0                    ***
        ***
***
        ***                                  input data written on
restart unit                    yes                     ***
        ***
***
        ***
***

*********************************************************************
```

```
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        ***
***
        ***                                 fuel bundle
***
        ***
***

**************************************************************************
*********************************************
        ***                                    ******      logical
parameters        ******                                    ***
        ***
***
        ***  run  execute problem after checking data    yes
plt  plot picture map(s)                        yes ***
        ***
***
        ***       compute fluxes (cfx, flx or mfp)       yes
fdn  compute fission densities                  yes ***
        ***
***
        ***  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 fiss prod matrix by unit number   no
fmp  print fiss prod matrix by unit location  no ***
        ***
***
        ***  mkh  compute matrix k-eff by hole number     no
mka  compute matrix k-eff by array number     no ***
        ***
***
        ***  ckh  compute cofactor k-eff by hole number   no
```

```
cka  compute cofactor k-eff by array number   no ***
        ***
***
        ***  fmh  print fiss prod matrix by hole number   no
fma  print fiss prod matrix by array number   no ***
        ***
***
        ***  hhl  collect matrix by highest hole level    no
hal  collect matrix by highest array level    no ***
        ***
***
        ***  amx  print all mixed cross sections          no
far  print fis. and abs. by region            no ***
        ***
***
        ***  xs1  print 1-d mixture x-sections            no
gas  print far by group                       no ***
        ***
***
        ***  xs2  print 2-d mixture x-sections            no
pax  print xsec-albedo correlation tables     no ***
        ***
***
        ***  xsl  print 2-d mixture Pl arrays             no
pwt  print weight average array               no ***
        ***
***
        ***  xap  print mixture angles & probabilities    no
pgm  print input geometry                     no ***
        ***
***
        ***  pki  print fission spectrum                  no
bug  print debug information                  no ***
        ***
***
        ***  p1d  print extra 1-d cross sections          no
trk  print tracking information               no ***
        ***
***
        ***  tfm  coordinate transform for fluxes         no
pmf  print angular fluxes and flux moments    no ***
        ***
***
        ***       print fluxes (flx)                     yes
app  append, not overwrite, restart data      no ***
        ***
***
        ***  mfx  compute mesh fluxes                     no
pms  print mesh fluxes if calculated          no ***
        ***
***
        ***  mfp  compute region mean free paths          no
```

```
pmm  print mesh flux moments if calculated    no ***
        ***
***
        ***  sen  compute derivative sensitivites         no
pmv  print mesh volumes                        no ***
        ***
***
        ***  cep  continuous energy calculation           no
ptb  use probability tables                   yes ***
        ***
***
        ***  fre  use analytic free gas kernel           yes
pnu  use prompt neutron spectrum only         no ***
        ***
***
        ***  cbt  compute contributons                    no
pct  print contributons                        no ***
        ***
***
        ***  cds  collect CADIS fissions                  no
htm  produce HTML output                      yes ***
        ***
***
        ***
***

******************************************************************************
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******************************************************************************
*******************************************
                                                 parameter input completed


                                  ........ finished reading the parameter
data      ........


                                 ************** data reading completed
***************
1
******************************************************************************
*******************************************
        ***
***
        ***                                   fuel bundle
***
        ***
***
```

```
********************************************************************************
*****************************************

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*****************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number               data set name
name        unit function                       ***
        ***         ------               -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.33572\ft14f001            mixed cross
sections               ***
        ***
***
        ***      alb  79     C:\SCALE\data\albedos
input albedos                       ***
        ***
***
        ***      wts  80     C:\SCALE\data\scale.rev01.weights
input weights                       ***
        ***
***
        ***      skt  16      unknown
write scratch data                  ***
        ***
***
        ***      rst  95
->\Temp\scale.David.33572\restart.keno_input            read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.33572\restart.keno_input            write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.33572\ft04f001            input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.33572\xfile008            input data
direct access           ***
        ***
```

```
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

**********************************************************************
*****************************************

                                  ........ finished preparing input data
........
1
**********************************************************************
*****************************
                  ***
***
                  ***           fuel bundle
***
                  ***
***

**********************************************************************
*****************************

**********************************************************************
*****************************
                  ***
***
                  ***                                  ****** additional
information ******                           ***
                  ***
***
                  ***  use a global unit                       yes    use
lattice geometry                    yes  ***
                  ***
***
                  ***  no. of scattering angles in xsecs        3
global array number                         0  ***
                  ***
***
                  ***  number of mixtures used                  3
number of units in the global x dir.      0  ***
                  ***
***
                  ***  number of bias id's used                 1
number of units in the global y dir.      0  ***
                  ***
***
                  ***  number of differential albedos used      2
number of units in the global z dir.      0  ***
                  ***
***
```

```
                  ***  total input geometry regions              4
number of energy groups                  238  ***
                  ***
***
                  ***  number of geometry regions used           4    no.
of fission spectrum source grps.      1  ***
                  ***
***
                  ***  use nested arrays                        no    use
nested holes                          no  ***
                  ***
***
                  ***  number of arrays used                     1
number of holes                          0  ***
                  ***
***
                  ***  maximum array nesting level               1
maximum hole nesting level               0  ***
                  ***
***
                  ***  largest array number                      1
largest geometry unit number             2  ***
                  ***
***
                  ***
***
                  ***  boundary label 1               cuboid
***
                  ***
***
                  ***    +x boundary condition             h2o
-x boundary condition                h2o  ***
                  ***
***
                  ***    +y boundary condition        graphite
-y boundary condition            graphite  ***
                  ***
***
                  ***    +z boundary condition             h2o
-z boundary condition                h2o  ***
                  ***
***

*****************************************************************
*****************************


                                  cross sections read from the ampx
working library on unit    4

1                                      fuel bundle
```

mixing table

number of scattering angles = 3

cross section message threshold =1.0E+00

mixture = 1 density(g/cc) = 5.5474

nuclide	atom-dens.	wgt. frac.	za	awt	nuclide title
1001001	1.00000E-20	3.01682E-21	1001	1.0078	h_h2o 1 fast: h1 endf/b7 rel0 rev7 mod0 12/17/09
1003007	3.23535E-08	6.79473E-08	3007	7.0160	li7 328 endf/b7 rel0 rev7 mod0 12/17/09
1004009	1.25936E-07	3.39736E-07	4009	9.0122	be9 425 endf/b7 rel8 rev7 mod2 12/17/09
1005010	6.04529E-08	1.81193E-07	5010	10.0129	b10 525 endf/b7 rel1 rev7 mod0 12/17/09
1005011	1.00000E-20	3.29550E-20	5011	11.0093	b11 528 endf/b7 rel8 rev7 mod0 12/17/09
1007014	8.91558E-06	3.73710E-05	7014	14.0031	n14 725 endf/b7 rel8 rev7 mod0 12/17/09
1008016	1.00000E-20	4.78788E-20	8016	15.9949	o16 825 endf/b7 rel8 rev7 mod3 12/17/09
1011023	9.87360E-07	6.79473E-06	11023	22.9898	na23 1125 endf/b7 rel8 rev7 mod0 12/17/09
1012024	7.37710E-07	5.29649E-06	12024	23.9850	mg24 1225 endf/b7 rel3 rev7 mod3 12/17/09
1012025	9.33929E-08	6.98505E-07	12025	24.9858	mg25 1228 endf/b7 rel3 rev7 mod2 12/17/09
1012026	1.02826E-07	7.99733E-07	12026	25.9826	mg26 1231 endf/b7 rel3 rev7 mod2 12/17/09
1013027	3.96970E-02	3.20617E-01	13027	26.9815	al27 1325 endf/b7 rel6 rev7 mod1 12/17/09
1014028	5.44792E-03	4.56239E-02	14028	27.9769	si28 1425 endf/b7 rel6 rev7 mod1 12/17/09
1014029	2.76759E-04	2.40054E-03	14029	28.9765	si29 1428 endf/b7 rel8 rev7 mod3 12/17/09
1014030	1.82655E-04	1.63883E-03	14030	29.9738	si30 1431 endf/b7 rel6 rev7 mod2 12/17/09
1015031	1.46571E-06	1.35895E-05	15031	30.9738	p31 1525 endf/b7 rel6 rev7 mod1 12/17/09
1020040	1.09810E-06	1.31359E-05	20040	39.9626	ca40 2025 endf/b7 rel1 rev7 mod1 12/17/09
1020042	7.32891E-09	9.20497E-08	20042	41.9586	ca42 2031 endf/b7 rel1 rev7 mod1 12/17/09
1020043	1.52922E-09	1.96645E-08	20043	42.9588	ca43 2034 endf/b7 rel1 rev7 mod1 12/17/09
1020044	2.36292E-08	3.10903E-07	20044	43.9555	ca44 2037 endf/b7 rel1 rev7 mod1 12/17/09

```
    1020046  4.53101E-11  6.23272E-10   20046    45.9537     ca46 2043
endf/b7 rel1 rev7 mod1                 12/17/09
    1020048  2.11825E-09  3.04054E-08   20048    47.9525     ca48 2049
endf/b7 rel1 rev7 mod1                 12/17/09
    1023000  2.00517E-07  3.05763E-06   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                   12/17/09
    1024050  3.47753E-08  5.19916E-07   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                 12/17/09
    1024052  6.70606E-07  1.04264E-05   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                 12/17/09
    1024053  7.60414E-08  1.20504E-06   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                 12/17/09
    1024054  1.89283E-08  3.05615E-07   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                 12/17/09
    1025055  3.58088E-07  5.88877E-06   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                 12/17/09
    1026054  1.44567E-06  2.33421E-05   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                 12/17/09
    1026056  2.26940E-05  3.79975E-04   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                 12/17/09
    1026057  5.24102E-07  8.93223E-06   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                 12/17/09
    1026058  6.97484E-08  1.20955E-06   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                 12/17/09
    1027059  1.92584E-07  3.39736E-06   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                 12/17/09
    1028058  1.14089E-06  1.97855E-05   28058    57.9353     ni58 2825
endf/b7 rel8 rev7 mod4                 12/17/09
    1028060  4.39468E-07  7.88386E-06   28060    59.9308     ni60 2831
endf/b7 rel8 rev7 mod4                 12/17/09
    1028061  1.91034E-08  3.48426E-07   28061    60.9311     ni61 2834
endf/b7 rel8 rev7 mod5                 12/17/09
    1028062  6.09099E-08  1.12912E-06   28062    61.9283     ni62 2837
endf/b7 rel8 rev7 mod5                 12/17/09
    1028064  1.55120E-08  2.96838E-07   28064    63.9280     ni64 2843
endf/b7 rel8 rev7 mod4                 12/17/09
    1029063  2.49068E-06  4.69175E-05   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                 12/17/09
    1029065  1.11117E-06  2.15960E-05   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                 12/17/09
    1030000  6.94379E-07  1.35895E-05   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                   12/17/09
    1036083  1.00000E-20  2.48193E-19   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90756E-08  1.32072E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.07022E-08  2.91223E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.63585E-08  4.50034E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.00000E-20  2.78104E-19   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
```

```
    1040094  1.65779E-08  4.66000E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  1.00000E-20  2.84096E-19   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.67078E-09  7.66754E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.00000E-20  2.78104E-19   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.00000E-20  2.84092E-19   41095    94.9068     nb95 4131
endf/b7 rel0 rev7 mod1                 12/17/09
    1042092  1.04839E-08  2.88425E-07   42092    91.9068     mo92 4225
endf/b7 rel0 rev7 mod1                 12/17/09
    1042094  6.55156E-09  1.84160E-07   42094    93.9051     mo94 4231
endf/b7 rel0 rev7 mod1                 12/17/09
    1042095  1.12860E-08  3.20623E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39892E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  6.78580E-09  1.96840E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.71703E-08  5.03208E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.00000E-20  2.96068E-19   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.86388E-09  2.05272E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.00000E-20  2.96064E-19   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.00000E-20  3.02049E-19   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  1.00000E-20  3.05038E-19   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  1.00000E-20  3.08038E-19   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  1.00000E-20  3.11028E-19   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  1.00000E-20  3.17021E-19   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  1.00000E-20  3.08035E-19   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.00000E-20  3.14022E-19   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  1.00000E-20  3.14021E-19   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  1.00000E-20  3.20008E-19   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  1.00000E-20  3.22997E-19   46108   107.9039     pd108 4643
endf/b7 rel5 rev7 mod1                 12/17/09
    1047107  2.12330E-08  6.79473E-07   47107   106.9051     ag107 4725
endf/b7 rel0 rev7 mod1                 12/17/09
    1047109  1.00000E-20  3.25993E-19   47109   108.9047     ag109 4731
endf/b7 rel0 rev7 mod1                 12/17/09
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    1048106  1.26206E-10  4.00095E-09   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                 12/17/09
    1048108  8.98584E-11  2.90241E-09   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                 12/17/09
    1048110  1.26105E-09  4.14861E-08   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                 12/17/09
    1048111  1.29235E-09  4.29031E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                 12/17/09
    1048112  2.43627E-09  8.16072E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                 12/17/09
    1048113  1.23379E-09  4.16977E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                 12/17/09
    1048114  2.90071E-09  9.89014E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                 12/17/09
    1048116  7.56224E-10  2.62370E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                 12/17/09
    1049115  1.00000E-20  3.43951E-19   49115   114.9039     in115 4931
endf/b7 rel3 rev7 mod1                 12/17/09
    1050112  1.85479E-10  6.21305E-09   50112   111.9048     sn112 5025
endf/b7 rel0 rev7 mod1                 12/17/09
    1050114  1.26202E-10  4.30291E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                 12/17/09
    1050115  6.50132E-11  2.23612E-09   50115   114.9033     sn115 5034
endf/b7 rel0 rev7 mod1                 12/17/09
    1050116  2.78027E-09  9.64581E-08   50116   115.9017     sn116 5037
endf/b7 rel0 rev7 mod1                 12/17/09
    1050117  1.46853E-09  5.13891E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                 12/17/09
    1050118  4.63123E-09  1.63447E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                 12/17/09
    1050119  1.64254E-09  5.84617E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                 12/17/09
    1050120  6.22979E-09  2.23595E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                 12/17/09
    1050122  8.85327E-10  3.23059E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                 12/17/09
    1050124  1.10714E-09  4.10632E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                 12/17/09
    1050126  1.00000E-20  3.76889E-19   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                 12/17/09
    1053127  1.00000E-20  3.79873E-19   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                  12/17/09
    1053129  1.00000E-20  3.85862E-19   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                  12/17/09
    1053135  1.00000E-20  4.03837E-19   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                  12/17/09
    1054131  1.00000E-20  3.91848E-19   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                 12/17/09
    1054133  1.00000E-20  3.97838E-19   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                 12/17/09
    1054135  1.00000E-20  4.03828E-19   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                 12/17/09
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    1055133  1.00000E-20  3.97836E-19   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                 12/17/09
    1055134  1.00000E-20  4.00834E-19   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                 12/17/09
    1055135  1.00000E-20  4.03825E-19   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                 12/17/09
    1055137  1.00000E-20  4.09815E-19   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                 12/17/09
    1056138  3.29201E-08  1.35895E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                 12/17/09
    1056140  1.00000E-20  4.18805E-19   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                 12/17/09
    1057139  1.00000E-20  4.15799E-19   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                 12/17/09
    1058141  1.00000E-20  4.21792E-19   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                 12/17/09
    1058142  1.00000E-20  4.24788E-19   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                 12/17/09
    1058143  1.00000E-20  4.27791E-19   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                 12/17/09
    1058144  1.00000E-20  4.30788E-19   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                 12/17/09
    1059141  1.00000E-20  4.21790E-19   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                 12/17/09
    1059143  1.00000E-20  4.27786E-19   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                 12/17/09
    1060143  1.00000E-20  4.27783E-19   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                 12/17/09
    1060144  1.00000E-20  4.30777E-19   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                 12/17/09
    1060145  1.00000E-20  4.33778E-19   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                 12/17/09
    1060146  1.00000E-20  4.36773E-19   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                 12/17/09
    1060147  1.00000E-20  4.39776E-19   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                 12/17/09
    1060148  1.00000E-20  4.42771E-19   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                 12/17/09
    1061147  1.00000E-20  4.39773E-19   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                 12/17/09
    1061148  1.00000E-20  4.42773E-19   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                 12/17/09
    1061149  1.00000E-20  4.45769E-19   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                 12/17/09
    1062147  1.00000E-20  4.39772E-19   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                 12/17/09
    1062149  1.00000E-20  4.45766E-19   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                 12/17/09
    1062150  1.00000E-20  4.48759E-19   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                 12/17/09
    1062151  3.00812E-09  1.35895E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                 12/17/09
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    1062152  1.00000E-20  4.54753E-19   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                 12/17/09
    1062153  1.00000E-20  4.57754E-19   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                 12/17/09
    1063151  1.42830E-09  6.45248E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                 12/17/09
    1063153  1.55915E-09  7.13702E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                 12/17/09
    1063154  1.00000E-20  4.60750E-19   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                 12/17/09
    1063155  1.00000E-20  4.63743E-19   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                 12/17/09
    1063156  1.00000E-20  4.66742E-19   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                 12/17/09
    1064152  5.77398E-12  2.62574E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                 12/17/09
    1064154  6.29364E-11  2.89975E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                 12/17/09
    1064155  4.27274E-10  1.98145E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                 12/17/09
    1064156  5.90966E-10  2.75824E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                 12/17/09
    1064157  4.51814E-10  2.12232E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                 12/17/09
    1064158  7.17128E-10  3.39006E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                 12/17/09
    1064160  6.31096E-10  3.02120E-08   64160   159.9270     gd160 6449
endf/b7 rel0 rev7 mod1                 12/17/09
    1074182  7.16308E-08  3.90130E-06   74182   181.9482     w182 7431
endf/b7 rel8 rev7 mod2                  12/17/09
    1074183  3.84687E-08  2.10670E-06   74183   182.9502     w183 7434
endf/b7 rel8 rev7 mod2                  12/17/09
    1074184  8.19198E-08  4.51079E-06   74184   183.9509     w184 7437
endf/b7 rel8 rev7 mod2                  12/17/09
    1074186  7.51922E-08  4.18544E-06   74186   185.9544     w186 7443
endf/b7 rel8 rev7 mod2                  12/17/09
    1082204  7.66801E-11  4.68184E-09   82204   203.9730     pb204 8225
endf/b7 rel1 rev7 mod1                 12/17/09
    1082206  1.31999E-09  8.13854E-08   82206   205.9745     pb206 8231
endf/b7 rel1 rev7 mod1                 12/17/09
    1082207  1.21045E-09  7.49943E-08   82207   206.9759     pb207 8234
endf/b7 rel1 rev7 mod1                 12/17/09
    1082208  2.87003E-09  1.78674E-07   82208   207.9767     pb208 8237
endf/b7 rel6 rev7 mod2                 12/17/09
    1092234  1.45935E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                  12/17/09
    1092235  1.76388E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                  12/17/09
    1092236  9.22547E-06  6.51848E-04   92236   236.0456     u236 9231
endf/b7 rel0 rev7 mod1                  12/17/09
    1092238  7.06299E-03  5.03292E-01   92238   238.0508     u238 9237
endf/b7 rel6 rev7 mod5                  12/17/09
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    1093237  1.00000E-20  7.09575E-19   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.00000E-20  7.12573E-19   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  1.00000E-20  7.15574E-19   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  1.00000E-20  7.18572E-19   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.00000E-20  7.21575E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.00000E-20  7.24574E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00000E-20  7.21574E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  1.00000E-20  7.24576E-19   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  1.00000E-20  7.27575E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.00000E-20  7.24574E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  1.00000E-20  7.27575E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  1.00000E-20  7.30572E-19   96244   244.0627     cm244 9637
endf/b7 rel3 rev7 mod2                12/17/09

 mixture =     2          density(g/cc) = 0.99396
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    2001001  6.64695E-02  1.11915E-01    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    2008016  3.32348E-02  8.88085E-01    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09

 mixture =     3          density(g/cc) =  2.7020
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    3003006  1.75835E-07  6.50000E-07    3006     6.0151     li6 325
endf/b7 rel1 rev7 mod0                   12/17/09
    3003007  2.16849E-06  9.35000E-06    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    3005010  2.99015E-07  1.84000E-06    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    3005011  1.20605E-06  8.16000E-06    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    3012024  4.88634E-04  7.20258E-03   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    3012025  6.18603E-05  9.49881E-04   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    3012026  6.81081E-05  1.08754E-03   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    3013027  5.88689E-02  9.76150E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
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    3014028  2.67155E-04  4.59332E-03   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                 12/17/09
    3014029  1.35717E-05  2.41681E-04   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                 12/17/09
    3014030  8.95702E-06  1.64994E-04   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                 12/17/09
    3023000  3.19422E-06  1.00000E-04   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                   12/17/09
    3024050  1.83565E-06  5.63448E-05   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                 12/17/09
    3024052  3.53986E-05  1.12994E-03   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                 12/17/09
    3024053  4.01392E-06  1.30593E-04   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                 12/17/09
    3024054  9.99149E-07  3.31204E-05   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                 12/17/09
    3025055  2.07330E-05  7.00000E-04   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                 12/17/09
    3026054  6.02891E-06  1.99853E-04   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                 12/17/09
    3026056  9.46410E-05  3.25331E-03   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                 12/17/09
    3026057  2.18567E-06  7.64770E-05   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                 12/17/09
    3026058  2.90873E-07  1.03561E-05   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                 12/17/09
    3027059  2.76106E-07  1.00000E-05   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                 12/17/09
    3029063  5.20580E-05  2.01329E-03   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                 12/17/09
    3029065  2.32247E-05  9.26712E-04   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                 12/17/09
    3030000  2.21504E-05  8.90000E-04   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                   12/17/09
    3031069  7.01394E-07  2.97102E-05   31069    68.9256     ga69 3125
endf/b7 rel0 rev7 mod1                 12/17/09
    3031071  4.65496E-07  2.02898E-05   31071    70.9247     ga71 3131
endf/b7 rel0 rev7 mod1                 12/17/09
    3048106  1.80940E-09  1.17766E-07   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                12/17/09
    3048108  1.28830E-09  8.54314E-08   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    3048110  1.80796E-08  1.22113E-06   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    3048111  1.85283E-08  1.26284E-06   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    3048112  3.49287E-08  2.40208E-06   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    3048113  1.76887E-08  1.22736E-06   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    3048114  4.15873E-08  2.91113E-06   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
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3048116 1.08419E-08 7.72275E-07 48116 115.9048 cd116 4855 endf/b7 rel0 rev7 mod1 12/17/09

3003006 li6 325 endf/b7 rel1 rev7 mod0 12/17/09
1003007 li7 328 endf/b7 rel0 rev7 mod0 12/17/09
3003007 li7 328 endf/b7 rel0 rev7 mod0 12/17/09
1004009 be9 425 endf/b7 rel8 rev7 mod2 12/17/09
1005010 b10 525 endf/b7 rel1 rev7 mod0 12/17/09
3005010 b10 525 endf/b7 rel1 rev7 mod0 12/17/09
3005011 b11 528 endf/b7 rel8 rev7 mod0 12/17/09
1005011 b11 528 endf/b7 rel8 rev7 mod0 12/17/09
1007014 n14 725 endf/b7 rel8 rev7 mod0 12/17/09
2008016 o16 825 endf/b7 rel8 rev7 mod3 12/17/09
1008016 o16 825 endf/b7 rel8 rev7 mod3 12/17/09
1011023 na23 1125 endf/b7 rel8 rev7 mod0 12/17/09
1012024 mg24 1225 endf/b7 rel3 rev7 mod3 12/17/09
3012024 mg24 1225 endf/b7 rel3 rev7 mod3 12/17/09
1012025 mg25 1228 endf/b7 rel3 rev7 mod2 12/17/09
3012025 mg25 1228 endf/b7 rel3 rev7 mod2 12/17/09
1012026 mg26 1231 endf/b7 rel3 rev7 mod2 12/17/09
3012026 mg26 1231 endf/b7 rel3 rev7 mod2 12/17/09
1013027 al27 1325 endf/b7 rel6 rev7 mod1 12/17/09
3013027 al27 1325 endf/b7 rel6 rev7 mod1 12/17/09
1014028 si28 1425 endf/b7 rel6 rev7 mod1 12/17/09
3014028 si28 1425 endf/b7 rel6 rev7 mod1 12/17/09
1014029 si29 1428 endf/b7 rel8 rev7 mod3 12/17/09
3014029 si29 1428 endf/b7 rel8 rev7 mod3

12/17/09
1014030 si30 1431 endf/b7 rel6 rev7 mod2
12/17/09
3014030 si30 1431 endf/b7 rel6 rev7 mod2
12/17/09
1015031 p31 1525 endf/b7 rel6 rev7 mod1
12/17/09
1020040 ca40 2025 endf/b7 rel1 rev7 mod1
12/17/09
1020042 ca42 2031 endf/b7 rel1 rev7 mod1
12/17/09
1020043 ca43 2034 endf/b7 rel1 rev7 mod1
12/17/09
1020044 ca44 2037 endf/b7 rel1 rev7 mod1
12/17/09
1020046 ca46 2043 endf/b7 rel1 rev7 mod1
12/17/09
1020048 ca48 2049 endf/b7 rel1 rev7 mod1
12/17/09
1023000 v 2300 endf/b7 rel8 rev7 mod0
12/17/09
3023000 v 2300 endf/b7 rel8 rev7 mod0
12/17/09
1024050 cr50 2425 endf/b7 rel8 rev7 mod5
12/17/09
3024050 cr50 2425 endf/b7 rel8 rev7 mod5
12/17/09
1024052 cr52 2431 endf/b7 rel8 rev7 mod4
12/17/09
3024052 cr52 2431 endf/b7 rel8 rev7 mod4
12/17/09
1024053 cr53 2434 endf/b7 rel8 rev7 mod4
12/17/09
3024053 cr53 2434 endf/b7 rel8 rev7 mod4
12/17/09
1024054 cr54 2437 endf/b7 rel8 rev7 mod5
12/17/09
3024054 cr54 2437 endf/b7 rel8 rev7 mod5
12/17/09
1025055 mn55 2525 endf/b7 rel8 rev7 mod0
12/17/09
3025055 mn55 2525 endf/b7 rel8 rev7 mod0
12/17/09
1026054 fe54 2625 endf/b7 rel8 rev7 mod5
12/17/09
3026054 fe54 2625 endf/b7 rel8 rev7 mod5
12/17/09
1026056 fe56 2631 endf/b7 rel8 rev7 mod4
12/17/09
3026056 fe56 2631 endf/b7 rel8 rev7 mod4
12/17/09
1026057 fe57 2634 endf/b7 rel8 rev7 mod4

12/17/09
3026057 fe57 2634 endf/b7 rel8 rev7 mod4
12/17/09
1026058 fe58 2637 endf/b7 rel8 rev7 mod0
12/17/09
3026058 fe58 2637 endf/b7 rel8 rev7 mod0
12/17/09
1027059 co59 2725 endf/b7 rel2 rev7 mod0
12/17/09
3027059 co59 2725 endf/b7 rel2 rev7 mod0
12/17/09
1028058 ni58 2825 endf/b7 rel8 rev7 mod4
12/17/09
1028060 ni60 2831 endf/b7 rel8 rev7 mod4
12/17/09
1028061 ni61 2834 endf/b7 rel8 rev7 mod5
12/17/09
1028062 ni62 2837 endf/b7 rel8 rev7 mod5
12/17/09
1028064 ni64 2843 endf/b7 rel8 rev7 mod4
12/17/09
1029063 cu63 2925 endf/b7 rel8 rev7 mod5
12/17/09
3029063 cu63 2925 endf/b7 rel8 rev7 mod5
12/17/09
1029065 cu65 2931 endf/b7 rel8 rev7 mod5
12/17/09
3029065 cu65 2931 endf/b7 rel8 rev7 mod5
12/17/09
1030000 zn 3000 endf/b7 rel0 rev7 mod0
12/17/09
3030000 zn 3000 endf/b7 rel0 rev7 mod0
12/17/09
3031069 ga69 3125 endf/b7 rel0 rev7 mod1
12/17/09
3031071 ga71 3131 endf/b7 rel0 rev7 mod1
12/17/09
1036083 kr83 3640 endf/b7 rel0 rev7 mod1
12/17/09
1040090 zr90 4025 endf/b7 rel0 rev7 mod1
12/17/09
1040091 zr91 4028 endf/b7 rel0 rev7 mod1
12/17/09
1040092 zr92 4031 endf/b7 rel3 rev7 mod4
12/17/09
1040093 zr93 4034 endf/b7 rel3 rev7 mod1
12/17/09
1040094 zr94 4037 endf/b7 rel3 rev7 mod1
12/17/09
1040095 zr95 4040 endf/b7 rel0 rev7 mod1
12/17/09
1040096 zr96 4043 endf/b7 rel0 rev7 mod1

```
12/17/09
                          1041093    nb93 4125 endf/b7 rel6 rev7 mod3
12/17/09
                          1041095    nb95 4131 endf/b7 rel0 rev7 mod1
12/17/09
                          1042092    mo92 4225 endf/b7 rel0 rev7 mod1
12/17/09
                          1042094    mo94 4231 endf/b7 rel0 rev7 mod1
12/17/09
                          1042095    mo95 4234 endf/b7 rel0 rev7 mod1
12/17/09
                          1042096    mo96 4237 endf/b7 rel0 rev7 mod1
12/17/09
                          1042097    mo97 4240 endf/b7 rel0 rev7 mod1
12/17/09
                          1042098    mo98 4243 endf/b7 rel0 rev7 mod1
12/17/09
                          1042099    mo99 4246 endf/b7 rel0 rev7 mod1
12/17/09
                          1042100    mo100 4249 endf/b7 rel0 rev7
mod1                12/17/09
                          1043099    tc99 4325 endf/b7 rel0 rev7 mod1
12/17/09
                          1044101    ru101 4440 endf/b7 rel0 rev7
mod1                12/17/09
                          1044102    ru102 4443 endf/b7 rel0 rev7
mod1                12/17/09
                          1044103    ru103 4446 endf/b7 rel0 rev7
mod1                12/17/09
                          1044104    ru104 4449 endf/b7 rel0 rev7
mod1                12/17/09
                          1044106    ru106 4455 endf/b7 rel0 rev7
mod0                12/17/09
                          1045103    rh103 4525 endf/b7 rel0 rev7
mod1                12/17/09
                          1045105    rh105 4531 endf/b7 rel0 rev7
mod1                12/17/09
                          1046105    pd105 4634 endf/b7 rel0 rev7
mod1                12/17/09
                          1046107    pd107 4640 endf/b7 rel0 rev7
mod1                12/17/09
                          1046108    pd108 4643 endf/b7 rel5 rev7
mod1                12/17/09
                          1047107    ag107 4725 endf/b7 rel0 rev7
mod1                12/17/09
                          1047109    ag109 4731 endf/b7 rel0 rev7
mod1                12/17/09
                          1048106    cd106 4825 endf/b7 rel0 rev7
mod1                12/17/09
                          3048106    cd106 4825 endf/b7 rel0 rev7
mod1                12/17/09
                          1048108    cd108 4831 endf/b7 rel0 rev7
```

```
mod1                    12/17/09
                        3048108    cd108 4831 endf/b7 rel0 rev7
mod1                    12/17/09
                        1048110    cd110 4837 endf/b7 rel0 rev7
mod1                    12/17/09
                        3048110    cd110 4837 endf/b7 rel0 rev7
mod1                    12/17/09
                        1048111    cd111 4840 endf/b7 rel0 rev7
mod1                    12/17/09
                        3048111    cd111 4840 endf/b7 rel0 rev7
mod1                    12/17/09
                        1048112    cd112 4843 endf/b7 rel0 rev7
mod1                    12/17/09
                        3048112    cd112 4843 endf/b7 rel0 rev7
mod1                    12/17/09
                        1048113    cd113 4846 endf/b7 rel0 rev7
mod1                    12/17/09
                        3048113    cd113 4846 endf/b7 rel0 rev7
mod1                    12/17/09
                        1048114    cd114 4849 endf/b7 rel4 rev7
mod1                    12/17/09
                        3048114    cd114 4849 endf/b7 rel4 rev7
mod1                    12/17/09
                        1048116    cd116 4855 endf/b7 rel0 rev7
mod1                    12/17/09
                        3048116    cd116 4855 endf/b7 rel0 rev7
mod1                    12/17/09
                        1049115    in115 4931 endf/b7 rel3 rev7
mod1                    12/17/09
                        1050112    sn112 5025 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050114    sn114 5031 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050115    sn115 5034 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050116    sn116 5037 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050117    sn117 5040 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050118    sn118 5043 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050119    sn119 5046 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050120    sn120 5049 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050122    sn122 5055 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050124    sn124 5061 endf/b7 rel0 rev7
mod1                    12/17/09
                        1050126    sn126 5067 endf/b7 rel0 rev7
mod1                    12/17/09
                        1053127    i127 5325 endf/b7 rel2 rev7 mod1
```

```
12/17/09
                                1053129    i129 5331 endf/b7 rel0 rev7 mod1
12/17/09
                                1053135    i135 5349 endf/b7 rel0 rev7 mod1
12/17/09
                                1054131    xe131 5446 endf/b7 rel0 rev7
mod1                  12/17/09
                                1054133    xe133 5452 endf/b7 rel0 rev7
mod1                  12/17/09
                                1054135    xe135 5458 endf/b7 rel0 rev7
mod1                  12/17/09
                                1055133    cs133 5525 endf/b7 rel0 rev7
mod1                  12/17/09
                                1055134    cs134 5528 endf/b7 rel0 rev7
mod1                  12/17/09
                                1055135    cs135 5531 endf/b7 rel0 rev7
mod1                  12/17/09
                                1055137    cs137 5537 endf/b7 rel0 rev7
mod1                  12/17/09
                                1056138    ba138 5649 endf/b7 rel0 rev7
mod1                  12/17/09
                                1056140    ba140 5655 endf/b7 rel0 rev7
mod1                  12/17/09
                                1057139    la139 5728 endf/b7 rel0 rev7
mod1                  12/17/09
                                1058141    ce141 5840 endf/b7 rel0 rev7
mod1                  12/17/09
                                1058142    ce142 5843 endf/b7 rel0 rev7
mod1                  12/17/09
                                1058143    ce143 5846 endf/b7 rel0 rev7
mod1                  12/17/09
                                1058144    ce144 5849 endf/b7 rel0 rev7
mod1                  12/17/09
                                1059141    pr141 5925 endf/b7 rel0 rev7
mod1                  12/17/09
                                1059143    pr143 5931 endf/b7 rel0 rev7
mod1                  12/17/09
                                1060143    nd143 6028 endf/b7 rel0 rev7
mod1                  12/17/09
                                1060144    nd144 6031 endf/b7 rel0 rev7
mod1                  12/17/09
                                1060145    nd145 6034 endf/b7 rel0 rev7
mod1                  12/17/09
                                1060146    nd146 6037 endf/b7 rel0 rev7
mod1                  12/17/09
                                1060147    nd147 6040 endf/b7 rel0 rev7
mod1                  12/17/09
                                1060148    nd148 6043 endf/b7 rel0 rev7
mod1                  12/17/09
                                1061147    pm147 6149 endf/b7 rel3 rev7
mod1                  12/17/09
                                1061148    pm148 6152 endf/b7 rel3 rev7
```

```
mod1                 12/17/09
                      1061149    pm149 6155 endf/b7 rel3 rev7
mod1                 12/17/09
                      1062147    sm147 6234 endf/b7 rel0 rev7
mod1                 12/17/09
                      1062149    sm149 6240 endf/b7 rel0 rev7
mod1                 12/17/09
                      1062150    sm150 6243 endf/b7 rel0 rev7
mod1                 12/17/09
                      1062151    sm151 6246 endf/b7 rel0 rev7
mod1                 12/17/09
                      1062152    sm152 6249 endf/b7 rel0 rev7
mod1                 12/17/09
                      1062153    sm153 6252 endf/b7 rel0 rev7
mod1                 12/17/09
                      1063151    eu151 6325 endf/b7 rel0 rev7
mod1                 12/17/09
                      1063153    eu153 6331 endf/b7 rel1 rev7
mod1                 12/17/09
                      1063154    eu154 6334 endf/b7 rel0 rev7
mod1                 12/17/09
                      1063155    eu155 6337 endf/b7 rel0 rev7
mod1                 12/17/09
                      1063156    eu156 6340 endf/b7 rel0 rev7
mod1                 12/17/09
                      1064152    gd152 6425 endf/b7 rel0 rev7
mod1                 12/17/09
                      1064154    gd154 6431 endf/b7 rel0 rev7
mod1                 12/17/09
                      1064155    gd155 6434 endf/b7 rel0 rev7
mod1                 12/17/09
                      1064156    gd156 6437 endf/b7 rel0 rev7
mod1                 12/17/09
                      1064157    gd157 6440 endf/b7 rel0 rev7
mod1                 12/17/09
                      1064158    gd158 6443 endf/b7 rel0 rev7
mod1                 12/17/09
                      1064160    gd160 6449 endf/b7 rel0 rev7
mod1                 12/17/09
                      1074182    w182 7431 endf/b7 rel8 rev7 mod2
12/17/09
                      1074183    w183 7434 endf/b7 rel8 rev7 mod2
12/17/09
                      1074184    w184 7437 endf/b7 rel8 rev7 mod2
12/17/09
                      1074186    w186 7443 endf/b7 rel8 rev7 mod2
12/17/09
                      1082204    pb204 8225 endf/b7 rel1 rev7
mod1                 12/17/09
                      1082206    pb206 8231 endf/b7 rel1 rev7
mod1                 12/17/09
                      1082207    pb207 8234 endf/b7 rel1 rev7
```

```
mod1                 12/17/09
                                1082208    pb208 8237 endf/b7 rel6 rev7
mod2                 12/17/09
                                1092234    u234 9225 endf/b7 rel5 rev7 mod2
12/17/09
                                1092235    u235 9228 endf/b7 rel0 rev7 mod7
12/17/09
                                1092236    u236 9231 endf/b7 rel0 rev7 mod1
12/17/09
                                1092238    u238 9237 endf/b7 rel6 rev7 mod5
12/17/09
                                1093237    np237 9346 endf/b7 rel0 rev7
mod1                 12/17/09
                                1094238    pu238 9434 endf/b7 rel0 rev7
mod0                 12/17/09
                                1094239    pu239 9437 endf/b7 rel5 rev7
mod5                 12/17/09
                                1094240    pu240 9440 endf/b7 rel2 rev7
mod0                 12/17/09
                                1094241    pu241 9443 endf/b7 rel3 rev7
mod1                 12/17/09
                                1094242    pu242 9446 endf/b7 rel0 rev7
mod0                 12/17/09
                                1095241    am241 9543 endf/b7 rel0 rev7
mod4                 12/17/09
                                1095242    am242 9546 endf/b7 rel0 rev7
mod0                 12/17/09
                                1095243    am243 9549 endf/b7 rel5 rev7
mod0                 12/17/09
                                1096242    cm242 9631 endf/b7 rel0 rev7
mod0                 12/17/09
                                1096243    cm243 9634 endf/b7 rel7 rev7
mod0                 12/17/09
                                1096244    cm244 9637 endf/b7 rel3 rev7
mod2                 12/17/09
                                2001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09
                                1001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09

  ***** warning ***** keno message number k6-222 follows:
  9707 transfers for mixture 1 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  139 transfers for mixture 3 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  13467 transfers for mixture 2 were corrected for bad moments.

                                ........ finished mixing cross-sections
........
```

1-d cross section array id numbers

neutron

reaction name	reaction id
total	1
non-absorption	2002
nu-fission	1452
absorption	27
fission	18
chi	1018

..... finished preparing the cross sections .....

```
************************************************************
**                                                        **
**   array      units in   units in   units in   nesting  **
**   number      x dir.     y dir.     z dir.     level   **
**                                                        **
**     1            1         14         1          1    **
**                                                        **
************************************************************
```

..... finished loading the data .....

```
1
************************************************************************
*****************************************
        ***
***
        ***
***

************************************************************************
*****************************************
        ***                                  ******      geometry
parameters       ******                                  ***
        ***
***
        ***
***
        ***                      niar        number of independent array
```

```
references              1                       ***
        ***
***
        ***                     ngblu       global unit number
2                        ***
        ***
***
        ***                     nboxt       number of units in the
problem                      2                       ***
        ***
***
        ***                     nquad       number of quadratics in the
problem                    12                      ***
        ***
***
        ***                     ngwrds      number of geometry words
read                         4                       ***
        ***
***
        ***                     maxgwd      maximum geometry words in a
unit                       3                       ***
        ***
***
        ***                     maxsfu      largest number of surfaces
in a unit                  9                       ***
        ***
***
        ***                     maxreg      largest number of media in a
unit                       3                      ***
        ***
***
        ***                     regtot      number of spatial volumes
defined                      4                      ***
        ***
***
        ***                     sectot      number of entries in the
sector array               14                       ***
        ***
***
        ***                     nucom       number of comments in the
geometry data              2                       ***
        ***
***
        ***                     numhol      number of holes in the
problem                      0                       ***
        ***
***

******************************************************************************
*****************************************

1                                       fuel bundle
```

geometry description for those units utilized in this problem

----- unit 1 -----

fuel meat

1 cuboid 1 quadratic surfaces

X**2	Y**2	Z**2	XY	XZ	YZ	X	Y	Z	Constant
-1.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+8.86938E+00
+0.00000E+00	-1.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+6.45160E-04
+0.00000E+00	+0.00000E+00	-1.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+9.00225E+02

2 cuboid 2 quadratic surfaces

X**2	Y**2	Z**2	XY	XZ	YZ	X	Y	Z	Constant
-1.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+1.30549E+01
+0.00000E+00	-1.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+4.03225E-03
+0.00000E+00	+0.00000E+00	-1.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+1.05910E+03

3 cuboid 3 quadratic surfaces

X**2	Y**2	Z**2	XY	XZ	YZ	X	Y	Z	Constant
-1.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+1.30549E+01
+0.00000E+00	-1.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+0.00000E+00	+4.18080E-02

```
  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 media 1    1          1

 media 3    1          2 -1

 media 2    1          -1 -2 3

 boundary                         3


                                          ******************   global
******************
                                                      -----   unit 2
-----

 array unit

       1        cuboid         1                             quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +5.31622E+00 +0.00000E+00 +1.12882E+00

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 array 1               1

 boundary                         1
1                        fuel bundle

                   -------  unit orientation description for array 1
-------


 z layer 1, x column 1 to 1 left to right   y row 1 to 14  bottom to top
```

1

1

1

1

1

1

1

1

1

1

1

1

1

1 fuel bundle

volumes for those units utilized in this problem

volumes not specified in the input were set to -1.0

unit	uses	geometry region	mixture	total region volume (cm**3)
1	14	1	1	2.47925E+02 +/- 7.84971E-01
		2	3	5.95366E+02 +/- 1.88502E+00
		3	2	1.84949E+03 +/- 5.85578E+00
2	1	1		

mixture	total mixture volume (cm**3)	total mixture mass (gm)

```
                                    1          2.47925E+02 +/- 7.84971E-01
1.37533E+03 +/- 4.35453E+00
                                    2          1.84949E+03 +/- 5.85578E+00
1.83832E+03 +/- 5.82041E+00
                                    3          5.95366E+02 +/- 1.88502E+00
1.60868E+03 +/- 5.09333E+00
                                              -------------
-------------
                                               2.69278E+03
4.82233E+03
                                   *****  restart data has been written on
unit 95  *****



*************************************************************************
*****************************************
        ***
***
        ***                                                biasing information
***
        ***
***
        ***     a default weight of    0.500 will be used for all bias
id's.                                                      ***
        ***
***

*************************************************************************
*****************************************

                                   ........ finished in Keno-VI before
tracking       ........

                                   ........     0.01383 minutes were used
processing data.        ........

 volume fraction of fissile material in the system= 9.20704E-02

 start type 0 was used.

 the neutrons were started with a flat distribution in a cuboid defined
by:
                          +x= 3.61315E+00  -x=-3.61315E+00  +y=
5.52069E+00  -y=-2.04470E-01  +z= 3.25438E+01  -z=-3.25438E+01

   0.00367 minutes were required for starting.   total elapsed time is
0.01750 minutes.
1fuel bundle

                    generation        average         avg k-eff
matrix       matrix k-eff
```

```
     generation   k-effective      k-effective       deviation
k-effective       deviation
  keno message number k6-132 follows:
 only 15369 independent fission points were generated for generation 1
          1       7.47594E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15274 independent fission points were generated for generation 2
          2       7.46222E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15456 independent fission points were generated for generation 3
          3       7.56524E-01      7.56524E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.59245E-01      7.57885E-01      1.36060E-03
0.00000E+00      0.00000E+00
          5       7.60497E-01      7.58755E-01      1.17269E-03
0.00000E+00      0.00000E+00
          6       7.67963E-01      7.61057E-01      2.44670E-03
0.00000E+00      0.00000E+00
          7       7.59240E-01      7.60694E-01      1.92975E-03
0.00000E+00      0.00000E+00
          8       7.64733E-01      7.61367E-01      1.71341E-03
0.00000E+00      0.00000E+00
          9       7.59196E-01      7.61057E-01      1.48093E-03
0.00000E+00      0.00000E+00
         10       7.70081E-01      7.62185E-01      1.70806E-03
0.00000E+00      0.00000E+00
         11       7.69255E-01      7.62970E-01      1.69892E-03
0.00000E+00      0.00000E+00
         12       7.66209E-01      7.63294E-01      1.55369E-03
0.00000E+00      0.00000E+00
         13       7.63259E-01      7.63291E-01      1.40537E-03
0.00000E+00      0.00000E+00
         14       7.66343E-01      7.63545E-01      1.30789E-03
0.00000E+00      0.00000E+00
         15       7.68414E-01      7.63920E-01      1.26003E-03
0.00000E+00      0.00000E+00
         16       7.65453E-01      7.64029E-01      1.17169E-03
0.00000E+00      0.00000E+00
         17       7.64784E-01      7.64080E-01      1.09194E-03
0.00000E+00      0.00000E+00
         18       7.67025E-01      7.64264E-01      1.03787E-03
0.00000E+00      0.00000E+00
         19       7.68531E-01      7.64515E-01      1.00670E-03
0.00000E+00      0.00000E+00
         20       7.62396E-01      7.64397E-01      9.56404E-04
0.00000E+00      0.00000E+00
         21       7.71307E-01      7.64761E-01      9.75037E-04
0.00000E+00      0.00000E+00
         22       7.69160E-01      7.64981E-01      9.50799E-04
0.00000E+00      0.00000E+00
```

23	7.69957E-01	7.65218E-01	9.34915E-04	0.00000E+00
0.00000E+00				
24	7.66443E-01	7.65273E-01	8.93144E-04	0.00000E+00
0.00000E+00				
25	7.55929E-01	7.64867E-01	9.45195E-04	0.00000E+00
0.00000E+00				
26	7.68147E-01	7.65004E-01	9.15217E-04	0.00000E+00
0.00000E+00				
27	7.68044E-01	7.64641E-01	4.14345E-03	0.00000E+00
0.00000E+00				
28	7.66371E-01	7.64987E-01	2.96377E-03	0.00000E+00
0.00000E+00				
29	7.67537E-01	7.65412E-01	2.35401E-03	0.00000E+00
0.00000E+00				
30	7.66010E-01	7.65497E-01	1.92470E-03	0.00000E+00
0.00000E+00				
31	7.70244E-01	7.66091E-01	1.76504E-03	0.00000E+00
0.00000E+00				
32	7.63832E-01	7.65840E-01	1.55482E-03	0.00000E+00
0.00000E+00				
33	7.65083E-01	7.65764E-01	1.37384E-03	0.00000E+00
0.00000E+00				
34	7.69833E-01	7.66134E-01	1.29505E-03	0.00000E+00
0.00000E+00				
35	7.76465E-01	7.66995E-01	1.71374E-03	0.00000E+00
0.00000E+00				
36	7.63110E-01	7.66696E-01	1.41076E-03	0.00000E+00
0.00000E+00				
37	7.62105E-01	7.66368E-01	1.34518E-03	0.00000E+00
0.00000E+00				
38	7.62875E-01	7.66135E-01	1.38012E-03	0.00000E+00
0.00000E+00				
39	7.64178E-01	7.66013E-01	1.31408E-03	0.00000E+00
0.00000E+00				
40	7.72001E-01	7.66365E-01	1.17440E-03	0.00000E+00
0.00000E+00				
41	7.73937E-01	7.66786E-01	1.39807E-03	0.00000E+00
0.00000E+00				
42	7.58343E-01	7.66342E-01	1.21629E-03	0.00000E+00
0.00000E+00				
43	7.71645E-01	7.66607E-01	1.18396E-03	0.00000E+00
0.00000E+00				
44	7.67483E-01	7.66648E-01	1.12406E-03	0.00000E+00
0.00000E+00				
45	7.61018E-01	7.66392E-01	1.10238E-03	0.00000E+00
0.00000E+00				
46	7.61910E-01	7.66198E-01	1.07069E-03	0.00000E+00
0.00000E+00				
47	7.69691E-01	7.66343E-01	1.03431E-03	0.00000E+00
0.00000E+00				
48	7.68000E-01	7.66409E-01	9.92684E-04	0.00000E+00
0.00000E+00				

49	7.68221E-01	7.66479E-01	9.54906E-04
0.00000E+00	0.00000E+00		
50	7.61083E-01	7.66279E-01	9.40656E-04
0.00000E+00	0.00000E+00		
51	7.63032E-01	7.66163E-01	9.13113E-04
0.00000E+00	0.00000E+00		
52	7.76710E-01	7.66527E-01	9.57228E-04
0.00000E+00	0.00000E+00		
53	7.56749E-01	7.66201E-01	9.83312E-04
0.00000E+00	0.00000E+00		
54	7.63197E-01	7.66104E-01	9.55237E-04
0.00000E+00	0.00000E+00		
55	7.73442E-01	7.66333E-01	9.53780E-04
0.00000E+00	0.00000E+00		
56	7.66526E-01	7.66339E-01	9.23513E-04
0.00000E+00	0.00000E+00		
57	7.65052E-01	7.66301E-01	8.95940E-04
0.00000E+00	0.00000E+00		
58	7.67358E-01	7.66332E-01	8.69746E-04
0.00000E+00	0.00000E+00		
59	7.65114E-01	7.66298E-01	8.45247E-04
0.00000E+00	0.00000E+00		
60	7.60350E-01	7.66137E-01	8.37897E-04
0.00000E+00	0.00000E+00		
61	7.65028E-01	7.66108E-01	8.15488E-04
0.00000E+00	0.00000E+00		
62	7.56576E-01	7.65863E-01	8.32457E-04
0.00000E+00	0.00000E+00		
63	7.66209E-01	7.65872E-01	8.10879E-04
0.00000E+00	0.00000E+00		
64	7.55202E-01	7.65612E-01	8.34174E-04
0.00000E+00	0.00000E+00		
65	7.67017E-01	7.65645E-01	8.14296E-04
0.00000E+00	0.00000E+00		
66	7.67733E-01	7.65694E-01	7.96224E-04
0.00000E+00	0.00000E+00		
67	7.58996E-01	7.65542E-01	7.92947E-04
0.00000E+00	0.00000E+00		
68	7.65689E-01	7.65545E-01	7.74723E-04
0.00000E+00	0.00000E+00		
69	7.73193E-01	7.65711E-01	7.76155E-04
0.00000E+00	0.00000E+00		
70	7.59428E-01	7.65577E-01	7.71290E-04
0.00000E+00	0.00000E+00		
71	7.68151E-01	7.65631E-01	7.56686E-04
0.00000E+00	0.00000E+00		
72	7.65941E-01	7.65637E-01	7.40782E-04
0.00000E+00	0.00000E+00		
73	7.64588E-01	7.65616E-01	7.25823E-04
0.00000E+00	0.00000E+00		
74	7.69043E-01	7.65684E-01	7.14455E-04
0.00000E+00	0.00000E+00		

75	7.64541E-01	7.65662E-01	7.00664E-04
0.00000E+00	0.00000E+00		
76	7.66783E-01	7.65683E-01	6.87396E-04
0.00000E+00	0.00000E+00		
77	7.59392E-01	7.65566E-01	6.84672E-04
0.00000E+00	0.00000E+00		
78	7.64883E-01	7.65554E-01	6.71992E-04
0.00000E+00	0.00000E+00		
79	7.71144E-01	7.65654E-01	6.67447E-04
0.00000E+00	0.00000E+00		
80	7.69029E-01	7.65713E-01	6.58187E-04
0.00000E+00	0.00000E+00		
81	7.66446E-01	7.65726E-01	6.46664E-04
0.00000E+00	0.00000E+00		
82	7.61069E-01	7.65647E-01	6.40471E-04
0.00000E+00	0.00000E+00		
83	7.65558E-01	7.65645E-01	6.29524E-04
0.00000E+00	0.00000E+00		
84	7.66098E-01	7.65653E-01	6.18989E-04
0.00000E+00	0.00000E+00		
85	7.67866E-01	7.65688E-01	6.09837E-04
0.00000E+00	0.00000E+00		
86	7.65452E-01	7.65685E-01	5.99933E-04
0.00000E+00	0.00000E+00		
87	7.71189E-01	7.65771E-01	5.96765E-04
0.00000E+00	0.00000E+00		
88	7.60901E-01	7.65696E-01	5.92275E-04
0.00000E+00	0.00000E+00		
89	7.68099E-01	7.65732E-01	5.84264E-04
0.00000E+00	0.00000E+00		
90	7.69156E-01	7.65783E-01	5.77678E-04
0.00000E+00	0.00000E+00		
91	7.70591E-01	7.65854E-01	5.73499E-04
0.00000E+00	0.00000E+00		
92	7.61169E-01	7.65786E-01	5.69189E-04
0.00000E+00	0.00000E+00		
93	7.68210E-01	7.65821E-01	5.61978E-04
0.00000E+00	0.00000E+00		
94	7.71792E-01	7.65905E-01	5.60423E-04
0.00000E+00	0.00000E+00		
95	7.64362E-01	7.65883E-01	5.52901E-04
0.00000E+00	0.00000E+00		
96	7.61398E-01	7.65822E-01	5.48716E-04
0.00000E+00	0.00000E+00		
97	7.65183E-01	7.65813E-01	5.41217E-04
0.00000E+00	0.00000E+00		
98	7.68082E-01	7.65843E-01	5.34733E-04
0.00000E+00	0.00000E+00		
99	7.69022E-01	7.65885E-01	5.29255E-04
0.00000E+00	0.00000E+00		
100	7.75505E-01	7.66010E-01	5.37369E-04
0.00000E+00	0.00000E+00		

```
        101       7.65368E-01      7.66002E-01      5.30410E-04
0.00000E+00      0.00000E+00
        102       7.65865E-01      7.66000E-01      5.23568E-04
0.00000E+00      0.00000E+00
        103       7.64301E-01      7.65979E-01      5.17346E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=4CF76E410284C5EA
        104       7.69453E-01      7.66022E-01      5.12680E-04
0.00000E+00      0.00000E+00
        105       7.67766E-01      7.66043E-01      5.06769E-04
0.00000E+00      0.00000E+00
        106       7.75246E-01      7.66154E-01      5.12981E-04
0.00000E+00      0.00000E+00
        107       7.63469E-01      7.66122E-01      5.07795E-04
0.00000E+00      0.00000E+00
        108       7.66541E-01      7.66127E-01      5.01738E-04
0.00000E+00      0.00000E+00
        109       7.69557E-01      7.66167E-01      4.97439E-04
0.00000E+00      0.00000E+00
        110       7.66854E-01      7.66175E-01      4.91686E-04
0.00000E+00      0.00000E+00
        111       7.69874E-01      7.66217E-01      4.87858E-04
0.00000E+00      0.00000E+00
        112       7.62744E-01      7.66178E-01      4.83895E-04
0.00000E+00      0.00000E+00
        113       7.64014E-01      7.66154E-01      4.79044E-04
0.00000E+00      0.00000E+00
        114       7.72789E-01      7.66227E-01      4.79396E-04
0.00000E+00      0.00000E+00
        115       7.69125E-01      7.66258E-01      4.75167E-04
0.00000E+00      0.00000E+00
        116       7.65875E-01      7.66254E-01      4.69993E-04
0.00000E+00      0.00000E+00
        117       7.65352E-01      7.66244E-01      4.65013E-04
0.00000E+00      0.00000E+00
        118       7.71668E-01      7.66302E-01      4.63644E-04
0.00000E+00      0.00000E+00
        119       7.65423E-01      7.66292E-01      4.58831E-04
0.00000E+00      0.00000E+00
        120       7.66177E-01      7.66291E-01      4.54027E-04
0.00000E+00      0.00000E+00
        121       7.64366E-01      7.66272E-01      4.49761E-04
0.00000E+00      0.00000E+00
        122       7.66144E-01      7.66270E-01      4.45149E-04
0.00000E+00      0.00000E+00
        123       7.66651E-01      7.66274E-01      4.40647E-04
0.00000E+00      0.00000E+00

  keno message number k6-123          execution terminated due to
completion of the specified number of generations.
                                   restart data was written for
```

```
generation  123       random number=289BF275A38608BA
                                   A start type 6 file will be written to
keno_start6_file
1                                                  fuel bundle

 lifetime =  1.55371E-05 + or -  1.18931E-08             generation time
=  2.99813E-05 + or -  2.10485E-08
 nu bar   =  2.43896E+00 + or -  1.05750E-05       average fission group
=  2.17543E+02 + or -  1.08902E-02
                       energy(ev) of the average lethargy causing fission
=  5.63331E-02 + or -  1.06339E-04
                                                system mean free path (cm)
=  6.52823E-01 + or -  1.75337E-04

 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

      23          0.76627   + or - 0.00044     0.76583 to 0.76671
0.76539 to 0.76716    0.76495 to 0.76760    2000000      14.8806

      24          0.76627   + or - 0.00045     0.76583 to 0.76672
0.76538 to 0.76716    0.76494 to 0.76761    1980000      14.8461

      25          0.76638   + or - 0.00044     0.76594 to 0.76681
0.76550 to 0.76725    0.76507 to 0.76769    1960000      14.9478

      26          0.76636   + or - 0.00044     0.76592 to 0.76680
0.76548 to 0.76724    0.76504 to 0.76768    1940000      14.9491

      27          0.76634   + or - 0.00045     0.76590 to 0.76679
0.76545 to 0.76723    0.76501 to 0.76768    1920000      14.9471

      28          0.76634   + or - 0.00045     0.76589 to 0.76679
0.76544 to 0.76724    0.76499 to 0.76769    1900000      14.9100

      29          0.76633   + or - 0.00045     0.76587 to 0.76678
0.76542 to 0.76724    0.76497 to 0.76769    1880000      14.8900

      30          0.76633   + or - 0.00046     0.76587 to 0.76679
0.76541 to 0.76725    0.76495 to 0.76771    1860000      14.8522

      31          0.76629   + or - 0.00046     0.76583 to 0.76675
0.76536 to 0.76722    0.76490 to 0.76768    1840000      14.9841

      32          0.76632   + or - 0.00047     0.76585 to 0.76678
0.76538 to 0.76725    0.76492 to 0.76772    1820000      15.0151

      37          0.76626   + or - 0.00047     0.76579 to 0.76673
```

0.76531 to 0.76721 0.76484 to 0.76768 1720000 15.4449

42 0.76626 + or - 0.00048 0.76578 to 0.76673
0.76531 to 0.76721 0.76483 to 0.76769 1620000 16.6949

47 0.76625 + or - 0.00049 0.76576 to 0.76674
0.76527 to 0.76724 0.76478 to 0.76773 1520000 17.7075

52 0.76617 + or - 0.00050 0.76567 to 0.76667
0.76518 to 0.76716 0.76468 to 0.76766 1420000 18.2629

57 0.76626 + or - 0.00050 0.76576 to 0.76676
0.76526 to 0.76726 0.76476 to 0.76776 1320000 19.3958

62 0.76654 + or - 0.00050 0.76603 to 0.76704
0.76553 to 0.76754 0.76503 to 0.76805 1220000 20.4743

67 0.76685 + or - 0.00049 0.76636 to 0.76734
0.76587 to 0.76782 0.76539 to 0.76831 1120000 18.8344

72 0.76689 + or - 0.00050 0.76639 to 0.76738
0.76589 to 0.76788 0.76539 to 0.76838 1020000 19.9471

77 0.76710 + or - 0.00052 0.76659 to 0.76762
0.76607 to 0.76814 0.76555 to 0.76866 920000 20.3559

82 0.76718 + or - 0.00055 0.76663 to 0.76773
0.76608 to 0.76828 0.76553 to 0.76883 820000 21.9453

87 0.76717 + or - 0.00061 0.76656 to 0.76778
0.76594 to 0.76840 0.76533 to 0.76901 720000 22.6110

92 0.76736 + or - 0.00064 0.76672 to 0.76800
0.76608 to 0.76864 0.76544 to 0.76928 620000 25.2803

97 0.76759 + or - 0.00069 0.76690 to 0.76827
0.76621 to 0.76896 0.76552 to 0.76965 520000 28.2331

102 0.76730 + or - 0.00074 0.76656 to 0.76805
0.76582 to 0.76879 0.76508 to 0.76953 420000 30.3014

107 0.76707 + or - 0.00075 0.76633 to 0.76782
0.76558 to 0.76856 0.76484 to 0.76931 320000 29.8145

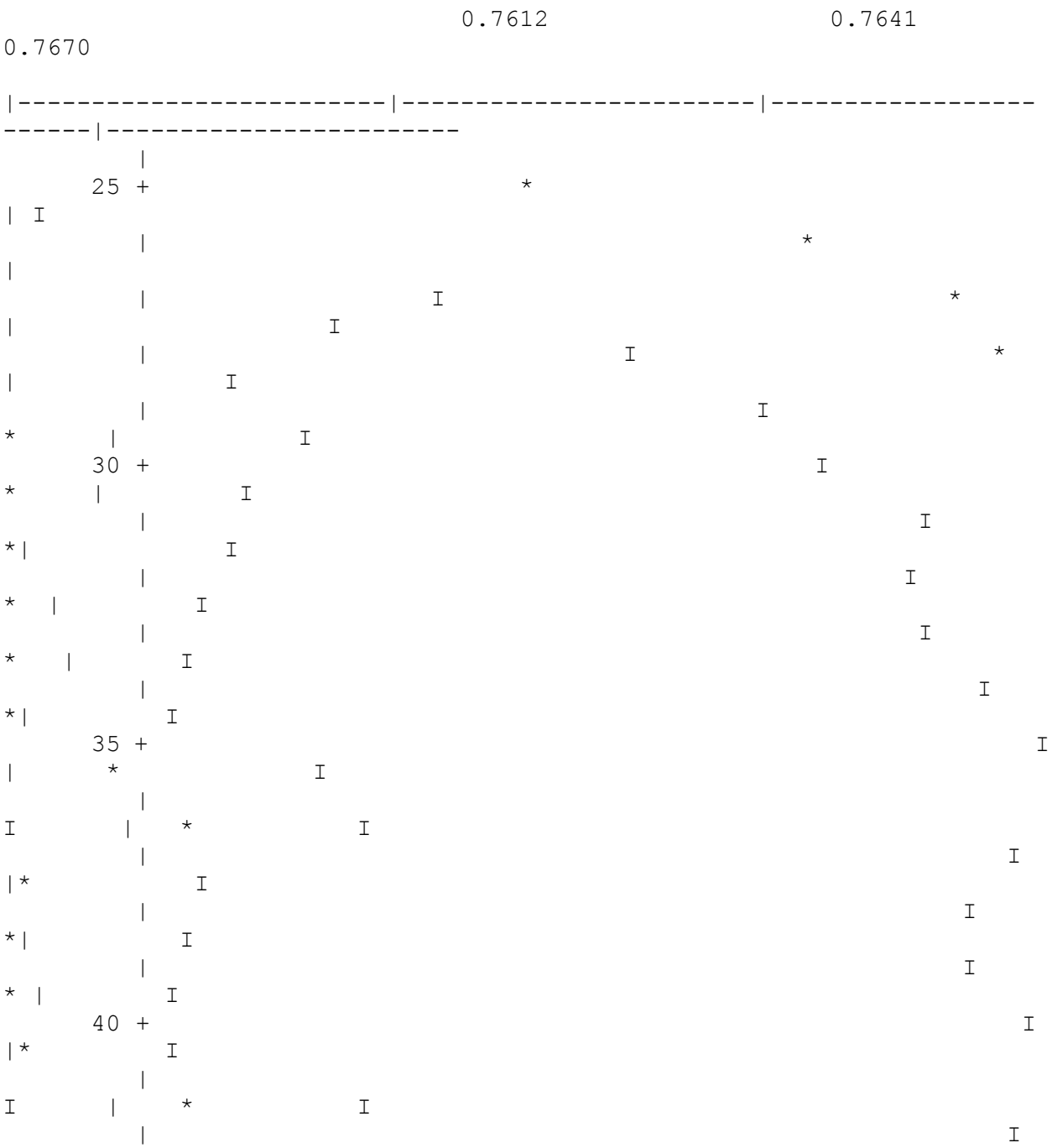
112 0.76705 + or - 0.00096 0.76609 to 0.76802
0.76513 to 0.76898 0.76416 to 0.76995 220000 37.3684
1 fuel bundle

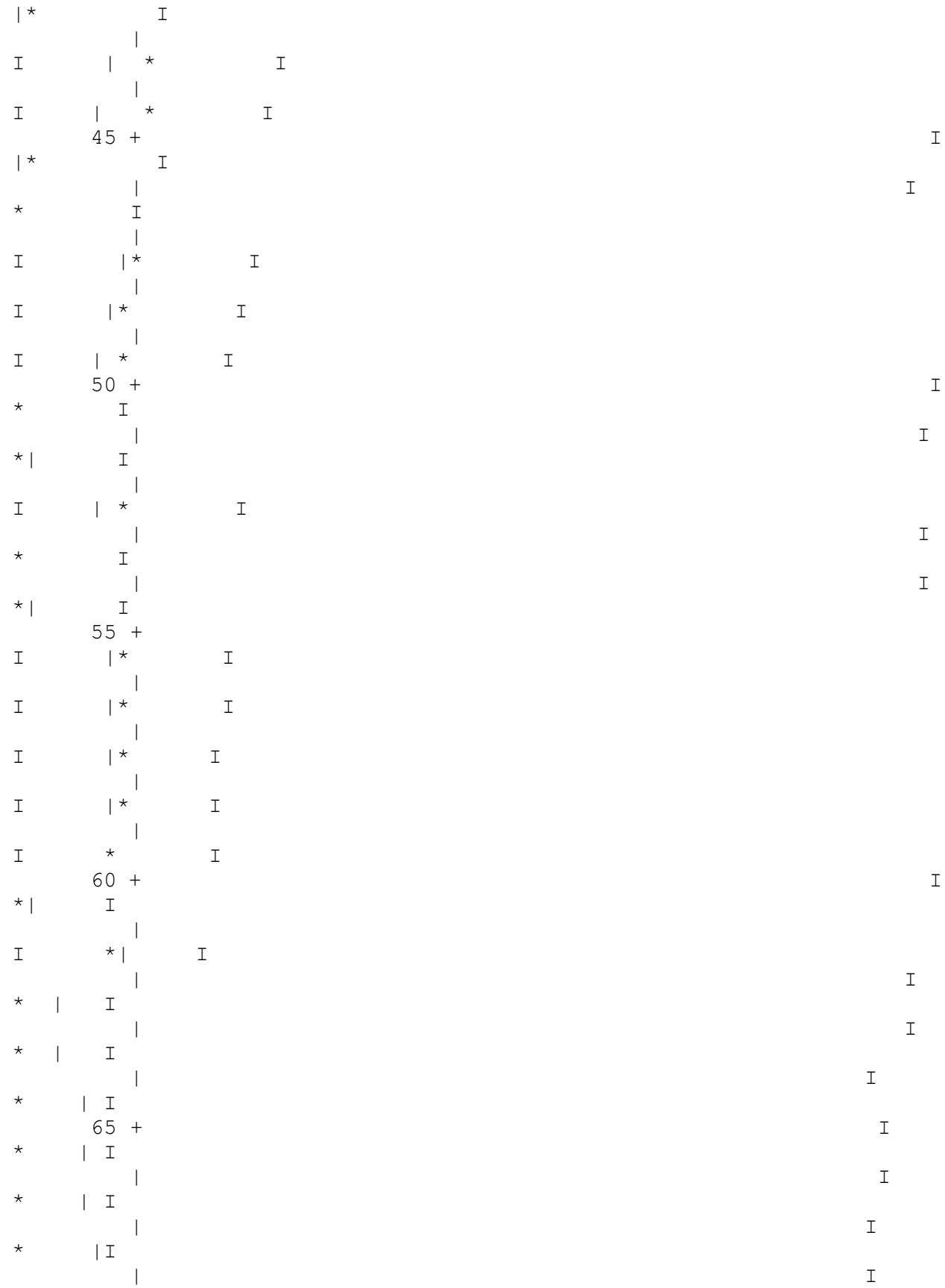
no. of initial
deviation of
generations average 67 per cent
95 per cent 99 per cent number of variance

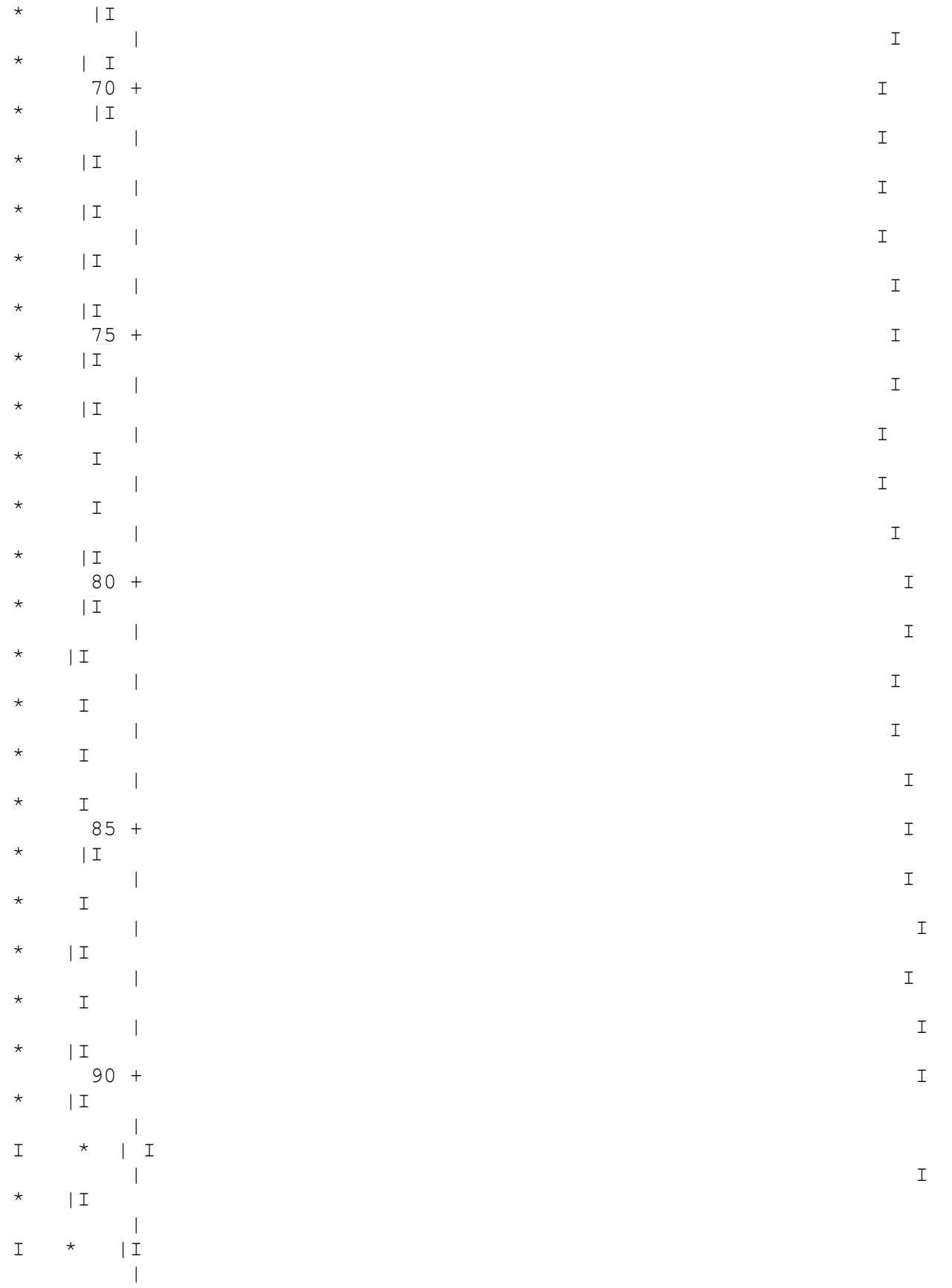
skipped	k-effective	deviation	confidence interval	confidence interval	confidence interval	histories	(per cent)
117	0.76674	+ or - 0.00170	0.76504 to 0.76844	0.76334 to 0.77014	0.76164 to 0.77184	120000	33.5106

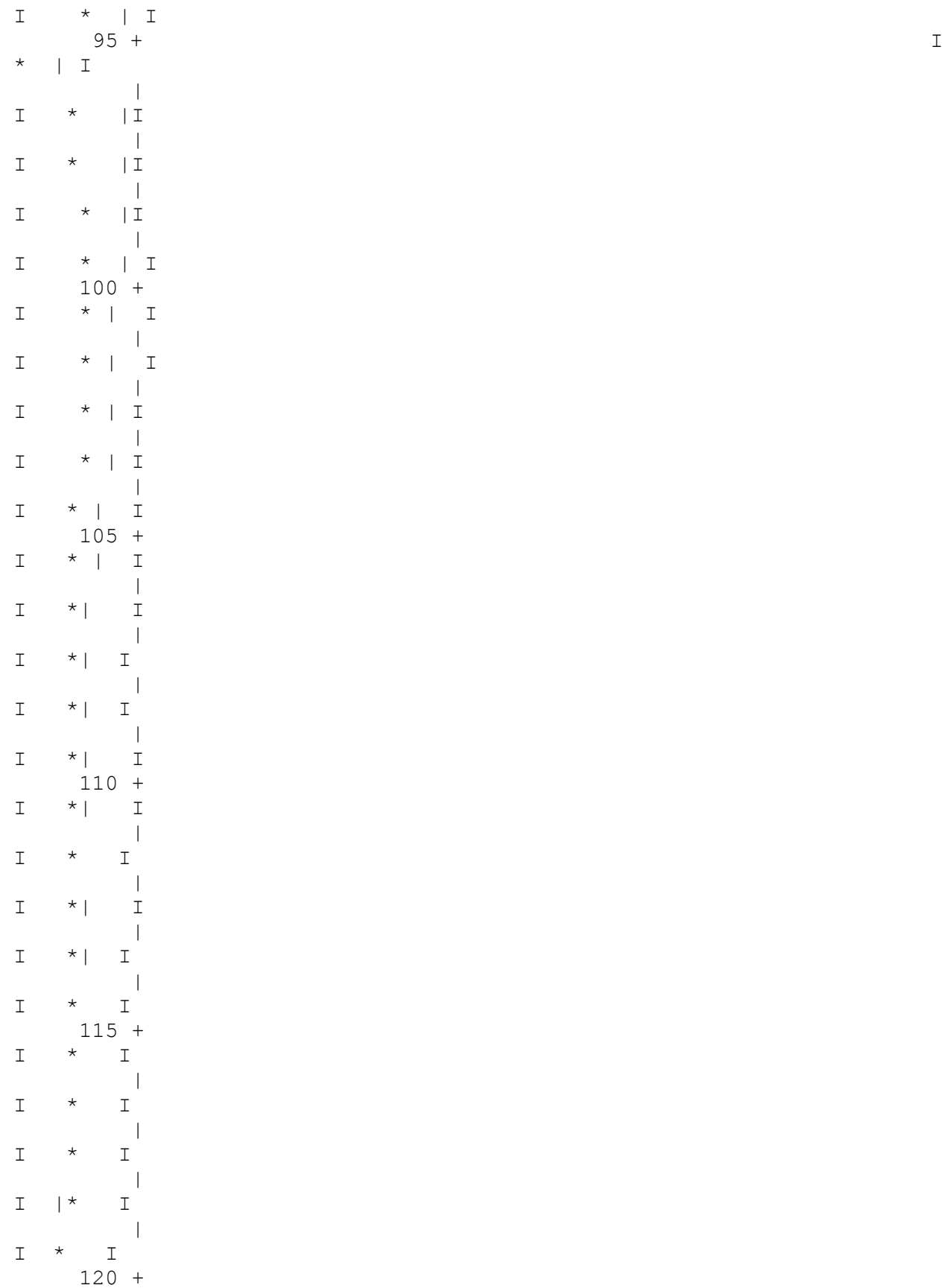
1 fuel bundle

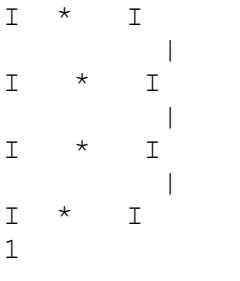
plot of average k-effective by generation run.
the line represents k-eff = 0.76627 + or - 0.00044 which occurs for 123 generations run.





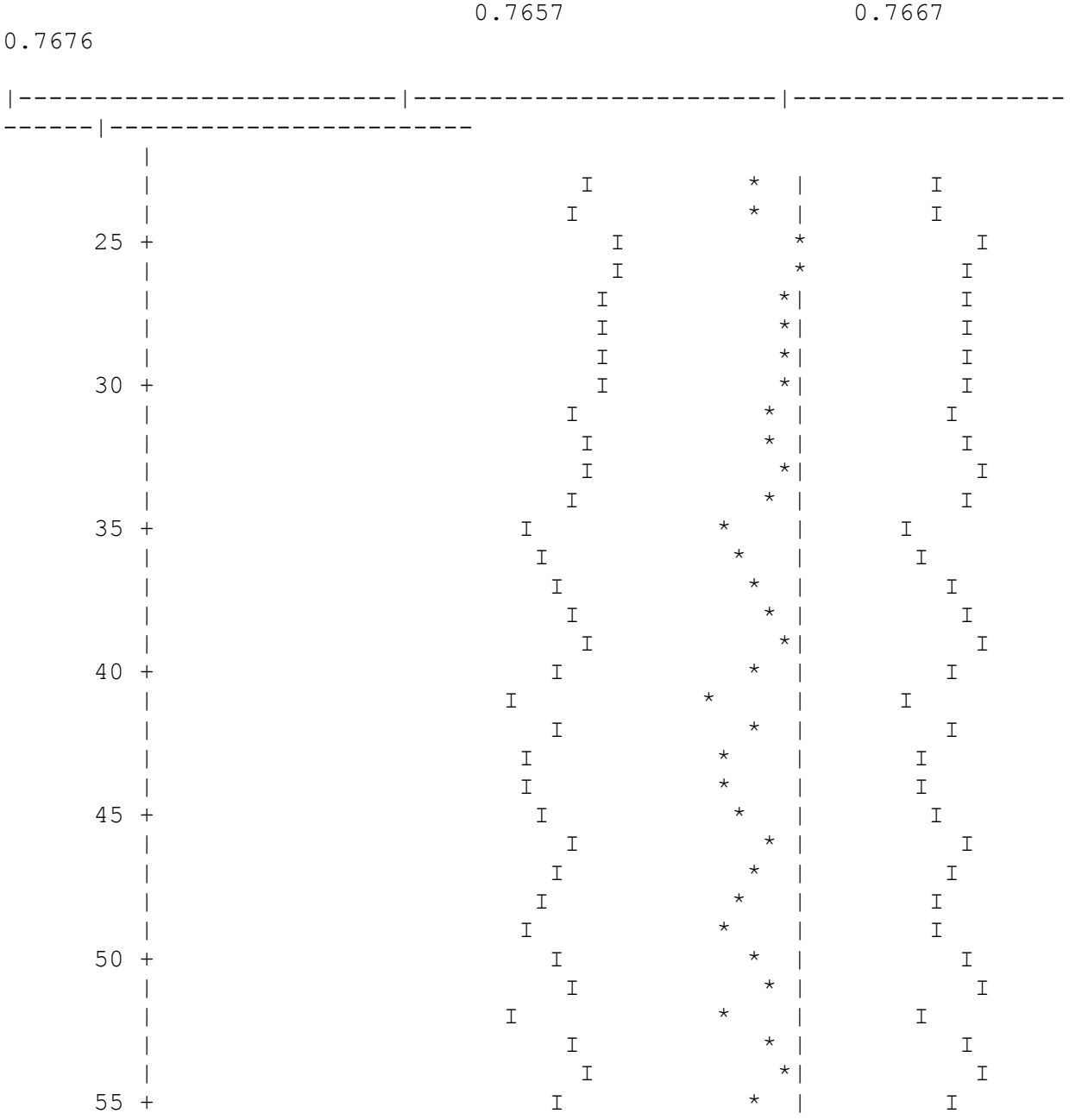


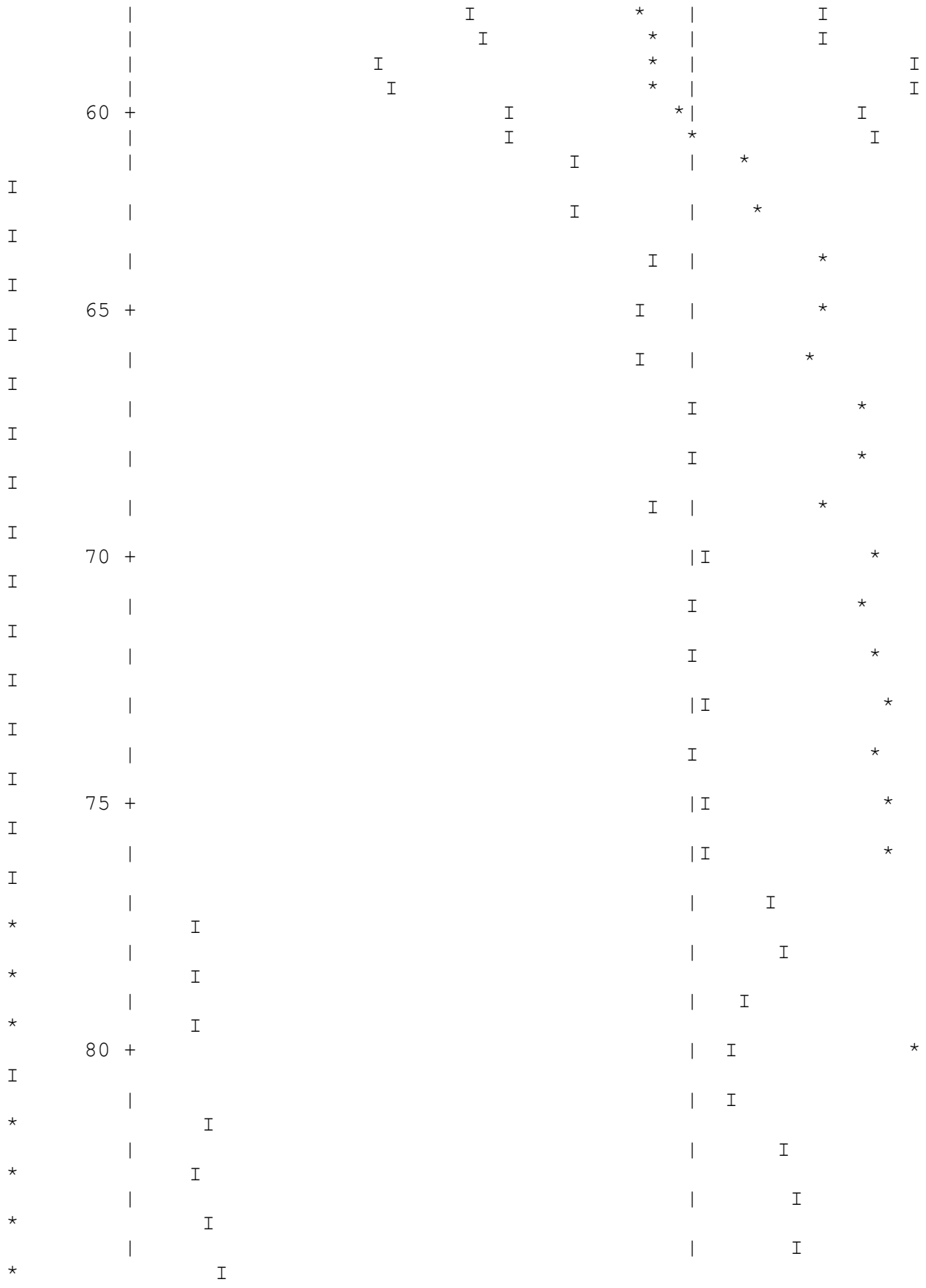

95
100
105
110
115
120

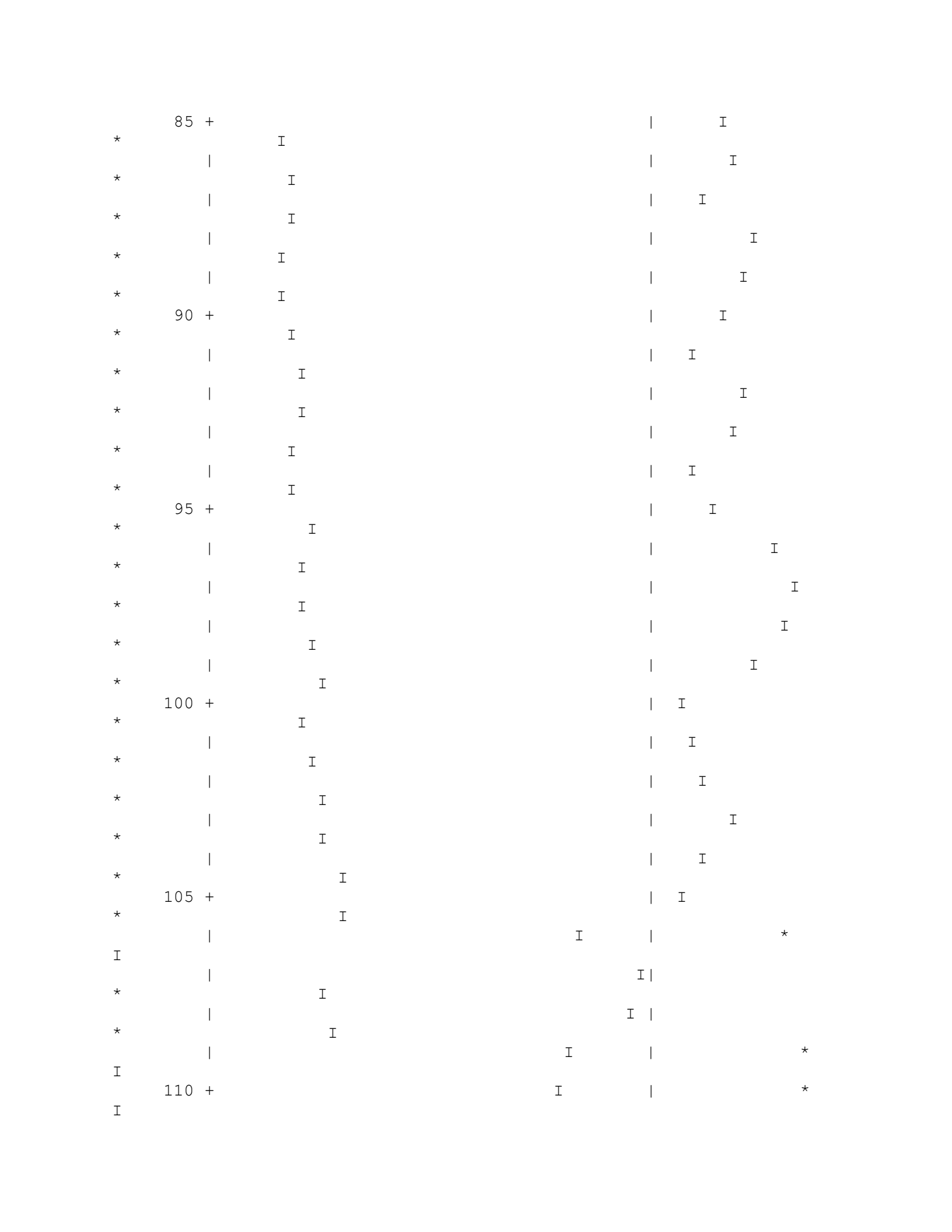


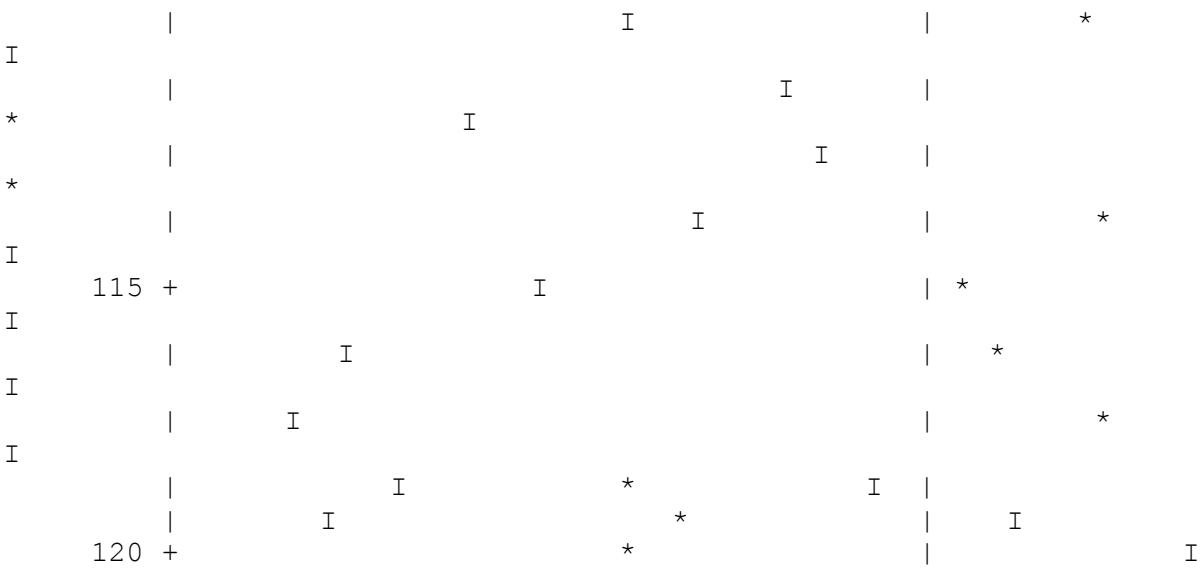
1 fuel bundle

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7663 + or - 0.0004 which occurs for 25 generations skipped.




60
65
70
75
80





k-effective satisfies the chi**2 test for normality at the 95 % level

1 fuel bundle

skipping 23 generations

group	fission	unit	region	fissions	percent	absorptions	percent	leakage	percent
	fraction				deviation		deviation		deviation
1	0.0000			0.00000E+00	0.0000	0.00000E+00	0.0000	0.00000E+00	0.0000
2	0.0000			2.32346E-07	100.0000	5.00414E-07	32.8722	0.00000E+00	0.0000
3	0.0000			1.40672E-05	13.8780	1.95889E-05	5.5162	0.00000E+00	0.0000
4	0.0000			2.15823E-05	8.8260	3.39037E-05	3.8291	0.00000E+00	0.0000
5	0.0000			2.66917E-05	7.3677	5.29937E-05	2.8581	0.00000E+00	0.0000
6	0.0001			9.41077E-05	3.8843	2.31930E-04	1.5099	0.00000E+00	0.0000
7	0.0002			1.22398E-04	3.1396	2.11217E-04	1.3152	0.00000E+00	0.0000
8	0.0003			2.47818E-04	2.1057	3.26194E-04	1.0616	0.00000E+00	0.0000
9	0.0005			3.88202E-04	1.4385	4.44798E-04	0.6499	0.00000E+00	0.0000
10	0.0003			2.02445E-04	1.5235	2.06533E-04	0.7062	0.00000E+00	0.0000
11	0.0012			9.10808E-04	0.7211	5.25035E-04	0.4915	0.00000E+00	0.0000
12	0.0010			7.68667E-04	0.6887	3.01363E-04	0.6789	0.00000E+00	0.0000

13	0.0003		2.28866E-04	1.4522	9.09307E-05	1.4349	0.00000E+00	0.0000
14	0.0013		1.01377E-03	0.5719	4.14330E-04	0.5670	0.00000E+00	0.0000
15	0.0010		7.69340E-04	0.6999	3.31655E-04	0.6920	0.00000E+00	0.0000
16	0.0002		1.88751E-04	1.1420	8.67445E-05	1.1234	0.00000E+00	0.0000
17	0.0001		6.62041E-05	1.8980	3.22111E-05	1.8614	0.00000E+00	0.0000
18	0.0001		5.21602E-05	1.7893	2.63420E-05	1.7553	0.00000E+00	0.0000
19	0.0001		8.19036E-05	1.4623	4.32960E-05	1.4314	0.00000E+00	0.0000
20	0.0001		6.03406E-05	1.1990	3.30574E-05	1.1716	0.00000E+00	0.0000
21	0.0002		1.18934E-04	1.0804	6.71651E-05	1.0542	0.00000E+00	0.0000
22	0.0001		1.03876E-04	1.1557	6.15114E-05	1.1306	0.00000E+00	0.0000
23	0.0001		1.08441E-04	1.1480	6.61773E-05	1.1225	0.00000E+00	0.0000
24	0.0000		2.41536E-05	2.6684	1.50157E-05	2.6041	0.00000E+00	0.0000
25	0.0000		3.03349E-05	1.7960	1.89628E-05	1.7461	0.00000E+00	0.0000
26	0.0000		1.69431E-05	2.7107	1.06550E-05	2.6374	0.00000E+00	0.0000
27	0.0001		5.31091E-05	1.4313	3.31466E-05	1.4033	0.00000E+00	0.0000
28	0.0001		9.62959E-05	0.9758	6.00774E-05	0.9596	0.00000E+00	0.0000
29	0.0001		9.77399E-05	1.0809	6.15769E-05	1.0668	0.00000E+00	0.0000
30	0.0000		1.23187E-05	3.1136	7.72834E-06	3.0893	0.00000E+00	0.0000
31	0.0001		9.71090E-05	1.0356	6.13451E-05	1.0226	0.00000E+00	0.0000
32	0.0001		3.95798E-05	1.5002	2.52904E-05	1.4696	0.00000E+00	0.0000
33	0.0000		3.27430E-05	1.6007	2.05017E-05	1.5823	0.00000E+00	0.0000
34	0.0001		7.55625E-05	1.2779	4.74707E-05	1.2585	0.00000E+00	0.0000
35	0.0001		4.54467E-05	1.2567	2.85232E-05	1.2387	0.00000E+00	0.0000
36	0.0001		4.25224E-05	1.3830	2.63274E-05	1.3716	0.00000E+00	0.0000
37	0.0000		2.89034E-05	1.8181	1.81360E-05	1.7796	0.00000E+00	0.0000
38	0.0000		3.41241E-05	1.6427	2.14855E-05	1.6014	0.00000E+00	0.0000

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   39    0.0002                1.28572E-04     0.7794
8.18166E-05     0.7607       0.00000E+00     0.0000
   40    0.0002                1.19557E-04     0.9127
7.72922E-05     0.8941       0.00000E+00     0.0000
   41    0.0002                1.60954E-04     0.7559
1.07538E-04     0.7317       0.00000E+00     0.0000
   42    0.0002                1.39308E-04     0.7953
9.47582E-05     0.7751       0.00000E+00     0.0000
   43    0.0001                7.94084E-05     1.1703
5.70033E-05     1.1167       0.00000E+00     0.0000
   44    0.0001                1.12991E-04     1.1022
8.30136E-05     1.0584       0.00000E+00     0.0000
   45    0.0001                5.99707E-05     0.9816
4.83292E-05     0.9013       0.00000E+00     0.0000
   46    0.0000                1.44625E-05     1.8382
1.16384E-05     1.7070       0.00000E+00     0.0000
   47    0.0001                4.13779E-05     1.3769
3.21029E-05     1.3235       0.00000E+00     0.0000
   48    0.0000                1.17320E-05     3.7437
9.11151E-06     3.6413       0.00000E+00     0.0000
   49    0.0001                7.90036E-05     1.6609
6.23304E-05     1.6266       0.00000E+00     0.0000
   50    0.0001                5.74954E-05     1.7037
4.73380E-05     1.6713       0.00000E+00     0.0000
   51    0.0000                1.53032E-05     3.4296
1.27137E-05     3.3648       0.00000E+00     0.0000
   52    0.0001                4.05049E-05     2.1543
3.50151E-05     2.1030       0.00000E+00     0.0000
   53    0.0002                1.56803E-04     0.8077
1.54228E-04     0.7521       0.00000E+00     0.0000
   54    0.0001                7.28564E-05     1.8132
6.77974E-05     1.7319       0.00000E+00     0.0000
   55    0.0002                1.62630E-04     1.2656
1.49128E-04     1.2338       0.00000E+00     0.0000
   56    0.0002                1.18259E-04     1.5109
1.09683E-04     1.4715       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                deviation
deviation                   deviation

   57    0.0002                1.48651E-04     1.4602
1.34898E-04     1.4231       0.00000E+00     0.0000
   58    0.0001                8.54874E-05     2.0031
7.48558E-05     1.9479       0.00000E+00     0.0000
   59    0.0002                1.58170E-04     1.4988
1.42084E-04     1.4398       0.00000E+00     0.0000
   60    0.0004                2.81926E-04     1.1865
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2.55135E-04	1.1122	0.00000E+00	0.0000
61	0.0000	2.96028E-05	3.7886
2.27485E-05	3.6765	0.00000E+00	0.0000
62	0.0002	1.60845E-04	1.5454
1.34984E-04	1.5020	0.00000E+00	0.0000
63	0.0002	1.20591E-04	1.8511
9.92610E-05	1.7870	0.00000E+00	0.0000
64	0.0001	1.00599E-04	2.0224
8.10741E-05	1.9565	0.00000E+00	0.0000
65	0.0000	3.45721E-05	3.6039
3.41956E-05	3.4834	0.00000E+00	0.0000
66	0.0002	1.68989E-04	2.0398
1.50092E-04	1.9734	0.00000E+00	0.0000
67	0.0002	1.50739E-04	2.0296
1.23159E-04	1.9660	0.00000E+00	0.0000
68	0.0000	2.74996E-05	4.2776
2.37561E-05	4.1325	0.00000E+00	0.0000
69	0.0004	3.09521E-04	1.5562
2.42670E-04	1.5083	0.00000E+00	0.0000
70	0.0003	2.04987E-04	1.7867
1.86662E-04	1.7243	0.00000E+00	0.0000
71	0.0006	4.31694E-04	1.4206
3.57147E-04	1.3771	0.00000E+00	0.0000
72	0.0001	5.01126E-05	5.0907
2.95897E-05	4.9685	0.00000E+00	0.0000
73	0.0004	3.23163E-04	1.7880
2.46505E-04	1.6821	0.00000E+00	0.0000
74	0.0014	1.05372E-03	1.0427
7.66400E-04	1.0008	0.00000E+00	0.0000
75	0.0001	1.07197E-04	3.1122
8.25691E-05	2.9574	0.00000E+00	0.0000
76	0.0006	4.70096E-04	1.9444
2.98381E-04	1.8785	0.00000E+00	0.0000
77	0.0005	3.79511E-04	1.9484
2.71781E-04	1.8759	0.00000E+00	0.0000
78	0.0000	7.48997E-06	4.3161
7.32568E-05	4.2728	0.00000E+00	0.0000
79	0.0002	1.80439E-04	2.4863
1.21579E-04	2.3895	0.00000E+00	0.0000
80	0.0001	6.69137E-05	3.4795
8.90172E-05	3.3905	0.00000E+00	0.0000
81	0.0014	1.05570E-03	1.2269
7.76521E-04	1.1766	0.00000E+00	0.0000
82	0.0001	6.17062E-05	4.8662
3.72213E-05	4.5833	0.00000E+00	0.0000
83	0.0002	1.28411E-04	3.4642
1.42087E-04	3.3940	0.00000E+00	0.0000
84	0.0001	7.95559E-05	3.1538
8.07627E-05	2.9263	0.00000E+00	0.0000
85	0.0003	1.97476E-04	2.1541
2.43208E-04	2.0966	0.00000E+00	0.0000
86	0.0004	2.75308E-04	2.6272

2.21127E-04	2.5036	0.00000E+00	0.0000				
87	0.0005	3.50837E-04	2.2845				
2.17879E-04	2.1824	0.00000E+00	0.0000				
88	0.0001	5.34087E-05	5.0493				
9.71113E-05	4.9196	0.00000E+00	0.0000				
89	0.0001	9.51878E-05	3.3863				
6.60271E-05	3.1238	0.00000E+00	0.0000				
90	0.0003	2.27756E-04	2.8727				
1.34474E-04	2.7540	0.00000E+00	0.0000				
91	0.0003	1.96934E-04	2.6154				
1.24270E-04	2.4625	0.00000E+00	0.0000				
92	0.0000	3.08721E-05	2.4925				
2.01961E-04	2.4444	0.00000E+00	0.0000				
93	0.0002	1.33967E-04	3.0719				
1.08661E-04	2.8678	0.00000E+00	0.0000				
94	0.0001	1.12333E-04	4.2534				
6.30435E-05	3.9897	0.00000E+00	0.0000				
95	0.0008	5.97229E-04	2.0244				
3.68585E-04	1.9600	0.00000E+00	0.0000				
96	0.0002	1.55244E-04	4.4144				
7.87932E-05	4.2261	0.00000E+00	0.0000				
97	0.0004	2.80450E-04	3.5189				
1.60668E-04	3.4435	0.00000E+00	0.0000				
98	0.0001	9.47296E-05	3.4948				
9.11317E-05	3.3551	0.00000E+00	0.0000				
99	0.0001	9.72756E-05	5.1147				
6.53238E-05	4.9261	0.00000E+00	0.0000				
100	0.0002	1.24037E-04	3.9519				
8.29876E-05	3.7859	0.00000E+00	0.0000				
101	0.0001	1.13335E-04	3.4513				
7.21089E-05	3.2009	0.00000E+00	0.0000				
102	0.0002	1.64228E-04	3.8764				
9.14732E-05	3.7224	0.00000E+00	0.0000				
103	0.0001	9.60822E-05	3.4168				
9.37532E-05	3.2486	0.00000E+00	0.0000				
104	0.0002	1.71222E-04	3.7016				
1.35625E-04	3.5784	0.00000E+00	0.0000				
105	0.0002	1.28875E-04	2.8576				
8.50002E-05	2.6996	0.00000E+00	0.0000				
106	0.0002	1.73254E-04	4.3702				
1.28849E-04	4.3060	0.00000E+00	0.0000				
107	0.0001	6.54843E-05	2.9894				
6.59938E-05	2.8023	0.00000E+00	0.0000				
108	0.0000	3.42382E-05	2.7005				
1.47919E-04	2.6359	0.00000E+00	0.0000				
109	0.0002	1.29227E-04	2.1676				
4.28856E-04	2.1384	0.00000E+00	0.0000				
110	0.0009	6.69021E-04	2.7135				
4.12513E-04	2.6894	0.00000E+00	0.0000				
111	0.0002	1.52600E-04	4.7704				
1.40255E-04	4.6454	0.00000E+00	0.0000				
112	0.0001	1.14201E-04	4.1453				

1.20432E-04 4.0658 0.00000E+00 0.0000
1 fuel bundle

skipping 23 generations

group	fission fraction	deviation	unit	region	fissions	deviation	absorptions	percent deviation	leakage	percent deviation
113	0.0002				1.33214E-04	3.5984	1.16115E-04	3.3759	0.00000E+00	0.0000
114	0.0000				1.09699E-05	6.8017	1.49253E-05	5.6758	0.00000E+00	0.0000
115	0.0001				7.34274E-05	4.2114	8.52664E-05	3.8763	0.00000E+00	0.0000
116	0.0003				1.96724E-04	2.7719	1.47641E-04	2.4965	0.00000E+00	0.0000
117	0.0006				4.79293E-04	2.0900	2.56185E-04	1.9553	0.00000E+00	0.0000
118	0.0008				5.76491E-04	2.0333	4.50568E-04	1.9475	0.00000E+00	0.0000
119	0.0002				1.46851E-04	2.1297	3.78505E-04	2.0594	0.00000E+00	0.0000
120	0.0002				1.70425E-04	1.9128	6.48418E-04	1.8856	0.00000E+00	0.0000
121	0.0007				5.32520E-04	2.8006	4.09617E-04	2.7306	0.00000E+00	0.0000
122	0.0001				1.05815E-04	5.2400	8.25288E-05	4.8982	0.00000E+00	0.0000
123	0.0003				2.16276E-04	2.6936	1.53331E-04	2.3826	0.00000E+00	0.0000
124	0.0003				2.38110E-04	3.0393	1.96252E-04	2.8388	0.00000E+00	0.0000
125	0.0002				1.39625E-04	2.9691	1.28213E-04	2.6751	0.00000E+00	0.0000
126	0.0001				1.03884E-04	3.0028	9.29080E-05	2.6544	0.00000E+00	0.0000
127	0.0006				4.35055E-04	3.1397	2.12514E-04	2.9825	0.00000E+00	0.0000
128	0.0003				2.15839E-04	3.3042	1.33425E-04	2.9324	0.00000E+00	0.0000
129	0.0006				4.37995E-04	2.4519	4.03929E-04	2.3405	0.00000E+00	0.0000
130	0.0002				1.17202E-04	2.9162	2.85902E-04	2.8229	0.00000E+00	0.0000
131	0.0004				3.04877E-04	2.3353	2.44100E-04	1.9747	0.00000E+00	0.0000
132	0.0007				5.30784E-04	2.3468	3.25516E-04	2.1556	0.00000E+00	0.0000
133	0.0013				1.03178E-03	2.0591	6.52255E-04	1.9566	0.00000E+00	0.0000

134	0.0001		9.04173E-05	2.0593	
2.35874E-04	1.7229		0.00000E+00	0.0000	
135	0.0002		1.75080E-04	3.3166	
2.59571E-04	3.2381		0.00000E+00	0.0000	
136	0.0001		4.35167E-05	1.9547	
6.75776E-04	1.9227		0.00000E+00	0.0000	
137	0.0000		1.95005E-05	1.0533	
3.50867E-03	1.0506		0.00000E+00	0.0000	
138	0.0004		3.19432E-04	2.0114	
8.31877E-04	1.9829		0.00000E+00	0.0000	
139	0.0003		1.92668E-04	2.8903	
2.35554E-04	2.7274		0.00000E+00	0.0000	
140	0.0003		2.13467E-04	2.3670	
2.83460E-04	2.0640		0.00000E+00	0.0000	
141	0.0001		8.36165E-05	2.4496	
2.62350E-04	2.1942		0.00000E+00	0.0000	
142	0.0001		6.86866E-05	2.9558	
2.36713E-04	2.7201		0.00000E+00	0.0000	
143	0.0001		8.29995E-05	2.0897	
1.76268E-04	1.3300		0.00000E+00	0.0000	
144	0.0000		3.32779E-05	3.4883	
7.32630E-05	2.0982		0.00000E+00	0.0000	
145	0.0005		3.93265E-04	2.7403	
3.07791E-04	2.4957		0.00000E+00	0.0000	
146	0.0004		3.37255E-04	2.5524	
2.47642E-04	2.0771		0.00000E+00	0.0000	
147	0.0002		1.67245E-04	4.0928	
1.07624E-04	3.5421		0.00000E+00	0.0000	
148	0.0001		6.68815E-05	6.8656	
4.36802E-05	5.6409		0.00000E+00	0.0000	
149	0.0000		2.89296E-05	8.5147	
2.02700E-05	6.5286		0.00000E+00	0.0000	
150	0.0001		9.25066E-05	3.8417	
6.61147E-05	2.9253		0.00000E+00	0.0000	
151	0.0001		7.12363E-05	4.3816	
5.93078E-05	3.0593		0.00000E+00	0.0000	
152	0.0001		4.13469E-05	4.8485	
4.71713E-05	3.0052		0.00000E+00	0.0000	
153	0.0001		4.25334E-05	4.2572	
4.72967E-05	2.5117		0.00000E+00	0.0000	
154	0.0001		4.30278E-05	4.4304	
4.67694E-05	2.4919		0.00000E+00	0.0000	
155	0.0001		4.88584E-05	4.2298	
4.88840E-05	2.5826		0.00000E+00	0.0000	
156	0.0001		4.56317E-05	4.9723	
4.52650E-05	2.9329		0.00000E+00	0.0000	
157	0.0001		5.81473E-05	4.4344	
5.69451E-05	2.7253		0.00000E+00	0.0000	
158	0.0001		6.59925E-05	3.9015	
6.72476E-05	2.5739		0.00000E+00	0.0000	
159	0.0002		1.42957E-04	2.9911	
2.00708E-04	2.4866		0.00000E+00	0.0000	

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  160    0.0001                6.13466E-05     4.8010
7.36527E-05     3.5788       0.00000E+00     0.0000
  161    0.0001                7.44659E-05     3.7639
7.32862E-05     2.4169       0.00000E+00     0.0000
  162    0.0001                8.70012E-05     3.5645
8.17637E-05     2.2062       0.00000E+00     0.0000
  163    0.0001                9.26965E-05     3.5159
8.63838E-05     2.1513       0.00000E+00     0.0000
  164    0.0001                1.07144E-04     3.9662
9.77463E-05     2.4535       0.00000E+00     0.0000
  165    0.0001                1.13632E-04     3.3069
1.04341E-04     2.0708       0.00000E+00     0.0000
  166    0.0001                7.08474E-05     4.8060
6.47234E-05     3.0154       0.00000E+00     0.0000
  167    0.0001                7.66629E-05     4.3814
6.93419E-05     2.7741       0.00000E+00     0.0000
  168    0.0001                9.00462E-05     3.8579
7.99639E-05     2.5744       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  169    0.0001                1.04901E-04     3.7833
9.22435E-05     2.7223       0.00000E+00     0.0000
  170    0.0002                1.36750E-04     3.6504
1.16344E-04     2.7823       0.00000E+00     0.0000
  171    0.0001                9.45149E-05     5.1313
7.35982E-05     4.0489       0.00000E+00     0.0000
  172    0.0002                1.40661E-04     5.0120
9.94561E-05     4.2423       0.00000E+00     0.0000
  173    0.0002                1.88163E-04     4.6071
1.24355E-04     4.0160       0.00000E+00     0.0000
  174    0.0003                2.53139E-04     4.0653
1.57394E-04     3.6298       0.00000E+00     0.0000
  175    0.0002                1.15542E-04     5.8392
6.94776E-05     5.2805       0.00000E+00     0.0000
  176    0.0001                1.11611E-04     5.8153
6.68221E-05     5.1824       0.00000E+00     0.0000
  177    0.0001                1.10725E-04     6.0446
6.57462E-05     5.4190       0.00000E+00     0.0000
  178    0.0002                1.26306E-04     5.7308
7.37683E-05     5.1496       0.00000E+00     0.0000
  179    0.0001                1.11842E-04     6.1173
6.55970E-05     5.4683       0.00000E+00     0.0000
  180    0.0001                1.05649E-04     6.1389
6.18880E-05     5.4300       0.00000E+00     0.0000
  181    0.0002                1.15600E-04     6.6183
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6.66998E-05	5.8647	0.00000E+00	0.0000				
182	0.0001	1.04561E-04	6.0262				
6.07608E-05	5.3100	0.00000E+00	0.0000				
183	0.0001	9.01468E-05	6.4174				
5.33994E-05	5.4721	0.00000E+00	0.0000				
184	0.0001	9.89215E-05	5.6445				
5.72461E-05	4.9290	0.00000E+00	0.0000				
185	0.0001	9.52739E-05	5.8311				
5.51770E-05	5.0744	0.00000E+00	0.0000				
186	0.0001	9.37314E-05	5.3282				
5.45638E-05	4.6043	0.00000E+00	0.0000				
187	0.0001	9.21450E-05	5.8535				
5.38433E-05	4.9668	0.00000E+00	0.0000				
188	0.0001	8.54706E-05	6.1119				
5.06863E-05	5.0927	0.00000E+00	0.0000				
189	0.0001	9.56122E-05	6.2960				
5.55326E-05	5.3372	0.00000E+00	0.0000				
190	0.0003	2.18996E-04	3.8482				
1.29526E-04	3.1848	0.00000E+00	0.0000				
191	0.0002	1.90568E-04	4.3247				
1.15916E-04	3.4759	0.00000E+00	0.0000				
192	0.0002	1.85143E-04	4.1773				
1.13373E-04	3.3084	0.00000E+00	0.0000				
193	0.0002	1.87535E-04	3.8125				
1.15413E-04	3.0408	0.00000E+00	0.0000				
194	0.0005	4.02920E-04	2.5452				
2.47314E-04	1.9976	0.00000E+00	0.0000				
195	0.0006	4.34680E-04	2.7084				
2.67722E-04	2.1351	0.00000E+00	0.0000				
196	0.0006	4.61766E-04	2.6677				
2.86766E-04	2.0681	0.00000E+00	0.0000				
197	0.0007	5.28118E-04	2.3318				
3.26641E-04	1.8350	0.00000E+00	0.0000				
198	0.0008	5.94044E-04	2.5745				
3.65730E-04	2.0039	0.00000E+00	0.0000				
199	0.0004	3.08155E-04	3.0884				
1.92242E-04	2.4159	0.00000E+00	0.0000				
200	0.0005	3.78480E-04	2.9221				
2.29860E-04	2.3245	0.00000E+00	0.0000				
201	0.0011	8.23565E-04	2.2509				
4.99670E-04	1.7910	0.00000E+00	0.0000				
202	0.0013	9.70170E-04	2.0792				
5.89706E-04	1.6672	0.00000E+00	0.0000				
203	0.0016	1.25713E-03	1.5743				
7.46697E-04	1.2769	0.00000E+00	0.0000				
204	0.0022	1.67311E-03	1.6479				
9.84530E-04	1.3642	0.00000E+00	0.0000				
205	0.0015	1.13962E-03	2.0894				
6.68942E-04	1.7787	0.00000E+00	0.0000				
206	0.0018	1.38601E-03	1.6396				
8.08880E-04	1.4025	0.00000E+00	0.0000				
207	0.0021	1.61188E-03	1.7084				

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9.40230E-04     1.4696       0.00000E+00     0.0000
  208    0.0029                  2.21723E-03     1.5027
1.28834E-03     1.3392       0.00000E+00     0.0000
  209    0.0030                  2.33034E-03     1.3056
1.37465E-03     1.1638       0.00000E+00     0.0000
  210    0.0037                  2.86608E-03     1.5497
1.70645E-03     1.3641       0.00000E+00     0.0000
  211    0.0040                  3.02869E-03     1.1942
1.83383E-03     1.0309       0.00000E+00     0.0000
  212    0.0046                  3.55285E-03     1.2153
2.15939E-03     1.0469       0.00000E+00     0.0000
  213    0.0065                  4.96718E-03     0.9836
3.01072E-03     0.8355       0.00000E+00     0.0000
  214    0.0095                  7.25726E-03     0.7558
4.38089E-03     0.6439       0.00000E+00     0.0000
  215    0.0158                  1.21413E-02     0.5988
7.23589E-03     0.5060       0.00000E+00     0.0000
  216    0.0300                  2.30063E-02     0.3721
1.35744E-02     0.3199       0.00000E+00     0.0000
  217    0.0200                  1.53584E-02     0.5618
9.03909E-03     0.4712       0.00000E+00     0.0000
  218    0.0277                  2.12147E-02     0.4934
1.24170E-02     0.4204       0.00000E+00     0.0000
  219    0.0359                  2.74764E-02     0.4096
1.60197E-02     0.3476       0.00000E+00     0.0000
  220    0.0476                  3.64733E-02     0.3573
2.11919E-02     0.3083       0.00000E+00     0.0000
  221    0.0619                  4.74172E-02     0.2923
2.75320E-02     0.2483       0.00000E+00     0.0000
  222    0.0803                  6.15387E-02     0.3205
3.56290E-02     0.2741       0.00000E+00     0.0000
  223    0.1045                  8.00635E-02     0.2510
4.64286E-02     0.2178       0.00000E+00     0.0000
  224    0.0582                  4.46173E-02     0.3548
2.59922E-02     0.3009       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
      fraction                                 deviation
deviation                    deviation

  225    0.2313                  1.77262E-01     0.1622
1.04916E-01     0.1386       0.00000E+00     0.0000
  226    0.0454                  3.47725E-02     0.4426
2.11637E-02     0.3619       0.00000E+00     0.0000
  227    0.0487                  3.73291E-02     0.3694
2.32062E-02     0.3054       0.00000E+00     0.0000
  228    0.0211                  1.61829E-02     0.4550
1.02263E-02     0.3667       0.00000E+00     0.0000
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  229    0.0221                1.69227E-02     0.5452
1.09012E-02     0.4261       0.00000E+00     0.0000
  230    0.0116                8.87489E-03     0.8643
5.81454E-03     0.6496       0.00000E+00     0.0000
  231    0.0122                9.36440E-03     0.8550
6.23393E-03     0.6505       0.00000E+00     0.0000
  232    0.0130                9.93917E-03     0.7106
6.76857E-03     0.5335       0.00000E+00     0.0000
  233    0.0083                6.35237E-03     1.0490
4.46468E-03     0.7581       0.00000E+00     0.0000
  234    0.0060                4.58526E-03     1.1447
3.29503E-03     0.8288       0.00000E+00     0.0000
  235    0.0024                1.82543E-03     1.7754
1.21235E-03     1.3430       0.00000E+00     0.0000
  236    0.0019                1.48702E-03     2.0238
9.93630E-04     1.5503       0.00000E+00     0.0000
  237    0.0017                1.32100E-03     1.9226
9.35862E-04     1.4071       0.00000E+00     0.0000
  238    0.0001                6.55701E-05     8.6765
5.93834E-05     5.0457       0.00000E+00     0.0000

 system total =                 7.66274E-01     0.0569
4.69182E-01     0.0484       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3104E-01  +
or -  0.0002



 elapsed time   3.03867 minutes

 random number=   28BAEB6231D8119F
1                                                fuel bundle

                                                     **** fission
densities ****


                                                          fission
percent         total
                                                unit  region   density
deviation      fissions

                                                   1      1    3.091E-03
0.06         7.663E-01
                                                          2    0.000E+00
0.00         0.000E+00
                                                          3    0.000E+00
0.00         0.000E+00
```

global unit

2 1 0.000E+00
0.00 0.000E+00
1 fuel bundle

fluxes for Unit 1

	region 1		region 2		region 3	
group	flux	percent deviation	flux	percent deviation	flux	percent deviation
1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	2.377E-08	25.02	1.816E-08	25.82	1.930E-08	24.34
3	8.601E-07	4.22	7.152E-07	3.88	7.656E-07	3.87
4	1.513E-06	3.43	1.237E-06	3.08	1.328E-06	3.06
5	2.290E-06	2.68	1.878E-06	2.41	2.016E-06	2.45
6	9.575E-06	1.34	7.618E-06	1.17	8.130E-06	1.15
7	1.260E-05	1.11	9.554E-06	0.89	1.001E-05	0.86
8	3.109E-05	0.74	2.287E-05	0.65	2.400E-05	0.67
9	8.192E-05	0.49	5.869E-05	0.42	6.122E-05	0.42
10	4.610E-05	0.58	3.256E-05	0.50	3.387E-05	0.50
11	2.202E-04	0.29	1.557E-04	0.27	1.615E-04	0.26
12	1.908E-04	0.31	1.381E-04	0.29	1.447E-04	0.27
13	5.681E-05	0.44	4.149E-05	0.43	4.339E-05	0.43
14	2.533E-04	0.21	1.832E-04	0.20	1.912E-04	0.19
15	2.204E-04	0.27	1.599E-04	0.23	1.669E-04	0.23
16	7.168E-05	0.42	5.189E-05	0.33	5.419E-05	0.33
17	3.230E-05	0.67	2.360E-05	0.56	2.452E-05	0.55
18	2.779E-05	0.72	2.029E-05	0.62	2.104E-05	0.63
19	5.066E-05	0.55	3.683E-05	0.48	3.829E-05	0.49
20	3.948E-05	0.60	2.913E-05	0.55	3.036E-05	0.51
21	8.060E-05	0.42	5.886E-05	0.35	6.144E-05	0.32
22	7.289E-05	0.46	5.339E-05	0.40	5.534E-05	0.37
23	7.705E-05	0.43	5.647E-05	0.33	5.863E-05	0.32
24	1.866E-05	0.85	1.383E-05	0.73	1.440E-05	0.73
25	2.341E-05	0.71	1.742E-05	0.62	1.829E-05	0.55
26	1.331E-05	1.00	9.961E-06	0.82	1.050E-05	0.82
27	4.179E-05	0.56	3.090E-05	0.49	3.277E-05	0.49
28	7.699E-05	0.39	5.733E-05	0.32	6.076E-05	0.32
29	7.938E-05	0.43	5.959E-05	0.39	6.243E-05	0.37
30	1.007E-05	0.93	7.553E-06	0.88	7.922E-06	0.84
31	7.861E-05	0.41	5.894E-05	0.35	6.207E-05	0.35
32	3.114E-05	0.62	2.343E-05	0.57	2.477E-05	0.53
33	2.677E-05	0.58	2.027E-05	0.53	2.143E-05	0.49
34	6.121E-05	0.38	4.609E-05	0.35	4.849E-05	0.34
35	3.637E-05	0.57	2.745E-05	0.49	2.875E-05	0.44
36	3.429E-05	0.57	2.583E-05	0.48	2.706E-05	0.47
37	2.195E-05	0.68	1.651E-05	0.55	1.732E-05	0.47
38	2.594E-05	0.62	1.985E-05	0.51	2.095E-05	0.46
39	9.716E-05	0.36	7.442E-05	0.28	7.874E-05	0.27
40	8.975E-05	0.34	6.942E-05	0.32	7.408E-05	0.28

41	1.136E-04	0.28	8.851E-05	0.23	9.459E-05	0.20
42	9.379E-05	0.30	7.415E-05	0.26	7.966E-05	0.25
43	5.084E-05	0.43	4.049E-05	0.36	4.256E-05	0.30
44	6.971E-05	0.36	5.595E-05	0.33	6.008E-05	0.29
45	3.530E-05	0.45	2.813E-05	0.39	3.121E-05	0.34
46	8.476E-06	0.95	6.708E-06	0.72	7.233E-06	0.67
47	2.339E-05	0.60	1.859E-05	0.53	1.950E-05	0.44
48	6.748E-06	1.15	5.446E-06	1.04	5.730E-06	0.83
49	4.343E-05	0.41	3.495E-05	0.38	3.766E-05	0.32
50	2.930E-05	0.48	2.367E-05	0.40	2.566E-05	0.34
51	7.995E-06	0.97	6.481E-06	0.83	6.999E-06	0.75
52	2.056E-05	0.58	1.652E-05	0.51	1.802E-05	0.41
53	7.626E-05	0.38	6.140E-05	0.31	6.671E-05	0.27
54	3.336E-05	0.47	2.705E-05	0.39	2.930E-05	0.33
55	6.632E-05	0.30	5.386E-05	0.25	5.880E-05	0.24
56	4.338E-05	0.43	3.530E-05	0.38	3.839E-05	0.30
57	4.923E-05	0.35	4.011E-05	0.35	4.358E-05	0.25
58	2.579E-05	0.44	2.110E-05	0.39	2.303E-05	0.35
59	4.394E-05	0.43	3.600E-05	0.38	3.916E-05	0.31
60	6.469E-05	0.30	5.284E-05	0.27	5.735E-05	0.23
61	6.186E-06	0.82	5.021E-06	0.73	5.526E-06	0.68
62	3.225E-05	0.46	2.640E-05	0.39	2.880E-05	0.31
63	2.151E-05	0.56	1.778E-05	0.52	1.929E-05	0.44
64	1.713E-05	0.58	1.414E-05	0.49	1.527E-05	0.46
65	5.749E-06	1.07	4.721E-06	0.92	5.125E-06	0.77
66	2.851E-05	0.47	2.341E-05	0.38	2.546E-05	0.34
67	2.111E-05	0.45	1.734E-05	0.42	1.883E-05	0.37
68	4.522E-06	1.03	3.729E-06	1.00	4.087E-06	0.81
69	3.721E-05	0.38	3.065E-05	0.37	3.336E-05	0.33
70	2.660E-05	0.48	2.194E-05	0.44	2.388E-05	0.39
71	4.555E-05	0.35	3.751E-05	0.32	4.083E-05	0.26
72	2.623E-06	1.58	2.166E-06	1.38	2.348E-06	1.15
73	2.722E-05	0.43	2.252E-05	0.38	2.441E-05	0.33
74	7.944E-05	0.26	6.575E-05	0.22	7.141E-05	0.19
75	9.015E-06	0.71	7.510E-06	0.67	8.160E-06	0.56
76	2.287E-05	0.47	1.907E-05	0.41	2.067E-05	0.36
77	1.768E-05	0.61	1.466E-05	0.53	1.593E-05	0.41
78	1.470E-06	1.68	1.258E-06	1.60	1.381E-06	1.26
79	1.005E-05	0.73	8.340E-06	0.63	9.028E-06	0.50
80	4.673E-06	1.04	3.847E-06	0.89	4.138E-06	0.77
81	5.508E-05	0.32	4.589E-05	0.28	4.976E-05	0.25
82	3.283E-06	1.39	2.746E-06	1.23	2.943E-06	0.86
83	4.303E-06	0.93	3.658E-06	0.85	3.977E-06	0.76
84	8.194E-06	0.80	6.859E-06	0.70	7.395E-06	0.62
85	9.953E-06	0.78	8.268E-06	0.70	8.960E-06	0.56
86	1.351E-05	0.66	1.130E-05	0.57	1.219E-05	0.45
87	1.210E-05	0.68	1.004E-05	0.56	1.088E-05	0.46
88	3.189E-06	1.22	2.689E-06	1.18	2.878E-06	0.95
89	6.662E-06	0.96	5.541E-06	0.72	6.000E-06	0.63
90	6.920E-06	0.79	5.744E-06	0.77	6.278E-06	0.59
91	8.342E-06	0.85	6.986E-06	0.71	7.508E-06	0.62
92	4.730E-06	1.01	3.941E-06	0.92	4.265E-06	0.66

93	8.128E-06	0.84	6.788E-06	0.73	7.365E-06	0.58
94	4.225E-06	1.07	3.528E-06	0.95	3.829E-06	0.75
95	1.243E-05	0.66	1.050E-05	0.57	1.134E-05	0.51
96	3.424E-06	1.03	2.839E-06	0.99	3.083E-06	0.86
97	3.404E-06	1.27	2.866E-06	1.24	3.115E-06	0.94
98	3.538E-06	1.17	2.967E-06	1.02	3.212E-06	0.83
99	2.303E-06	1.57	1.946E-06	1.42	2.106E-06	1.24
100	3.428E-06	1.32	2.889E-06	1.02	3.105E-06	0.87
101	4.957E-06	0.80	4.164E-06	0.83	4.491E-06	0.72
102	3.373E-06	1.07	2.836E-06	1.08	3.064E-06	0.85
103	4.666E-06	1.01	3.863E-06	0.95	4.212E-06	0.79
104	4.196E-06	0.97	3.506E-06	0.91	3.799E-06	0.69
105	4.387E-06	1.11	3.678E-06	0.93	3.952E-06	0.79
106	1.563E-06	1.55	1.312E-06	1.33	1.419E-06	1.19
107	3.528E-06	1.21	2.934E-06	1.00	3.217E-06	0.77
108	3.209E-06	1.26	2.751E-06	1.12	2.956E-06	0.91
109	5.153E-06	0.89	4.293E-06	0.94	4.654E-06	0.74
110	3.069E-06	1.13	2.607E-06	1.07	2.845E-06	0.84
111	3.169E-06	1.24	2.621E-06	1.06	2.833E-06	0.80
112	1.793E-06	1.59	1.525E-06	1.34	1.651E-06	1.18
113	5.836E-06	0.98	4.827E-06	0.91	5.231E-06	0.67
114	1.973E-06	1.59	1.674E-06	1.40	1.782E-06	1.18
115	5.056E-06	1.04	4.247E-06	0.86	4.585E-06	0.76
116	1.082E-05	0.70	9.057E-06	0.61	9.797E-06	0.51
117	1.180E-05	0.69	9.894E-06	0.65	1.066E-05	0.46
118	1.281E-05	0.62	1.079E-05	0.57	1.166E-05	0.40
119	8.222E-06	0.83	6.988E-06	0.76	7.572E-06	0.59
120	5.767E-06	0.83	4.926E-06	0.83	5.326E-06	0.60
121	6.095E-06	0.87	5.186E-06	0.77	5.602E-06	0.64
122	3.230E-06	1.20	2.715E-06	1.04	2.921E-06	0.86
123	1.037E-05	0.69	8.730E-06	0.68	9.403E-06	0.56
124	7.438E-06	0.80	6.304E-06	0.73	6.764E-06	0.66
125	7.036E-06	0.84	5.893E-06	0.71	6.361E-06	0.63
126	5.850E-06	0.93	4.873E-06	0.82	5.213E-06	0.69
127	5.609E-06	0.86	4.686E-06	0.79	5.044E-06	0.61
128	7.707E-06	0.70	6.448E-06	0.62	6.955E-06	0.53
129	9.548E-06	0.65	8.150E-06	0.59	8.804E-06	0.49
130	4.023E-06	1.03	3.399E-06	0.89	3.708E-06	0.75
131	1.701E-05	0.59	1.426E-05	0.47	1.539E-05	0.43
132	1.113E-05	0.60	9.395E-06	0.54	1.011E-05	0.46
133	1.370E-05	0.64	1.159E-05	0.56	1.252E-05	0.48
134	1.484E-05	0.63	1.250E-05	0.52	1.346E-05	0.42
135	2.348E-06	1.39	1.992E-06	1.24	2.196E-06	1.06
136	3.775E-06	1.06	3.334E-06	1.06	3.616E-06	0.76
137	2.498E-06	0.96	2.635E-06	0.92	2.969E-06	0.72
138	4.057E-06	0.95	3.512E-06	0.87	3.842E-06	0.81
139	4.522E-06	0.97	3.914E-06	0.90	4.188E-06	0.82
140	1.201E-05	0.65	1.019E-05	0.55	1.104E-05	0.48
141	8.839E-06	0.70	7.431E-06	0.62	8.047E-06	0.46
142	5.911E-06	0.90	4.973E-06	0.82	5.345E-06	0.64
143	1.992E-05	0.49	1.674E-05	0.44	1.807E-05	0.35
144	8.071E-06	0.76	6.795E-06	0.63	7.329E-06	0.61

145	7.191E-06	0.70	6.086E-06	0.70	6.584E-06	0.56
146	1.204E-05	0.62	1.020E-05	0.55	1.093E-05	0.44
147	3.650E-06	1.15	3.088E-06	1.01	3.318E-06	0.83
148	1.913E-06	1.54	1.623E-06	1.53	1.717E-06	1.15
149	1.177E-06	1.75	9.725E-07	1.56	1.061E-06	1.42
150	3.942E-06	1.14	3.296E-06	0.90	3.570E-06	0.69
151	4.153E-06	0.98	3.477E-06	0.92	3.759E-06	0.82
152	4.312E-06	1.12	3.596E-06	0.93	3.900E-06	0.79
153	4.512E-06	1.06	3.830E-06	0.81	4.051E-06	0.76
154	4.575E-06	1.02	3.860E-06	0.95	4.145E-06	0.75
155	4.368E-06	1.07	3.664E-06	0.93	3.984E-06	0.80
156	3.961E-06	1.06	3.327E-06	0.91	3.577E-06	0.77
157	4.712E-06	1.03	4.005E-06	0.91	4.292E-06	0.71
158	4.869E-06	1.03	4.114E-06	0.85	4.427E-06	0.74
159	6.766E-06	0.83	5.731E-06	0.77	6.183E-06	0.61
160	3.634E-06	1.10	3.077E-06	1.04	3.273E-06	0.86
161	4.986E-06	0.89	4.217E-06	0.74	4.515E-06	0.64
162	5.769E-06	0.94	4.847E-06	0.80	5.252E-06	0.69
163	6.181E-06	0.88	5.193E-06	0.76	5.584E-06	0.64
164	6.530E-06	1.01	5.544E-06	0.86	5.951E-06	0.65
165	6.911E-06	0.78	5.830E-06	0.67	6.283E-06	0.55
166	4.094E-06	1.10	3.417E-06	0.98	3.703E-06	0.84
167	4.133E-06	1.05	3.475E-06	0.91	3.759E-06	0.68
168	4.373E-06	1.07	3.700E-06	1.02	3.990E-06	0.76
169	4.455E-06	0.94	3.715E-06	0.77	4.032E-06	0.73
170	4.547E-06	0.90	3.843E-06	0.86	4.171E-06	0.72
171	2.367E-06	1.23	1.978E-06	1.29	2.158E-06	0.94
172	2.387E-06	1.54	2.014E-06	1.27	2.204E-06	1.02
173	2.435E-06	1.33	2.078E-06	1.23	2.242E-06	0.94
174	2.516E-06	1.20	2.148E-06	1.25	2.300E-06	0.93
175	9.766E-07	2.08	8.360E-07	1.74	9.170E-07	1.50
176	9.902E-07	1.84	8.416E-07	1.83	9.189E-07	1.41
177	9.969E-07	2.06	8.518E-07	1.78	9.307E-07	1.39
178	1.052E-06	2.12	8.958E-07	1.76	9.629E-07	1.47
179	1.064E-06	1.94	9.153E-07	1.64	9.878E-07	1.35
180	1.041E-06	1.95	8.913E-07	1.94	9.844E-07	1.46
181	1.067E-06	1.78	9.049E-07	1.63	9.911E-07	1.23
182	1.066E-06	1.90	9.211E-07	1.86	1.001E-06	1.34
183	1.077E-06	1.87	9.212E-07	1.75	1.016E-06	1.45
184	1.108E-06	2.38	9.472E-07	2.14	1.016E-06	1.51
185	1.096E-06	1.93	9.282E-07	1.72	1.011E-06	1.37
186	1.139E-06	2.08	9.756E-07	1.91	1.048E-06	1.52
187	1.145E-06	1.75	9.675E-07	1.71	1.044E-06	1.40
188	1.156E-06	1.80	9.860E-07	1.53	1.058E-06	1.35
189	1.181E-06	2.31	9.843E-07	1.78	1.075E-06	1.56
190	3.072E-06	1.28	2.604E-06	1.19	2.790E-06	0.94
191	3.119E-06	1.29	2.651E-06	1.18	2.851E-06	0.89
192	3.146E-06	1.18	2.634E-06	1.00	2.848E-06	0.80
193	3.257E-06	1.33	2.744E-06	1.14	2.962E-06	0.85
194	6.765E-06	0.82	5.697E-06	0.69	6.174E-06	0.62
195	7.300E-06	0.79	6.182E-06	0.71	6.677E-06	0.60
196	7.810E-06	0.80	6.570E-06	0.68	7.092E-06	0.54

197	8.433E-06	0.74	7.131E-06	0.68	7.753E-06	0.55
198	8.960E-06	0.73	7.566E-06	0.67	8.184E-06	0.51
199	4.796E-06	1.00	4.071E-06	0.80	4.410E-06	0.72
200	5.135E-06	0.94	4.314E-06	0.86	4.652E-06	0.65
201	1.068E-05	0.66	9.020E-06	0.58	9.729E-06	0.52
202	1.217E-05	0.66	1.022E-05	0.60	1.107E-05	0.48
203	1.291E-05	0.55	1.090E-05	0.54	1.185E-05	0.41
204	1.494E-05	0.58	1.266E-05	0.52	1.367E-05	0.39
205	8.646E-06	0.80	7.790E-06	0.63	8.240E-06	0.57
206	9.314E-06	0.61	8.423E-06	0.59	8.905E-06	0.47
207	9.670E-06	0.64	8.690E-06	0.53	9.214E-06	0.40
208	1.125E-05	0.60	1.017E-05	0.50	1.080E-05	0.39
209	1.163E-05	0.59	1.057E-05	0.51	1.122E-05	0.41
210	1.401E-05	0.55	1.275E-05	0.47	1.356E-05	0.38
211	1.616E-05	0.51	1.462E-05	0.42	1.555E-05	0.33
212	1.913E-05	0.44	1.732E-05	0.37	1.853E-05	0.31
213	2.631E-05	0.36	2.364E-05	0.35	2.525E-05	0.29
214	3.686E-05	0.29	3.319E-05	0.27	3.567E-05	0.24
215	5.543E-05	0.25	5.012E-05	0.21	5.396E-05	0.20
216	9.204E-05	0.22	8.384E-05	0.18	9.078E-05	0.15
217	5.552E-05	0.22	5.309E-05	0.19	5.630E-05	0.18
218	7.089E-05	0.24	6.788E-05	0.21	7.223E-05	0.18
219	8.428E-05	0.20	8.160E-05	0.18	8.671E-05	0.15
220	1.017E-04	0.19	9.905E-05	0.15	1.055E-04	0.13
221	1.202E-04	0.18	1.183E-04	0.13	1.264E-04	0.12
222	1.368E-04	0.15	1.369E-04	0.13	1.458E-04	0.11
223	1.540E-04	0.17	1.578E-04	0.13	1.676E-04	0.11
224	7.500E-05	0.18	7.976E-05	0.17	8.441E-05	0.12
225	2.340E-04	0.12	2.723E-04	0.11	2.826E-04	0.09
226	3.172E-05	0.26	4.486E-05	0.23	4.454E-05	0.14
227	2.891E-05	0.25	4.634E-05	0.22	4.444E-05	0.13
228	1.038E-05	0.40	1.902E-05	0.31	1.756E-05	0.19
229	9.672E-06	0.41	1.964E-05	0.33	1.745E-05	0.16
230	4.441E-06	0.51	1.015E-05	0.35	8.664E-06	0.23
231	4.251E-06	0.58	1.065E-05	0.43	8.761E-06	0.22
232	3.984E-06	0.56	1.131E-05	0.42	8.888E-06	0.20
233	2.220E-06	0.77	7.385E-06	0.63	5.491E-06	0.27
234	1.441E-06	0.89	5.443E-06	0.64	3.831E-06	0.29
235	5.185E-07	1.49	1.030E-06	1.06	1.116E-06	0.52
236	3.426E-07	1.89	7.431E-07	1.16	7.977E-07	0.61
237	2.303E-07	1.90	5.512E-07	1.47	6.173E-07	0.65
238	4.678E-09	11.36	2.238E-08	9.12	2.497E-08	1.93

1 fuel bundle

fluxes for Global Unit
region 1

group	flux	percent deviation
1	0.000E+00	0.00
2	0.000E+00	0.00
3	0.000E+00	0.00

4	0.000E+00	0.00
5	0.000E+00	0.00
6	0.000E+00	0.00
7	0.000E+00	0.00
8	0.000E+00	0.00
9	0.000E+00	0.00
10	0.000E+00	0.00
11	0.000E+00	0.00
12	0.000E+00	0.00
13	0.000E+00	0.00
14	0.000E+00	0.00
15	0.000E+00	0.00
16	0.000E+00	0.00
17	0.000E+00	0.00
18	0.000E+00	0.00
19	0.000E+00	0.00
20	0.000E+00	0.00
21	0.000E+00	0.00
22	0.000E+00	0.00
23	0.000E+00	0.00
24	0.000E+00	0.00
25	0.000E+00	0.00
26	0.000E+00	0.00
27	0.000E+00	0.00
28	0.000E+00	0.00
29	0.000E+00	0.00
30	0.000E+00	0.00
31	0.000E+00	0.00
32	0.000E+00	0.00
33	0.000E+00	0.00
34	0.000E+00	0.00
35	0.000E+00	0.00
36	0.000E+00	0.00
37	0.000E+00	0.00
38	0.000E+00	0.00
39	0.000E+00	0.00
40	0.000E+00	0.00
41	0.000E+00	0.00
42	0.000E+00	0.00
43	0.000E+00	0.00
44	0.000E+00	0.00
45	0.000E+00	0.00
46	0.000E+00	0.00
47	0.000E+00	0.00
48	0.000E+00	0.00
49	0.000E+00	0.00
50	0.000E+00	0.00
51	0.000E+00	0.00
52	0.000E+00	0.00
53	0.000E+00	0.00
54	0.000E+00	0.00
55	0.000E+00	0.00

56	0.000E+00	0.00
57	0.000E+00	0.00
58	0.000E+00	0.00
59	0.000E+00	0.00
60	0.000E+00	0.00
61	0.000E+00	0.00
62	0.000E+00	0.00
63	0.000E+00	0.00
64	0.000E+00	0.00
65	0.000E+00	0.00
66	0.000E+00	0.00
67	0.000E+00	0.00
68	0.000E+00	0.00
69	0.000E+00	0.00
70	0.000E+00	0.00
71	0.000E+00	0.00
72	0.000E+00	0.00
73	0.000E+00	0.00
74	0.000E+00	0.00
75	0.000E+00	0.00
76	0.000E+00	0.00
77	0.000E+00	0.00
78	0.000E+00	0.00
79	0.000E+00	0.00
80	0.000E+00	0.00
81	0.000E+00	0.00
82	0.000E+00	0.00
83	0.000E+00	0.00
84	0.000E+00	0.00
85	0.000E+00	0.00
86	0.000E+00	0.00
87	0.000E+00	0.00
88	0.000E+00	0.00
89	0.000E+00	0.00
90	0.000E+00	0.00
91	0.000E+00	0.00
92	0.000E+00	0.00
93	0.000E+00	0.00
94	0.000E+00	0.00
95	0.000E+00	0.00
96	0.000E+00	0.00
97	0.000E+00	0.00
98	0.000E+00	0.00
99	0.000E+00	0.00
100	0.000E+00	0.00
101	0.000E+00	0.00
102	0.000E+00	0.00
103	0.000E+00	0.00
104	0.000E+00	0.00
105	0.000E+00	0.00
106	0.000E+00	0.00
107	0.000E+00	0.00

108	0.000E+00	0.00
109	0.000E+00	0.00
110	0.000E+00	0.00
111	0.000E+00	0.00
112	0.000E+00	0.00
113	0.000E+00	0.00
114	0.000E+00	0.00
115	0.000E+00	0.00
116	0.000E+00	0.00
117	0.000E+00	0.00
118	0.000E+00	0.00
119	0.000E+00	0.00
120	0.000E+00	0.00
121	0.000E+00	0.00
122	0.000E+00	0.00
123	0.000E+00	0.00
124	0.000E+00	0.00
125	0.000E+00	0.00
126	0.000E+00	0.00
127	0.000E+00	0.00
128	0.000E+00	0.00
129	0.000E+00	0.00
130	0.000E+00	0.00
131	0.000E+00	0.00
132	0.000E+00	0.00
133	0.000E+00	0.00
134	0.000E+00	0.00
135	0.000E+00	0.00
136	0.000E+00	0.00
137	0.000E+00	0.00
138	0.000E+00	0.00
139	0.000E+00	0.00
140	0.000E+00	0.00
141	0.000E+00	0.00
142	0.000E+00	0.00
143	0.000E+00	0.00
144	0.000E+00	0.00
145	0.000E+00	0.00
146	0.000E+00	0.00
147	0.000E+00	0.00
148	0.000E+00	0.00
149	0.000E+00	0.00
150	0.000E+00	0.00
151	0.000E+00	0.00
152	0.000E+00	0.00
153	0.000E+00	0.00
154	0.000E+00	0.00
155	0.000E+00	0.00
156	0.000E+00	0.00
157	0.000E+00	0.00
158	0.000E+00	0.00
159	0.000E+00	0.00

160	0.000E+00	0.00
161	0.000E+00	0.00
162	0.000E+00	0.00
163	0.000E+00	0.00
164	0.000E+00	0.00
165	0.000E+00	0.00
166	0.000E+00	0.00
167	0.000E+00	0.00
168	0.000E+00	0.00
169	0.000E+00	0.00
170	0.000E+00	0.00
171	0.000E+00	0.00
172	0.000E+00	0.00
173	0.000E+00	0.00
174	0.000E+00	0.00
175	0.000E+00	0.00
176	0.000E+00	0.00
177	0.000E+00	0.00
178	0.000E+00	0.00
179	0.000E+00	0.00
180	0.000E+00	0.00
181	0.000E+00	0.00
182	0.000E+00	0.00
183	0.000E+00	0.00
184	0.000E+00	0.00
185	0.000E+00	0.00
186	0.000E+00	0.00
187	0.000E+00	0.00
188	0.000E+00	0.00
189	0.000E+00	0.00
190	0.000E+00	0.00
191	0.000E+00	0.00
192	0.000E+00	0.00
193	0.000E+00	0.00
194	0.000E+00	0.00
195	0.000E+00	0.00
196	0.000E+00	0.00
197	0.000E+00	0.00
198	0.000E+00	0.00
199	0.000E+00	0.00
200	0.000E+00	0.00
201	0.000E+00	0.00
202	0.000E+00	0.00
203	0.000E+00	0.00
204	0.000E+00	0.00
205	0.000E+00	0.00
206	0.000E+00	0.00
207	0.000E+00	0.00
208	0.000E+00	0.00
209	0.000E+00	0.00
210	0.000E+00	0.00
211	0.000E+00	0.00

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  212   0.000E+00    0.00
  213   0.000E+00    0.00
  214   0.000E+00    0.00
  215   0.000E+00    0.00
  216   0.000E+00    0.00
  217   0.000E+00    0.00
  218   0.000E+00    0.00
  219   0.000E+00    0.00
  220   0.000E+00    0.00
  221   0.000E+00    0.00
  222   0.000E+00    0.00
  223   0.000E+00    0.00
  224   0.000E+00    0.00
  225   0.000E+00    0.00
  226   0.000E+00    0.00
  227   0.000E+00    0.00
  228   0.000E+00    0.00
  229   0.000E+00    0.00
  230   0.000E+00    0.00
  231   0.000E+00    0.00
  232   0.000E+00    0.00
  233   0.000E+00    0.00
  234   0.000E+00    0.00
  235   0.000E+00    0.00
  236   0.000E+00    0.00
  237   0.000E+00    0.00
  238   0.000E+00    0.00
1fuel bundle

                                frequency for generations      24 to
123 each asterisk represents   1.0000 generations
 0.7537 to 0.7565     **
 0.7565 to 0.7593     ****
 0.7593 to 0.7621     ***********
 0.7621 to 0.7650     ***************
 0.7650 to 0.7678     ********************************
 0.7678 to 0.7706     ********************
 0.7706 to 0.7734     *********
 0.7734 to 0.7763     ***
 0.7763 to 0.7791     **

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7537 to 0.7565     *
 0.7565 to 0.7593     ***
 0.7593 to 0.7621     ********
 0.7621 to 0.7650     ***********
 0.7650 to 0.7678     ***************************
 0.7678 to 0.7706     ***************
 0.7706 to 0.7734     *******
 0.7734 to 0.7763     **
 0.7763 to 0.7791     *
```

```
                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7537 to 0.7565
 0.7565 to 0.7593
 0.7593 to 0.7621     *****
 0.7621 to 0.7650     ********
 0.7650 to 0.7678     ****************
 0.7678 to 0.7706     *************
 0.7706 to 0.7734     *****
 0.7734 to 0.7763     **
 0.7763 to 0.7791

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7537 to 0.7565
 0.7565 to 0.7593
 0.7593 to 0.7621
 0.7621 to 0.7650     *****
 0.7650 to 0.7678     ***********
 0.7678 to 0.7706     *****
 0.7706 to 0.7734     **
 0.7734 to 0.7763     **
 0.7763 to 0.7791

1
*************************************************************************
*****************************************
        ***
***
        ***   fuel bundle
***
        ***
***

*************************************************************************
*****************************************
        ***
***
        ***                                      ******      final results
table      ******                                    ***
        ***
***
        ***        best estimate system k-eff
0.76637 + or - 0.00043                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.63331E-02 + or -  1.06339E-04           ***
        ***
***
        ***        system nu bar
```

```
2.43896E+00 + or -  1.05750E-05           ***
        ***
***
        ***        system mean free path (cm)
6.52823E-01 + or -  1.75337E-04           ***
        ***
***
        ***        number of warning messages
7                                         ***
        ***
***
        ***        number of error messages
0                                         ***
        ***
***
        ***        k-effective satisfies the chi**2 test for normality at
the 95 % level                                    ***
        ***
***
        ***
***

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************************************************************

           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.04000 minutes


********************************************************************************
************************************************************
1
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
VV          VV  IIIIIIIIIII
   KK          KK   EEEEEEEEEEEEE   NNN          NN  OOOOOOOOOOOO
VV          VV  IIIIIIIIIII
   KK         KK    EE              NNNN         NN  OO         OO
VV          VV       II
   KK        KK     EE              NN NN        NN  OO         OO
VV          VV       II
   KK       KK      EE              NN   NN      NN  OO         OO
VV          VV       II
   KKKKKKKK         EEEEEEEEE       NN    NN     NN  OO         OO
```

```
--------------   VV          VV       II
   KKKKKKKK        EEEEEEEEE       NN     NN   NN  OO         OO
-------------    VV        VV        II
   KK      KK      EE              NN      NN  NN  OO         OO
VV     VV         II
   KK       KK     EE              NN       NN NN  OO         OO
VV   VV           II
   KK        KK    EE              NN        NNNN  OO         OO
VV VV            II
   KK         KK   EEEEEEEEEEEEE   NN         NNN  OOOOOOOOOOOOO
VVV       IIIIIIIIIIII
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOO
V        IIIIIIIIIII


   DDDDDDDDDDDD      AAAAAAAAA     VV          VV  IIIIIIIIIIII
DDDDDDDDDDDD
   DDDDDDDDDDDDD    AAAAAAAAAA    VV          VV  IIIIIIIIIIII
DDDDDDDDDDDDD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA    VV        VV        II         DD
DD
   DD         DD   AA         AA      VV     VV         II         DD
DD
   DD         DD   AA         AA       VV   VV          II         DD
DD
   DD         DD   AA         AA        VV VV           II         DD
DD
   DDDDDDDDDDDDD   AA         AA         VVV       IIIIIIIIIIII
DDDDDDDDDDDDD
   DDDDDDDDDDDD    AA         AA          V        IIIIIIIIIIII
DDDDDDDDDDDD


      0000000       88888888888               //   22222222222
33333333333               //        11         666666666666
     000000000     8888888888888             //   2222222222222
3333333333333             //        111        6666666666666
    00       00    88         88             //    22         22   33
33             //        1111         66
   00         00   88         88            //                22
33            //          11         66
   00         00   88         88          //                 22
```

```
33           //            11         66
   00          00    88888888888            //                 22
333            //              11         666666666666
   00          00    88888888888           //                 22
333           //               11         6666666666666
   00          00   88          88         //                 22
33         //                  11         66          66
   00          00   88          88        //              22
33        //                   11         66          66
    00        00    88          88       //             22              33
33      //                     11         66          66
     000000000     8888888888888     //             2222222222222
3333333333333     //                 11111111     6666666666666
      0000000       88888888888     //             2222222222222
33333333333     //                 11111111      66666666666



      0000000      5555555555555                      5555555555555
11                          22222222222     22222222222
     000000000     5555555555555                      5555555555555
111                         2222222222222   2222222222222
    00        00    55                      :::        55
1111                :::       22          22   22          22
   00          00   55                      :::        55
11                :::                    22               22
   00          00   55                      :::        55
11                :::                    22               22
   00          00   555555555555                       555555555555
11                                    22               22
   00          00   5555555555555                      5555555555555
11                                 22                22
   00          00                55          :::                    55
11                :::             22                22
   00          00                55          :::                    55
11                :::           22                 22
    00        00    55          55          :::        55          55
11                :::         22                22
     000000000     5555555555555                      5555555555555
11111111                    2222222222222   2222222222222
      0000000       55555555555                        55555555555
11111111                    2222222222222   2222222222222
1

    SSSSSSSSSSS     CCCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   SS         SS   CC          CC   AA         AA   LL              EE
   SS              CC               AA         AA   LL              EE
   SS              CC               AA         AA   LL              EE
   SSSSSSSSSSS     CC               AAAAAAAAAAAAA   LL
```

```
EEEEEEEEE
    SSSSSSSSSSS   CC              AAAAAAAAAAAAA   LL
EEEEEEEEE
              SS   CC              AA         AA   LL              EE
              SS   CC              AA         AA   LL              EE
   SS         SS   CC         CC   AA         AA   LL              EE
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

****
****

****
****

****
****
        *****
*****
        *****   program
verification information   *****
        *****
*****
        *****   code system: SCALE
version: 6.1   *****
        *****
*****

****
****

****
****
        *****
*****
        *****
*****
        *****   program: kenovi
*****
        *****
*****
        *****   creation date: 21_jun_2011
*****
        *****
*****

```
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****          machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  05:51:22.28
*****
        *****
*****
        *****
*****

**************************************************************************
************************************************

**************************************************************************
************************************************

**************************************************************************
************************************************
1

**************************************************************************
******************************************
        ***
***
        ***                                 fuel bundle
***
        ***
***

**************************************************************************
******************************************
        ***                                    ******       numeric
```

```
parameters       ******                                  ***
        ***
***
        ***
***
        ***                    tme          maximum problem time (min)
0.00                     ***
        ***
***
        ***                    tba          time per generation (min)
10.00                     ***
        ***
***
        ***                    gen          number of generations
123                    ***
        ***
***
        ***                    npg          number per generation
20000                     ***
        ***
***
        ***                    nsk          number of generations to be
skipped                    23                    ***
        ***
***
        ***                    beg          beginning generation number
1                      ***
        ***
***
        ***                    res          generations between
checkpoints                     103                    ***
        ***
***
        ***                    x1d          number of extra 1-d cross
sections                      1                       ***
        ***
***
        ***                    nbk          neutron bank size
20025                     ***
        ***
***
        ***                    xnb          extra positions in neutron
bank                        0                     ***
        ***
***
        ***                    nfb          fission bank size
20000                     ***
        ***
***
        ***                    xfb          extra positions in fission
bank                        0                     ***
        ***
```

```
***
        ***                    sig         cut off standard deviation
0.0000                    ***
        ***
***
        ***                    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
000015714D98EE96                       ***
        ***
***
        ***                    nb8         number of d.a. blocks on unit
8                      1000                  ***
        ***
***
        ***                    nl8         length of d.a. blocks on unit
8                       512                  ***
        ***
***
        ***                    nqd         quadrature order for angular
fluxes                    0                     ***
        ***
***
        ***                    pnm         highest order of flux
moments                    0                    ***
        ***
***
        ***                    msh         mesh size for mesh flux tally
0.0000                    ***
        ***
***
        ***                    adj         mode of calculation
forward                    ***
        ***
***
        ***                    tps         sampling sites per track
length                       5                  ***
        ***
***
        ***                    cgs         number of secondary groups
to sampl                   0                     ***
        ***
```

```
***
        ***                       cas         number of secondary angles
to sampl                    0                       ***
        ***
***
        ***                                   input data written on
restart unit                   yes                        ***
        ***
***
        ***
***

**************************************************************************
*****************************************

**************************************************************************
*****************************************
1
**************************************************************************
*****************************************

**************************************************************************
*****************************************
        ***
***
        ***                                fuel bundle
***
        ***
***

**************************************************************************
*****************************************
        ***                                    ******      logical
parameters         ******                                   ***
        ***
***
        ***  run  execute problem after checking data    yes
plt  plot picture map(s)                        yes ***
        ***
***
        ***       compute fluxes (cfx, flx or mfp)       yes
fdn  compute fission densities                yes ***
        ***
***
        ***  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 fiss prod matrix by unit number   no
fmp  print fiss prod matrix by unit location  no ***
        ***
***
        ***  mkh  compute matrix k-eff by hole number     no
mka  compute matrix k-eff by array number     no ***
        ***
***
        ***  ckh  compute cofactor k-eff by hole number   no
cka  compute cofactor k-eff by array number   no ***
        ***
***
        ***  fmh  print fiss prod matrix by hole number   no
fma  print fiss prod matrix by array number   no ***
        ***
***
        ***  hhl  collect matrix by highest hole level    no
hal  collect matrix by highest array level    no ***
        ***
***
        ***  amx  print all mixed cross sections          no
far  print fis. and abs. by region            no ***
        ***
***
        ***  xs1  print 1-d mixture x-sections            no
gas  print far by group                       no ***
        ***
***
        ***  xs2  print 2-d mixture x-sections            no
pax  print xsec-albedo correlation tables     no ***
        ***
***
        ***  xsl  print 2-d mixture Pl arrays             no
pwt  print weight average array               no ***
        ***
***
        ***  xap  print mixture angles & probabilities    no
pgm  print input geometry                     no ***
        ***
***
        ***  pki  print fission spectrum                  no
bug  print debug information                  no ***
        ***
***
        ***  p1d  print extra 1-d cross sections          no
trk  print tracking information               no ***
        ***
***
```

```
        ***  tfm  coordinate transform for fluxes         no
pmf  print angular fluxes and flux moments    no ***
        ***
***
        ***       print fluxes (flx)                     yes
app  append, not overwrite, restart data      no ***
        ***
***
        ***  mfx  compute mesh fluxes                     no
pms  print mesh fluxes if calculated          no ***
        ***
***
        ***  mfp  compute region mean free paths          no
pmm  print mesh flux moments if calculated    no ***
        ***
***
        ***  sen  compute derivative sensitivites         no
pmv  print mesh volumes                       no ***
        ***
***
        ***  cep  continuous energy calculation           no
ptb  use probability tables                  yes ***
        ***
***
        ***  fre  use analytic free gas kernel           yes
pnu  use prompt neutron spectrum only         no ***
        ***
***
        ***  cbt  compute contributons                    no
pct  print contributons                       no ***
        ***
***
        ***  cds  collect CADIS fissions                  no
htm  produce HTML output                     yes ***
        ***
***
        ***
***

**********************************************************************
*****************************************

**********************************************************************
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**********************************************************************
*****************************************
                                                 parameter input completed


                                    ........ finished reading the parameter
data      ........
```

```
                                  *************** data reading completed
***************
1
******************************************************************************
*****************************************
        ***
***
        ***                                  fuel bundle
***
        ***
***

******************************************************************************
*****************************************

******************************************************************************
*****************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number                data set name
name         unit function                      ***
        ***         ------                ------------
----         -------------                      ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.33572\ft14f001             mixed cross
sections               ***
        ***
***
        ***      alb  79     C:\SCALE\data\albedos
input albedos                      ***
        ***
***
        ***      wts  80     C:\SCALE\data\scale.rev01.weights
input weights                      ***
        ***
***
        ***      skt  16      unknown
write scratch data                 ***
        ***
***
        ***      rst  95
->\Temp\scale.David.33572\restart.keno_input             read restart
data                   ***
        ***
***
        ***      wrs  95
```

```
->\Temp\scale.David.33572\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.33572\ft04f001             input ampx
working library         ***
        ***
***
        ***             8
->Data\Local\Temp\scale.David.33572\xfile008             input data
direct access           ***
        ***
***
        ***            10      unknown
xsec mixing direct access          ***
        ***
***

******************************************************************************
*******************************************

                                  ........ finished preparing input data
........
1
******************************************************************************
*****************************
                  ***
***
                  ***           fuel bundle
***
                  ***
***

******************************************************************************
*****************************

******************************************************************************
*****************************
                  ***
***
                  ***                                  ****** additional
information ******                            ***
                  ***
***
                  ***  use a global unit                        yes    use
lattice geometry                    yes  ***
                  ***
***
                  ***  no. of scattering angles in xsecs        3
global array number                         0  ***
                  ***
```

```
***
                ***  number of mixtures used                  3
number of units in the global x dir.      0  ***
                ***
***
                ***  number of bias id's used                 1
number of units in the global y dir.      0  ***
                ***
***
                ***  number of differential albedos used      2
number of units in the global z dir.      0  ***
                ***
***
                ***  total input geometry regions             4
number of energy groups                 238  ***
                ***
***
                ***  number of geometry regions used          4    no.
of fission spectrum source grps.      1  ***
                ***
***
                ***  use nested arrays                       no    use
nested holes                           no  ***
                ***
***
                ***  number of arrays used                    1
number of holes                           0  ***
                ***
***
                ***  maximum array nesting level              1
maximum hole nesting level                0  ***
                ***
***
                ***  largest array number                     1
largest geometry unit number              2  ***
                ***
***
                ***
***
                ***  boundary label 1                cuboid
***
                ***
***
                ***    +x boundary condition             h2o
-x boundary condition                  h2o  ***
                ***
***
                ***    +y boundary condition        graphite
-y boundary condition             graphite  ***
                ***
***
                ***    +z boundary condition             h2o
```

```
-z boundary condition                 h2o  ***
                  ***
***

********************************************************************
****************************


                                    cross sections read from the ampx
working library on unit    4

1                                        fuel bundle

                                                  mixing table

                                         number of scattering angles =
3
                                       cross section message threshold
=1.0E+00


 mixture =     1          density(g/cc) =  5.5474
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    1001001  5.93318E-14  1.78993E-14    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    1003007  3.23535E-08  6.79473E-08    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    1004009  1.25936E-07  3.39736E-07    4009     9.0122     be9 425
endf/b7 rel8 rev7 mod2                   12/17/09
    1005010  6.04529E-08  1.81193E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  1.65122E-16  5.44161E-16    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    1007014  8.91558E-06  3.73710E-05    7014    14.0031     n14 725
endf/b7 rel8 rev7 mod0                   12/17/09
    1008016  1.00000E-20  4.78788E-20    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09
    1011023  9.87361E-07  6.79473E-06   11023    22.9898     na23 1125
endf/b7 rel8 rev7 mod0                  12/17/09
    1012024  7.37710E-07  5.29649E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33929E-08  6.98505E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02826E-07  7.99733E-07   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    1013027  3.96970E-02  3.20617E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    1014028  5.44792E-03  4.56239E-02   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    1014029  2.76758E-04  2.40054E-03   14029    28.9765     si29 1428
```

```
endf/b7 rel8 rev7 mod3                  12/17/09
    1014030  1.82655E-04  1.63883E-03   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    1015031  1.46571E-06  1.35895E-05   15031    30.9738     p31 1525
endf/b7 rel6 rev7 mod1                   12/17/09
    1020040  1.09810E-06  1.31358E-05   20040    39.9626     ca40 2025
endf/b7 rel1 rev7 mod1                  12/17/09
    1020042  7.32891E-09  9.20497E-08   20042    41.9586     ca42 2031
endf/b7 rel1 rev7 mod1                  12/17/09
    1020043  1.52922E-09  1.96645E-08   20043    42.9588     ca43 2034
endf/b7 rel1 rev7 mod1                  12/17/09
    1020044  2.36292E-08  3.10903E-07   20044    43.9555     ca44 2037
endf/b7 rel1 rev7 mod1                  12/17/09
    1020046  4.53101E-11  6.23272E-10   20046    45.9537     ca46 2043
endf/b7 rel1 rev7 mod1                  12/17/09
    1020048  2.11825E-09  3.04054E-08   20048    47.9525     ca48 2049
endf/b7 rel1 rev7 mod1                  12/17/09
    1023000  2.00517E-07  3.05763E-06   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                    12/17/09
    1024050  3.47753E-08  5.19916E-07   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                  12/17/09
    1024052  6.70606E-07  1.04264E-05   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                  12/17/09
    1024053  7.60414E-08  1.20504E-06   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                  12/17/09
    1024054  1.89283E-08  3.05615E-07   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                  12/17/09
    1025055  3.58088E-07  5.88877E-06   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                  12/17/09
    1026054  1.44567E-06  2.33421E-05   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                  12/17/09
    1026056  2.26940E-05  3.79975E-04   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                  12/17/09
    1026057  5.24102E-07  8.93224E-06   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                  12/17/09
    1026058  6.97484E-08  1.20955E-06   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                  12/17/09
    1027059  1.92584E-07  3.39736E-06   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                  12/17/09
    1028058  1.14089E-06  1.97856E-05   28058    57.9353     ni58 2825
endf/b7 rel8 rev7 mod4                  12/17/09
    1028060  4.39468E-07  7.88386E-06   28060    59.9308     ni60 2831
endf/b7 rel8 rev7 mod4                  12/17/09
    1028061  1.91034E-08  3.48426E-07   28061    60.9311     ni61 2834
endf/b7 rel8 rev7 mod5                  12/17/09
    1028062  6.09099E-08  1.12912E-06   28062    61.9283     ni62 2837
endf/b7 rel8 rev7 mod5                  12/17/09
    1028064  1.55120E-08  2.96838E-07   28064    63.9280     ni64 2843
endf/b7 rel8 rev7 mod4                  12/17/09
    1029063  2.49068E-06  4.69175E-05   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                  12/17/09
    1029065  1.11117E-06  2.15960E-05   29065    64.9278     cu65 2931
```

```
endf/b7 rel8 rev7 mod5                  12/17/09
    1030000  6.94379E-07  1.35895E-05   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                   12/17/09
    1036083  6.59759E-13  1.63748E-11   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90756E-08  1.32072E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.07023E-08  2.91225E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.63653E-08  4.50219E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  6.36328E-12  1.76966E-10   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.65866E-08  4.66244E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  8.50631E-12  2.41661E-10   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.67909E-09  7.69140E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  1.50151E-20  4.17577E-19   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.12803E-13  3.20465E-12   41095    94.9068     nb95 4131
endf/b7 rel0 rev7 mod1                  12/17/09
    1042092  1.04839E-08  2.88425E-07   42092    91.9068     mo92 4225
endf/b7 rel0 rev7 mod1                  12/17/09
    1042094  6.55156E-09  1.84160E-07   42094    93.9051     mo94 4231
endf/b7 rel0 rev7 mod1                  12/17/09
    1042095  1.12860E-08  3.20623E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                  12/17/09
    1042096  1.18397E-08  3.39892E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                  12/17/09
    1042097  6.79083E-09  1.96986E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                  12/17/09
    1042098  1.71779E-08  5.03429E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                  12/17/09
    1042099  5.93666E-12  1.75766E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                  12/17/09
    1042100  6.87213E-09  2.05519E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.64577E-12  4.87254E-11   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                  12/17/09
    1044101  6.87178E-12  2.07561E-10   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  5.60747E-12  1.71049E-10   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  3.90616E-12  1.20324E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  2.53193E-12  7.87502E-11   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  5.35732E-13  1.69838E-11   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  8.49558E-14  2.61694E-12   45103   102.9055     rh103 4525
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endf/b7 rel0 rev7 mod1                12/17/09
    1045105  7.13899E-13  2.24180E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  4.44520E-13  1.39588E-11   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.03529E-13  6.51308E-12   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  7.43843E-14  2.40259E-12   46108   107.9039     pd108 4643
endf/b7 rel5 rev7 mod1                12/17/09
    1047107  2.12330E-08  6.79473E-07   47107   106.9051     ag107 4725
endf/b7 rel0 rev7 mod1                12/17/09
    1047109  2.91864E-14  9.51457E-13   47109   108.9047     ag109 4731
endf/b7 rel0 rev7 mod1                12/17/09
    1048106  1.26206E-10  4.00095E-09   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                12/17/09
    1048108  8.98585E-11  2.90241E-09   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    1048110  1.26105E-09  4.14861E-08   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    1048111  1.29235E-09  4.29032E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43628E-09  8.16075E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23380E-09  4.16982E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90073E-09  9.89021E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56242E-10  2.62376E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  3.98300E-15  1.36996E-13   49115   114.9039     in115 4931
endf/b7 rel3 rev7 mod1                12/17/09
    1050112  1.85479E-10  6.21305E-09   50112   111.9048     sn112 5025
endf/b7 rel0 rev7 mod1                12/17/09
    1050114  1.26202E-10  4.30291E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50134E-11  2.23613E-09   50115   114.9033     sn115 5034
endf/b7 rel0 rev7 mod1                12/17/09
    1050116  2.78027E-09  9.64582E-08   50116   115.9017     sn116 5037
endf/b7 rel0 rev7 mod1                12/17/09
    1050117  1.46855E-09  5.13897E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63125E-09  1.63448E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64256E-09  5.84623E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22981E-09  2.23596E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85348E-10  3.23066E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10717E-09  4.10645E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  7.42051E-14  2.79671E-12   50126   125.9077     sn126 5067
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endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.30040E-14  8.73860E-13   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  6.83020E-13  2.63551E-11   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.29978E-12  5.24900E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  3.64554E-13  1.42850E-11   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  4.52304E-12  1.79944E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.82589E-12  7.37348E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  5.85916E-13  2.33099E-11   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  9.83974E-18  3.94410E-16   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  5.46448E-12  2.20669E-10   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  8.14500E-12  3.33794E-10   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29292E-08  1.35933E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  7.62386E-12  3.19292E-10   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  9.21183E-12  3.83027E-10   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  6.93115E-12  2.92350E-10   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  7.48226E-12  3.17838E-10   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  4.51150E-12  1.92998E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.18920E-12  3.09702E-10   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.70145E-13  7.17653E-12   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  3.26946E-12  1.39863E-10   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.54048E-13  6.58990E-12   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  2.17525E-14  9.37049E-13   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  4.43169E-12  1.92237E-10   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  4.02470E-12  1.75788E-10   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  2.76861E-12  1.21757E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  2.20217E-12  9.75057E-11   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  2.24064E-13  9.85373E-12   61147   146.9151     pm147 6149
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endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.41854E-20  6.28091E-19   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  9.59715E-13  4.27811E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.36568E-16  6.00588E-15   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  4.05668E-13  1.80833E-11   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  3.80320E-17  1.70672E-15   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.00822E-09  1.35900E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  3.56860E-13  1.62283E-11   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  1.38603E-13  6.34460E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.42845E-09  6.45319E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.55922E-09  7.13734E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  8.77434E-17  4.04278E-15   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  4.38193E-14  2.03209E-12   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.46932E-14  6.85792E-13   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77431E-12  2.62589E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29364E-11  2.89975E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27272E-10  1.98144E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.90970E-10  2.75826E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51808E-10  2.12229E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17144E-10  3.39013E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31096E-10  3.02120E-08   64160   159.9270     gd160 6449
endf/b7 rel0 rev7 mod1                12/17/09
    1074182  7.16309E-08  3.90130E-06   74182   181.9482     w182 7431
endf/b7 rel8 rev7 mod2                 12/17/09
    1074183  3.84687E-08  2.10670E-06   74183   182.9502     w183 7434
endf/b7 rel8 rev7 mod2                 12/17/09
    1074184  8.19198E-08  4.51079E-06   74184   183.9509     w184 7437
endf/b7 rel8 rev7 mod2                 12/17/09
    1074186  7.51922E-08  4.18544E-06   74186   185.9544     w186 7443
endf/b7 rel8 rev7 mod2                 12/17/09
    1082204  7.66801E-11  4.68184E-09   82204   203.9730     pb204 8225
endf/b7 rel1 rev7 mod1                12/17/09
    1082206  1.31999E-09  8.13854E-08   82206   205.9745     pb206 8231
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endf/b7 rel1 rev7 mod1                12/17/09
    1082207  1.21045E-09  7.49943E-08   82207   206.9759     pb207 8234
endf/b7 rel1 rev7 mod1                12/17/09
    1082208  2.87003E-09  1.78674E-07   82208   207.9767     pb208 8237
endf/b7 rel6 rev7 mod2                12/17/09
    1092234  1.45935E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76388E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22550E-06  6.51850E-04   92236   236.0456     u236 9231
endf/b7 rel0 rev7 mod1                 12/17/09
    1092238  7.06299E-03  5.03292E-01   92238   238.0508     u238 9237
endf/b7 rel6 rev7 mod5                 12/17/09
    1093237  8.86668E-15  6.29157E-13   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.01799E-20  7.25390E-19   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  1.80016E-12  1.28814E-10   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  8.22036E-20  5.90692E-18   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.99668E-21  7.21335E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.16010E-20  8.40577E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00032E-20  7.21806E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  7.45679E-22  5.40301E-20   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  1.00000E-20  7.27575E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.74910E-20  1.26735E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.99837E-21  7.27456E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.99738E-21  7.30381E-19   96244   244.0627     cm244 9637
endf/b7 rel3 rev7 mod2                12/17/09

 mixture =     2          density(g/cc) = 0.99396
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    2001001  6.64695E-02  1.11915E-01    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    2008016  3.32348E-02  8.88085E-01    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09

 mixture =     3          density(g/cc) =  2.7020
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    3003006  1.75835E-07  6.50000E-07    3006     6.0151     li6 325
endf/b7 rel1 rev7 mod0                   12/17/09
    3003007  2.16849E-06  9.35000E-06    3007     7.0160     li7 328
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endf/b7 rel0 rev7 mod0                    12/17/09
    3005010  2.99015E-07  1.84000E-06    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                    12/17/09
    3005011  1.20605E-06  8.16000E-06    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                    12/17/09
    3012024  4.88634E-04  7.20258E-03   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    3012025  6.18603E-05  9.49881E-04   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    3012026  6.81081E-05  1.08754E-03   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    3013027  5.88689E-02  9.76150E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    3014028  2.67155E-04  4.59332E-03   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    3014029  1.35717E-05  2.41681E-04   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                  12/17/09
    3014030  8.95702E-06  1.64994E-04   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    3023000  3.19422E-06  1.00000E-04   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                    12/17/09
    3024050  1.83565E-06  5.63448E-05   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                  12/17/09
    3024052  3.53986E-05  1.12994E-03   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                  12/17/09
    3024053  4.01392E-06  1.30593E-04   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                  12/17/09
    3024054  9.99149E-07  3.31204E-05   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                  12/17/09
    3025055  2.07330E-05  7.00000E-04   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                  12/17/09
    3026054  6.02891E-06  1.99853E-04   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                  12/17/09
    3026056  9.46410E-05  3.25331E-03   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                  12/17/09
    3026057  2.18567E-06  7.64770E-05   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                  12/17/09
    3026058  2.90873E-07  1.03561E-05   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                  12/17/09
    3027059  2.76106E-07  1.00000E-05   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                  12/17/09
    3029063  5.20580E-05  2.01329E-03   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                  12/17/09
    3029065  2.32247E-05  9.26712E-04   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                  12/17/09
    3030000  2.21504E-05  8.90000E-04   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                    12/17/09
    3031069  7.01394E-07  2.97102E-05   31069    68.9256     ga69 3125
endf/b7 rel0 rev7 mod1                  12/17/09
    3031071  4.65496E-07  2.02898E-05   31071    70.9247     ga71 3131
endf/b7 rel0 rev7 mod1                  12/17/09
    3048106  1.80940E-09  1.17766E-07   48106   105.9065     cd106 4825
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endf/b7 rel0 rev7 mod1                12/17/09
    3048108  1.28830E-09  8.54314E-08   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    3048110  1.80796E-08  1.22113E-06   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    3048111  1.85283E-08  1.26284E-06   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    3048112  3.49287E-08  2.40208E-06   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    3048113  1.76887E-08  1.22736E-06   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    3048114  4.15873E-08  2.91113E-06   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    3048116  1.08419E-08  7.72275E-07   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09



                              3003006    li6 325 endf/b7 rel1 rev7 mod0
12/17/09
                              1003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                              3003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                              1004009    be9 425 endf/b7 rel8 rev7 mod2
12/17/09
                              1005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                              3005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                              3005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                              1005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                              1007014    n14 725 endf/b7 rel8 rev7 mod0
12/17/09
                              2008016    o16 825 endf/b7 rel8 rev7 mod3
12/17/09
                              1008016    o16 825 endf/b7 rel8 rev7 mod3
12/17/09
                              1011023    na23 1125 endf/b7 rel8 rev7 mod0
12/17/09
                              1012024    mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09
                              3012024    mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09
                              1012025    mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09
                              3012025    mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09
                              1012026    mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09
```

	3012026	mg26	1231	endf/b7	rel3	rev7	mod2
12/17/09							
	1013027	al27	1325	endf/b7	rel6	rev7	mod1
12/17/09							
	3013027	al27	1325	endf/b7	rel6	rev7	mod1
12/17/09							
	1014028	si28	1425	endf/b7	rel6	rev7	mod1
12/17/09							
	3014028	si28	1425	endf/b7	rel6	rev7	mod1
12/17/09							
	1014029	si29	1428	endf/b7	rel8	rev7	mod3
12/17/09							
	3014029	si29	1428	endf/b7	rel8	rev7	mod3
12/17/09							
	1014030	si30	1431	endf/b7	rel6	rev7	mod2
12/17/09							
	3014030	si30	1431	endf/b7	rel6	rev7	mod2
12/17/09							
	1015031	p31	1525	endf/b7	rel6	rev7	mod1
12/17/09							
	1020040	ca40	2025	endf/b7	rel1	rev7	mod1
12/17/09							
	1020042	ca42	2031	endf/b7	rel1	rev7	mod1
12/17/09							
	1020043	ca43	2034	endf/b7	rel1	rev7	mod1
12/17/09							
	1020044	ca44	2037	endf/b7	rel1	rev7	mod1
12/17/09							
	1020046	ca46	2043	endf/b7	rel1	rev7	mod1
12/17/09							
	1020048	ca48	2049	endf/b7	rel1	rev7	mod1
12/17/09							
	1023000	v	2300	endf/b7	rel8	rev7	mod0
12/17/09							
	3023000	v	2300	endf/b7	rel8	rev7	mod0
12/17/09							
	1024050	cr50	2425	endf/b7	rel8	rev7	mod5
12/17/09							
	3024050	cr50	2425	endf/b7	rel8	rev7	mod5
12/17/09							
	1024052	cr52	2431	endf/b7	rel8	rev7	mod4
12/17/09							
	3024052	cr52	2431	endf/b7	rel8	rev7	mod4
12/17/09							
	1024053	cr53	2434	endf/b7	rel8	rev7	mod4
12/17/09							
	3024053	cr53	2434	endf/b7	rel8	rev7	mod4
12/17/09							
	1024054	cr54	2437	endf/b7	rel8	rev7	mod5
12/17/09							
	3024054	cr54	2437	endf/b7	rel8	rev7	mod5
12/17/09							

	1025055	mn55	2525	endf/b7	rel8	rev7	mod0
12/17/09							
	3025055	mn55	2525	endf/b7	rel8	rev7	mod0
12/17/09							
	1026054	fe54	2625	endf/b7	rel8	rev7	mod5
12/17/09							
	3026054	fe54	2625	endf/b7	rel8	rev7	mod5
12/17/09							
	1026056	fe56	2631	endf/b7	rel8	rev7	mod4
12/17/09							
	3026056	fe56	2631	endf/b7	rel8	rev7	mod4
12/17/09							
	1026057	fe57	2634	endf/b7	rel8	rev7	mod4
12/17/09							
	3026057	fe57	2634	endf/b7	rel8	rev7	mod4
12/17/09							
	1026058	fe58	2637	endf/b7	rel8	rev7	mod0
12/17/09							
	3026058	fe58	2637	endf/b7	rel8	rev7	mod0
12/17/09							
	1027059	co59	2725	endf/b7	rel2	rev7	mod0
12/17/09							
	3027059	co59	2725	endf/b7	rel2	rev7	mod0
12/17/09							
	1028058	ni58	2825	endf/b7	rel8	rev7	mod4
12/17/09							
	1028060	ni60	2831	endf/b7	rel8	rev7	mod4
12/17/09							
	1028061	ni61	2834	endf/b7	rel8	rev7	mod5
12/17/09							
	1028062	ni62	2837	endf/b7	rel8	rev7	mod5
12/17/09							
	1028064	ni64	2843	endf/b7	rel8	rev7	mod4
12/17/09							
	1029063	cu63	2925	endf/b7	rel8	rev7	mod5
12/17/09							
	3029063	cu63	2925	endf/b7	rel8	rev7	mod5
12/17/09							
	1029065	cu65	2931	endf/b7	rel8	rev7	mod5
12/17/09							
	3029065	cu65	2931	endf/b7	rel8	rev7	mod5
12/17/09							
	1030000	zn	3000	endf/b7	rel0	rev7	mod0
12/17/09							
	3030000	zn	3000	endf/b7	rel0	rev7	mod0
12/17/09							
	3031069	ga69	3125	endf/b7	rel0	rev7	mod1
12/17/09							
	3031071	ga71	3131	endf/b7	rel0	rev7	mod1
12/17/09							
	1036083	kr83	3640	endf/b7	rel0	rev7	mod1
12/17/09							

```
                                1040090    zr90 4025 endf/b7 rel0 rev7 mod1
12/17/09
                                1040091    zr91 4028 endf/b7 rel0 rev7 mod1
12/17/09
                                1040092    zr92 4031 endf/b7 rel3 rev7 mod4
12/17/09
                                1040093    zr93 4034 endf/b7 rel3 rev7 mod1
12/17/09
                                1040094    zr94 4037 endf/b7 rel3 rev7 mod1
12/17/09
                                1040095    zr95 4040 endf/b7 rel0 rev7 mod1
12/17/09
                                1040096    zr96 4043 endf/b7 rel0 rev7 mod1
12/17/09
                                1041093    nb93 4125 endf/b7 rel6 rev7 mod3
12/17/09
                                1041095    nb95 4131 endf/b7 rel0 rev7 mod1
12/17/09
                                1042092    mo92 4225 endf/b7 rel0 rev7 mod1
12/17/09
                                1042094    mo94 4231 endf/b7 rel0 rev7 mod1
12/17/09
                                1042095    mo95 4234 endf/b7 rel0 rev7 mod1
12/17/09
                                1042096    mo96 4237 endf/b7 rel0 rev7 mod1
12/17/09
                                1042097    mo97 4240 endf/b7 rel0 rev7 mod1
12/17/09
                                1042098    mo98 4243 endf/b7 rel0 rev7 mod1
12/17/09
                                1042099    mo99 4246 endf/b7 rel0 rev7 mod1
12/17/09
                                1042100    mo100 4249 endf/b7 rel0 rev7
mod1                 12/17/09
                                1043099    tc99 4325 endf/b7 rel0 rev7 mod1
12/17/09
                                1044101    ru101 4440 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044102    ru102 4443 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044103    ru103 4446 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044104    ru104 4449 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044106    ru106 4455 endf/b7 rel0 rev7
mod0                 12/17/09
                                1045103    rh103 4525 endf/b7 rel0 rev7
mod1                 12/17/09
                                1045105    rh105 4531 endf/b7 rel0 rev7
mod1                 12/17/09
                                1046105    pd105 4634 endf/b7 rel0 rev7
mod1                 12/17/09
```

		1046107	pd107 4640 endf/b7 rel0 rev7
mod1	12/17/09		
		1046108	pd108 4643 endf/b7 rel5 rev7
mod1	12/17/09		
		1047107	ag107 4725 endf/b7 rel0 rev7
mod1	12/17/09		
		1047109	ag109 4731 endf/b7 rel0 rev7
mod1	12/17/09		
		1048106	cd106 4825 endf/b7 rel0 rev7
mod1	12/17/09		
		3048106	cd106 4825 endf/b7 rel0 rev7
mod1	12/17/09		
		1048108	cd108 4831 endf/b7 rel0 rev7
mod1	12/17/09		
		3048108	cd108 4831 endf/b7 rel0 rev7
mod1	12/17/09		
		1048110	cd110 4837 endf/b7 rel0 rev7
mod1	12/17/09		
		3048110	cd110 4837 endf/b7 rel0 rev7
mod1	12/17/09		
		1048111	cd111 4840 endf/b7 rel0 rev7
mod1	12/17/09		
		3048111	cd111 4840 endf/b7 rel0 rev7
mod1	12/17/09		
		1048112	cd112 4843 endf/b7 rel0 rev7
mod1	12/17/09		
		3048112	cd112 4843 endf/b7 rel0 rev7
mod1	12/17/09		
		1048113	cd113 4846 endf/b7 rel0 rev7
mod1	12/17/09		
		3048113	cd113 4846 endf/b7 rel0 rev7
mod1	12/17/09		
		1048114	cd114 4849 endf/b7 rel4 rev7
mod1	12/17/09		
		3048114	cd114 4849 endf/b7 rel4 rev7
mod1	12/17/09		
		1048116	cd116 4855 endf/b7 rel0 rev7
mod1	12/17/09		
		3048116	cd116 4855 endf/b7 rel0 rev7
mod1	12/17/09		
		1049115	in115 4931 endf/b7 rel3 rev7
mod1	12/17/09		
		1050112	sn112 5025 endf/b7 rel0 rev7
mod1	12/17/09		
		1050114	sn114 5031 endf/b7 rel0 rev7
mod1	12/17/09		
		1050115	sn115 5034 endf/b7 rel0 rev7
mod1	12/17/09		
		1050116	sn116 5037 endf/b7 rel0 rev7
mod1	12/17/09		
		1050117	sn117 5040 endf/b7 rel0 rev7
mod1	12/17/09		

```
                                1050118    sn118 5043 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050119    sn119 5046 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050120    sn120 5049 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050122    sn122 5055 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050124    sn124 5061 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050126    sn126 5067 endf/b7 rel0 rev7
mod1                 12/17/09
                                1053127    i127 5325 endf/b7 rel2 rev7 mod1
12/17/09
                                1053129    i129 5331 endf/b7 rel0 rev7 mod1
12/17/09
                                1053135    i135 5349 endf/b7 rel0 rev7 mod1
12/17/09
                                1054131    xe131 5446 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054133    xe133 5452 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054135    xe135 5458 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055133    cs133 5525 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055134    cs134 5528 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055135    cs135 5531 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055137    cs137 5537 endf/b7 rel0 rev7
mod1                 12/17/09
                                1056138    ba138 5649 endf/b7 rel0 rev7
mod1                 12/17/09
                                1056140    ba140 5655 endf/b7 rel0 rev7
mod1                 12/17/09
                                1057139    la139 5728 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058141    ce141 5840 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058142    ce142 5843 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058143    ce143 5846 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058144    ce144 5849 endf/b7 rel0 rev7
mod1                 12/17/09
                                1059141    pr141 5925 endf/b7 rel0 rev7
mod1                 12/17/09
                                1059143    pr143 5931 endf/b7 rel0 rev7
mod1                 12/17/09
                                1060143    nd143 6028 endf/b7 rel0 rev7
mod1                 12/17/09
```

		1060144	nd144	6031	endf/b7	rel0	rev7
mod1	12/17/09						
		1060145	nd145	6034	endf/b7	rel0	rev7
mod1	12/17/09						
		1060146	nd146	6037	endf/b7	rel0	rev7
mod1	12/17/09						
		1060147	nd147	6040	endf/b7	rel0	rev7
mod1	12/17/09						
		1060148	nd148	6043	endf/b7	rel0	rev7
mod1	12/17/09						
		1061147	pm147	6149	endf/b7	rel3	rev7
mod1	12/17/09						
		1061148	pm148	6152	endf/b7	rel3	rev7
mod1	12/17/09						
		1061149	pm149	6155	endf/b7	rel3	rev7
mod1	12/17/09						
		1062147	sm147	6234	endf/b7	rel0	rev7
mod1	12/17/09						
		1062149	sm149	6240	endf/b7	rel0	rev7
mod1	12/17/09						
		1062150	sm150	6243	endf/b7	rel0	rev7
mod1	12/17/09						
		1062151	sm151	6246	endf/b7	rel0	rev7
mod1	12/17/09						
		1062152	sm152	6249	endf/b7	rel0	rev7
mod1	12/17/09						
		1062153	sm153	6252	endf/b7	rel0	rev7
mod1	12/17/09						
		1063151	eu151	6325	endf/b7	rel0	rev7
mod1	12/17/09						
		1063153	eu153	6331	endf/b7	rel1	rev7
mod1	12/17/09						
		1063154	eu154	6334	endf/b7	rel0	rev7
mod1	12/17/09						
		1063155	eu155	6337	endf/b7	rel0	rev7
mod1	12/17/09						
		1063156	eu156	6340	endf/b7	rel0	rev7
mod1	12/17/09						
		1064152	gd152	6425	endf/b7	rel0	rev7
mod1	12/17/09						
		1064154	gd154	6431	endf/b7	rel0	rev7
mod1	12/17/09						
		1064155	gd155	6434	endf/b7	rel0	rev7
mod1	12/17/09						
		1064156	gd156	6437	endf/b7	rel0	rev7
mod1	12/17/09						
		1064157	gd157	6440	endf/b7	rel0	rev7
mod1	12/17/09						
		1064158	gd158	6443	endf/b7	rel0	rev7
mod1	12/17/09						
		1064160	gd160	6449	endf/b7	rel0	rev7
mod1	12/17/09						

```
                                1074182    w182 7431 endf/b7 rel8 rev7 mod2
12/17/09
                                1074183    w183 7434 endf/b7 rel8 rev7 mod2
12/17/09
                                1074184    w184 7437 endf/b7 rel8 rev7 mod2
12/17/09
                                1074186    w186 7443 endf/b7 rel8 rev7 mod2
12/17/09
                                1082204    pb204 8225 endf/b7 rel1 rev7
mod1                  12/17/09
                                1082206    pb206 8231 endf/b7 rel1 rev7
mod1                  12/17/09
                                1082207    pb207 8234 endf/b7 rel1 rev7
mod1                  12/17/09
                                1082208    pb208 8237 endf/b7 rel6 rev7
mod2                  12/17/09
                                1092234    u234 9225 endf/b7 rel5 rev7 mod2
12/17/09
                                1092235    u235 9228 endf/b7 rel0 rev7 mod7
12/17/09
                                1092236    u236 9231 endf/b7 rel0 rev7 mod1
12/17/09
                                1092238    u238 9237 endf/b7 rel6 rev7 mod5
12/17/09
                                1093237    np237 9346 endf/b7 rel0 rev7
mod1                  12/17/09
                                1094238    pu238 9434 endf/b7 rel0 rev7
mod0                  12/17/09
                                1094239    pu239 9437 endf/b7 rel5 rev7
mod5                  12/17/09
                                1094240    pu240 9440 endf/b7 rel2 rev7
mod0                  12/17/09
                                1094241    pu241 9443 endf/b7 rel3 rev7
mod1                  12/17/09
                                1094242    pu242 9446 endf/b7 rel0 rev7
mod0                  12/17/09
                                1095241    am241 9543 endf/b7 rel0 rev7
mod4                  12/17/09
                                1095242    am242 9546 endf/b7 rel0 rev7
mod0                  12/17/09
                                1095243    am243 9549 endf/b7 rel5 rev7
mod0                  12/17/09
                                1096242    cm242 9631 endf/b7 rel0 rev7
mod0                  12/17/09
                                1096243    cm243 9634 endf/b7 rel7 rev7
mod0                  12/17/09
                                1096244    cm244 9637 endf/b7 rel3 rev7
mod2                  12/17/09
                                2001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09
                                1001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09
```

```
  ***** warning ***** keno message number k6-222 follows:
  9613 transfers for mixture 1 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  139 transfers for mixture 3 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  13467 transfers for mixture 2 were corrected for bad moments.

                                ........ finished mixing cross-sections
........

                                 1-d cross section array id numbers

                                            neutron
                                 reaction name    reaction id
                                         total              1
                                non-absorption           2002
                                    nu-fission           1452
                                    absorption             27
                                       fission             18
                                           chi           1018

                                ........ finished preparing the cross
sections    ........


************************************************************
                                **
**
                                **   array      units in   units in
units in   nesting  **
                                **   number      x dir.     y dir.     z
dir.     level   **
                                **
**
                                **     1            1         14
1          1    **
                                **
**

************************************************************


                                ........ finished loading the data
........
1
************************************************************************
*****************************************
        ***
```

```
***
        ***
***

**********************************************************************
*****************************************
        ***                                     ******      geometry
parameters       ******                                     ***
        ***
***
        ***
***
        ***                      niar        number of independent array
references               1                        ***
        ***
***
        ***                      ngblu       global unit number
2                         ***
        ***
***
        ***                      nboxt       number of units in the
problem                      2                          ***
        ***
***
        ***                      nquad       number of quadratics in the
problem                 12                        ***
        ***
***
        ***                      ngwrds      number of geometry words
read                        4                          ***
        ***
***
        ***                      maxgwd      maximum geometry words in a
unit                      3                        ***
        ***
***
        ***                      maxsfu      largest number of surfaces
in a unit                  9                          ***
        ***
***
        ***                      maxreg      largest number of media in a
unit                    3                       ***
        ***
***
        ***                      regtot      number of spatial volumes
defined                     4                          ***
        ***
***
        ***                      sectot      number of entries in the
sector array               14                          ***
        ***
***
```

```
        ***                       nucom       number of comments in the
geometry data              2                          ***
        ***
***
        ***                       numhol      number of holes in the
problem                       0                          ***
        ***
***

********************************************************************************
*****************************************

1                                          fuel bundle

                                    geometry description for those units
utilized in this problem



                                                          -----   unit 1
-----

 fuel meat

       1        cuboid         1                             quadratic
surfaces

      X**2          Y**2          Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +8.86938E+00

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +6.45160E-04

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +9.00225E+02

       2        cuboid         2                             quadratic
surfaces

      X**2          Y**2          Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.03225E-03

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
```

```
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

       3        cuboid         3                              quadratic
surfaces

      X**2          Y**2          Z**2           XY            XZ
YZ             X             Y             Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.18080E-02

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 media 1    1          1

 media 3    1          2 -1

 media 2    1          -1 -2 3

 boundary                        3


                                                  ******************   global
******************
                                                             -----   unit 2
-----

 array unit

       1        cuboid         1                              quadratic
surfaces

      X**2          Y**2          Z**2           XY            XZ
YZ             X             Y             Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +5.31622E+00 +0.00000E+00 +1.12882E+00

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
```

imp definitions

array 1 1

boundary 1
1 fuel bundle

------- unit orientation description for array 1 -------

z layer 1, x column 1 to 1 left to right y row 1 to 14 bottom to top

1

1

1

1

1

1

1

1

1

1

1

1

1

1 fuel bundle

volumes for those units utilized in this problem

volumes not specified in the input were set to -1.0

unit	uses	geometry region	mixture	total region volume (cm**3)
1	14	1	1	

```
2.47925E+02 +/- 7.84971E-01
                                                  2           3
5.95366E+02 +/- 1.88502E+00
                                                  3           2
1.84949E+03 +/- 5.85578E+00

                              2         1       1


                                    mixture       total mixture volume (cm**3)
total mixture mass (gm)

                                       1          2.47925E+02 +/- 7.84971E-01
1.37533E+03 +/- 4.35453E+00
                                       2          1.84949E+03 +/- 5.85578E+00
1.83832E+03 +/- 5.82041E+00
                                       3          5.95366E+02 +/- 1.88502E+00
1.60868E+03 +/- 5.09333E+00
                                                 -------------
-------------
                                                  2.69278E+03
4.82233E+03
                                  *****  restart data has been written on
unit 95  *****


*****************************************************************************
*******************************************
        ***
***
        ***                                              biasing information
***
        ***
***
        ***     a default weight of    0.500 will be used for all bias
id's.                                                    ***
        ***
***

*****************************************************************************
*******************************************

                                  ........ finished in Keno-VI before
tracking       ........

                                  ........     0.01683 minutes were used
processing data.        ........

 volume fraction of fissile material in the system= 9.20704E-02
```

```
 start type 6 was used.

 neutrons were started from binary start data on file
keno_start6_file

 neutrons started in non-fissile mixtures will use the fission spectrum
for mixture     1

   0.00083 minutes were required for starting.   total elapsed time is
0.01767 minutes.
1fuel bundle

                   generation        average         avg k-eff
matrix       matrix k-eff
     generation   k-effective      k-effective       deviation
k-effective       deviation
  keno message number k6-132 follows:
 only 15469 independent fission points were generated for generation 1
          1       7.61661E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15584 independent fission points were generated for generation 2
          2       7.60101E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15671 independent fission points were generated for generation 3
          3       7.66701E-01      7.66701E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.65414E-01      7.66058E-01      6.43343E-04
0.00000E+00      0.00000E+00
          5       7.69532E-01      7.67216E-01      1.21618E-03
0.00000E+00      0.00000E+00
          6       7.57897E-01      7.64886E-01      2.48341E-03
0.00000E+00      0.00000E+00
          7       7.61512E-01      7.64211E-01      2.03856E-03
0.00000E+00      0.00000E+00
          8       7.60862E-01      7.63653E-01      1.75558E-03
0.00000E+00      0.00000E+00
          9       7.67986E-01      7.64272E-01      1.60768E-03
0.00000E+00      0.00000E+00
         10       7.66524E-01      7.64553E-01      1.42045E-03
0.00000E+00      0.00000E+00
         11       7.60986E-01      7.64157E-01      1.31393E-03
0.00000E+00      0.00000E+00
         12       7.67688E-01      7.64510E-01      1.22712E-03
0.00000E+00      0.00000E+00
         13       7.66826E-01      7.64721E-01      1.12976E-03
0.00000E+00      0.00000E+00
         14       7.74256E-01      7.65515E-01      1.30194E-03
0.00000E+00      0.00000E+00
         15       7.65596E-01      7.65521E-01      1.19763E-03
0.00000E+00      0.00000E+00
```

16	7.62161E-01	7.65281E-01	1.13448E-03
0.00000E+00	0.00000E+00		
17	7.68533E-01	7.65498E-01	1.07815E-03
0.00000E+00	0.00000E+00		
18	7.67036E-01	7.65594E-01	1.01309E-03
0.00000E+00	0.00000E+00		
19	7.63403E-01	7.65465E-01	9.60320E-04
0.00000E+00	0.00000E+00		
20	7.64266E-01	7.65399E-01	9.07848E-04
0.00000E+00	0.00000E+00		
21	7.64558E-01	7.65355E-01	8.59878E-04
0.00000E+00	0.00000E+00		
22	7.62217E-01	7.65198E-01	8.30697E-04
0.00000E+00	0.00000E+00		
23	7.61103E-01	7.65003E-01	8.13858E-04
0.00000E+00	0.00000E+00		
24	7.65703E-01	7.65035E-01	7.76636E-04
0.00000E+00	0.00000E+00		
25	7.66555E-01	7.65101E-01	7.45039E-04
0.00000E+00	0.00000E+00		
26	7.62634E-01	7.64998E-01	7.20685E-04
0.00000E+00	0.00000E+00		
27	7.67246E-01	7.65535E-01	2.95160E-03
0.00000E+00	0.00000E+00		
28	7.62511E-01	7.64930E-01	2.65630E-03
0.00000E+00	0.00000E+00		
29	7.57999E-01	7.63775E-01	3.91336E-03
0.00000E+00	0.00000E+00		
30	7.57943E-01	7.62942E-01	2.88922E-03
0.00000E+00	0.00000E+00		
31	7.63583E-01	7.63022E-01	2.29613E-03
0.00000E+00	0.00000E+00		
32	7.71260E-01	7.63937E-01	2.34693E-03
0.00000E+00	0.00000E+00		
33	7.65681E-01	7.64112E-01	2.16365E-03
0.00000E+00	0.00000E+00		
34	7.68353E-01	7.64497E-01	2.01726E-03
0.00000E+00	0.00000E+00		
35	7.60656E-01	7.64177E-01	1.73722E-03
0.00000E+00	0.00000E+00		
36	7.67549E-01	7.64436E-01	1.52610E-03
0.00000E+00	0.00000E+00		
37	7.71916E-01	7.64971E-01	1.64911E-03
0.00000E+00	0.00000E+00		
38	7.68651E-01	7.65216E-01	1.65300E-03
0.00000E+00	0.00000E+00		
39	7.70835E-01	7.65567E-01	1.86489E-03
0.00000E+00	0.00000E+00		
40	7.59094E-01	7.65186E-01	1.48291E-03
0.00000E+00	0.00000E+00		
41	7.72873E-01	7.65614E-01	2.23270E-03
0.00000E+00	0.00000E+00		

42	7.59789E-01	7.65307E-01	1.45282E-03
0.00000E+00	0.00000E+00		
43	7.70510E-01	7.65567E-01	1.49096E-03
0.00000E+00	0.00000E+00		
44	7.63375E-01	7.65463E-01	1.44026E-03
0.00000E+00	0.00000E+00		
45	7.62945E-01	7.65348E-01	1.34567E-03
0.00000E+00	0.00000E+00		
46	7.65393E-01	7.65350E-01	1.27926E-03
0.00000E+00	0.00000E+00		
47	7.66053E-01	7.65380E-01	1.21660E-03
0.00000E+00	0.00000E+00		
48	7.65754E-01	7.65394E-01	1.16227E-03
0.00000E+00	0.00000E+00		
49	7.70274E-01	7.65582E-01	1.13674E-03
0.00000E+00	0.00000E+00		
50	7.69013E-01	7.65709E-01	1.10068E-03
0.00000E+00	0.00000E+00		
51	7.71321E-01	7.65910E-01	1.11749E-03
0.00000E+00	0.00000E+00		
52	7.64422E-01	7.65858E-01	1.06965E-03
0.00000E+00	0.00000E+00		
53	7.66233E-01	7.65871E-01	1.03328E-03
0.00000E+00	0.00000E+00		
54	7.64510E-01	7.65827E-01	1.00035E-03
0.00000E+00	0.00000E+00		
55	7.58928E-01	7.65611E-01	9.89988E-04
0.00000E+00	0.00000E+00		
56	7.57866E-01	7.65377E-01	1.06616E-03
0.00000E+00	0.00000E+00		
57	7.65659E-01	7.65385E-01	1.02674E-03
0.00000E+00	0.00000E+00		
58	7.65089E-01	7.65376E-01	9.96228E-04
0.00000E+00	0.00000E+00		
59	7.66376E-01	7.65404E-01	9.65912E-04
0.00000E+00	0.00000E+00		
60	7.65765E-01	7.65414E-01	9.37244E-04
0.00000E+00	0.00000E+00		
61	7.66662E-01	7.65447E-01	9.12252E-04
0.00000E+00	0.00000E+00		
62	7.70711E-01	7.65582E-01	9.06018E-04
0.00000E+00	0.00000E+00		
63	7.64968E-01	7.65566E-01	8.77804E-04
0.00000E+00	0.00000E+00		
64	7.66635E-01	7.65592E-01	8.58900E-04
0.00000E+00	0.00000E+00		
65	7.60671E-01	7.65475E-01	8.44042E-04
0.00000E+00	0.00000E+00		
66	7.63097E-01	7.65420E-01	8.31738E-04
0.00000E+00	0.00000E+00		
67	7.64675E-01	7.65403E-01	8.15365E-04
0.00000E+00	0.00000E+00		

68	7.67368E-01	7.65447E-01	7.92579E-04	
0.00000E+00	0.00000E+00			
69	7.63368E-01	7.65402E-01	7.73494E-04	
0.00000E+00	0.00000E+00			
70	7.66159E-01	7.65418E-01	7.55798E-04	
0.00000E+00	0.00000E+00			
71	7.58916E-01	7.65282E-01	7.58315E-04	
0.00000E+00	0.00000E+00			
72	7.59183E-01	7.65158E-01	7.75282E-04	
0.00000E+00	0.00000E+00			
73	7.65260E-01	7.65160E-01	7.57762E-04	
0.00000E+00	0.00000E+00			
74	7.68071E-01	7.65217E-01	7.33836E-04	
0.00000E+00	0.00000E+00			
75	7.68120E-01	7.65273E-01	7.26301E-04	
0.00000E+00	0.00000E+00			
76	7.67764E-01	7.65320E-01	7.21612E-04	
0.00000E+00	0.00000E+00			
77	7.63003E-01	7.65277E-01	7.01730E-04	
0.00000E+00	0.00000E+00			
78	7.65299E-01	7.65277E-01	6.88060E-04	
0.00000E+00	0.00000E+00			
79	7.61613E-01	7.65212E-01	6.82845E-04	
0.00000E+00	0.00000E+00			
80	7.61602E-01	7.65148E-01	6.80069E-04	
0.00000E+00	0.00000E+00			
81	7.61231E-01	7.65081E-01	6.85386E-04	
0.00000E+00	0.00000E+00			
82	7.63807E-01	7.65059E-01	6.77957E-04	
0.00000E+00	0.00000E+00			
83	7.63180E-01	7.65028E-01	6.71256E-04	
0.00000E+00	0.00000E+00			
84	7.67444E-01	7.65068E-01	6.57413E-04	
0.00000E+00	0.00000E+00			
85	7.62138E-01	7.65020E-01	6.47273E-04	
0.00000E+00	0.00000E+00			
86	7.67141E-01	7.65054E-01	6.36902E-04	
0.00000E+00	0.00000E+00			
87	7.70959E-01	7.65146E-01	6.31820E-04	
0.00000E+00	0.00000E+00			
88	7.67148E-01	7.65177E-01	6.29174E-04	
0.00000E+00	0.00000E+00			
89	7.62068E-01	7.65130E-01	6.10772E-04	
0.00000E+00	0.00000E+00			
90	7.66788E-01	7.65155E-01	6.00955E-04	
0.00000E+00	0.00000E+00			
91	7.71081E-01	7.65242E-01	5.95215E-04	
0.00000E+00	0.00000E+00			
92	7.63335E-01	7.65214E-01	5.81019E-04	
0.00000E+00	0.00000E+00			
93	7.71479E-01	7.65304E-01	5.89667E-04	
0.00000E+00	0.00000E+00			

```
          94       7.61096E-01      7.65244E-01      5.77219E-04
0.00000E+00      0.00000E+00
          95       7.62798E-01      7.65210E-01      5.67959E-04
0.00000E+00      0.00000E+00
          96       7.71792E-01      7.65301E-01      5.51481E-04
0.00000E+00      0.00000E+00
          97       7.66771E-01      7.65321E-01      5.46297E-04
0.00000E+00      0.00000E+00
          98       7.64601E-01      7.65311E-01      5.36618E-04
0.00000E+00      0.00000E+00
          99       7.64791E-01      7.65304E-01      5.29105E-04
0.00000E+00      0.00000E+00
         100       7.69982E-01      7.65365E-01      5.23704E-04
0.00000E+00      0.00000E+00
         101       7.67167E-01      7.65388E-01      5.19838E-04
0.00000E+00      0.00000E+00
         102       7.71743E-01      7.65468E-01      5.33474E-04
0.00000E+00      0.00000E+00
         103       7.63483E-01      7.65444E-01      5.21830E-04
0.00000E+00      0.00000E+00
                                    restart data was written for
generation  103       random number=F40F0E208D3FD23A
         104       7.73541E-01      7.65544E-01      5.36587E-04
0.00000E+00      0.00000E+00
         105       7.70226E-01      7.65601E-01      5.41706E-04
0.00000E+00      0.00000E+00
         106       7.60175E-01      7.65535E-01      5.18388E-04
0.00000E+00      0.00000E+00
         107       7.61803E-01      7.65491E-01      5.14819E-04
0.00000E+00      0.00000E+00
         108       7.69488E-01      7.65538E-01      4.99939E-04
0.00000E+00      0.00000E+00
         109       7.65670E-01      7.65539E-01      4.93885E-04
0.00000E+00      0.00000E+00
         110       7.67125E-01      7.65558E-01      4.90253E-04
0.00000E+00      0.00000E+00
         111       7.64731E-01      7.65548E-01      4.84127E-04
0.00000E+00      0.00000E+00
         112       7.69741E-01      7.65595E-01      4.89488E-04
0.00000E+00      0.00000E+00
         113       7.67443E-01      7.65616E-01      4.86058E-04
0.00000E+00      0.00000E+00
         114       7.74575E-01      7.65714E-01      5.09591E-04
0.00000E+00      0.00000E+00
         115       7.59705E-01      7.65649E-01      4.92722E-04
0.00000E+00      0.00000E+00
         116       7.62151E-01      7.65611E-01      4.82152E-04
0.00000E+00      0.00000E+00
         117       7.58890E-01      7.65540E-01      4.90448E-04
0.00000E+00      0.00000E+00
         118       7.64114E-01      7.65525E-01      4.88897E-04
0.00000E+00      0.00000E+00
```

```
        119       7.65254E-01      7.65522E-01      4.84146E-04
0.00000E+00      0.00000E+00
        120       7.63185E-01      7.65498E-01      4.80543E-04
0.00000E+00      0.00000E+00
        121       7.65632E-01      7.65499E-01      4.75371E-04
0.00000E+00      0.00000E+00
        122       7.65034E-01      7.65495E-01      4.70648E-04
0.00000E+00      0.00000E+00
        123       7.64850E-01      7.65488E-01      4.65859E-04
0.00000E+00      0.00000E+00

  keno message number k6-123          execution terminated due to
completion of the specified number of generations.
                                    restart data was written for
generation  123       random number=BECCE3E4CA635999
                                    A start type 6 file will be written to
keno_start6_file
1                                                  fuel bundle

 lifetime =  1.55252E-05 + or -  1.24195E-08             generation time
=  2.99700E-05 + or -  2.22831E-08
 nu bar   =  2.43895E+00 + or -  9.91808E-06       average fission group
=  2.17548E+02 + or -  9.55743E-03
                        energy(ev) of the average lethargy causing fission
=  5.65701E-02 + or -  1.23996E-04
                                                 system mean free path (cm)
=  6.52779E-01 + or -  1.51570E-04

 no. of initial
deviation of
  generations      average                            67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

      23          0.76549   + or - 0.00047     0.76502 to 0.76595
0.76456 to 0.76642    0.76409 to 0.76689    2000000       8.4589

      24          0.76549   + or - 0.00047     0.76502 to 0.76596
0.76454 to 0.76643    0.76407 to 0.76690    1980000       8.4230

      25          0.76548   + or - 0.00048     0.76499 to 0.76596
0.76451 to 0.76644    0.76403 to 0.76692    1960000       8.1744

      26          0.76550   + or - 0.00048     0.76503 to 0.76598
0.76455 to 0.76646    0.76407 to 0.76694    1940000       8.4375

      27          0.76549   + or - 0.00049     0.76500 to 0.76597
0.76451 to 0.76646    0.76402 to 0.76695    1920000       8.2757

      28          0.76552   + or - 0.00049     0.76503 to 0.76601
0.76454 to 0.76649    0.76405 to 0.76698    1900000       8.4738
```

29	0.76560	+ or - 0.00047	0.76513 to 0.76606	0.76467 to 0.76653	0.76420 to 0.76700	1880000	9.1857
30	0.76568	+ or - 0.00048	0.76520 to 0.76616	0.76473 to 0.76663	0.76425 to 0.76711	1860000	8.6574
31	0.76570	+ or - 0.00048	0.76522 to 0.76618	0.76474 to 0.76667	0.76426 to 0.76715	1840000	8.6369
32	0.76564	+ or - 0.00048	0.76517 to 0.76612	0.76469 to 0.76659	0.76422 to 0.76707	1820000	9.0261
37	0.76557	+ or - 0.00048	0.76509 to 0.76605	0.76461 to 0.76653	0.76413 to 0.76701	1720000	9.7626
42	0.76553	+ or - 0.00049	0.76504 to 0.76602	0.76454 to 0.76652	0.76405 to 0.76701	1620000	9.8283
47	0.76552	+ or - 0.00053	0.76500 to 0.76605	0.76447 to 0.76658	0.76394 to 0.76710	1520000	9.6887
52	0.76534	+ or - 0.00054	0.76480 to 0.76588	0.76425 to 0.76642	0.76371 to 0.76696	1420000	10.4378
57	0.76554	+ or - 0.00054	0.76500 to 0.76608	0.76446 to 0.76662	0.76393 to 0.76716	1320000	11.1269
62	0.76543	+ or - 0.00058	0.76485 to 0.76601	0.76426 to 0.76660	0.76368 to 0.76718	1220000	11.0084
67	0.76556	+ or - 0.00062	0.76494 to 0.76617	0.76432 to 0.76679	0.76371 to 0.76740	1120000	11.3828
72	0.76581	+ or - 0.00065	0.76516 to 0.76645	0.76451 to 0.76710	0.76386 to 0.76775	1020000	11.2458
77	0.76574	+ or - 0.00071	0.76502 to 0.76645	0.76431 to 0.76716	0.76360 to 0.76788	920000	11.3589
82	0.76611	+ or - 0.00063	0.76548 to 0.76673	0.76486 to 0.76736	0.76423 to 0.76798	820000	17.5922
87	0.76610	+ or - 0.00069	0.76541 to 0.76678	0.76473 to 0.76747	0.76404 to 0.76815	720000	18.7690
92	0.76610	+ or - 0.00076	0.76533 to 0.76686	0.76457 to 0.76763	0.76380 to 0.76839	620000	20.0127
97	0.76597	+ or - 0.00113	0.76483 to 0.76710	0.76370 to 0.76823	0.76256 to 0.76937	520000	12.8201

```
     102          0.76556   + or - 0.00108     0.76448 to 0.76664
0.76340 to 0.76773    0.76232 to 0.76881     420000      22.1018

     107          0.76547   + or - 0.00174     0.76373 to 0.76722
0.76199 to 0.76896    0.76024 to 0.77070     320000      13.2197

     112          0.76462   + or - 0.00162     0.76301 to 0.76624
0.76139 to 0.76785    0.75977 to 0.76947     220000      38.1448
1                                                fuel bundle

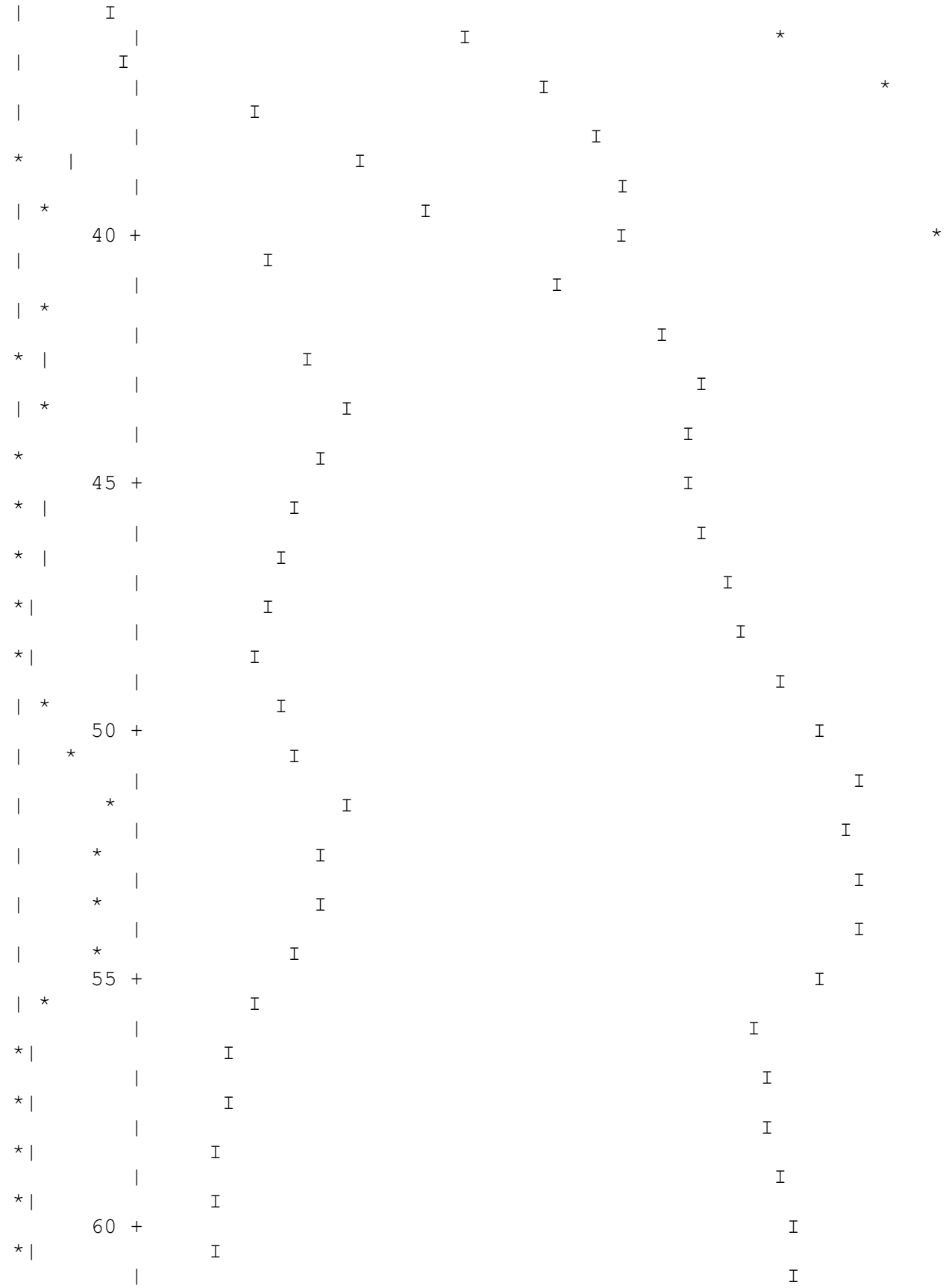
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76468   + or - 0.00075     0.76393 to 0.76542
0.76319 to 0.76617    0.76244 to 0.76692     120000      15.2023
1                          fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76548 + or - 0.00046 which occurs for
123 generations run.

                                0.7629                  0.7645
0.7661

|-------------------------|-------------------------|------------------
------|-------------------------
         |
      25 +
|   I      *     I
         |                          I                                 *
|                         I
         |                     I
|*
         |               I                                            *
|                                 I
         |                                      *
|                                   I
      30 +                           *
|     I
         |                             *
I |
         |   I                                    *
|            I
         |         I                                 *
|            I
         |                   I                             *
|                 I
      35 +                   I                           *
```


40
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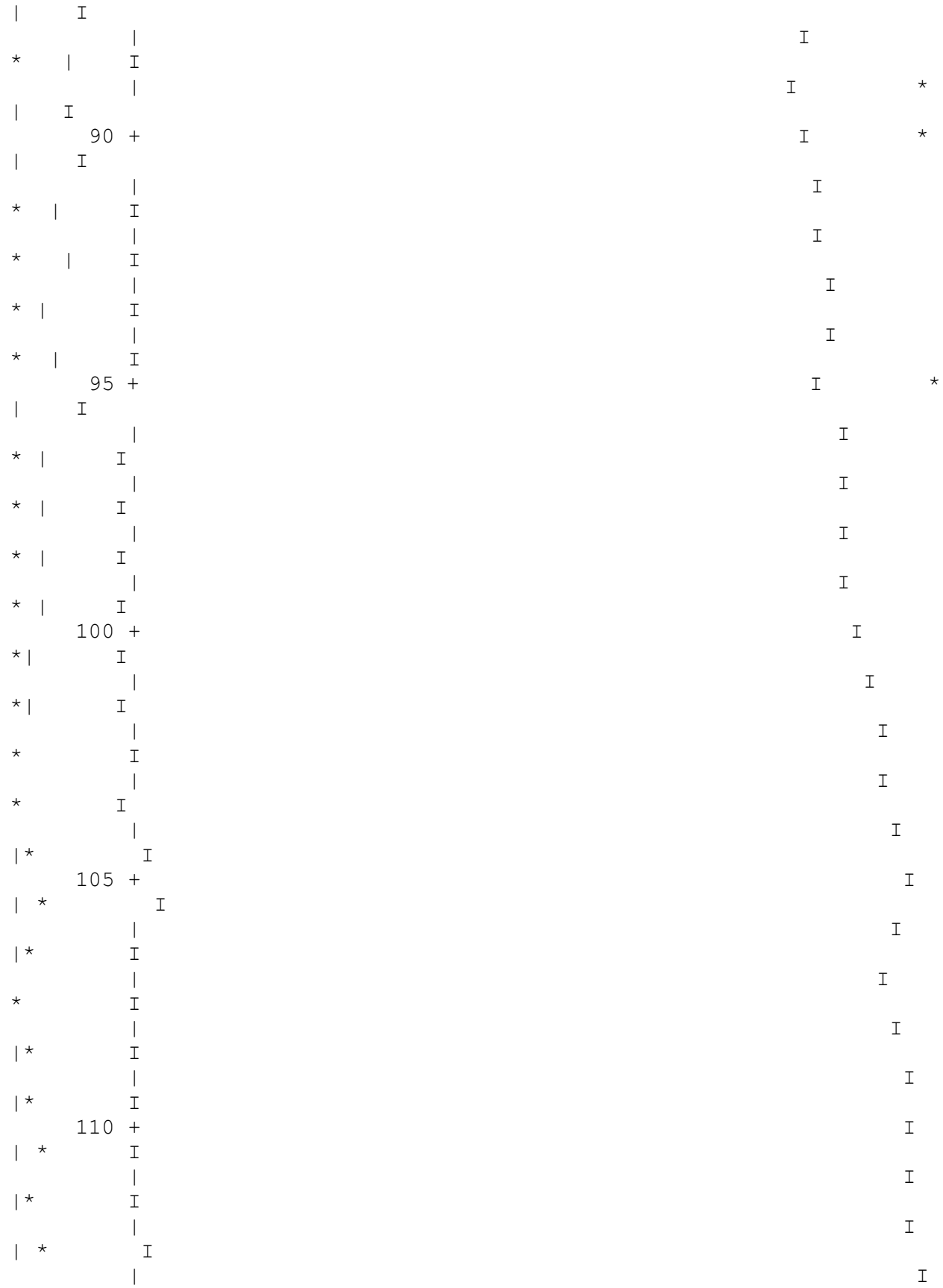
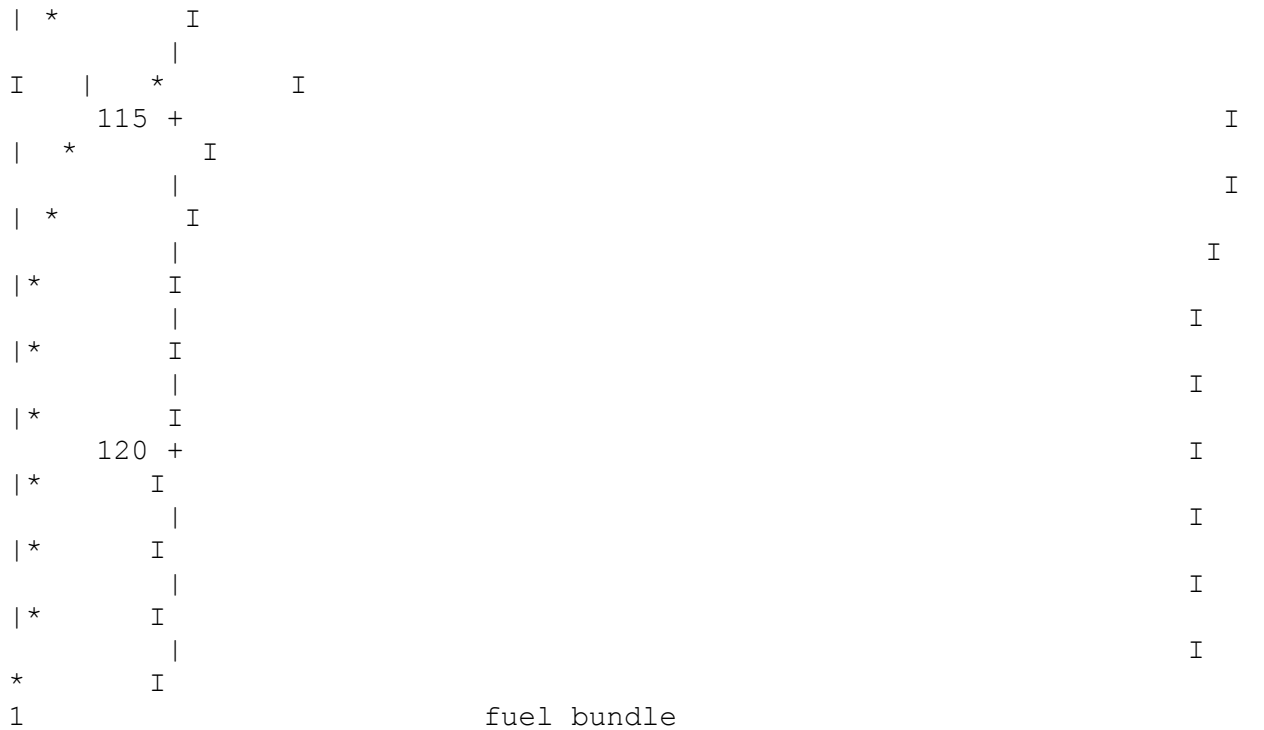
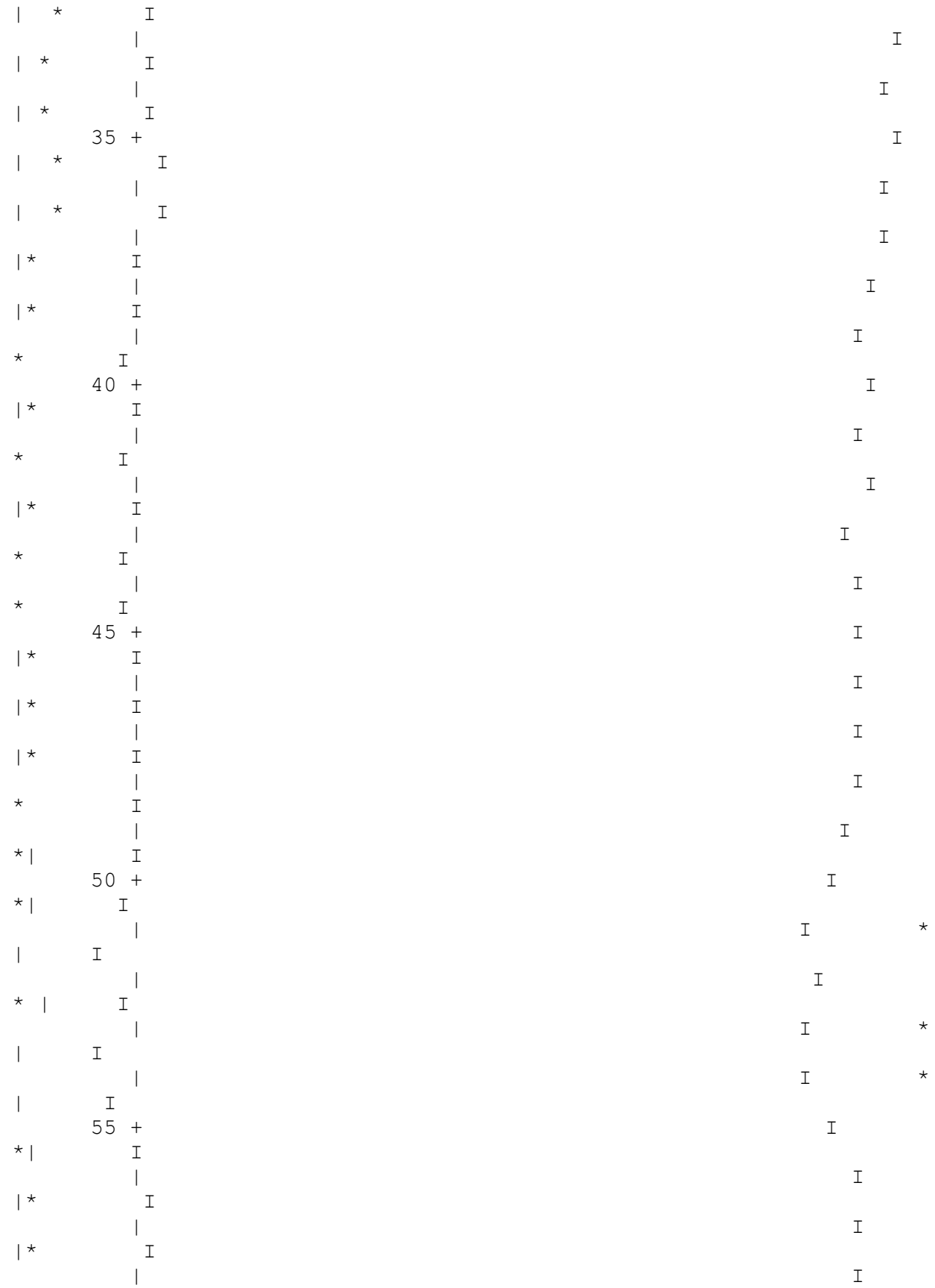
65
70
75
80
85


90
95
100
105
110



plot of average k-effective by generation skipped.
the line represents k-eff = 0.7654 + or - 0.0004 which occurs for 23 generations skipped.


35
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45
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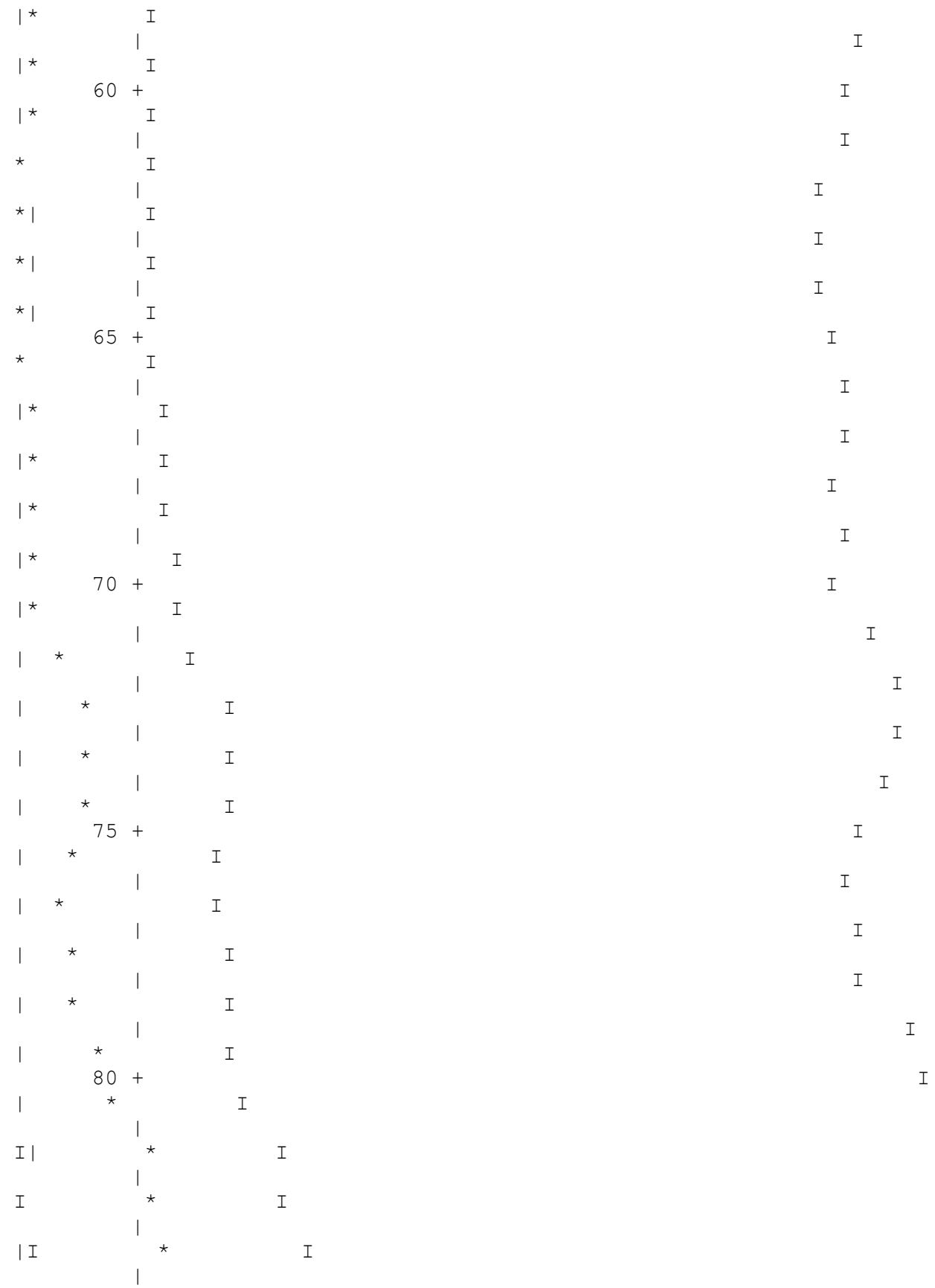
55


60
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85
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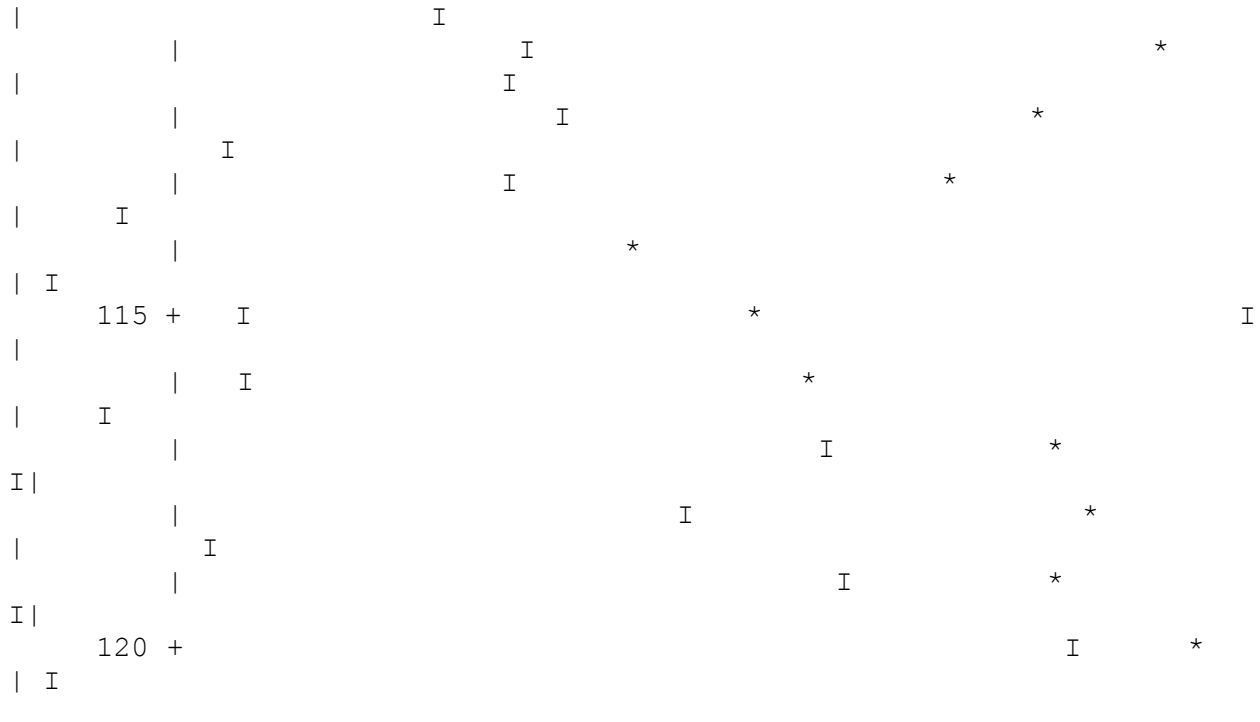
100
105
110



   k-effective satisfies the chi**2 test for normality at the 95 % level
1   fuel bundle

skipping 23 generations

group	fission fraction	deviation	unit absorptions	deviation	region leakage	deviation
1	0.0000	0.0000	0.00000E+00	0.0000	0.00000E+00	0.0000
2	0.0000	45.9975	1.98595E-07	0.0000	0.00000E+00	0.0000
3	0.0000	4.8338	2.04972E-05	10.7392	0.00000E+00	0.0000
4	0.0000	4.2882	3.47457E-05	9.5605	0.00000E+00	0.0000
5	0.0000	3.1855	5.46906E-05	7.7502	0.00000E+00	0.0000
6	0.0001	1.4337	2.27736E-04	3.6145	0.00000E+00	0.0000
7	0.0002	1.6288	2.04205E-04	3.8616	0.00000E+00	0.0000
8	0.0003	1.1059	3.24558E-04	2.2669	0.00000E+00	0.0000
9	0.0005	0.6510	4.43279E-04	1.4363	0.00000E+00	0.0000
10	0.0003	0.6817	2.06650E-04	1.5688	0.00000E+00	0.0000

11	0.0012		9.15821E-04	0.7058	
5.26710E-04	0.4855		0.00000E+00	0.0000	
12	0.0010		7.61607E-04	0.8124	
2.98559E-04	0.8005		0.00000E+00	0.0000	
13	0.0003		2.29157E-04	1.3646	
9.10393E-05	1.3514		0.00000E+00	0.0000	
14	0.0013		1.00184E-03	0.6724	
4.09488E-04	0.6656		0.00000E+00	0.0000	
15	0.0010		7.69000E-04	0.7230	
3.31505E-04	0.7152		0.00000E+00	0.0000	
16	0.0002		1.89581E-04	1.2885	
8.71239E-05	1.2691		0.00000E+00	0.0000	
17	0.0001		6.94926E-05	1.6933	
3.37705E-05	1.6648		0.00000E+00	0.0000	
18	0.0001		5.19569E-05	1.7350	
2.62480E-05	1.7012		0.00000E+00	0.0000	
19	0.0001		8.18359E-05	1.1725	
4.32546E-05	1.1449		0.00000E+00	0.0000	
20	0.0001		5.93532E-05	1.4170	
3.25172E-05	1.3815		0.00000E+00	0.0000	
21	0.0002		1.21042E-04	0.9547	
6.83389E-05	0.9301		0.00000E+00	0.0000	
22	0.0001		1.04026E-04	1.2632	
6.16051E-05	1.2315		0.00000E+00	0.0000	
23	0.0001		1.05232E-04	1.1890	
6.42675E-05	1.1633		0.00000E+00	0.0000	
24	0.0000		2.61338E-05	2.5220	
1.62070E-05	2.4639		0.00000E+00	0.0000	
25	0.0000		3.11957E-05	1.8035	
1.94835E-05	1.7570		0.00000E+00	0.0000	
26	0.0000		1.77965E-05	2.4943	
1.11823E-05	2.4233		0.00000E+00	0.0000	
27	0.0001		5.34907E-05	1.4159	
3.33872E-05	1.3872		0.00000E+00	0.0000	
28	0.0001		9.66967E-05	0.9455	
6.03233E-05	0.9301		0.00000E+00	0.0000	
29	0.0001		9.93650E-05	1.1437	
6.25765E-05	1.1293		0.00000E+00	0.0000	
30	0.0000		1.24693E-05	2.8156	
7.82164E-06	2.7926		0.00000E+00	0.0000	
31	0.0001		9.75171E-05	1.1007	
6.16042E-05	1.0875		0.00000E+00	0.0000	
32	0.0001		3.82955E-05	1.7717	
2.44751E-05	1.7335		0.00000E+00	0.0000	
33	0.0000		3.26539E-05	1.5166	
2.04420E-05	1.4977		0.00000E+00	0.0000	
34	0.0001		7.38627E-05	1.0882	
4.64170E-05	1.0737		0.00000E+00	0.0000	
35	0.0001		4.43152E-05	1.4875	
2.78217E-05	1.4622		0.00000E+00	0.0000	
36	0.0001		4.21425E-05	1.7021	
2.60928E-05	1.6868		0.00000E+00	0.0000	

```
   37    0.0000                2.82192E-05     1.7261
1.77113E-05     1.6904       0.00000E+00     0.0000
   38    0.0000                3.45036E-05     1.4266
2.17101E-05     1.3974       0.00000E+00     0.0000
   39    0.0002                1.27660E-04     1.0626
8.12682E-05     1.0403       0.00000E+00     0.0000
   40    0.0002                1.20953E-04     0.8009
7.81832E-05     0.7866       0.00000E+00     0.0000
   41    0.0002                1.60209E-04     0.8363
1.07063E-04     0.8079       0.00000E+00     0.0000
   42    0.0002                1.40496E-04     0.6880
9.55302E-05     0.6741       0.00000E+00     0.0000
   43    0.0001                8.05717E-05     1.1236
5.78139E-05     1.0676       0.00000E+00     0.0000
   44    0.0002                1.15560E-04     1.0779
8.48285E-05     1.0312       0.00000E+00     0.0000
   45    0.0001                5.95365E-05     1.0136
4.80529E-05     0.9301       0.00000E+00     0.0000
   46    0.0000                1.40570E-05     1.8685
1.13287E-05     1.7305       0.00000E+00     0.0000
   47    0.0001                4.12247E-05     1.7378
3.19903E-05     1.6666       0.00000E+00     0.0000
   48    0.0000                1.23933E-05     3.4733
9.61945E-06     3.3803       0.00000E+00     0.0000
   49    0.0001                8.07861E-05     1.6001
6.37169E-05     1.5657       0.00000E+00     0.0000
   50    0.0001                5.74921E-05     1.8489
4.73193E-05     1.8106       0.00000E+00     0.0000
   51    0.0000                1.44247E-05     3.5163
1.19956E-05     3.4404       0.00000E+00     0.0000
   52    0.0001                3.98266E-05     1.8397
3.44528E-05     1.7922       0.00000E+00     0.0000
   53    0.0002                1.57097E-04     0.8452
1.54427E-04     0.7832       0.00000E+00     0.0000
   54    0.0001                7.54399E-05     1.8261
7.00635E-05     1.7648       0.00000E+00     0.0000
   55    0.0002                1.63464E-04     1.2355
1.49857E-04     1.2007       0.00000E+00     0.0000
   56    0.0002                1.16138E-04     1.6754
1.07713E-04     1.6340       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

   57    0.0002                1.48126E-04     1.4469
1.34449E-04     1.4119       0.00000E+00     0.0000
   58    0.0001                8.56265E-05     2.1275
```

7.49664E-05	2.0676	0.00000E+00	0.0000
59 0.0002		1.61336E-04	1.4171
1.44881E-04	1.3607	0.00000E+00	0.0000
60 0.0004		2.76412E-04	1.1017
2.50672E-04	1.0376	0.00000E+00	0.0000
61 0.0000		2.95265E-05	3.9726
2.26854E-05	3.8521	0.00000E+00	0.0000
62 0.0002		1.68094E-04	1.3811
1.40892E-04	1.3445	0.00000E+00	0.0000
63 0.0002		1.19823E-04	2.0154
9.87111E-05	1.9423	0.00000E+00	0.0000
64 0.0001		9.84957E-05	2.5325
7.94564E-05	2.4479	0.00000E+00	0.0000
65 0.0000		3.68166E-05	3.5041
3.63151E-05	3.3911	0.00000E+00	0.0000
66 0.0002		1.72064E-04	2.0259
1.52687E-04	1.9627	0.00000E+00	0.0000
67 0.0002		1.46535E-04	2.0524
1.19877E-04	1.9847	0.00000E+00	0.0000
68 0.0000		2.90059E-05	3.8417
2.50322E-05	3.7063	0.00000E+00	0.0000
69 0.0004		3.04796E-04	1.6424
2.39121E-04	1.5904	0.00000E+00	0.0000
70 0.0003		2.06762E-04	1.7202
1.88302E-04	1.6561	0.00000E+00	0.0000
71 0.0006		4.25539E-04	1.1424
3.52225E-04	1.1071	0.00000E+00	0.0000
72 0.0001		4.80730E-05	5.4769
2.84287E-05	5.3431	0.00000E+00	0.0000
73 0.0004		3.17602E-04	1.5173
2.42247E-04	1.4520	0.00000E+00	0.0000
74 0.0014		1.06381E-03	0.9675
7.73274E-04	0.9237	0.00000E+00	0.0000
75 0.0001		1.06804E-04	2.9781
8.23283E-05	2.8325	0.00000E+00	0.0000
76 0.0006		4.60518E-04	1.6636
2.92554E-04	1.6037	0.00000E+00	0.0000
77 0.0005		3.80380E-04	1.6706
2.72536E-04	1.6103	0.00000E+00	0.0000
78 0.0000		7.44018E-06	3.8732
7.27893E-05	3.8337	0.00000E+00	0.0000
79 0.0002		1.85341E-04	2.4077
1.24728E-04	2.3061	0.00000E+00	0.0000
80 0.0001		6.06022E-05	3.6072
8.09141E-05	3.4989	0.00000E+00	0.0000
81 0.0014		1.08361E-03	1.1298
7.96210E-04	1.0817	0.00000E+00	0.0000
82 0.0001		6.98596E-05	4.3591
4.18395E-05	4.1380	0.00000E+00	0.0000
83 0.0002		1.26001E-04	3.0272
1.39437E-04	2.9643	0.00000E+00	0.0000
84 0.0001		7.77513E-05	2.9738

7.91094E-05	2.7525	0.00000E+00	0.0000				
85	0.0003	2.02647E-04	2.0857				
2.49328E-04	2.0290	0.00000E+00	0.0000				
86	0.0003	2.53306E-04	2.9597				
2.04280E-04	2.8114	0.00000E+00	0.0000				
87	0.0004	3.26055E-04	2.3372				
2.03064E-04	2.2343	0.00000E+00	0.0000				
88	0.0001	5.64121E-05	3.8244				
1.02435E-04	3.7315	0.00000E+00	0.0000				
89	0.0001	9.24472E-05	3.9907				
6.42487E-05	3.6737	0.00000E+00	0.0000				
90	0.0003	2.24928E-04	3.0051				
1.32823E-04	2.8757	0.00000E+00	0.0000				
91	0.0002	1.91269E-04	2.8314				
1.20945E-04	2.6701	0.00000E+00	0.0000				
92	0.0000	3.21099E-05	2.4242				
2.10010E-04	2.3737	0.00000E+00	0.0000				
93	0.0002	1.19612E-04	3.5118				
9.78830E-05	3.2521	0.00000E+00	0.0000				
94	0.0001	1.11049E-04	4.5172				
6.23326E-05	4.2317	0.00000E+00	0.0000				
95	0.0008	6.06669E-04	2.0476				
3.74175E-04	1.9844	0.00000E+00	0.0000				
96	0.0002	1.51274E-04	5.0181				
7.68195E-05	4.7946	0.00000E+00	0.0000				
97	0.0004	2.76257E-04	3.4040				
1.58258E-04	3.3318	0.00000E+00	0.0000				
98	0.0001	1.06861E-04	3.7723				
1.02375E-04	3.6434	0.00000E+00	0.0000				
99	0.0001	1.08016E-04	4.7958				
7.22491E-05	4.6414	0.00000E+00	0.0000				
100	0.0002	1.30811E-04	4.2931				
8.74044E-05	4.1177	0.00000E+00	0.0000				
101	0.0002	1.16254E-04	3.3307				
7.36771E-05	3.1079	0.00000E+00	0.0000				
102	0.0002	1.55136E-04	3.9035				
8.65612E-05	3.7446	0.00000E+00	0.0000				
103	0.0001	9.75398E-05	3.3659				
9.50665E-05	3.1959	0.00000E+00	0.0000				
104	0.0002	1.72758E-04	3.3408				
1.36836E-04	3.2244	0.00000E+00	0.0000				
105	0.0002	1.19475E-04	3.4969				
7.91018E-05	3.2844	0.00000E+00	0.0000				
106	0.0002	1.89117E-04	3.9160				
1.40482E-04	3.8643	0.00000E+00	0.0000				
107	0.0001	6.07685E-05	3.6697				
6.16069E-05	3.4221	0.00000E+00	0.0000				
108	0.0000	3.43438E-05	2.8060				
1.48485E-04	2.7336	0.00000E+00	0.0000				
109	0.0002	1.29244E-04	2.4328				
4.28897E-04	2.4010	0.00000E+00	0.0000				
110	0.0009	6.54518E-04	3.0019				

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4.03596E-04     2.9756       0.00000E+00     0.0000
  111    0.0002                  1.55670E-04     4.5041
1.43063E-04     4.3856       0.00000E+00     0.0000
  112    0.0002                  1.16565E-04     4.9075
1.22903E-04     4.8161       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                               deviation
deviation                    deviation

  113    0.0002                  1.26881E-04     3.6778
1.10971E-04     3.4431       0.00000E+00     0.0000
  114    0.0000                  1.16157E-05     7.4888
1.56854E-05     6.2860       0.00000E+00     0.0000
  115    0.0001                  7.52466E-05     3.8245
8.73050E-05     3.5285       0.00000E+00     0.0000
  116    0.0003                  1.98476E-04     3.1030
1.49054E-04     2.7990       0.00000E+00     0.0000
  117    0.0006                  4.87331E-04     2.3860
2.60053E-04     2.2310       0.00000E+00     0.0000
  118    0.0008                  5.81746E-04     1.8272
4.54407E-04     1.7530       0.00000E+00     0.0000
  119    0.0002                  1.41328E-04     1.8048
3.64798E-04     1.7510       0.00000E+00     0.0000
  120    0.0002                  1.67528E-04     2.2240
6.37532E-04     2.1918       0.00000E+00     0.0000
  121    0.0007                  5.20488E-04     2.7940
4.00428E-04     2.7222       0.00000E+00     0.0000
  122    0.0001                  1.08522E-04     4.3812
8.45151E-05     4.1041       0.00000E+00     0.0000
  123    0.0003                  2.10700E-04     3.0963
1.49892E-04     2.7324       0.00000E+00     0.0000
  124    0.0003                  2.49091E-04     2.8025
2.04718E-04     2.6257       0.00000E+00     0.0000
  125    0.0002                  1.38566E-04     3.3769
1.27582E-04     3.0486       0.00000E+00     0.0000
  126    0.0001                  1.02026E-04     3.5182
9.11936E-05     3.1171       0.00000E+00     0.0000
  127    0.0005                  3.85032E-04     2.7590
1.89304E-04     2.6114       0.00000E+00     0.0000
  128    0.0003                  2.24804E-04     3.4515
1.38326E-04     3.0685       0.00000E+00     0.0000
  129    0.0006                  4.43468E-04     2.1560
4.08689E-04     2.0499       0.00000E+00     0.0000
  130    0.0002                  1.16849E-04     2.7769
2.84737E-04     2.7002       0.00000E+00     0.0000
  131    0.0004                  2.94244E-04     2.0298
2.36695E-04     1.7080       0.00000E+00     0.0000
```

132	0.0007		5.11149E-04	2.5611	
3.14785E-04	2.3540		0.00000E+00	0.0000	
133	0.0013		1.00783E-03	1.5802	
6.38017E-04	1.4985		0.00000E+00	0.0000	
134	0.0001		8.77283E-05	2.5016	
2.30062E-04	2.0958		0.00000E+00	0.0000	
135	0.0002		1.75891E-04	3.0866	
2.60927E-04	3.0087		0.00000E+00	0.0000	
136	0.0001		4.48715E-05	1.7526	
6.96589E-04	1.7280		0.00000E+00	0.0000	
137	0.0000		1.94046E-05	0.8339	
3.49148E-03	0.8317		0.00000E+00	0.0000	
138	0.0004		3.07977E-04	2.2470	
8.02579E-04	2.2116		0.00000E+00	0.0000	
139	0.0003		2.00526E-04	3.2594	
2.44721E-04	3.0777		0.00000E+00	0.0000	
140	0.0003		2.08813E-04	2.4485	
2.77999E-04	2.1328		0.00000E+00	0.0000	
141	0.0001		8.05365E-05	2.4785	
2.53607E-04	2.2139		0.00000E+00	0.0000	
142	0.0001		6.76160E-05	2.9666	
2.33313E-04	2.7266		0.00000E+00	0.0000	
143	0.0001		8.50752E-05	1.9727	
1.79885E-04	1.2352		0.00000E+00	0.0000	
144	0.0000		3.09765E-05	2.9698	
6.99245E-05	1.7776		0.00000E+00	0.0000	
145	0.0005		3.86999E-04	2.4522	
3.03233E-04	2.2346		0.00000E+00	0.0000	
146	0.0004		3.35000E-04	2.4053	
2.46175E-04	1.9402		0.00000E+00	0.0000	
147	0.0002		1.78199E-04	3.3043	
1.13937E-04	2.8881		0.00000E+00	0.0000	
148	0.0001		5.47275E-05	6.6452	
3.70711E-05	5.2760		0.00000E+00	0.0000	
149	0.0000		3.18904E-05	7.0571	
2.17902E-05	5.4406		0.00000E+00	0.0000	
150	0.0001		8.66569E-05	4.5610	
6.32681E-05	3.3284		0.00000E+00	0.0000	
151	0.0001		6.67878E-05	4.6565	
5.67703E-05	3.1681		0.00000E+00	0.0000	
152	0.0001		3.99181E-05	4.5853	
4.62211E-05	2.7745		0.00000E+00	0.0000	
153	0.0001		4.30939E-05	4.6705	
4.78390E-05	2.7282		0.00000E+00	0.0000	
154	0.0001		4.84059E-05	4.7856	
4.99664E-05	2.8986		0.00000E+00	0.0000	
155	0.0001		5.21861E-05	5.0723	
5.05188E-05	3.1018		0.00000E+00	0.0000	
156	0.0001		4.61945E-05	4.6307	
4.58156E-05	2.7628		0.00000E+00	0.0000	
157	0.0001		6.19490E-05	4.5988	
5.91157E-05	2.8934		0.00000E+00	0.0000	

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  158    0.0001                6.84058E-05     3.9432
6.89295E-05     2.5932       0.00000E+00     0.0000
  159    0.0002                1.49970E-04     3.0179
2.08596E-04     2.5261       0.00000E+00     0.0000
  160    0.0001                6.25952E-05     4.4739
7.39699E-05     3.3801       0.00000E+00     0.0000
  161    0.0001                7.58313E-05     4.0947
7.37968E-05     2.6959       0.00000E+00     0.0000
  162    0.0001                8.59299E-05     4.0543
8.12944E-05     2.5688       0.00000E+00     0.0000
  163    0.0001                9.20042E-05     3.6822
8.59888E-05     2.2640       0.00000E+00     0.0000
  164    0.0001                1.02656E-04     3.3912
9.45487E-05     2.1068       0.00000E+00     0.0000
  165    0.0001                1.12869E-04     3.3484
1.03944E-04     2.0649       0.00000E+00     0.0000
  166    0.0001                6.97770E-05     4.9337
6.40244E-05     3.1280       0.00000E+00     0.0000
  167    0.0001                7.47026E-05     4.3656
6.85023E-05     2.8054       0.00000E+00     0.0000
  168    0.0001                9.03390E-05     4.5909
7.99657E-05     3.1167       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  169    0.0001                1.06441E-04     3.6777
9.27374E-05     2.6230       0.00000E+00     0.0000
  170    0.0002                1.29126E-04     4.0653
1.11456E-04     3.0429       0.00000E+00     0.0000
  171    0.0001                9.87034E-05     4.6872
7.59917E-05     3.7513       0.00000E+00     0.0000
  172    0.0002                1.43461E-04     4.2080
1.00959E-04     3.6038       0.00000E+00     0.0000
  173    0.0003                1.96230E-04     4.2049
1.29227E-04     3.6668       0.00000E+00     0.0000
  174    0.0003                2.66403E-04     3.6602
1.64531E-04     3.3016       0.00000E+00     0.0000
  175    0.0001                1.11941E-04     6.4994
6.78125E-05     5.8270       0.00000E+00     0.0000
  176    0.0002                1.14844E-04     6.1641
6.88415E-05     5.5136       0.00000E+00     0.0000
  177    0.0001                1.14820E-04     5.8466
6.77912E-05     5.2619       0.00000E+00     0.0000
  178    0.0002                1.18815E-04     6.0731
6.95352E-05     5.4743       0.00000E+00     0.0000
  179    0.0002                1.28904E-04     5.4074
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7.39941E-05	4.8867	0.00000E+00	0.0000				
180	0.0002	1.17483E-04	6.0229				
6.80235E-05	5.3590	0.00000E+00	0.0000				
181	0.0001	1.04917E-04	6.5058				
6.10822E-05	5.7491	0.00000E+00	0.0000				
182	0.0001	1.06011E-04	7.0029				
6.15192E-05	6.1466	0.00000E+00	0.0000				
183	0.0001	1.03357E-04	6.0670				
5.99744E-05	5.3318	0.00000E+00	0.0000				
184	0.0001	9.92188E-05	6.7473				
5.76571E-05	5.8634	0.00000E+00	0.0000				
185	0.0001	1.00455E-04	6.2232				
5.81791E-05	5.4037	0.00000E+00	0.0000				
186	0.0001	9.49688E-05	6.6346				
5.54532E-05	5.6400	0.00000E+00	0.0000				
187	0.0001	9.17696E-05	5.8806				
5.36979E-05	4.9512	0.00000E+00	0.0000				
188	0.0001	9.19640E-05	6.3406				
5.38171E-05	5.3687	0.00000E+00	0.0000				
189	0.0001	8.62764E-05	6.7599				
5.10084E-05	5.6797	0.00000E+00	0.0000				
190	0.0003	2.16225E-04	3.6018				
1.28075E-04	2.9774	0.00000E+00	0.0000				
191	0.0003	2.15392E-04	3.9278				
1.27699E-04	3.2525	0.00000E+00	0.0000				
192	0.0003	1.97294E-04	4.4035				
1.19798E-04	3.5167	0.00000E+00	0.0000				
193	0.0002	1.79676E-04	3.8499				
1.11874E-04	3.0213	0.00000E+00	0.0000				
194	0.0005	4.14161E-04	2.8360				
2.53281E-04	2.2439	0.00000E+00	0.0000				
195	0.0006	4.35905E-04	2.6980				
2.68668E-04	2.1216	0.00000E+00	0.0000				
196	0.0006	4.60212E-04	2.7013				
2.85550E-04	2.1263	0.00000E+00	0.0000				
197	0.0007	5.02809E-04	2.5119				
3.15080E-04	1.9649	0.00000E+00	0.0000				
198	0.0008	5.98717E-04	2.1844				
3.68138E-04	1.7539	0.00000E+00	0.0000				
199	0.0004	3.20203E-04	3.2272				
1.97795E-04	2.5357	0.00000E+00	0.0000				
200	0.0005	3.48132E-04	3.2708				
2.15476E-04	2.5691	0.00000E+00	0.0000				
201	0.0010	7.61477E-04	2.2430				
4.70069E-04	1.7940	0.00000E+00	0.0000				
202	0.0013	9.76580E-04	1.9372				
5.93560E-04	1.5652	0.00000E+00	0.0000				
203	0.0016	1.21216E-03	1.9974				
7.24653E-04	1.6229	0.00000E+00	0.0000				
204	0.0022	1.67718E-03	1.5209				
9.85676E-04	1.2863	0.00000E+00	0.0000				
205	0.0015	1.13819E-03	2.2828				

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6.67444E-04     1.9290       0.00000E+00     0.0000
  206    0.0019                  1.42862E-03     1.8291
8.29786E-04     1.5894       0.00000E+00     0.0000
  207    0.0021                  1.63239E-03     1.5911
9.51272E-04     1.4024       0.00000E+00     0.0000
  208    0.0029                  2.24771E-03     1.2642
1.30563E-03     1.1174       0.00000E+00     0.0000
  209    0.0031                  2.39068E-03     1.3167
1.40506E-03     1.1547       0.00000E+00     0.0000
  210    0.0037                  2.86175E-03     1.1660
1.70471E-03     1.0206       0.00000E+00     0.0000
  211    0.0041                  3.16371E-03     1.2554
1.90387E-03     1.0805       0.00000E+00     0.0000
  212    0.0047                  3.57546E-03     1.2631
2.16902E-03     1.0868       0.00000E+00     0.0000
  213    0.0065                  4.97595E-03     0.9787
3.01138E-03     0.8263       0.00000E+00     0.0000
  214    0.0096                  7.36491E-03     0.7231
4.43254E-03     0.6137       0.00000E+00     0.0000
  215    0.0157                  1.20199E-02     0.6726
7.17547E-03     0.5712       0.00000E+00     0.0000
  216    0.0299                  2.29154E-02     0.4591
1.35308E-02     0.3857       0.00000E+00     0.0000
  217    0.0202                  1.54912E-02     0.5312
9.10214E-03     0.4471       0.00000E+00     0.0000
  218    0.0280                  2.14046E-02     0.4378
1.25090E-02     0.3690       0.00000E+00     0.0000
  219    0.0354                  2.71324E-02     0.4259
1.58535E-02     0.3618       0.00000E+00     0.0000
  220    0.0472                  3.61451E-02     0.3779
2.10254E-02     0.3166       0.00000E+00     0.0000
  221    0.0624                  4.77746E-02     0.2766
2.77233E-02     0.2386       0.00000E+00     0.0000
  222    0.0802                  6.14086E-02     0.2723
3.55742E-02     0.2333       0.00000E+00     0.0000
  223    0.1044                  7.98905E-02     0.2549
4.63528E-02     0.2183       0.00000E+00     0.0000
  224    0.0585                  4.47890E-02     0.2807
2.60928E-02     0.2373       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  225    0.2304                  1.76373E-01     0.1591
1.04511E-01     0.1359       0.00000E+00     0.0000
  226    0.0452                  3.45636E-02     0.4574
2.10646E-02     0.3707       0.00000E+00     0.0000
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  227    0.0493                3.77260E-02     0.3661
2.34030E-02     0.2955       0.00000E+00     0.0000
  228    0.0210                1.60634E-02     0.5818
1.01668E-02     0.4621       0.00000E+00     0.0000
  229    0.0223                1.71076E-02     0.5897
1.09929E-02     0.4705       0.00000E+00     0.0000
  230    0.0118                9.02524E-03     0.7411
5.89508E-03     0.5803       0.00000E+00     0.0000
  231    0.0122                9.36141E-03     0.7733
6.22505E-03     0.5887       0.00000E+00     0.0000
  232    0.0129                9.85954E-03     0.7893
6.72967E-03     0.5863       0.00000E+00     0.0000
  233    0.0083                6.33420E-03     0.9605
4.45369E-03     0.6799       0.00000E+00     0.0000
  234    0.0058                4.43722E-03     1.1091
3.21738E-03     0.8096       0.00000E+00     0.0000
  235    0.0025                1.89530E-03     1.8061
1.24583E-03     1.3849       0.00000E+00     0.0000
  236    0.0018                1.40181E-03     1.9664
9.53077E-04     1.4630       0.00000E+00     0.0000
  237    0.0018                1.38343E-03     1.8717
9.70691E-04     1.3391       0.00000E+00     0.0000
  238    0.0001                6.86771E-05     9.2396
5.99228E-05     5.2816       0.00000E+00     0.0000

 system total =                 7.65488E-01     0.0505
4.68832E-01     0.0449       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3148E-01  +
or -  0.0002



 elapsed time   3.05817 minutes

 random number=   0767AC1634CD92BA
1                                                  fuel bundle

                                                       **** fission
densities ****


                                                                fission
percent         total
                                                unit  region   density
deviation      fissions

                                                   1      1    3.088E-03
0.05         7.655E-01
```

2 0.000E+00
0.00 0.000E+00
3 0.000E+00
0.00 0.000E+00

global unit

2 1 0.000E+00
0.00 0.000E+00
1 fuel bundle

fluxes for Unit 1

	region 1		region 2		region 3	
group	flux	percent deviation	flux	percent deviation	flux	percent deviation
1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	1.774E-08	26.72	1.587E-08	25.51	1.590E-08	26.59
3	8.964E-07	4.06	7.338E-07	3.68	7.928E-07	3.79
4	1.448E-06	3.51	1.193E-06	3.15	1.277E-06	3.20
5	2.337E-06	2.13	1.904E-06	2.02	2.050E-06	2.01
6	9.320E-06	1.09	7.458E-06	1.06	7.988E-06	1.07
7	1.249E-05	1.23	9.568E-06	1.03	1.014E-05	1.00
8	3.125E-05	0.78	2.308E-05	0.66	2.420E-05	0.63
9	8.252E-05	0.50	5.899E-05	0.44	6.160E-05	0.42
10	4.610E-05	0.64	3.260E-05	0.55	3.402E-05	0.55
11	2.196E-04	0.29	1.555E-04	0.26	1.611E-04	0.26
12	1.896E-04	0.31	1.378E-04	0.27	1.444E-04	0.27
13	5.668E-05	0.48	4.130E-05	0.43	4.332E-05	0.44
14	2.532E-04	0.26	1.835E-04	0.22	1.916E-04	0.22
15	2.208E-04	0.26	1.600E-04	0.23	1.670E-04	0.24
16	7.168E-05	0.50	5.186E-05	0.37	5.433E-05	0.37
17	3.211E-05	0.60	2.353E-05	0.53	2.453E-05	0.54
18	2.829E-05	0.68	2.058E-05	0.54	2.126E-05	0.54
19	5.008E-05	0.49	3.667E-05	0.44	3.817E-05	0.41
20	3.965E-05	0.58	2.905E-05	0.48	3.038E-05	0.44
21	8.056E-05	0.42	5.903E-05	0.40	6.163E-05	0.38
22	7.295E-05	0.45	5.339E-05	0.36	5.516E-05	0.34
23	7.629E-05	0.40	5.590E-05	0.34	5.814E-05	0.32
24	1.858E-05	0.82	1.366E-05	0.67	1.427E-05	0.68
25	2.341E-05	0.68	1.729E-05	0.60	1.816E-05	0.55
26	1.357E-05	1.00	9.998E-06	0.85	1.050E-05	0.83
27	4.217E-05	0.57	3.110E-05	0.43	3.292E-05	0.41
28	7.691E-05	0.44	5.721E-05	0.36	6.070E-05	0.34
29	7.942E-05	0.41	5.927E-05	0.33	6.224E-05	0.32
30	1.013E-05	1.14	7.501E-06	0.95	7.806E-06	0.87
31	7.883E-05	0.40	5.904E-05	0.36	6.225E-05	0.35
32	3.088E-05	0.56	2.340E-05	0.47	2.462E-05	0.47
33	2.644E-05	0.65	1.990E-05	0.61	2.112E-05	0.57
34	6.065E-05	0.50	4.592E-05	0.38	4.845E-05	0.35
35	3.611E-05	0.52	2.735E-05	0.48	2.877E-05	0.46
36	3.404E-05	0.52	2.563E-05	0.43	2.694E-05	0.41

37	2.183E-05	0.73	1.647E-05	0.59	1.726E-05	0.54
38	2.582E-05	0.63	1.969E-05	0.51	2.079E-05	0.47
39	9.747E-05	0.36	7.477E-05	0.33	7.897E-05	0.30
40	8.972E-05	0.33	6.932E-05	0.26	7.388E-05	0.25
41	1.135E-04	0.30	8.858E-05	0.25	9.459E-05	0.23
42	9.407E-05	0.35	7.417E-05	0.29	7.950E-05	0.27
43	5.089E-05	0.41	4.048E-05	0.36	4.262E-05	0.34
44	7.025E-05	0.34	5.638E-05	0.28	6.040E-05	0.23
45	3.531E-05	0.43	2.811E-05	0.34	3.124E-05	0.32
46	8.305E-06	0.97	6.602E-06	0.82	7.146E-06	0.66
47	2.369E-05	0.61	1.882E-05	0.48	1.955E-05	0.46
48	6.851E-06	1.02	5.433E-06	0.79	5.740E-06	0.67
49	4.368E-05	0.40	3.500E-05	0.35	3.764E-05	0.27
50	2.933E-05	0.50	2.355E-05	0.46	2.569E-05	0.36
51	7.812E-06	0.88	6.353E-06	0.77	6.912E-06	0.68
52	2.054E-05	0.53	1.655E-05	0.44	1.812E-05	0.39
53	7.635E-05	0.30	6.142E-05	0.26	6.676E-05	0.25
54	3.341E-05	0.46	2.700E-05	0.44	2.919E-05	0.31
55	6.650E-05	0.31	5.389E-05	0.27	5.881E-05	0.22
56	4.301E-05	0.38	3.511E-05	0.32	3.830E-05	0.30
57	4.902E-05	0.36	4.005E-05	0.33	4.379E-05	0.25
58	2.600E-05	0.50	2.119E-05	0.44	2.315E-05	0.36
59	4.427E-05	0.41	3.610E-05	0.34	3.928E-05	0.27
60	6.469E-05	0.29	5.292E-05	0.27	5.758E-05	0.23
61	6.189E-06	0.97	5.062E-06	0.82	5.499E-06	0.71
62	3.270E-05	0.40	2.658E-05	0.37	2.893E-05	0.34
63	2.175E-05	0.47	1.784E-05	0.43	1.943E-05	0.36
64	1.721E-05	0.60	1.412E-05	0.50	1.534E-05	0.41
65	5.685E-06	0.92	4.702E-06	0.79	5.135E-06	0.67
66	2.882E-05	0.45	2.368E-05	0.41	2.573E-05	0.32
67	2.121E-05	0.49	1.748E-05	0.48	1.902E-05	0.41
68	4.701E-06	1.05	3.859E-06	0.94	4.215E-06	0.82
69	3.757E-05	0.43	3.090E-05	0.36	3.351E-05	0.28
70	2.663E-05	0.49	2.196E-05	0.41	2.388E-05	0.32
71	4.581E-05	0.37	3.770E-05	0.32	4.101E-05	0.26
72	2.655E-06	1.41	2.206E-06	1.21	2.385E-06	1.06
73	2.733E-05	0.41	2.248E-05	0.37	2.447E-05	0.33
74	7.945E-05	0.26	6.577E-05	0.24	7.130E-05	0.21
75	9.088E-06	0.66	7.545E-06	0.57	8.218E-06	0.49
76	2.289E-05	0.48	1.923E-05	0.44	2.067E-05	0.36
77	1.768E-05	0.52	1.470E-05	0.48	1.592E-05	0.38
78	1.558E-06	1.68	1.313E-06	1.68	1.428E-06	1.35
79	1.009E-05	0.81	8.376E-06	0.75	8.982E-06	0.63
80	4.645E-06	1.04	3.829E-06	0.98	4.134E-06	0.73
81	5.554E-05	0.29	4.610E-05	0.29	4.990E-05	0.23
82	3.317E-06	1.37	2.744E-06	1.19	2.969E-06	0.94
83	4.485E-06	1.02	3.742E-06	0.94	4.008E-06	0.68
84	8.302E-06	0.78	6.909E-06	0.68	7.492E-06	0.55
85	9.980E-06	0.70	8.290E-06	0.59	8.997E-06	0.49
86	1.354E-05	0.54	1.126E-05	0.46	1.224E-05	0.40
87	1.187E-05	0.69	9.858E-06	0.54	1.069E-05	0.43
88	3.182E-06	1.38	2.689E-06	1.18	2.892E-06	0.88

89	6.640E-06	0.89	5.535E-06	0.74	5.980E-06	0.63
90	6.841E-06	0.86	5.667E-06	0.70	6.210E-06	0.63
91	8.251E-06	0.91	6.849E-06	0.79	7.433E-06	0.64
92	4.790E-06	1.03	4.041E-06	1.01	4.337E-06	0.73
93	8.141E-06	0.76	6.780E-06	0.71	7.336E-06	0.62
94	4.232E-06	1.20	3.495E-06	1.16	3.788E-06	0.87
95	1.253E-05	0.59	1.044E-05	0.47	1.141E-05	0.40
96	3.379E-06	1.12	2.832E-06	0.99	3.052E-06	0.87
97	3.378E-06	1.19	2.848E-06	1.11	3.083E-06	1.01
98	3.541E-06	1.16	2.943E-06	1.01	3.224E-06	0.88
99	2.322E-06	1.47	1.923E-06	1.45	2.106E-06	1.09
100	3.398E-06	1.29	2.849E-06	1.16	3.101E-06	0.98
101	4.878E-06	1.03	4.102E-06	0.92	4.457E-06	0.68
102	3.412E-06	1.16	2.840E-06	1.00	3.078E-06	0.84
103	4.666E-06	0.98	3.880E-06	0.89	4.230E-06	0.77
104	4.236E-06	0.92	3.561E-06	0.83	3.843E-06	0.67
105	4.371E-06	1.09	3.665E-06	0.97	3.931E-06	0.71
106	1.500E-06	1.60	1.279E-06	1.37	1.407E-06	1.16
107	3.574E-06	1.00	2.981E-06	0.93	3.234E-06	0.74
108	3.249E-06	1.20	2.741E-06	1.14	2.983E-06	0.93
109	5.092E-06	0.94	4.248E-06	0.88	4.625E-06	0.68
110	3.025E-06	1.24	2.576E-06	1.01	2.802E-06	0.88
111	3.055E-06	1.18	2.584E-06	1.07	2.791E-06	0.86
112	1.822E-06	1.70	1.546E-06	1.52	1.676E-06	1.25
113	5.734E-06	0.94	4.813E-06	0.87	5.215E-06	0.65
114	2.030E-06	1.62	1.663E-06	1.38	1.795E-06	1.08
115	5.066E-06	1.12	4.236E-06	0.96	4.584E-06	0.78
116	1.096E-05	0.73	9.183E-06	0.70	9.881E-06	0.56
117	1.164E-05	0.59	9.829E-06	0.57	1.060E-05	0.46
118	1.290E-05	0.66	1.083E-05	0.58	1.171E-05	0.43
119	8.281E-06	0.85	7.028E-06	0.71	7.625E-06	0.59
120	5.723E-06	0.85	4.884E-06	0.73	5.315E-06	0.64
121	5.997E-06	0.90	5.144E-06	0.85	5.555E-06	0.63
122	3.242E-06	1.22	2.746E-06	1.10	2.959E-06	0.97
123	1.047E-05	0.74	8.745E-06	0.65	9.412E-06	0.48
124	7.430E-06	0.80	6.271E-06	0.73	6.742E-06	0.62
125	7.042E-06	0.77	5.948E-06	0.77	6.353E-06	0.58
126	5.784E-06	0.92	4.872E-06	0.82	5.230E-06	0.71
127	5.537E-06	0.90	4.640E-06	0.74	5.048E-06	0.68
128	7.724E-06	0.83	6.491E-06	0.70	6.965E-06	0.60
129	9.661E-06	0.69	8.135E-06	0.58	8.797E-06	0.51
130	3.927E-06	1.03	3.317E-06	1.01	3.638E-06	0.78
131	1.678E-05	0.57	1.414E-05	0.53	1.536E-05	0.40
132	1.117E-05	0.67	9.406E-06	0.55	1.018E-05	0.48
133	1.360E-05	0.58	1.149E-05	0.56	1.245E-05	0.45
134	1.498E-05	0.64	1.255E-05	0.58	1.351E-05	0.43
135	2.373E-06	1.39	2.039E-06	1.36	2.228E-06	1.06
136	3.867E-06	1.01	3.387E-06	0.89	3.681E-06	0.80
137	2.464E-06	0.98	2.600E-06	1.03	2.953E-06	0.72
138	4.088E-06	0.95	3.585E-06	0.93	3.905E-06	0.69
139	4.679E-06	0.94	3.949E-06	0.80	4.270E-06	0.70
140	1.199E-05	0.69	1.021E-05	0.61	1.103E-05	0.51

141	8.834E-06	0.75	7.455E-06	0.62	8.040E-06	0.52
142	5.833E-06	0.85	4.930E-06	0.74	5.347E-06	0.66
143	2.013E-05	0.50	1.696E-05	0.48	1.817E-05	0.38
144	8.167E-06	0.79	6.830E-06	0.70	7.339E-06	0.55
145	7.143E-06	0.85	6.123E-06	0.79	6.589E-06	0.67
146	1.204E-05	0.65	1.020E-05	0.59	1.096E-05	0.47
147	3.673E-06	1.23	3.105E-06	1.06	3.342E-06	0.82
148	1.886E-06	1.47	1.579E-06	1.32	1.732E-06	1.11
149	1.167E-06	2.01	1.001E-06	1.64	1.072E-06	1.39
150	4.033E-06	1.13	3.397E-06	1.01	3.620E-06	0.85
151	4.108E-06	1.07	3.476E-06	0.94	3.759E-06	0.78
152	4.302E-06	1.08	3.647E-06	0.89	3.939E-06	0.79
153	4.498E-06	1.10	3.794E-06	0.93	4.107E-06	0.74
154	4.688E-06	1.25	3.925E-06	0.96	4.217E-06	0.74
155	4.355E-06	1.11	3.668E-06	0.97	3.949E-06	0.81
156	4.011E-06	1.04	3.363E-06	0.95	3.619E-06	0.82
157	4.728E-06	1.09	3.953E-06	0.95	4.243E-06	0.84
158	4.860E-06	0.96	4.130E-06	0.82	4.456E-06	0.66
159	6.776E-06	0.84	5.728E-06	0.76	6.192E-06	0.62
160	3.547E-06	0.94	2.997E-06	0.91	3.239E-06	0.74
161	4.954E-06	0.90	4.245E-06	0.90	4.499E-06	0.76
162	5.832E-06	1.01	4.922E-06	0.88	5.290E-06	0.70
163	6.071E-06	0.78	5.102E-06	0.60	5.513E-06	0.53
164	6.499E-06	0.88	5.516E-06	0.75	5.950E-06	0.57
165	6.871E-06	0.88	5.780E-06	0.71	6.266E-06	0.64
166	3.969E-06	1.06	3.388E-06	0.96	3.623E-06	0.72
167	4.173E-06	1.03	3.535E-06	0.97	3.777E-06	0.84
168	4.284E-06	0.97	3.632E-06	0.85	3.923E-06	0.71
169	4.460E-06	1.10	3.761E-06	0.89	4.053E-06	0.80
170	4.635E-06	1.10	3.881E-06	0.90	4.176E-06	0.77
171	2.371E-06	1.28	2.005E-06	1.28	2.186E-06	0.99
172	2.376E-06	1.33	2.023E-06	1.15	2.183E-06	1.02
173	2.472E-06	1.39	2.116E-06	1.27	2.291E-06	1.00
174	2.558E-06	1.31	2.157E-06	1.17	2.327E-06	0.94
175	1.052E-06	1.97	8.744E-07	1.68	9.514E-07	1.44
176	1.017E-06	2.27	8.624E-07	1.89	9.439E-07	1.46
177	1.025E-06	2.10	8.724E-07	1.95	9.308E-07	1.53
178	1.055E-06	1.94	9.086E-07	1.95	9.726E-07	1.58
179	1.030E-06	2.21	8.746E-07	2.11	9.280E-07	1.49
180	1.106E-06	1.91	9.273E-07	1.81	9.990E-07	1.42
181	1.034E-06	2.02	9.025E-07	1.82	9.755E-07	1.55
182	1.085E-06	2.10	9.237E-07	1.87	9.909E-07	1.38
183	1.078E-06	1.81	9.190E-07	1.66	1.006E-06	1.41
184	1.153E-06	2.19	9.705E-07	1.97	1.029E-06	1.36
185	1.090E-06	1.75	9.329E-07	1.62	1.014E-06	1.29
186	1.141E-06	1.80	9.780E-07	1.91	1.046E-06	1.41
187	1.149E-06	1.93	9.693E-07	1.78	1.062E-06	1.46
188	1.174E-06	1.71	1.026E-06	1.55	1.077E-06	1.19
189	1.179E-06	1.76	1.012E-06	1.85	1.075E-06	1.40
190	3.012E-06	1.15	2.548E-06	0.98	2.768E-06	0.85
191	3.113E-06	1.19	2.627E-06	1.08	2.844E-06	0.87
192	3.189E-06	1.14	2.697E-06	1.03	2.906E-06	0.84

193	3.235E-06	1.17	2.756E-06	1.11	2.957E-06	0.82
194	6.835E-06	0.78	5.830E-06	0.74	6.275E-06	0.54
195	7.210E-06	0.64	6.108E-06	0.61	6.628E-06	0.48
196	7.631E-06	0.70	6.469E-06	0.72	6.990E-06	0.56
197	8.539E-06	0.73	7.176E-06	0.59	7.756E-06	0.51
198	8.984E-06	0.68	7.597E-06	0.61	8.196E-06	0.49
199	4.828E-06	0.99	4.103E-06	0.90	4.427E-06	0.73
200	5.119E-06	0.90	4.339E-06	0.80	4.686E-06	0.64
201	1.070E-05	0.67	9.059E-06	0.57	9.792E-06	0.50
202	1.201E-05	0.56	1.012E-05	0.51	1.101E-05	0.45
203	1.292E-05	0.57	1.097E-05	0.56	1.188E-05	0.45
204	1.474E-05	0.53	1.254E-05	0.45	1.361E-05	0.40
205	8.628E-06	0.65	7.794E-06	0.60	8.210E-06	0.48
206	9.259E-06	0.72	8.357E-06	0.58	8.892E-06	0.46
207	9.594E-06	0.66	8.721E-06	0.61	9.200E-06	0.48
208	1.136E-05	0.56	1.022E-05	0.48	1.088E-05	0.42
209	1.163E-05	0.49	1.055E-05	0.49	1.116E-05	0.35
210	1.414E-05	0.53	1.279E-05	0.45	1.362E-05	0.35
211	1.618E-05	0.52	1.468E-05	0.46	1.559E-05	0.39
212	1.914E-05	0.45	1.728E-05	0.41	1.845E-05	0.35
213	2.610E-05	0.40	2.349E-05	0.32	2.515E-05	0.26
214	3.704E-05	0.31	3.333E-05	0.31	3.566E-05	0.19
215	5.501E-05	0.23	4.975E-05	0.22	5.370E-05	0.19
216	9.214E-05	0.19	8.402E-05	0.16	9.083E-05	0.14
217	5.539E-05	0.22	5.311E-05	0.21	5.633E-05	0.16
218	7.078E-05	0.21	6.788E-05	0.16	7.227E-05	0.14
219	8.411E-05	0.20	8.155E-05	0.17	8.668E-05	0.13
220	1.013E-04	0.18	9.910E-05	0.15	1.056E-04	0.12
221	1.202E-04	0.15	1.186E-04	0.13	1.266E-04	0.11
222	1.366E-04	0.17	1.369E-04	0.16	1.459E-04	0.13
223	1.535E-04	0.16	1.577E-04	0.13	1.676E-04	0.11
224	7.500E-05	0.19	7.983E-05	0.16	8.459E-05	0.12
225	2.338E-04	0.12	2.730E-04	0.10	2.831E-04	0.09
226	3.170E-05	0.25	4.478E-05	0.21	4.451E-05	0.13
227	2.899E-05	0.23	4.648E-05	0.20	4.459E-05	0.12
228	1.035E-05	0.36	1.900E-05	0.27	1.755E-05	0.18
229	9.715E-06	0.41	1.969E-05	0.31	1.753E-05	0.18
230	4.491E-06	0.54	1.014E-05	0.35	8.731E-06	0.20
231	4.212E-06	0.55	1.053E-05	0.43	8.724E-06	0.21
232	3.961E-06	0.56	1.133E-05	0.43	8.900E-06	0.21
233	2.222E-06	0.68	7.444E-06	0.56	5.521E-06	0.27
234	1.424E-06	0.89	5.384E-06	0.60	3.806E-06	0.29
235	5.159E-07	1.40	1.063E-06	1.08	1.119E-06	0.46
236	3.439E-07	1.72	7.430E-07	1.42	7.957E-07	0.58
237	2.373E-07	1.94	5.532E-07	1.15	6.215E-07	0.60
238	5.227E-09	10.41	1.997E-08	5.92	2.496E-08	1.95

1 fuel bundle

fluxes for Global Unit
region 1

group	flux	percent

		deviation
1	0.000E+00	0.00
2	0.000E+00	0.00
3	0.000E+00	0.00
4	0.000E+00	0.00
5	0.000E+00	0.00
6	0.000E+00	0.00
7	0.000E+00	0.00
8	0.000E+00	0.00
9	0.000E+00	0.00
10	0.000E+00	0.00
11	0.000E+00	0.00
12	0.000E+00	0.00
13	0.000E+00	0.00
14	0.000E+00	0.00
15	0.000E+00	0.00
16	0.000E+00	0.00
17	0.000E+00	0.00
18	0.000E+00	0.00
19	0.000E+00	0.00
20	0.000E+00	0.00
21	0.000E+00	0.00
22	0.000E+00	0.00
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65	0.000E+00	0.00
66	0.000E+00	0.00
67	0.000E+00	0.00
68	0.000E+00	0.00
69	0.000E+00	0.00
70	0.000E+00	0.00
71	0.000E+00	0.00
72	0.000E+00	0.00
73	0.000E+00	0.00
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76	0.000E+00	0.00
77	0.000E+00	0.00
78	0.000E+00	0.00
79	0.000E+00	0.00
80	0.000E+00	0.00
81	0.000E+00	0.00
82	0.000E+00	0.00
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93	0.000E+00	0.00
94	0.000E+00	0.00
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96	0.000E+00	0.00
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98	0.000E+00	0.00
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100	0.000E+00	0.00
101	0.000E+00	0.00
102	0.000E+00	0.00
103	0.000E+00	0.00

104	0.000E+00	0.00
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106	0.000E+00	0.00
107	0.000E+00	0.00
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110	0.000E+00	0.00
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147	0.000E+00	0.00
148	0.000E+00	0.00
149	0.000E+00	0.00
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171	0.000E+00	0.00
172	0.000E+00	0.00
173	0.000E+00	0.00
174	0.000E+00	0.00
175	0.000E+00	0.00
176	0.000E+00	0.00
177	0.000E+00	0.00
178	0.000E+00	0.00
179	0.000E+00	0.00
180	0.000E+00	0.00
181	0.000E+00	0.00
182	0.000E+00	0.00
183	0.000E+00	0.00
184	0.000E+00	0.00
185	0.000E+00	0.00
186	0.000E+00	0.00
187	0.000E+00	0.00
188	0.000E+00	0.00
189	0.000E+00	0.00
190	0.000E+00	0.00
191	0.000E+00	0.00
192	0.000E+00	0.00
193	0.000E+00	0.00
194	0.000E+00	0.00
195	0.000E+00	0.00
196	0.000E+00	0.00
197	0.000E+00	0.00
198	0.000E+00	0.00
199	0.000E+00	0.00
200	0.000E+00	0.00
201	0.000E+00	0.00
202	0.000E+00	0.00
203	0.000E+00	0.00
204	0.000E+00	0.00
205	0.000E+00	0.00
206	0.000E+00	0.00
207	0.000E+00	0.00

```
  208   0.000E+00    0.00
  209   0.000E+00    0.00
  210   0.000E+00    0.00
  211   0.000E+00    0.00
  212   0.000E+00    0.00
  213   0.000E+00    0.00
  214   0.000E+00    0.00
  215   0.000E+00    0.00
  216   0.000E+00    0.00
  217   0.000E+00    0.00
  218   0.000E+00    0.00
  219   0.000E+00    0.00
  220   0.000E+00    0.00
  221   0.000E+00    0.00
  222   0.000E+00    0.00
  223   0.000E+00    0.00
  224   0.000E+00    0.00
  225   0.000E+00    0.00
  226   0.000E+00    0.00
  227   0.000E+00    0.00
  228   0.000E+00    0.00
  229   0.000E+00    0.00
  230   0.000E+00    0.00
  231   0.000E+00    0.00
  232   0.000E+00    0.00
  233   0.000E+00    0.00
  234   0.000E+00    0.00
  235   0.000E+00    0.00
  236   0.000E+00    0.00
  237   0.000E+00    0.00
  238   0.000E+00    0.00
1fuel bundle

                                frequency for generations      24 to
123 each asterisk represents   1.0000 generations
 0.7556 to 0.7584     ***
 0.7584 to 0.7612     ************
 0.7612 to 0.7641     ********************
 0.7641 to 0.7669     ******************************
 0.7669 to 0.7697     ****************
 0.7697 to 0.7726     ***************
 0.7726 to 0.7754     ***

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7556 to 0.7584     *
 0.7584 to 0.7612     *********
 0.7612 to 0.7641     ***************
 0.7641 to 0.7669     ************************
 0.7669 to 0.7697     ************
 0.7697 to 0.7726     ***********
 0.7726 to 0.7754     **
```

```
                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7556 to 0.7584
 0.7584 to 0.7612     *****
 0.7612 to 0.7641     **********
 0.7641 to 0.7669     ***********
 0.7669 to 0.7697     **********
 0.7697 to 0.7726     ********
 0.7726 to 0.7754     **

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7556 to 0.7584
 0.7584 to 0.7612     ***
 0.7612 to 0.7641     ****
 0.7641 to 0.7669     ********
 0.7669 to 0.7697     ****
 0.7697 to 0.7726     ****
 0.7726 to 0.7754     **

1
*************************************************************************
*****************************************
        ***
***
        ***   fuel bundle
***
        ***
***

*************************************************************************
*****************************************
        ***
***
        ***                                    ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76548 + or - 0.00046                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65701E-02 + or -  1.23996E-04           ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  9.91808E-06           ***
        ***
***
        ***        system mean free path (cm)
```

```
6.52779E-01 + or -  1.51570E-04           ***
        ***
***
        ***        number of warning messages
7                                         ***
        ***
***
        ***        number of error messages
0                                         ***
        ***
***
        ***        k-effective satisfies the chi**2 test for normality at
the 95 % level                                  ***
        ***
***
        ***
***

*******************************************************************************
*********************************************

*******************************************************************************
*********************************************



*******************************************************************************
*************************************************************

           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.06100 minutes


*******************************************************************************
*************************************************************
1
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
VV           VV  IIIIIIIIIII
   KK          KK   EEEEEEEEEEEEE   NNN          NN  OOOOOOOOOOOO
VV           VV  IIIIIIIIIII
   KK         KK    EE              NNNN         NN  OO         OO
VV           VV       II
   KK        KK     EE              NN NN        NN  OO         OO
VV           VV       II
   KK       KK      EE              NN   NN      NN  OO         OO
VV           VV       II
   KKKKKKKK         EEEEEEEEE       NN    NN     NN  OO         OO
-------------   VV          VV       II
   KKKKKKKK         EEEEEEEEE       NN     NN    NN  OO         OO
-------------    VV        VV        II
   KK       KK      EE              NN       NN  NN  OO         OO
```

```
VV     VV          II
   KK       KK     EE              NN        NN NN  OO          OO
VV   VV           II
   KK         KK    EE              NN         NNNN  OO          OO
VV VV            II
   KK          KK   EEEEEEEEEEEEE   NN          NNN  OOOOOOOOOOOOO
VVV        IIIIIIIIIIII
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
V         IIIIIIIIIII


   DDDDDDDDDDDD      AAAAAAAAA     VV           VV  IIIIIIIIIII
DDDDDDDDDDDD
   DDDDDDDDDDDDD    AAAAAAAAAA    VV           VV  IIIIIIIIIII
DDDDDDDDDDDDD
   DD          DD   AA          AA   VV           VV       II          DD
DD
   DD          DD   AA          AA   VV           VV       II          DD
DD
   DD          DD   AA          AA   VV           VV       II          DD
DD
   DD          DD   AAAAAAAAAAAAA   VV           VV       II          DD
DD
   DD          DD   AAAAAAAAAAAAA    VV         VV        II          DD
DD
   DD          DD   AA          AA      VV     VV         II          DD
DD
   DD          DD   AA          AA       VV   VV          II          DD
DD
   DD          DD   AA          AA        VV VV           II          DD
DD
   DDDDDDDDDDDDD   AA          AA         VVV       IIIIIIIIIII
DDDDDDDDDDDDD
   DDDDDDDDDDDD    AA          AA          V        IIIIIIIIIII
DDDDDDDDDDDD


      0000000       88888888888                //   22222222222
33333333333               //        11          666666666666
     000000000     8888888888888              //   2222222222222
3333333333333             //        111         6666666666666
    00       00    88          88             //    22          22   33
33             //        1111        66
   00          00   88          88            //                22
33            //           11        66
   00          00   88          88           //                 22
33           //           11        66
   00          00    88888888888          //                22
333           //             11        666666666666
   00          00    88888888888          //              22
```

```
333          //              11        6666666666666
   00         00   88         88        //              22
33        //               11        66         66
   00         00   88         88       //             22
33       //                11        66         66
    00       00    88         88      //            22             33
33      //                 11        66         66
     000000000     8888888888888     //           2222222222222
3333333333333     //                11111111     6666666666666
      0000000       88888888888     //           2222222222222
33333333333     //                 11111111      66666666666



      0000000      5555555555555                    5555555555555
44                      33333333333    5555555555555
     000000000     5555555555555                    5555555555555
444                     3333333333333   5555555555555
    00       00    55                      :::       55
4444           :::       33         33   55
   00         00   55                      :::       55
44 44            :::                   33   55
   00         00   55                      :::       55
44  44           :::                    33   55
   00         00   555555555555                   555555555555
44   44                                 333    555555555555
   00         00   5555555555555                    5555555555555
44    44                                333    5555555555555
   00         00              55         :::                   55
444444444444         :::                   33              55
   00         00              55         :::                   55
4444444444444        :::                    33              55
    00       00    55         55         :::       55         55
44           :::       33         33   55         55
     000000000     5555555555555                    5555555555555
44                     3333333333333   5555555555555
      0000000       55555555555                    55555555555
44                      33333333333     55555555555
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   SS         SS   CC         CC   AA         AA   LL             EE
   SS              CC              AA         AA   LL             EE
   SS              CC              AA         AA   LL             EE
   SSSSSSSSSSS    CC              AAAAAAAAAAAAA   LL
EEEEEEEEE
    SSSSSSSSSSS   CC              AAAAAAAAAAAAA   LL
EEEEEEEEE
              SS   CC              AA         AA   LL             EE
```

```
              SS   CC              AA          AA   LL              EE
   SS         SS   CC         CC   AA          AA   LL              EE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC   AA          AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCCC    AA          AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
```

```
********************************************************************************
************************************************

********************************************************************************
************************************************

********************************************************************************
************************************************
        *****
*****
        *****                                                 program
verification information                                              *****
        *****
*****
        *****                                           code system:  SCALE
version:  6.1                                             *****
        *****
*****

********************************************************************************
************************************************

********************************************************************************
************************************************
        *****
*****
        *****
*****
        *****               program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
```

```
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  05:54:35.61
*****
        *****
*****
        *****
*****

**************************************************************************
************************************************

**************************************************************************
************************************************

**************************************************************************
************************************************
1

**************************************************************************
******************************************
        ***
***
        ***                                fuel bundle
***
        ***
***

**************************************************************************
******************************************
        ***                                   ******       numeric
parameters       ******                                   ***
        ***
***
        ***
```

```
***
        ***                     tme         maximum problem time (min)
0.00                     ***
        ***
***
        ***                     tba         time per generation (min)
10.00                     ***
        ***
***
        ***                     gen         number of generations
123                     ***
        ***
***
        ***                     npg         number per generation
20000                     ***
        ***
***
        ***                     nsk         number of generations to be
skipped                     23                       ***
        ***
***
        ***                     beg         beginning generation number
1                     ***
        ***
***
        ***                     res         generations between
checkpoints                      103                      ***
        ***
***
        ***                     x1d         number of extra 1-d cross
sections                       1                        ***
        ***
***
        ***                     nbk         neutron bank size
20025                     ***
        ***
***
        ***                     xnb         extra positions in neutron
bank                       0                        ***
        ***
***
        ***                     nfb         fission bank size
20000                     ***
        ***
***
        ***                     xfb         extra positions in fission
bank                       0                        ***
        ***
***
        ***                     sig         cut off standard deviation
0.0000                     ***
        ***
```

```
***
        ***                     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
000015714D98EE96                      ***
        ***
***
        ***                     nb8         number of d.a. blocks on unit
8                       1000                  ***
        ***
***
        ***                     nl8         length of d.a. blocks on unit
8                        512                  ***
        ***
***
        ***                     nqd         quadrature order for angular
fluxes                   0                      ***
        ***
***
        ***                     pnm         highest order of flux
moments                   0                      ***
        ***
***
        ***                     msh         mesh size for mesh flux tally
0.0000                    ***
        ***
***
        ***                     adj         mode of calculation
forward                    ***
        ***
***
        ***                     tps         sampling sites per track
length                      5                     ***
        ***
***
        ***                     cgs         number of secondary groups
to sampl                   0                     ***
        ***
***
        ***                     cas         number of secondary angles
to sampl                   0                     ***
        ***
```

```
***
        ***                                   input data written on
restart unit                    yes                          ***
        ***
***
        ***
***

**********************************************************************
*****************************************

**********************************************************************
*****************************************
1
**********************************************************************
*****************************************

**********************************************************************
*****************************************
        ***
***
        ***                                fuel bundle
***
        ***
***

**********************************************************************
*****************************************
        ***                                   ******      logical
parameters        ******                                   ***
        ***
***
        ***  run  execute problem after checking data    yes
plt  plot picture map(s)                        no ***
        ***
***
        ***       compute fluxes (cfx, flx or mfp)       yes
fdn  compute fission densities                yes ***
        ***
***
        ***  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 fiss prod matrix by unit number   no
fmp  print fiss prod matrix by unit location  no ***
        ***
***
        ***  mkh  compute matrix k-eff by hole number     no
mka  compute matrix k-eff by array number     no ***
        ***
***
        ***  ckh  compute cofactor k-eff by hole number   no
cka  compute cofactor k-eff by array number   no ***
        ***
***
        ***  fmh  print fiss prod matrix by hole number   no
fma  print fiss prod matrix by array number   no ***
        ***
***
        ***  hhl  collect matrix by highest hole level    no
hal  collect matrix by highest array level    no ***
        ***
***
        ***  amx  print all mixed cross sections          no
far  print fis. and abs. by region            no ***
        ***
***
        ***  xs1  print 1-d mixture x-sections            no
gas  print far by group                       no ***
        ***
***
        ***  xs2  print 2-d mixture x-sections            no
pax  print xsec-albedo correlation tables     no ***
        ***
***
        ***  xsl  print 2-d mixture Pl arrays             no
pwt  print weight average array               no ***
        ***
***
        ***  xap  print mixture angles & probabilities    no
pgm  print input geometry                     no ***
        ***
***
        ***  pki  print fission spectrum                  no
bug  print debug information                  no ***
        ***
***
        ***  p1d  print extra 1-d cross sections          no
trk  print tracking information               no ***
        ***
***
        ***  tfm  coordinate transform for fluxes         no
pmf  print angular fluxes and flux moments    no ***
        ***
***
```

```
        ***       print fluxes (flx)                      yes
app  append, not overwrite, restart data      no ***
        ***
***
        ***  mfx  compute mesh fluxes                      no
pms  print mesh fluxes if calculated          no ***
        ***
***
        ***  mfp  compute region mean free paths           no
pmm  print mesh flux moments if calculated    no ***
        ***
***
        ***  sen  compute derivative sensitivites          no
pmv  print mesh volumes                       no ***
        ***
***
        ***  cep  continuous energy calculation            no
ptb  use probability tables                  yes ***
        ***
***
        ***  fre  use analytic free gas kernel             yes
pnu  use prompt neutron spectrum only         no ***
        ***
***
        ***  cbt  compute contributons                     no
pct  print contributons                       no ***
        ***
***
        ***  cds  collect CADIS fissions                   no
htm  produce HTML output                     yes ***
        ***
***
        ***
***

************************************************************************
****************************************

************************************************************************
****************************************

************************************************************************
****************************************
                                                 parameter input completed


                                  ........ finished reading the parameter
data      ........


                                 ************** data reading completed
***************
```

```
1
********************************************************************************
*****************************************
        ***
***
        ***                                   fuel bundle
***
        ***
***

********************************************************************************
*****************************************

********************************************************************************
*****************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number               data set name
name        unit function                       ***
        ***         ------               -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.33572\ft14f001             mixed cross
sections               ***
        ***
***
        ***      alb  79     C:\SCALE\data\albedos
input albedos                      ***
        ***
***
        ***      wts  80     C:\SCALE\data\scale.rev01.weights
input weights                      ***
        ***
***
        ***      skt  16      unknown
write scratch data                 ***
        ***
***
        ***      rst  95
->\Temp\scale.David.33572\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.33572\restart.keno_input             write restart
data                  ***
        ***
***
```

```
        ***      lib   4
->Data\Local\Temp\scale.David.33572\ft04f001             input ampx
working library         ***
        ***
***
        ***             8
->Data\Local\Temp\scale.David.33572\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

******************************************************************************
*****************************************

                                  ........ finished preparing input data
........
1
******************************************************************************
*****************************
                  ***
***
                  ***           fuel bundle
***
                  ***
***

******************************************************************************
*****************************

******************************************************************************
*****************************
                  ***
***
                  ***                                  ****** additional
information ******                           ***
                  ***
***
                  ***  use a global unit                        yes    use
lattice geometry                    yes  ***
                  ***
***
                  ***  no. of scattering angles in xsecs        3
global array number                          0  ***
                  ***
***
                  ***  number of mixtures used                  3
number of units in the global x dir.      0  ***
                  ***
```

```
***
                ***  number of bias id's used                  1
number of units in the global y dir.      0  ***
                ***
***
                ***  number of differential albedos used       2
number of units in the global z dir.      0  ***
                ***
***
                ***  total input geometry regions              4
number of energy groups                 238  ***
                ***
***
                ***  number of geometry regions used           4    no.
of fission spectrum source grps.      1  ***
                ***
***
                ***  use nested arrays                        no    use
nested holes                          no  ***
                ***
***
                ***  number of arrays used                     1
number of holes                           0  ***
                ***
***
                ***  maximum array nesting level               1
maximum hole nesting level                0  ***
                ***
***
                ***  largest array number                      1
largest geometry unit number              2  ***
                ***
***
                ***
***
                ***  boundary label 1                cuboid
***
                ***
***
                ***    +x boundary condition             h2o
-x boundary condition                 h2o  ***
                ***
***
                ***    +y boundary condition        graphite
-y boundary condition           graphite  ***
                ***
***
                ***    +z boundary condition             h2o
-z boundary condition                 h2o  ***
                ***
***
```

```
********************************************************************************
****************************


                                    cross sections read from the ampx
working library on unit    4

1                                          fuel bundle

                                                    mixing table

                                                number of scattering angles =
3
                                           cross section message threshold
=1.0E+00


 mixture =     1          density(g/cc) =  5.5474
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    1001001  1.77772E-13  5.36306E-14    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    1003007  3.23535E-08  6.79473E-08    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    1004009  1.25936E-07  3.39736E-07    4009     9.0122     be9 425
endf/b7 rel8 rev7 mod2                   12/17/09
    1005010  6.04529E-08  1.81192E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  4.95158E-16  1.63179E-15    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    1007014  8.91558E-06  3.73710E-05    7014    14.0031     n14 725
endf/b7 rel8 rev7 mod0                   12/17/09
    1008016  1.00000E-20  4.78788E-20    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09
    1011023  9.87361E-07  6.79473E-06   11023    22.9898     na23 1125
endf/b7 rel8 rev7 mod0                  12/17/09
    1012024  7.37710E-07  5.29649E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33929E-08  6.98505E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02826E-07  7.99734E-07   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    1013027  3.96970E-02  3.20617E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    1014028  5.44792E-03  4.56239E-02   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    1014029  2.76758E-04  2.40054E-03   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                  12/17/09
    1014030  1.82655E-04  1.63883E-03   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    1015031  1.46571E-06  1.35895E-05   15031    30.9738     p31 1525
```

```
endf/b7 rel6 rev7 mod1                  12/17/09
    1020040  1.09810E-06  1.31358E-05   20040    39.9626     ca40 2025
endf/b7 rel1 rev7 mod1                 12/17/09
    1020042  7.32891E-09  9.20497E-08   20042    41.9586     ca42 2031
endf/b7 rel1 rev7 mod1                 12/17/09
    1020043  1.52922E-09  1.96645E-08   20043    42.9588     ca43 2034
endf/b7 rel1 rev7 mod1                 12/17/09
    1020044  2.36292E-08  3.10903E-07   20044    43.9555     ca44 2037
endf/b7 rel1 rev7 mod1                 12/17/09
    1020046  4.53101E-11  6.23272E-10   20046    45.9537     ca46 2043
endf/b7 rel1 rev7 mod1                 12/17/09
    1020048  2.11825E-09  3.04054E-08   20048    47.9525     ca48 2049
endf/b7 rel1 rev7 mod1                 12/17/09
    1023000  2.00517E-07  3.05763E-06   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                   12/17/09
    1024050  3.47753E-08  5.19916E-07   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                 12/17/09
    1024052  6.70606E-07  1.04264E-05   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                 12/17/09
    1024053  7.60414E-08  1.20504E-06   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                 12/17/09
    1024054  1.89283E-08  3.05615E-07   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                 12/17/09
    1025055  3.58088E-07  5.88877E-06   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                 12/17/09
    1026054  1.44567E-06  2.33421E-05   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                 12/17/09
    1026056  2.26940E-05  3.79975E-04   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                 12/17/09
    1026057  5.24102E-07  8.93224E-06   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                 12/17/09
    1026058  6.97484E-08  1.20955E-06   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                 12/17/09
    1027059  1.92584E-07  3.39736E-06   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                 12/17/09
    1028058  1.14089E-06  1.97856E-05   28058    57.9353     ni58 2825
endf/b7 rel8 rev7 mod4                 12/17/09
    1028060  4.39468E-07  7.88386E-06   28060    59.9308     ni60 2831
endf/b7 rel8 rev7 mod4                 12/17/09
    1028061  1.91034E-08  3.48426E-07   28061    60.9311     ni61 2834
endf/b7 rel8 rev7 mod5                 12/17/09
    1028062  6.09099E-08  1.12912E-06   28062    61.9283     ni62 2837
endf/b7 rel8 rev7 mod5                 12/17/09
    1028064  1.55120E-08  2.96838E-07   28064    63.9280     ni64 2843
endf/b7 rel8 rev7 mod4                 12/17/09
    1029063  2.49068E-06  4.69175E-05   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                 12/17/09
    1029065  1.11117E-06  2.15960E-05   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                 12/17/09
    1030000  6.94379E-07  1.35895E-05   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                  12/17/09
    1036083  2.21607E-12  5.50015E-11   36083    82.9141     kr83 3640
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endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90756E-08  1.32072E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.07031E-08  2.91246E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.63830E-08  4.50708E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  2.30340E-11  6.40586E-10   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.66038E-08  4.66728E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.47813E-11  7.04027E-10   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.69571E-09  7.73911E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  2.69348E-20  7.49068E-19   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  9.62296E-13  2.73381E-11   41095    94.9068     nb95 4131
endf/b7 rel0 rev7 mod1                 12/17/09
    1042092  1.04839E-08  2.88425E-07   42092    91.9068     mo92 4225
endf/b7 rel0 rev7 mod1                 12/17/09
    1042094  6.55156E-09  1.84160E-07   42094    93.9051     mo94 4231
endf/b7 rel0 rev7 mod1                 12/17/09
    1042095  1.12861E-08  3.20624E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39892E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  6.80681E-09  1.97450E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.71930E-08  5.03872E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.07774E-11  3.19085E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.88864E-09  2.06012E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.23840E-11  3.66646E-10   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  2.06182E-11  6.22770E-10   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  1.68730E-11  5.14691E-10   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  1.12205E-11  3.45634E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  7.56137E-12  2.35180E-10   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  1.59957E-12  5.07096E-11   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  7.53980E-13  2.32252E-11   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.06530E-12  3.34529E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  2.67753E-12  8.40801E-11   46105   104.9051     pd105 4634
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endf/b7 rel0 rev7 mod1                12/17/09
    1046107  6.07788E-13  1.94497E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  2.23410E-13  7.21610E-12   46108   107.9039     pd108 4643
endf/b7 rel5 rev7 mod1                12/17/09
    1047107  2.12330E-08  6.79473E-07   47107   106.9051     ag107 4725
endf/b7 rel0 rev7 mod1                12/17/09
    1047109  1.13529E-13  3.70095E-12   47109   108.9047     ag109 4731
endf/b7 rel0 rev7 mod1                12/17/09
    1048106  1.26206E-10  4.00095E-09   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                12/17/09
    1048108  8.98588E-11  2.90242E-09   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    1048110  1.26105E-09  4.14861E-08   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    1048111  1.29237E-09  4.29037E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43632E-09  8.16087E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23383E-09  4.16991E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90077E-09  9.89036E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56278E-10  2.62388E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.74688E-14  9.44791E-13   49115   114.9039     in115 4931
endf/b7 rel3 rev7 mod1                12/17/09
    1050112  1.85479E-10  6.21305E-09   50112   111.9048     sn112 5025
endf/b7 rel0 rev7 mod1                12/17/09
    1050114  1.26202E-10  4.30291E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50146E-11  2.23617E-09   50115   114.9033     sn115 5034
endf/b7 rel0 rev7 mod1                12/17/09
    1050116  2.78027E-09  9.64582E-08   50116   115.9017     sn116 5037
endf/b7 rel0 rev7 mod1                12/17/09
    1050117  1.46859E-09  5.13909E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63128E-09  1.63449E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64259E-09  5.84636E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22985E-09  2.23597E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85390E-10  3.23082E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10724E-09  4.10672E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  2.22612E-13  8.39000E-12   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.50102E-13  9.50070E-12   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  2.20466E-12  8.50692E-11   53129   128.9050     i129 5331
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endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30210E-12  5.25837E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  2.93668E-12  1.15073E-10   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                 12/17/09
    1054133  1.51125E-11  6.01234E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                 12/17/09
    1054135  1.88658E-12  7.61855E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                 12/17/09
    1055133  7.29200E-12  2.90102E-10   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                 12/17/09
    1055134  3.16188E-17  1.26739E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                 12/17/09
    1055135  2.25812E-11  9.11884E-10   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                 12/17/09
    1055137  2.44078E-11  1.00027E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                 12/17/09
    1056138  3.29474E-08  1.36008E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                 12/17/09
    1056140  2.00847E-11  8.41160E-10   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                 12/17/09
    1057139  2.71416E-11  1.12855E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                 12/17/09
    1058141  2.09845E-11  8.85108E-10   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                 12/17/09
    1058142  2.39339E-11  1.01669E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                 12/17/09
    1058143  6.15492E-12  2.63302E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                 12/17/09
    1058144  2.14341E-11  9.23357E-10   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                 12/17/09
    1059141  1.66222E-12  7.01108E-11   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                 12/17/09
    1059143  1.50886E-11  6.45469E-10   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                 12/17/09
    1060143  2.47462E-12  1.05860E-10   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                 12/17/09
    1060144  1.95729E-13  8.43156E-12   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                 12/17/09
    1060145  1.47681E-11  6.40609E-10   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                 12/17/09
    1060146  1.20409E-11  5.25914E-10   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                 12/17/09
    1060147  7.13244E-12  3.13667E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                 12/17/09
    1060148  6.60406E-12  2.92409E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                 12/17/09
    1061147  1.81289E-12  7.97258E-11   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                 12/17/09
    1061148  5.29687E-20  2.34531E-18   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                 12/17/09
    1061149  1.68348E-12  7.50443E-11   61149   148.9183     pm149 6155
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endf/b7 rel3 rev7 mod1                12/17/09
    1062147  3.39955E-15  1.49503E-13   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.75920E-12  1.22995E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.53798E-16  6.90183E-15   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.00892E-09  1.35931E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  1.07267E-12  4.87802E-11   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.17959E-13  9.97717E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.42877E-09  6.45461E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.55956E-09  7.13890E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  2.63320E-16  1.21325E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  1.30591E-13  6.05604E-12   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  4.71017E-14  2.19843E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77517E-12  2.62628E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29364E-11  2.89975E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27267E-10  1.98142E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.90982E-10  2.75831E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51802E-10  2.12226E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17176E-10  3.39028E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31097E-10  3.02120E-08   64160   159.9270     gd160 6449
endf/b7 rel0 rev7 mod1                12/17/09
    1074182  7.16309E-08  3.90130E-06   74182   181.9482     w182 7431
endf/b7 rel8 rev7 mod2                 12/17/09
    1074183  3.84687E-08  2.10670E-06   74183   182.9502     w183 7434
endf/b7 rel8 rev7 mod2                 12/17/09
    1074184  8.19198E-08  4.51079E-06   74184   183.9509     w184 7437
endf/b7 rel8 rev7 mod2                 12/17/09
    1074186  7.51922E-08  4.18544E-06   74186   185.9544     w186 7443
endf/b7 rel8 rev7 mod2                 12/17/09
    1082204  7.66801E-11  4.68184E-09   82204   203.9730     pb204 8225
endf/b7 rel1 rev7 mod1                12/17/09
    1082206  1.31999E-09  8.13854E-08   82206   205.9745     pb206 8231
endf/b7 rel1 rev7 mod1                12/17/09
    1082207  1.21045E-09  7.49943E-08   82207   206.9759     pb207 8234
endf/b7 rel1 rev7 mod1                12/17/09
    1082208  2.87003E-09  1.78674E-07   82208   207.9767     pb208 8237
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endf/b7 rel6 rev7 mod2                12/17/09
    1092234  1.45935E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76388E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22555E-06  6.51853E-04   92236   236.0456     u236 9231
endf/b7 rel0 rev7 mod1                 12/17/09
    1092238  7.06299E-03  5.03292E-01   92238   238.0508     u238 9237
endf/b7 rel6 rev7 mod5                 12/17/09
    1093237  6.79582E-14  4.82214E-12   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.14899E-20  8.18738E-19   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  1.09294E-11  7.82076E-10   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  9.29146E-19  6.67658E-17   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.99016E-21  7.20864E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17293E-20  8.49873E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00096E-20  7.22269E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  4.14664E-24  3.00455E-22   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99999E-21  7.27574E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.77253E-20  1.28433E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.99511E-21  7.27219E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.99214E-21  7.29998E-19   96244   244.0627     cm244 9637
endf/b7 rel3 rev7 mod2                12/17/09

 mixture =     2          density(g/cc) = 0.99396
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    2001001  6.64695E-02  1.11915E-01    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    2008016  3.32348E-02  8.88085E-01    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09

 mixture =     3          density(g/cc) =  2.7020
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    3003006  1.75835E-07  6.50000E-07    3006     6.0151     li6 325
endf/b7 rel1 rev7 mod0                   12/17/09
    3003007  2.16849E-06  9.35000E-06    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    3005010  2.99015E-07  1.84000E-06    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    3005011  1.20605E-06  8.16000E-06    5011    11.0093     b11 528
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endf/b7 rel8 rev7 mod0                    12/17/09
    3012024  4.88634E-04  7.20258E-03   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    3012025  6.18603E-05  9.49881E-04   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    3012026  6.81081E-05  1.08754E-03   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    3013027  5.88689E-02  9.76150E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    3014028  2.67155E-04  4.59332E-03   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    3014029  1.35717E-05  2.41681E-04   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                  12/17/09
    3014030  8.95702E-06  1.64994E-04   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    3023000  3.19422E-06  1.00000E-04   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                     12/17/09
    3024050  1.83565E-06  5.63448E-05   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                  12/17/09
    3024052  3.53986E-05  1.12994E-03   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                  12/17/09
    3024053  4.01392E-06  1.30593E-04   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                  12/17/09
    3024054  9.99149E-07  3.31204E-05   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                  12/17/09
    3025055  2.07330E-05  7.00000E-04   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                  12/17/09
    3026054  6.02891E-06  1.99853E-04   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                  12/17/09
    3026056  9.46410E-05  3.25331E-03   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                  12/17/09
    3026057  2.18567E-06  7.64770E-05   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                  12/17/09
    3026058  2.90873E-07  1.03561E-05   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                  12/17/09
    3027059  2.76106E-07  1.00000E-05   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                  12/17/09
    3029063  5.20580E-05  2.01329E-03   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                  12/17/09
    3029065  2.32247E-05  9.26712E-04   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                  12/17/09
    3030000  2.21504E-05  8.90000E-04   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                    12/17/09
    3031069  7.01394E-07  2.97102E-05   31069    68.9256     ga69 3125
endf/b7 rel0 rev7 mod1                  12/17/09
    3031071  4.65496E-07  2.02898E-05   31071    70.9247     ga71 3131
endf/b7 rel0 rev7 mod1                  12/17/09
    3048106  1.80940E-09  1.17766E-07   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                 12/17/09
    3048108  1.28830E-09  8.54314E-08   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                 12/17/09
    3048110  1.80796E-08  1.22113E-06   48110   109.9030     cd110 4837
```

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endf/b7 rel0 rev7 mod1                12/17/09
    3048111  1.85283E-08  1.26284E-06   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    3048112  3.49287E-08  2.40208E-06   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    3048113  1.76887E-08  1.22736E-06   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    3048114  4.15873E-08  2.91113E-06   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    3048116  1.08419E-08  7.72275E-07   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09



                                3003006    li6 325 endf/b7 rel1 rev7 mod0
12/17/09
                                1003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                                3003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                                1004009    be9 425 endf/b7 rel8 rev7 mod2
12/17/09
                                1005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                                3005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                                3005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                                1005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                                1007014    n14 725 endf/b7 rel8 rev7 mod0
12/17/09
                                2008016    o16 825 endf/b7 rel8 rev7 mod3
12/17/09
                                1008016    o16 825 endf/b7 rel8 rev7 mod3
12/17/09
                                1011023    na23 1125 endf/b7 rel8 rev7 mod0
12/17/09
                                1012024    mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09
                                3012024    mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09
                                1012025    mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09
                                3012025    mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09
                                1012026    mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09
                                3012026    mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09
                                1013027    al27 1325 endf/b7 rel6 rev7 mod1
12/17/09
```

12/17/09	3013027	al27	1325	endf/b7	rel6	rev7	mod1
12/17/09	1014028	si28	1425	endf/b7	rel6	rev7	mod1
12/17/09	3014028	si28	1425	endf/b7	rel6	rev7	mod1
12/17/09	1014029	si29	1428	endf/b7	rel8	rev7	mod3
12/17/09	3014029	si29	1428	endf/b7	rel8	rev7	mod3
12/17/09	1014030	si30	1431	endf/b7	rel6	rev7	mod2
12/17/09	3014030	si30	1431	endf/b7	rel6	rev7	mod2
12/17/09	1015031	p31	1525	endf/b7	rel6	rev7	mod1
12/17/09	1020040	ca40	2025	endf/b7	rel1	rev7	mod1
12/17/09	1020042	ca42	2031	endf/b7	rel1	rev7	mod1
12/17/09	1020043	ca43	2034	endf/b7	rel1	rev7	mod1
12/17/09	1020044	ca44	2037	endf/b7	rel1	rev7	mod1
12/17/09	1020046	ca46	2043	endf/b7	rel1	rev7	mod1
12/17/09	1020048	ca48	2049	endf/b7	rel1	rev7	mod1
12/17/09	1023000	v	2300	endf/b7	rel8	rev7	mod0
12/17/09	3023000	v	2300	endf/b7	rel8	rev7	mod0
12/17/09	1024050	cr50	2425	endf/b7	rel8	rev7	mod5
12/17/09	3024050	cr50	2425	endf/b7	rel8	rev7	mod5
12/17/09	1024052	cr52	2431	endf/b7	rel8	rev7	mod4
12/17/09	3024052	cr52	2431	endf/b7	rel8	rev7	mod4
12/17/09	1024053	cr53	2434	endf/b7	rel8	rev7	mod4
12/17/09	3024053	cr53	2434	endf/b7	rel8	rev7	mod4
12/17/09	1024054	cr54	2437	endf/b7	rel8	rev7	mod5
12/17/09	3024054	cr54	2437	endf/b7	rel8	rev7	mod5
12/17/09	1025055	mn55	2525	endf/b7	rel8	rev7	mod0
12/17/09	3025055	mn55	2525	endf/b7	rel8	rev7	mod0

1026054	fe54	2625	endf/b7	rel8	rev7	mod5
12/17/09						
3026054	fe54	2625	endf/b7	rel8	rev7	mod5
12/17/09						
1026056	fe56	2631	endf/b7	rel8	rev7	mod4
12/17/09						
3026056	fe56	2631	endf/b7	rel8	rev7	mod4
12/17/09						
1026057	fe57	2634	endf/b7	rel8	rev7	mod4
12/17/09						
3026057	fe57	2634	endf/b7	rel8	rev7	mod4
12/17/09						
1026058	fe58	2637	endf/b7	rel8	rev7	mod0
12/17/09						
3026058	fe58	2637	endf/b7	rel8	rev7	mod0
12/17/09						
1027059	co59	2725	endf/b7	rel2	rev7	mod0
12/17/09						
3027059	co59	2725	endf/b7	rel2	rev7	mod0
12/17/09						
1028058	ni58	2825	endf/b7	rel8	rev7	mod4
12/17/09						
1028060	ni60	2831	endf/b7	rel8	rev7	mod4
12/17/09						
1028061	ni61	2834	endf/b7	rel8	rev7	mod5
12/17/09						
1028062	ni62	2837	endf/b7	rel8	rev7	mod5
12/17/09						
1028064	ni64	2843	endf/b7	rel8	rev7	mod4
12/17/09						
1029063	cu63	2925	endf/b7	rel8	rev7	mod5
12/17/09						
3029063	cu63	2925	endf/b7	rel8	rev7	mod5
12/17/09						
1029065	cu65	2931	endf/b7	rel8	rev7	mod5
12/17/09						
3029065	cu65	2931	endf/b7	rel8	rev7	mod5
12/17/09						
1030000	zn	3000	endf/b7	rel0	rev7	mod0
12/17/09						
3030000	zn	3000	endf/b7	rel0	rev7	mod0
12/17/09						
3031069	ga69	3125	endf/b7	rel0	rev7	mod1
12/17/09						
3031071	ga71	3131	endf/b7	rel0	rev7	mod1
12/17/09						
1036083	kr83	3640	endf/b7	rel0	rev7	mod1
12/17/09						
1040090	zr90	4025	endf/b7	rel0	rev7	mod1
12/17/09						
1040091	zr91	4028	endf/b7	rel0	rev7	mod1
12/17/09						

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                                1040092    zr92 4031 endf/b7 rel3 rev7 mod4
12/17/09
                                1040093    zr93 4034 endf/b7 rel3 rev7 mod1
12/17/09
                                1040094    zr94 4037 endf/b7 rel3 rev7 mod1
12/17/09
                                1040095    zr95 4040 endf/b7 rel0 rev7 mod1
12/17/09
                                1040096    zr96 4043 endf/b7 rel0 rev7 mod1
12/17/09
                                1041093    nb93 4125 endf/b7 rel6 rev7 mod3
12/17/09
                                1041095    nb95 4131 endf/b7 rel0 rev7 mod1
12/17/09
                                1042092    mo92 4225 endf/b7 rel0 rev7 mod1
12/17/09
                                1042094    mo94 4231 endf/b7 rel0 rev7 mod1
12/17/09
                                1042095    mo95 4234 endf/b7 rel0 rev7 mod1
12/17/09
                                1042096    mo96 4237 endf/b7 rel0 rev7 mod1
12/17/09
                                1042097    mo97 4240 endf/b7 rel0 rev7 mod1
12/17/09
                                1042098    mo98 4243 endf/b7 rel0 rev7 mod1
12/17/09
                                1042099    mo99 4246 endf/b7 rel0 rev7 mod1
12/17/09
                                1042100    mo100 4249 endf/b7 rel0 rev7
mod1                 12/17/09
                                1043099    tc99 4325 endf/b7 rel0 rev7 mod1
12/17/09
                                1044101    ru101 4440 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044102    ru102 4443 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044103    ru103 4446 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044104    ru104 4449 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044106    ru106 4455 endf/b7 rel0 rev7
mod0                 12/17/09
                                1045103    rh103 4525 endf/b7 rel0 rev7
mod1                 12/17/09
                                1045105    rh105 4531 endf/b7 rel0 rev7
mod1                 12/17/09
                                1046105    pd105 4634 endf/b7 rel0 rev7
mod1                 12/17/09
                                1046107    pd107 4640 endf/b7 rel0 rev7
mod1                 12/17/09
                                1046108    pd108 4643 endf/b7 rel5 rev7
mod1                 12/17/09
```

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                                1047107    ag107 4725 endf/b7 rel0 rev7
mod1                 12/17/09
                                1047109    ag109 4731 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048106    cd106 4825 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048106    cd106 4825 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048108    cd108 4831 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048108    cd108 4831 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048110    cd110 4837 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048110    cd110 4837 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048111    cd111 4840 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048111    cd111 4840 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048112    cd112 4843 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048112    cd112 4843 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048113    cd113 4846 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048113    cd113 4846 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048114    cd114 4849 endf/b7 rel4 rev7
mod1                 12/17/09
                                3048114    cd114 4849 endf/b7 rel4 rev7
mod1                 12/17/09
                                1048116    cd116 4855 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048116    cd116 4855 endf/b7 rel0 rev7
mod1                 12/17/09
                                1049115    in115 4931 endf/b7 rel3 rev7
mod1                 12/17/09
                                1050112    sn112 5025 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050114    sn114 5031 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050115    sn115 5034 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050116    sn116 5037 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050117    sn117 5040 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050118    sn118 5043 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050119    sn119 5046 endf/b7 rel0 rev7
mod1                 12/17/09
```

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                                1050120    sn120 5049 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050122    sn122 5055 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050124    sn124 5061 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050126    sn126 5067 endf/b7 rel0 rev7
mod1                 12/17/09
                                1053127    i127 5325 endf/b7 rel2 rev7 mod1
12/17/09
                                1053129    i129 5331 endf/b7 rel0 rev7 mod1
12/17/09
                                1053135    i135 5349 endf/b7 rel0 rev7 mod1
12/17/09
                                1054131    xe131 5446 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054133    xe133 5452 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054135    xe135 5458 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055133    cs133 5525 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055134    cs134 5528 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055135    cs135 5531 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055137    cs137 5537 endf/b7 rel0 rev7
mod1                 12/17/09
                                1056138    ba138 5649 endf/b7 rel0 rev7
mod1                 12/17/09
                                1056140    ba140 5655 endf/b7 rel0 rev7
mod1                 12/17/09
                                1057139    la139 5728 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058141    ce141 5840 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058142    ce142 5843 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058143    ce143 5846 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058144    ce144 5849 endf/b7 rel0 rev7
mod1                 12/17/09
                                1059141    pr141 5925 endf/b7 rel0 rev7
mod1                 12/17/09
                                1059143    pr143 5931 endf/b7 rel0 rev7
mod1                 12/17/09
                                1060143    nd143 6028 endf/b7 rel0 rev7
mod1                 12/17/09
                                1060144    nd144 6031 endf/b7 rel0 rev7
mod1                 12/17/09
                                1060145    nd145 6034 endf/b7 rel0 rev7
mod1                 12/17/09
```

	1060146	nd146 6037 endf/b7 rel0 rev7
mod1	12/17/09	
	1060147	nd147 6040 endf/b7 rel0 rev7
mod1	12/17/09	
	1060148	nd148 6043 endf/b7 rel0 rev7
mod1	12/17/09	
	1061147	pm147 6149 endf/b7 rel3 rev7
mod1	12/17/09	
	1061148	pm148 6152 endf/b7 rel3 rev7
mod1	12/17/09	
	1061149	pm149 6155 endf/b7 rel3 rev7
mod1	12/17/09	
	1062147	sm147 6234 endf/b7 rel0 rev7
mod1	12/17/09	
	1062149	sm149 6240 endf/b7 rel0 rev7
mod1	12/17/09	
	1062150	sm150 6243 endf/b7 rel0 rev7
mod1	12/17/09	
	1062151	sm151 6246 endf/b7 rel0 rev7
mod1	12/17/09	
	1062152	sm152 6249 endf/b7 rel0 rev7
mod1	12/17/09	
	1062153	sm153 6252 endf/b7 rel0 rev7
mod1	12/17/09	
	1063151	eu151 6325 endf/b7 rel0 rev7
mod1	12/17/09	
	1063153	eu153 6331 endf/b7 rel1 rev7
mod1	12/17/09	
	1063154	eu154 6334 endf/b7 rel0 rev7
mod1	12/17/09	
	1063155	eu155 6337 endf/b7 rel0 rev7
mod1	12/17/09	
	1063156	eu156 6340 endf/b7 rel0 rev7
mod1	12/17/09	
	1064152	gd152 6425 endf/b7 rel0 rev7
mod1	12/17/09	
	1064154	gd154 6431 endf/b7 rel0 rev7
mod1	12/17/09	
	1064155	gd155 6434 endf/b7 rel0 rev7
mod1	12/17/09	
	1064156	gd156 6437 endf/b7 rel0 rev7
mod1	12/17/09	
	1064157	gd157 6440 endf/b7 rel0 rev7
mod1	12/17/09	
	1064158	gd158 6443 endf/b7 rel0 rev7
mod1	12/17/09	
	1064160	gd160 6449 endf/b7 rel0 rev7
mod1	12/17/09	
	1074182	w182 7431 endf/b7 rel8 rev7 mod2
12/17/09		
	1074183	w183 7434 endf/b7 rel8 rev7 mod2
12/17/09		

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                                1074184    w184 7437 endf/b7 rel8 rev7 mod2
12/17/09
                                1074186    w186 7443 endf/b7 rel8 rev7 mod2
12/17/09
                                1082204    pb204 8225 endf/b7 rel1 rev7
mod1                  12/17/09
                                1082206    pb206 8231 endf/b7 rel1 rev7
mod1                  12/17/09
                                1082207    pb207 8234 endf/b7 rel1 rev7
mod1                  12/17/09
                                1082208    pb208 8237 endf/b7 rel6 rev7
mod2                  12/17/09
                                1092234    u234 9225 endf/b7 rel5 rev7 mod2
12/17/09
                                1092235    u235 9228 endf/b7 rel0 rev7 mod7
12/17/09
                                1092236    u236 9231 endf/b7 rel0 rev7 mod1
12/17/09
                                1092238    u238 9237 endf/b7 rel6 rev7 mod5
12/17/09
                                1093237    np237 9346 endf/b7 rel0 rev7
mod1                  12/17/09
                                1094238    pu238 9434 endf/b7 rel0 rev7
mod0                  12/17/09
                                1094239    pu239 9437 endf/b7 rel5 rev7
mod5                  12/17/09
                                1094240    pu240 9440 endf/b7 rel2 rev7
mod0                  12/17/09
                                1094241    pu241 9443 endf/b7 rel3 rev7
mod1                  12/17/09
                                1094242    pu242 9446 endf/b7 rel0 rev7
mod0                  12/17/09
                                1095241    am241 9543 endf/b7 rel0 rev7
mod4                  12/17/09
                                1095242    am242 9546 endf/b7 rel0 rev7
mod0                  12/17/09
                                1095243    am243 9549 endf/b7 rel5 rev7
mod0                  12/17/09
                                1096242    cm242 9631 endf/b7 rel0 rev7
mod0                  12/17/09
                                1096243    cm243 9634 endf/b7 rel7 rev7
mod0                  12/17/09
                                1096244    cm244 9637 endf/b7 rel3 rev7
mod2                  12/17/09
                                2001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09
                                1001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09

  ***** warning ***** keno message number k6-222 follows:
  9594 transfers for mixture 1 were corrected for bad moments.
```

```
  ***** warning ***** keno message number k6-222 follows:
  139 transfers for mixture 3 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  13467 transfers for mixture 2 were corrected for bad moments.

                                ........ finished mixing cross-sections
........

                                 1-d cross section array id numbers

                                              neutron
                                 reaction name    reaction id
                                         total              1
                                non-absorption           2002
                                    nu-fission           1452
                                    absorption             27
                                       fission             18
                                           chi           1018

                                ........ finished preparing the cross
sections    ........


************************************************************
                                **
**
                                **   array      units in   units in
units in   nesting  **
                                **   number      x dir.     y dir.     z
dir.     level   **
                                **
**
                                **     1            1         14
1          1    **
                                **
**

************************************************************


                                ........ finished loading the data
........
1
************************************************************************
*****************************************
        ***
***
        ***
***
```

```
********************************************************************************
*****************************************
        ***                                   ******      geometry
parameters       ******                                   ***
        ***
***
        ***
***
        ***                       niar        number of independent array
references              1                          ***
        ***
***
        ***                       ngblu       global unit number
2                        ***
        ***
***
        ***                       nboxt       number of units in the
problem                      2                          ***
        ***
***
        ***                       nquad       number of quadratics in the
problem                 12                          ***
        ***
***
        ***                       ngwrds      number of geometry words
read                        4                           ***
        ***
***
        ***                       maxgwd      maximum geometry words in a
unit                     3                          ***
        ***
***
        ***                       maxsfu      largest number of surfaces
in a unit                9                           ***
        ***
***
        ***                       maxreg      largest number of media in a
unit                    3                         ***
        ***
***
        ***                       regtot      number of spatial volumes
defined                    4                          ***
        ***
***
        ***                       sectot      number of entries in the
sector array              14                           ***
        ***
***
        ***                       nucom       number of comments in the
geometry data              2                          ***
        ***
***
```

```
        ***                      numhol      number of holes in the
problem                      0                           ***
        ***
***

**************************************************************************
****************************************

1                                          fuel bundle

                                    geometry description for those units
utilized in this problem



                                                          -----   unit 1
-----

 fuel meat

       1        cuboid         1                             quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +8.86938E+00

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +6.45160E-04

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +9.00225E+02

       2        cuboid         2                             quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.03225E-03

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

       3        cuboid         3                             quadratic
surfaces
```

```
      X**2          Y**2          Z**2           XY            XZ
YZ            X             Y             Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.18080E-02

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 media 1    1          1

 media 3    1          2 -1

 media 2    1          -1 -2 3

 boundary                         3


                                              ******************   global
******************
                                                          -----   unit 2
-----

 array unit

       1        cuboid         1                            quadratic
surfaces

      X**2          Y**2          Z**2           XY            XZ
YZ            X             Y             Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +5.31622E+00 +0.00000E+00 +1.12882E+00

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 array 1              1
```

```
 boundary                          1
1                          fuel bundle

                    -------  unit orientation description for array 1
-------


 z layer 1, x column 1 to 1 left to right   y row 1 to 14  bottom to top

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1
1                                          fuel bundle

                                volumes for those units utilized in this
problem

                        volumes not specified in the input were set to -1.0

                                                 geometry
                            unit     uses    region     mixture
total region volume (cm**3)

                              1        14       1           1
2.47925E+02 +/- 7.84971E-01
                                                 2           3
5.95366E+02 +/- 1.88502E+00
                                                 3           2
```

```
1.84949E+03 +/- 5.85578E+00

                          2         1       1


                                mixture       total mixture volume (cm**3)
total mixture mass (gm)

                                    1         2.47925E+02 +/- 7.84971E-01
1.37533E+03 +/- 4.35453E+00
                                    2         1.84949E+03 +/- 5.85578E+00
1.83832E+03 +/- 5.82041E+00
                                    3         5.95366E+02 +/- 1.88502E+00
1.60868E+03 +/- 5.09333E+00
                                             -------------
-------------
                                              2.69278E+03
4.82233E+03
                                  *****  restart data has been written on
unit 95  *****


*************************************************************************
*****************************************
        ***
***
        ***                                              biasing information
***
        ***
***
        ***     a default weight of    0.500 will be used for all bias
id's.                                                    ***
        ***
***

*************************************************************************
*****************************************

                                  ........ finished in Keno-VI before
tracking       ........

                                  ........     0.01533 minutes were used
processing data.        ........

 volume fraction of fissile material in the system= 9.20704E-02

 start type 6 was used.

 neutrons were started from binary start data on file
keno_start6_file
```

```
 neutrons started in non-fissile mixtures will use the fission spectrum
for mixture     1

   0.00083 minutes were required for starting.   total elapsed time is
0.01617 minutes.
1fuel bundle

                  generation        average         avg k-eff
matrix       matrix k-eff
     generation   k-effective      k-effective       deviation
k-effective       deviation
  keno message number k6-132 follows:
 only 15714 independent fission points were generated for generation 1
          1       7.66775E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15763 independent fission points were generated for generation 2
          2       7.70763E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15833 independent fission points were generated for generation 3
          3       7.74476E-01      7.74476E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.61995E-01      7.68236E-01      6.24025E-03
0.00000E+00      0.00000E+00
          5       7.68964E-01      7.68478E-01      3.61097E-03
0.00000E+00      0.00000E+00
          6       7.70635E-01      7.69018E-01      2.60965E-03
0.00000E+00      0.00000E+00
          7       7.74437E-01      7.70101E-01      2.29367E-03
0.00000E+00      0.00000E+00
          8       7.62718E-01      7.68871E-01      2.24085E-03
0.00000E+00      0.00000E+00
          9       7.67184E-01      7.68630E-01      1.90913E-03
0.00000E+00      0.00000E+00
         10       7.64321E-01      7.68091E-01      1.73889E-03
0.00000E+00      0.00000E+00
         11       7.64411E-01      7.67682E-01      1.58714E-03
0.00000E+00      0.00000E+00
         12       7.62290E-01      7.67143E-01      1.51854E-03
0.00000E+00      0.00000E+00
         13       7.58506E-01      7.66358E-01      1.58218E-03
0.00000E+00      0.00000E+00
         14       7.59974E-01      7.65826E-01      1.53918E-03
0.00000E+00      0.00000E+00
         15       7.62314E-01      7.65556E-01      1.44138E-03
0.00000E+00      0.00000E+00
         16       7.59577E-01      7.65129E-01      1.40112E-03
0.00000E+00      0.00000E+00
         17       7.62529E-01      7.64955E-01      1.31583E-03
0.00000E+00      0.00000E+00
```

18	7.65536E-01	7.64992E-01	1.23138E-03	0.00000E+00
0.00000E+00				
19	7.58443E-01	7.64607E-01	1.21914E-03	0.00000E+00
0.00000E+00				
20	7.77838E-01	7.65342E-01	1.36438E-03	0.00000E+00
0.00000E+00				
21	7.61489E-01	7.65139E-01	1.30641E-03	0.00000E+00
0.00000E+00				
22	7.69601E-01	7.65362E-01	1.25929E-03	0.00000E+00
0.00000E+00				
23	7.65193E-01	7.65354E-01	1.19785E-03	0.00000E+00
0.00000E+00				
24	7.63821E-01	7.65284E-01	1.14423E-03	0.00000E+00
0.00000E+00				
25	7.66999E-01	7.65359E-01	1.09589E-03	0.00000E+00
0.00000E+00				
26	7.65993E-01	7.65385E-01	1.04957E-03	0.00000E+00
0.00000E+00				
27	7.71316E-01	7.67032E-01	4.60988E-03	0.00000E+00
0.00000E+00				
28	7.65841E-01	7.66794E-01	2.67965E-03	0.00000E+00
0.00000E+00				
29	7.63700E-01	7.66278E-01	1.39383E-03	0.00000E+00
0.00000E+00				
30	7.69784E-01	7.66779E-01	1.28311E-03	0.00000E+00
0.00000E+00				
31	7.67668E-01	7.66890E-01	1.09199E-03	0.00000E+00
0.00000E+00				
32	7.71157E-01	7.67364E-01	1.08779E-03	0.00000E+00
0.00000E+00				
33	7.62708E-01	7.66899E-01	1.09150E-03	0.00000E+00
0.00000E+00				
34	7.69539E-01	7.67139E-01	1.17206E-03	0.00000E+00
0.00000E+00				
35	7.68049E-01	7.67215E-01	9.18883E-04	0.00000E+00
0.00000E+00				
36	7.71381E-01	7.67535E-01	1.06756E-03	0.00000E+00
0.00000E+00				
37	7.66381E-01	7.67453E-01	9.73949E-04	0.00000E+00
0.00000E+00				
38	7.71026E-01	7.67691E-01	1.02699E-03	0.00000E+00
0.00000E+00				
39	7.63123E-01	7.67405E-01	1.04075E-03	0.00000E+00
0.00000E+00				
40	7.64299E-01	7.67223E-01	9.38411E-04	0.00000E+00
0.00000E+00				
41	7.71857E-01	7.67480E-01	7.92857E-04	0.00000E+00
0.00000E+00				
42	7.75773E-01	7.67917E-01	8.78451E-04	0.00000E+00
0.00000E+00				
43	7.63337E-01	7.67688E-01	8.65279E-04	0.00000E+00
0.00000E+00				

44	7.64684E-01	7.67545E-01	8.34538E-04	0.00000E+00
0.00000E+00				
45	7.61985E-01	7.67292E-01	8.36883E-04	0.00000E+00
0.00000E+00				
46	7.67285E-01	7.67292E-01	7.97937E-04	0.00000E+00
0.00000E+00				
47	7.64625E-01	7.67180E-01	7.71235E-04	0.00000E+00
0.00000E+00				
48	7.65960E-01	7.67132E-01	7.40154E-04	0.00000E+00
0.00000E+00				
49	7.66498E-01	7.67107E-01	7.10384E-04	0.00000E+00
0.00000E+00				
50	7.71800E-01	7.67281E-01	7.06007E-04	0.00000E+00
0.00000E+00				
51	7.66427E-01	7.67251E-01	6.80093E-04	0.00000E+00
0.00000E+00				
52	7.68285E-01	7.67286E-01	6.56396E-04	0.00000E+00
0.00000E+00				
53	7.59933E-01	7.67041E-01	6.82281E-04	0.00000E+00
0.00000E+00				
54	7.61991E-01	7.66878E-01	6.80326E-04	0.00000E+00
0.00000E+00				
55	7.54790E-01	7.66500E-01	1.10682E-03	0.00000E+00
0.00000E+00				
56	7.68944E-01	7.66574E-01	1.02488E-03	0.00000E+00
0.00000E+00				
57	7.68218E-01	7.66623E-01	9.58392E-04	0.00000E+00
0.00000E+00				
58	7.70737E-01	7.66740E-01	9.31256E-04	0.00000E+00
0.00000E+00				
59	7.59483E-01	7.66539E-01	9.79191E-04	0.00000E+00
0.00000E+00				
60	7.69247E-01	7.66612E-01	7.65138E-04	0.00000E+00
0.00000E+00				
61	7.69280E-01	7.66682E-01	7.26171E-04	0.00000E+00
0.00000E+00				
62	7.58982E-01	7.66485E-01	7.01626E-04	0.00000E+00
0.00000E+00				
63	7.69598E-01	7.66563E-01	7.09196E-04	0.00000E+00
0.00000E+00				
64	7.59411E-01	7.66388E-01	7.65285E-04	0.00000E+00
0.00000E+00				
65	7.67108E-01	7.66405E-01	7.47990E-04	0.00000E+00
0.00000E+00				
66	7.61092E-01	7.66282E-01	7.71737E-04	0.00000E+00
0.00000E+00				
67	7.66347E-01	7.66283E-01	7.53130E-04	0.00000E+00
0.00000E+00				
68	7.64771E-01	7.66250E-01	7.42265E-04	0.00000E+00
0.00000E+00				
69	7.65113E-01	7.66225E-01	7.25593E-04	0.00000E+00
0.00000E+00				

70	7.68076E-01	7.66264E-01	7.08399E-04
0.00000E+00	0.00000E+00		
71	7.63037E-01	7.66197E-01	6.98958E-04
0.00000E+00	0.00000E+00		
72	7.66179E-01	7.66197E-01	6.83868E-04
0.00000E+00	0.00000E+00		
73	7.66693E-01	7.66207E-01	6.68444E-04
0.00000E+00	0.00000E+00		
74	7.68872E-01	7.66259E-01	6.56798E-04
0.00000E+00	0.00000E+00		
75	7.68339E-01	7.66299E-01	6.45450E-04
0.00000E+00	0.00000E+00		
76	7.65917E-01	7.66292E-01	6.32062E-04
0.00000E+00	0.00000E+00		
77	7.66450E-01	7.66295E-01	6.19968E-04
0.00000E+00	0.00000E+00		
78	7.62681E-01	7.66229E-01	6.12831E-04
0.00000E+00	0.00000E+00		
79	7.57522E-01	7.66073E-01	6.21942E-04
0.00000E+00	0.00000E+00		
80	7.65810E-01	7.66069E-01	6.11056E-04
0.00000E+00	0.00000E+00		
81	7.62629E-01	7.66009E-01	6.19114E-04
0.00000E+00	0.00000E+00		
82	7.61442E-01	7.65932E-01	6.14045E-04
0.00000E+00	0.00000E+00		
83	7.66135E-01	7.65935E-01	6.03003E-04
0.00000E+00	0.00000E+00		
84	7.69282E-01	7.65990E-01	5.87802E-04
0.00000E+00	0.00000E+00		
85	7.66561E-01	7.65999E-01	5.78034E-04
0.00000E+00	0.00000E+00		
86	7.62987E-01	7.65952E-01	5.65783E-04
0.00000E+00	0.00000E+00		
87	7.65947E-01	7.65952E-01	5.56568E-04
0.00000E+00	0.00000E+00		
88	7.55834E-01	7.65796E-01	5.84290E-04
0.00000E+00	0.00000E+00		
89	7.65783E-01	7.65796E-01	5.75072E-04
0.00000E+00	0.00000E+00		
90	7.64271E-01	7.65773E-01	5.73141E-04
0.00000E+00	0.00000E+00		
91	7.61127E-01	7.65705E-01	5.68789E-04
0.00000E+00	0.00000E+00		
92	7.66921E-01	7.65722E-01	5.59763E-04
0.00000E+00	0.00000E+00		
93	7.59860E-01	7.65639E-01	5.68781E-04
0.00000E+00	0.00000E+00		
94	7.64257E-01	7.65619E-01	5.60182E-04
0.00000E+00	0.00000E+00		
95	7.68018E-01	7.65652E-01	5.47877E-04
0.00000E+00	0.00000E+00		

```
          96       7.67948E-01      7.65684E-01      5.39872E-04
0.00000E+00      0.00000E+00
          97       7.54070E-01      7.65527E-01      5.46354E-04
0.00000E+00      0.00000E+00
          98       7.61467E-01      7.65473E-01      5.38385E-04
0.00000E+00      0.00000E+00
          99       7.63220E-01      7.65443E-01      5.99748E-04
0.00000E+00      0.00000E+00
         100       7.65855E-01      7.65448E-01      5.90960E-04
0.00000E+00      0.00000E+00
         101       7.66911E-01      7.65467E-01      5.76987E-04
0.00000E+00      0.00000E+00
         102       7.69779E-01      7.65522E-01      5.69222E-04
0.00000E+00      0.00000E+00
         103       7.70132E-01      7.65579E-01      5.70016E-04
0.00000E+00      0.00000E+00
                                    restart data was written for
generation  103       random number=AE92704D4E4C6261
         104       7.70805E-01      7.65644E-01      5.81206E-04
0.00000E+00      0.00000E+00
         105       7.69124E-01      7.65686E-01      5.86715E-04
0.00000E+00      0.00000E+00
         106       7.59970E-01      7.65618E-01      5.62609E-04
0.00000E+00      0.00000E+00
         107       7.61538E-01      7.65569E-01      5.55051E-04
0.00000E+00      0.00000E+00
         108       7.60349E-01      7.65508E-01      5.58473E-04
0.00000E+00      0.00000E+00
         109       7.61249E-01      7.65458E-01      5.54460E-04
0.00000E+00      0.00000E+00
         110       7.59569E-01      7.65390E-01      5.81360E-04
0.00000E+00      0.00000E+00
         111       7.58339E-01      7.65310E-01      6.04646E-04
0.00000E+00      0.00000E+00
         112       7.62263E-01      7.65276E-01      6.11306E-04
0.00000E+00      0.00000E+00
         113       7.59789E-01      7.65215E-01      6.24894E-04
0.00000E+00      0.00000E+00
         114       7.60907E-01      7.65168E-01      6.32819E-04
0.00000E+00      0.00000E+00
         115       7.66607E-01      7.65183E-01      6.20725E-04
0.00000E+00      0.00000E+00
         116       7.72890E-01      7.65266E-01      6.10421E-04
0.00000E+00      0.00000E+00
         117       7.65409E-01      7.65268E-01      6.03696E-04
0.00000E+00      0.00000E+00
         118       7.68692E-01      7.65304E-01      6.00706E-04
0.00000E+00      0.00000E+00
         119       7.67687E-01      7.65329E-01      5.97107E-04
0.00000E+00      0.00000E+00
         120       7.59622E-01      7.65270E-01      5.78372E-04
0.00000E+00      0.00000E+00
```

```
        121       7.72187E-01      7.65340E-01      5.72588E-04
0.00000E+00      0.00000E+00
        122       7.62475E-01      7.65311E-01      5.64660E-04
0.00000E+00      0.00000E+00
        123       7.69877E-01      7.65357E-01      5.66521E-04
0.00000E+00      0.00000E+00

  keno message number k6-123          execution terminated due to
completion of the specified number of generations.
                                    restart data was written for
generation  123       random number=0D48C795B8ED0E47
                                    A start type 6 file will be written to
keno_start6_file
1                                                  fuel bundle

 lifetime =  1.55206E-05 + or -  1.17463E-08             generation time
=  2.99644E-05 + or -  2.33102E-08
 nu bar   =  2.43895E+00 + or -  1.07249E-05       average fission group
=  2.17565E+02 + or -  1.03023E-02
                     energy(ev) of the average lethargy causing fission
=  5.65450E-02 + or -  1.29619E-04
                                                 system mean free path (cm)
=  6.52481E-01 + or -  1.49156E-04

 no. of initial
deviation of
  generations      average                            67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

      23          0.76536   + or - 0.00057     0.76479 to 0.76592
0.76422 to 0.76649    0.76366 to 0.76706    2000000       7.5722

      24          0.76537   + or - 0.00057     0.76480 to 0.76595
0.76423 to 0.76652    0.76365 to 0.76709    1980000       7.5428

      25          0.76536   + or - 0.00058     0.76478 to 0.76593
0.76420 to 0.76651    0.76362 to 0.76709    1960000       7.5617

      26          0.76535   + or - 0.00058     0.76477 to 0.76593
0.76419 to 0.76651    0.76360 to 0.76710    1940000       7.5691

      27          0.76529   + or - 0.00058     0.76470 to 0.76587
0.76412 to 0.76645    0.76354 to 0.76704    1920000       7.6472

      28          0.76528   + or - 0.00059     0.76469 to 0.76587
0.76410 to 0.76646    0.76352 to 0.76705    1900000       7.6432

      29          0.76530   + or - 0.00060     0.76470 to 0.76589
0.76411 to 0.76649    0.76351 to 0.76709    1880000       7.5967
```

30	0.76525	+ or - 0.00058	0.76467 to 0.76583	0.76408 to 0.76642	0.76350 to 0.76700	1860000	8.0938
31	0.76522	+ or - 0.00059	0.76464 to 0.76581	0.76405 to 0.76640	0.76346 to 0.76698	1840000	8.1318
32	0.76516	+ or - 0.00059	0.76457 to 0.76575	0.76398 to 0.76633	0.76340 to 0.76692	1820000	8.2503
37	0.76502	+ or - 0.00059	0.76443 to 0.76561	0.76384 to 0.76619	0.76325 to 0.76678	1720000	9.0115
42	0.76476	+ or - 0.00060	0.76416 to 0.76535	0.76357 to 0.76595	0.76297 to 0.76654	1620000	8.4951
47	0.76478	+ or - 0.00063	0.76415 to 0.76542	0.76351 to 0.76605	0.76288 to 0.76669	1520000	8.4193
52	0.76457	+ or - 0.00066	0.76391 to 0.76523	0.76325 to 0.76588	0.76260 to 0.76654	1420000	8.5629
57	0.76470	+ or - 0.00071	0.76400 to 0.76541	0.76329 to 0.76612	0.76258 to 0.76683	1320000	7.7656
62	0.76464	+ or - 0.00075	0.76389 to 0.76539	0.76314 to 0.76614	0.76239 to 0.76689	1220000	7.9917
67	0.76463	+ or - 0.00082	0.76380 to 0.76545	0.76298 to 0.76628	0.76216 to 0.76710	1120000	7.7884
72	0.76455	+ or - 0.00090	0.76365 to 0.76545	0.76275 to 0.76635	0.76185 to 0.76725	1020000	7.6834
77	0.76426	+ or - 0.00097	0.76329 to 0.76523	0.76232 to 0.76620	0.76135 to 0.76716	920000	7.9604
82	0.76453	+ or - 0.00109	0.76344 to 0.76562	0.76236 to 0.76670	0.76127 to 0.76779	820000	7.8235
87	0.76430	+ or - 0.00124	0.76306 to 0.76554	0.76181 to 0.76679	0.76057 to 0.76803	720000	7.5097
92	0.76454	+ or - 0.00141	0.76313 to 0.76596	0.76172 to 0.76737	0.76031 to 0.76878	620000	7.1408
97	0.76487	+ or - 0.00175	0.76313 to 0.76662	0.76138 to 0.76837	0.75963 to 0.77011	520000	4.3064
102	0.76474	+ or - 0.00205	0.76269 to 0.76679	0.76064 to 0.76883	0.75859 to 0.77088	420000	4.6019
107	0.76424	+ or - 0.00291	0.76133 to 0.76716				

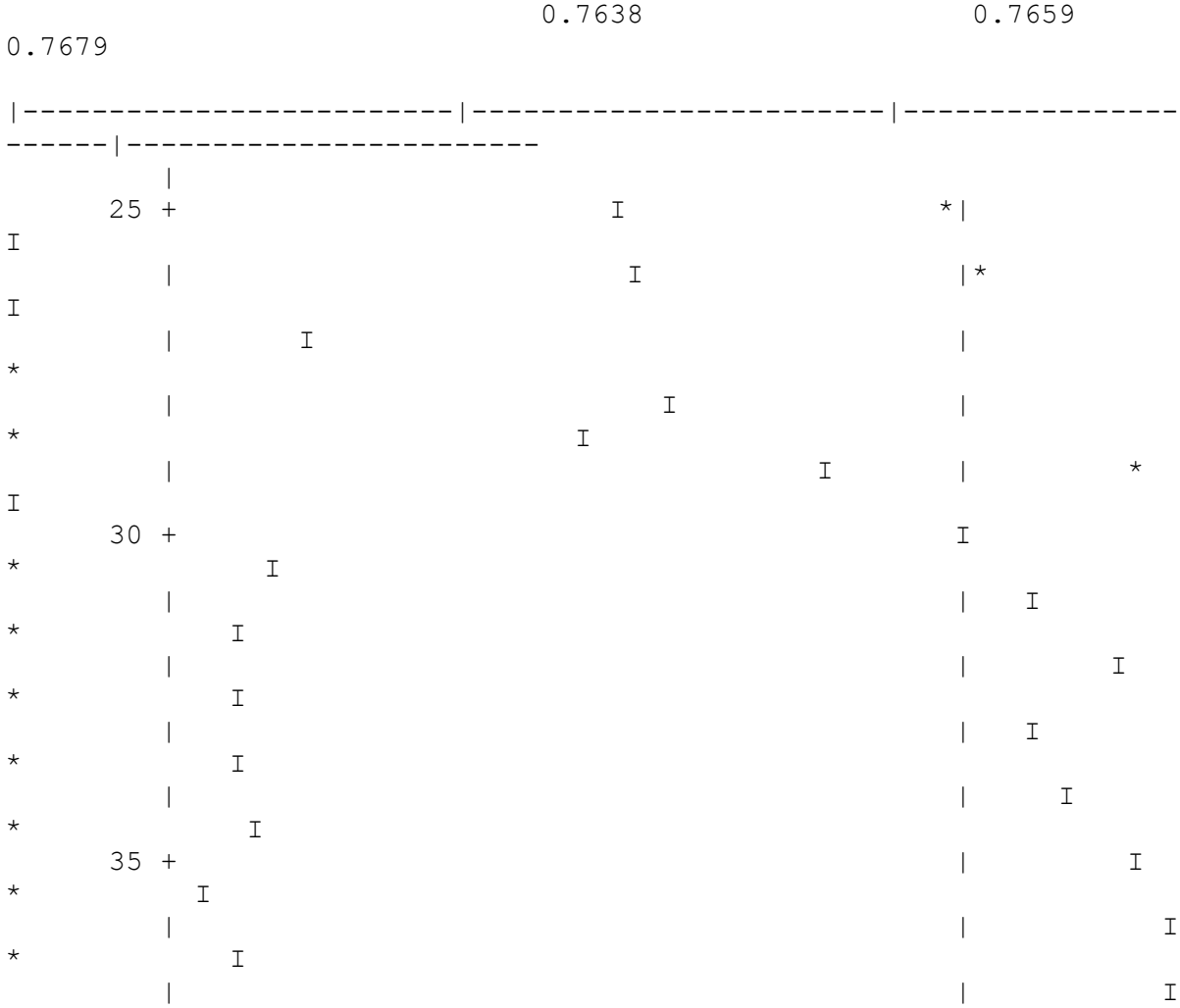
0.75842 to 0.77007 0.75550 to 0.77299 320000 4.3961

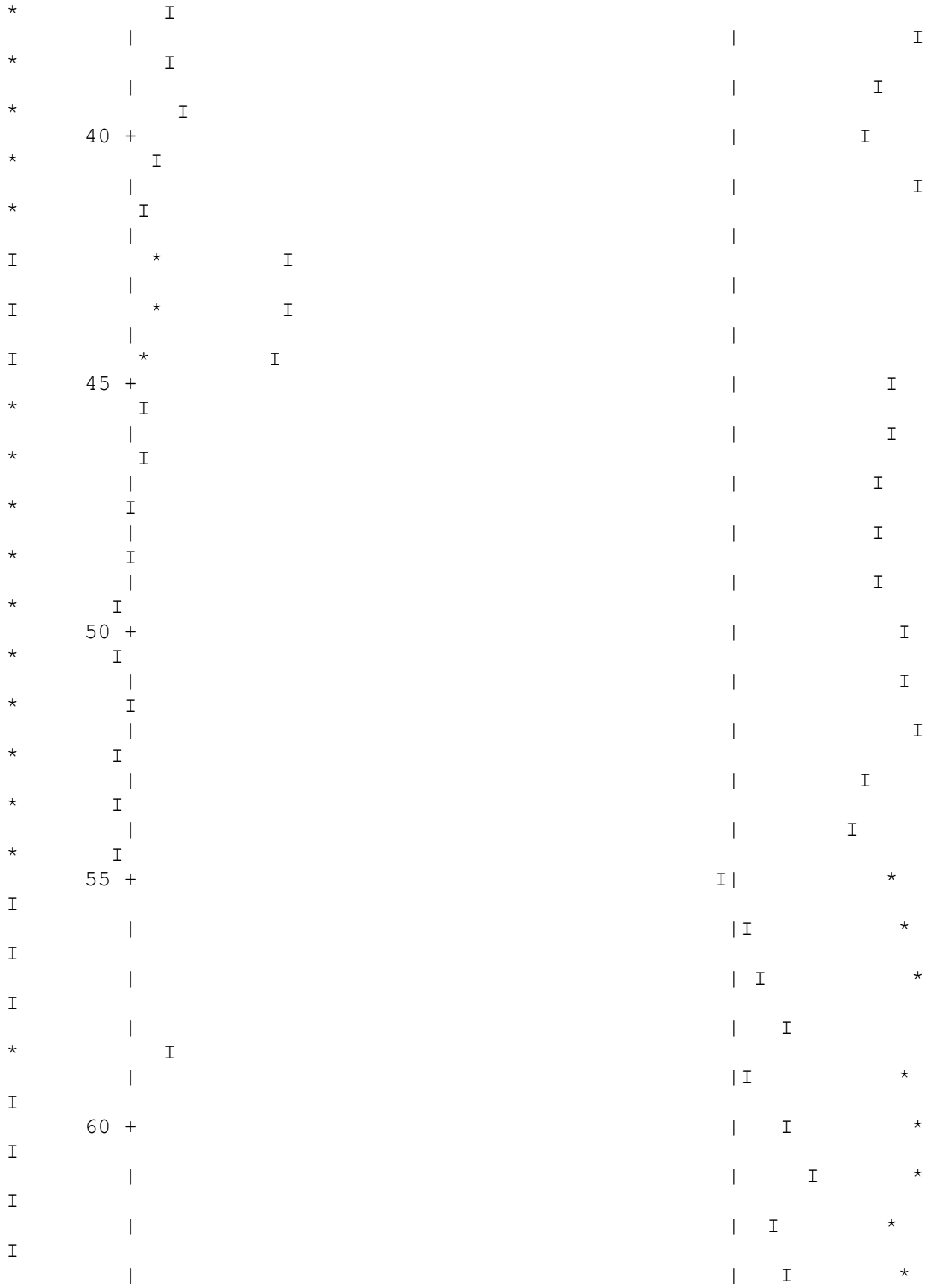
112 0.76601 + or - 0.00193 0.76408 to 0.76795
0.76214 to 0.76988 0.76021 to 0.77182 220000 16.0134
1 fuel bundle

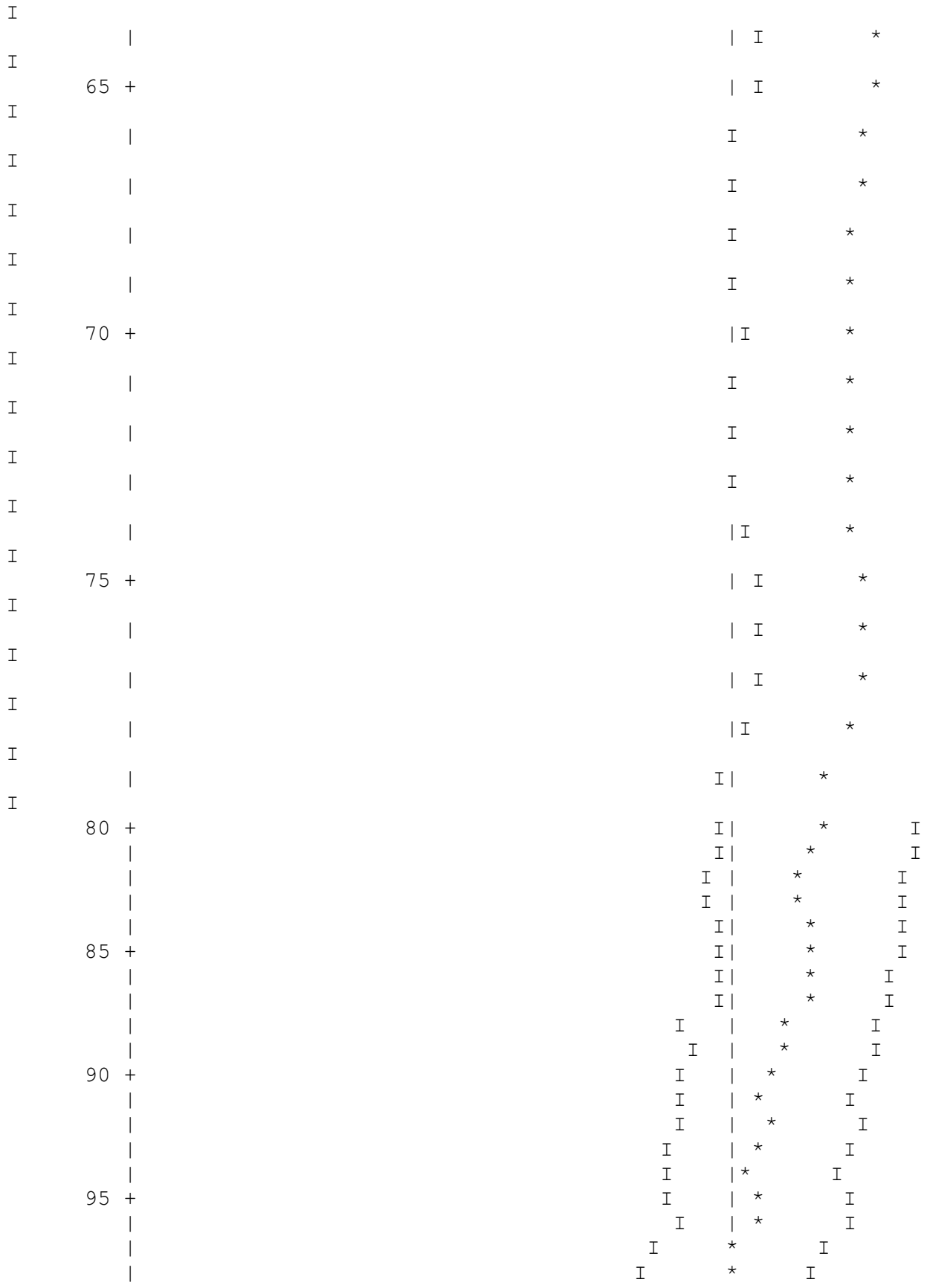
no. of initial
deviation of
generations average 67 per cent
95 per cent 99 per cent number of variance
skipped k-effective deviation confidence interval
confidence interval confidence interval histories (per cent)

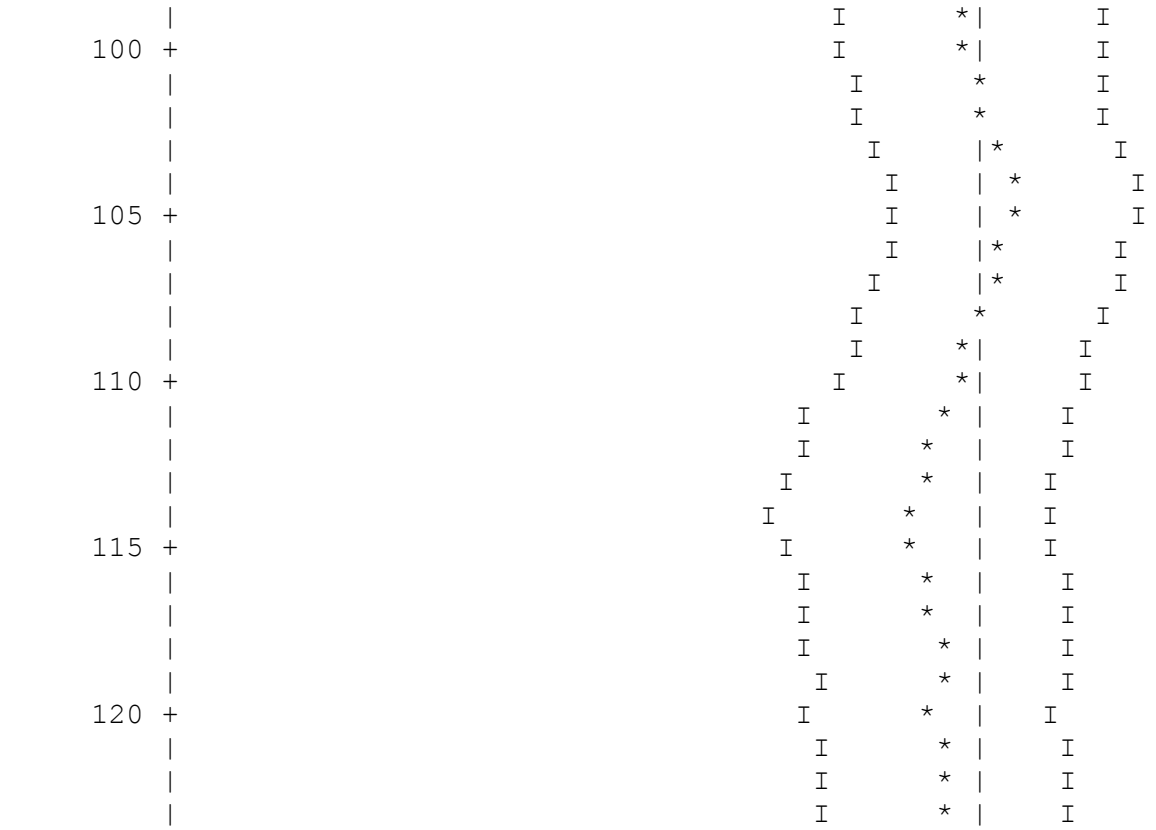
117 0.76676 + or - 0.00425 0.76251 to 0.77100
0.75827 to 0.77525 0.75402 to 0.77949 120000 10.6690
1 fuel bundle

plot of average k-effective by generation run.
the line represents k-eff = 0.76547 + or - 0.00053 which occurs for
98 generations run.




40
45
50
55
60

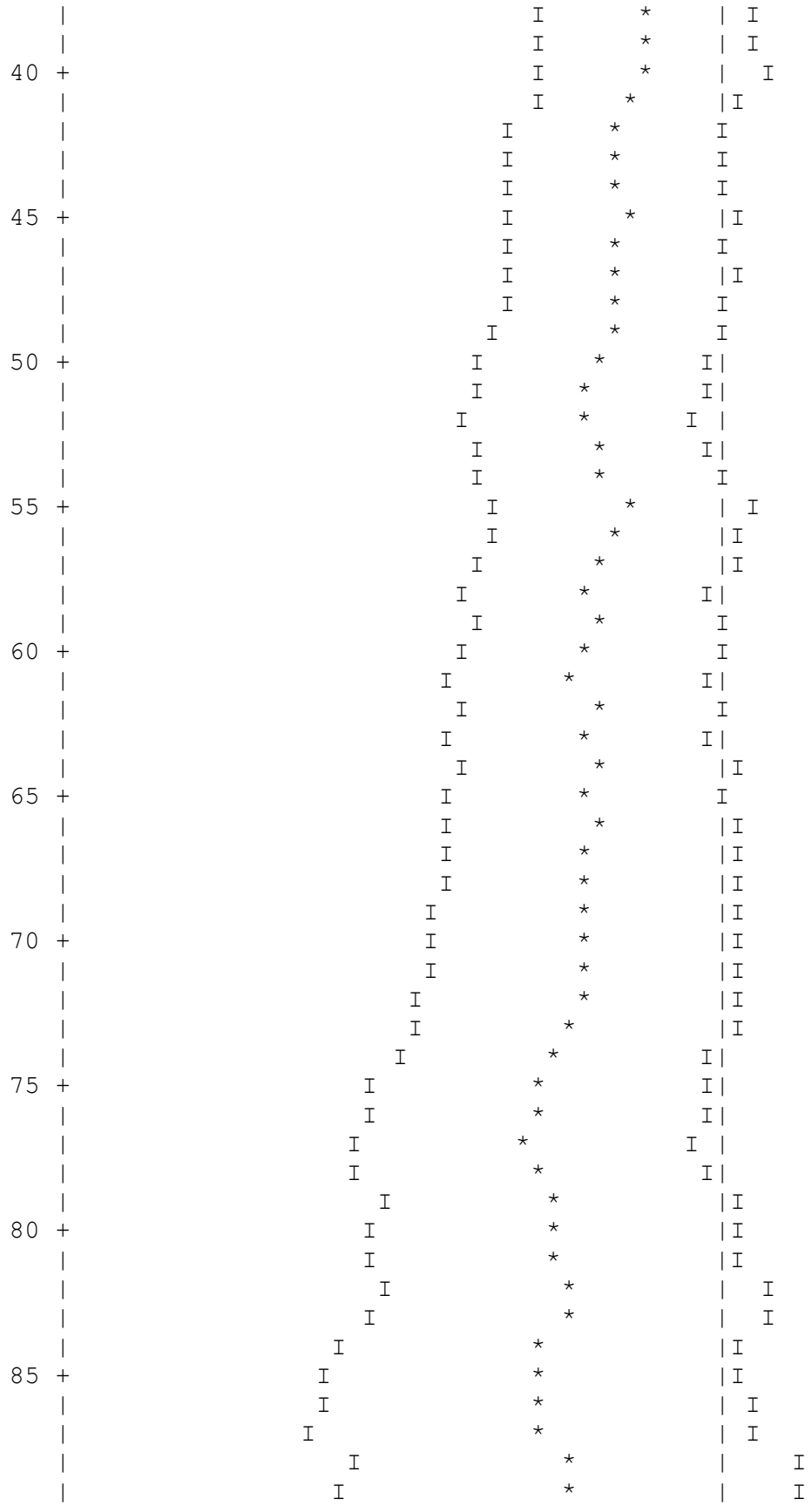




1 fuel bundle

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7653 + or - 0.0005 which occurs for 23 generations skipped.

0.7639 0.7660 0.7682


40
45
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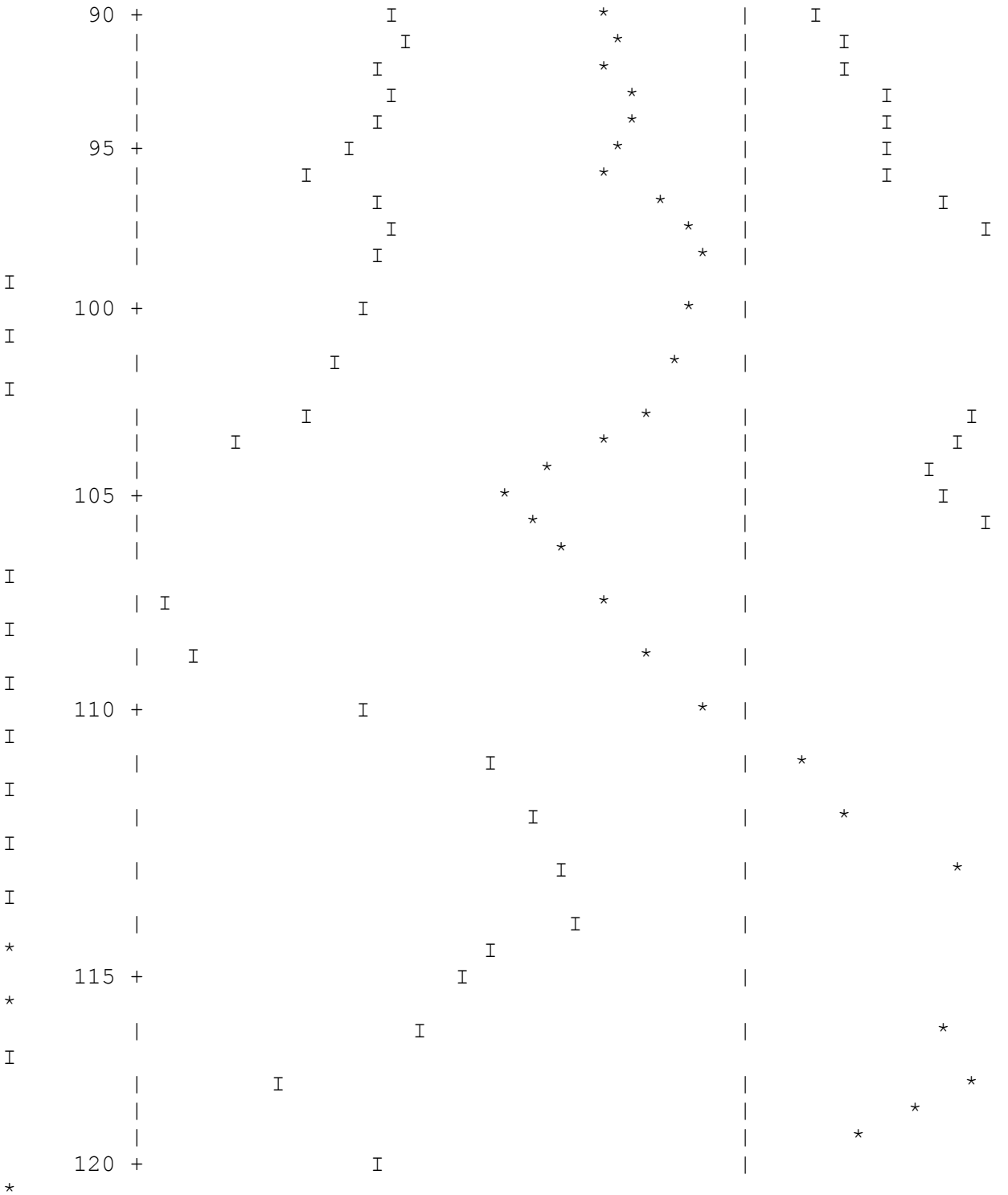
55
60
65
70
75
80
85



k-effective satisfies the chi**2 test for normality at the 95 % level

1 fuel bundle

skipping 23 generations

group	fission	unit	region	fissions	percent

	absorptions	percent fraction deviation	leakage	percent deviation
1	0.0000		0.00000E+00	0.0000
	0.00000E+00	0.0000	0.00000E+00	0.0000
2	0.0000		0.00000E+00	0.0000
	2.73340E-07	36.4455	0.00000E+00	0.0000
3	0.0000		1.28553E-05	12.8459
	2.05646E-05	5.3951	0.00000E+00	0.0000
4	0.0000		1.83137E-05	10.9289
	3.14680E-05	4.3646	0.00000E+00	0.0000
5	0.0000		2.77115E-05	7.0495
	5.43889E-05	3.2034	0.00000E+00	0.0000
6	0.0001		9.71081E-05	3.5576
	2.27378E-04	1.6492	0.00000E+00	0.0000
7	0.0002		1.19058E-04	3.2646
	2.06242E-04	1.5116	0.00000E+00	0.0000
8	0.0003		2.45851E-04	2.1850
	3.24733E-04	0.8882	0.00000E+00	0.0000
9	0.0005		3.81714E-04	1.1341
	4.41532E-04	0.5874	0.00000E+00	0.0000
10	0.0003		2.02406E-04	1.6377
	2.07246E-04	0.7422	0.00000E+00	0.0000
11	0.0012		9.03019E-04	0.6892
	5.21775E-04	0.4587	0.00000E+00	0.0000
12	0.0010		7.66531E-04	0.8007
	3.00461E-04	0.7878	0.00000E+00	0.0000
13	0.0003		2.32038E-04	1.4553
	9.21572E-05	1.4394	0.00000E+00	0.0000
14	0.0013		1.00410E-03	0.6152
	4.10412E-04	0.6089	0.00000E+00	0.0000
15	0.0010		7.59395E-04	0.6512
	3.27408E-04	0.6439	0.00000E+00	0.0000
16	0.0002		1.89000E-04	1.2589
	8.68490E-05	1.2390	0.00000E+00	0.0000
17	0.0001		6.72630E-05	1.7506
	3.27031E-05	1.7201	0.00000E+00	0.0000
18	0.0001		5.20975E-05	1.8190
	2.63117E-05	1.7826	0.00000E+00	0.0000
19	0.0001		7.95319E-05	1.4827
	4.20613E-05	1.4518	0.00000E+00	0.0000
20	0.0001		5.88506E-05	1.6438
	3.22589E-05	1.6073	0.00000E+00	0.0000
21	0.0002		1.18186E-04	0.9481
	6.67542E-05	0.9270	0.00000E+00	0.0000
22	0.0001		1.05620E-04	1.1527
	6.25154E-05	1.1275	0.00000E+00	0.0000
23	0.0001		1.06375E-04	1.2182
	6.49309E-05	1.1917	0.00000E+00	0.0000
24	0.0000		2.39771E-05	2.4301
	1.48932E-05	2.3669	0.00000E+00	0.0000

25	0.0000		3.08113E-05	1.6917	
1.92418E-05	1.6468		0.00000E+00	0.0000	
26	0.0000		1.70645E-05	2.0790	
1.07248E-05	2.0115		0.00000E+00	0.0000	
27	0.0001		5.23262E-05	1.4042	
3.26555E-05	1.3726		0.00000E+00	0.0000	
28	0.0001		9.77331E-05	1.0062	
6.09550E-05	0.9920		0.00000E+00	0.0000	
29	0.0001		9.93028E-05	1.2011	
6.25372E-05	1.1849		0.00000E+00	0.0000	
30	0.0000		1.28229E-05	2.7898	
8.04227E-06	2.7700		0.00000E+00	0.0000	
31	0.0001		9.46036E-05	1.1403	
5.97843E-05	1.1259		0.00000E+00	0.0000	
32	0.0000		3.82200E-05	1.5720	
2.44306E-05	1.5424		0.00000E+00	0.0000	
33	0.0000		3.32018E-05	1.3951	
2.07887E-05	1.3783		0.00000E+00	0.0000	
34	0.0001		7.60579E-05	1.0294	
4.77741E-05	1.0133		0.00000E+00	0.0000	
35	0.0001		4.54265E-05	1.4318	
2.85066E-05	1.4100		0.00000E+00	0.0000	
36	0.0001		4.33263E-05	1.5058	
2.68227E-05	1.4913		0.00000E+00	0.0000	
37	0.0000		2.85184E-05	1.9555	
1.78959E-05	1.9151		0.00000E+00	0.0000	
38	0.0000		3.47257E-05	1.7338	
2.18542E-05	1.6954		0.00000E+00	0.0000	
39	0.0002		1.31275E-04	0.9954	
8.35215E-05	0.9713		0.00000E+00	0.0000	
40	0.0002		1.20744E-04	0.8812	
7.80553E-05	0.8627		0.00000E+00	0.0000	
41	0.0002		1.59747E-04	0.7253	
1.06741E-04	0.6993		0.00000E+00	0.0000	
42	0.0002		1.39716E-04	0.8142	
9.50242E-05	0.7957		0.00000E+00	0.0000	
43	0.0001		8.01236E-05	1.2694	
5.75032E-05	1.2193		0.00000E+00	0.0000	
44	0.0002		1.15813E-04	1.0219	
8.49791E-05	0.9835		0.00000E+00	0.0000	
45	0.0001		6.00880E-05	0.9876	
4.83849E-05	0.9103		0.00000E+00	0.0000	
46	0.0000		1.42026E-05	1.8706	
1.14286E-05	1.7389		0.00000E+00	0.0000	
47	0.0001		4.17947E-05	1.5345	
3.24292E-05	1.4719		0.00000E+00	0.0000	
48	0.0000		1.18620E-05	3.9053	
9.21295E-06	3.7907		0.00000E+00	0.0000	
49	0.0001		8.08936E-05	1.4714	
6.37873E-05	1.4387		0.00000E+00	0.0000	
50	0.0001		5.46306E-05	1.7213	
4.50264E-05	1.6871		0.00000E+00	0.0000	

```
   51    0.0000                1.49184E-05     3.3273
1.24006E-05     3.2618       0.00000E+00     0.0000
   52    0.0001                3.96752E-05     2.0813
3.43255E-05     2.0297       0.00000E+00     0.0000
   53    0.0002                1.57877E-04     0.8584
1.55106E-04     0.7918       0.00000E+00     0.0000
   54    0.0001                7.73867E-05     1.8107
7.17280E-05     1.7449       0.00000E+00     0.0000
   55    0.0002                1.63512E-04     1.3396
1.49933E-04     1.3052       0.00000E+00     0.0000
   56    0.0002                1.17180E-04     1.6062
1.08675E-04     1.5678       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

   57    0.0002                1.47341E-04     1.6280
1.33753E-04     1.5892       0.00000E+00     0.0000
   58    0.0001                8.33097E-05     2.1678
7.30085E-05     2.1091       0.00000E+00     0.0000
   59    0.0002                1.59480E-04     1.6572
1.43151E-04     1.5884       0.00000E+00     0.0000
   60    0.0004                2.73506E-04     1.3706
2.47811E-04     1.2874       0.00000E+00     0.0000
   61    0.0000                2.84925E-05     3.5635
2.19100E-05     3.4501       0.00000E+00     0.0000
   62    0.0002                1.63969E-04     1.8257
1.37511E-04     1.7772       0.00000E+00     0.0000
   63    0.0002                1.17352E-04     2.1383
9.67556E-05     2.0620       0.00000E+00     0.0000
   64    0.0001                9.57545E-05     2.3527
7.72841E-05     2.2710       0.00000E+00     0.0000
   65    0.0000                3.50724E-05     3.3024
3.46596E-05     3.1905       0.00000E+00     0.0000
   66    0.0002                1.71647E-04     1.8484
1.52289E-04     1.7916       0.00000E+00     0.0000
   67    0.0002                1.43907E-04     2.0984
1.17757E-04     2.0305       0.00000E+00     0.0000
   68    0.0000                2.71458E-05     4.7647
2.34676E-05     4.5976       0.00000E+00     0.0000
   69    0.0004                3.03083E-04     1.3811
2.37826E-04     1.3369       0.00000E+00     0.0000
   70    0.0003                2.05382E-04     1.5676
1.86986E-04     1.5052       0.00000E+00     0.0000
   71    0.0005                4.19059E-04     1.4912
3.47071E-04     1.4440       0.00000E+00     0.0000
   72    0.0001                4.77406E-05     5.3857
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2.82270E-05	5.2513	0.00000E+00	0.0000				
73	0.0004	3.18374E-04	1.6525				
2.42863E-04	1.5685	0.00000E+00	0.0000				
74	0.0014	1.05870E-03	0.9419				
7.69939E-04	0.9014	0.00000E+00	0.0000				
75	0.0001	1.09026E-04	2.9425				
8.39676E-05	2.8031	0.00000E+00	0.0000				
76	0.0006	4.67628E-04	1.8192				
2.96796E-04	1.7577	0.00000E+00	0.0000				
77	0.0005	3.64736E-04	1.8914				
2.61847E-04	1.8150	0.00000E+00	0.0000				
78	0.0000	7.24327E-06	3.8461				
7.08500E-05	3.8059	0.00000E+00	0.0000				
79	0.0002	1.88292E-04	2.3255				
1.26548E-04	2.2385	0.00000E+00	0.0000				
80	0.0001	5.98984E-05	3.5255				
7.99454E-05	3.4271	0.00000E+00	0.0000				
81	0.0014	1.08164E-03	1.2854				
7.94665E-04	1.2324	0.00000E+00	0.0000				
82	0.0001	6.74204E-05	4.0962				
4.03883E-05	3.8952	0.00000E+00	0.0000				
83	0.0002	1.38775E-04	3.7852				
1.53242E-04	3.7139	0.00000E+00	0.0000				
84	0.0001	7.83740E-05	3.3742				
7.96802E-05	3.1352	0.00000E+00	0.0000				
85	0.0003	2.00845E-04	2.2667				
2.47211E-04	2.2033	0.00000E+00	0.0000				
86	0.0003	2.56034E-04	2.8403				
2.06322E-04	2.6956	0.00000E+00	0.0000				
87	0.0004	3.33941E-04	2.2322				
2.07736E-04	2.1400	0.00000E+00	0.0000				
88	0.0001	5.21052E-05	3.9756				
9.47473E-05	3.8690	0.00000E+00	0.0000				
89	0.0001	9.90930E-05	3.3485				
6.84696E-05	3.0796	0.00000E+00	0.0000				
90	0.0003	2.14444E-04	3.0134				
1.26907E-04	2.8772	0.00000E+00	0.0000				
91	0.0003	1.98401E-04	2.6648				
1.25168E-04	2.5188	0.00000E+00	0.0000				
92	0.0000	3.14150E-05	2.9428				
2.05476E-04	2.8812	0.00000E+00	0.0000				
93	0.0002	1.29631E-04	3.5050				
1.05398E-04	3.2621	0.00000E+00	0.0000				
94	0.0001	1.11166E-04	4.4399				
6.24340E-05	4.1667	0.00000E+00	0.0000				
95	0.0008	6.14464E-04	2.0299				
3.78908E-04	1.9679	0.00000E+00	0.0000				
96	0.0002	1.62024E-04	4.1268				
8.20101E-05	3.9561	0.00000E+00	0.0000				
97	0.0004	2.88196E-04	3.5874				
1.64911E-04	3.5120	0.00000E+00	0.0000				
98	0.0001	9.84397E-05	4.5517				

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9.45656E-05     4.3789       0.00000E+00     0.0000
   99    0.0001                  1.04650E-04     4.5714
7.01364E-05     4.4163       0.00000E+00     0.0000
  100    0.0002                  1.33580E-04     4.4466
8.91479E-05     4.2713       0.00000E+00     0.0000
  101    0.0001                  1.09368E-04     3.3877
6.96014E-05     3.1425       0.00000E+00     0.0000
  102    0.0002                  1.70377E-04     4.0151
9.47481E-05     3.8658       0.00000E+00     0.0000
  103    0.0001                  9.35722E-05     3.9121
9.14137E-05     3.7018       0.00000E+00     0.0000
  104    0.0002                  1.71114E-04     3.0970
1.35519E-04     2.9889       0.00000E+00     0.0000
  105    0.0002                  1.22819E-04     3.3261
8.12106E-05     3.1203       0.00000E+00     0.0000
  106    0.0002                  1.68575E-04     3.9919
1.25410E-04     3.9344       0.00000E+00     0.0000
  107    0.0001                  6.44350E-05     3.2800
6.51119E-05     3.0825       0.00000E+00     0.0000
  108    0.0000                  3.43684E-05     2.3511
1.48523E-04     2.2906       0.00000E+00     0.0000
  109    0.0002                  1.31733E-04     2.1900
4.37068E-04     2.1597       0.00000E+00     0.0000
  110    0.0008                  6.34111E-04     2.8600
3.91109E-04     2.8337       0.00000E+00     0.0000
  111    0.0002                  1.54247E-04     4.1918
1.41731E-04     4.0829       0.00000E+00     0.0000
  112    0.0002                  1.16423E-04     4.7863
1.22779E-04     4.6962       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  113    0.0002                  1.27884E-04     4.0244
1.11697E-04     3.7609       0.00000E+00     0.0000
  114    0.0000                  1.19480E-05     6.5678
1.60746E-05     5.5125       0.00000E+00     0.0000
  115    0.0001                  7.25705E-05     4.3546
8.43989E-05     4.0073       0.00000E+00     0.0000
  116    0.0002                  1.89095E-04     2.9844
1.42525E-04     2.6851       0.00000E+00     0.0000
  117    0.0006                  4.75257E-04     2.6460
2.53986E-04     2.4812       0.00000E+00     0.0000
  118    0.0008                  5.91589E-04     2.1805
4.61713E-04     2.0907       0.00000E+00     0.0000
  119    0.0002                  1.36664E-04     2.2296
3.53223E-04     2.1494       0.00000E+00     0.0000
```

120	0.0002		1.64050E-04	2.2734	
6.24583E-04	2.2399		0.00000E+00	0.0000	
121	0.0007		5.14048E-04	2.6066	
3.95595E-04	2.5430		0.00000E+00	0.0000	
122	0.0001		1.04219E-04	4.5739	
8.13884E-05	4.2674		0.00000E+00	0.0000	
123	0.0003		2.10878E-04	2.8121	
1.49850E-04	2.4814		0.00000E+00	0.0000	
124	0.0003		2.32730E-04	2.8711	
1.92112E-04	2.6775		0.00000E+00	0.0000	
125	0.0002		1.40841E-04	3.3307	
1.29218E-04	3.0058		0.00000E+00	0.0000	
126	0.0001		9.80564E-05	3.6758	
8.83968E-05	3.2193		0.00000E+00	0.0000	
127	0.0005		3.90869E-04	3.2053	
1.92017E-04	3.0305		0.00000E+00	0.0000	
128	0.0003		2.31765E-04	2.8008	
1.42224E-04	2.5044		0.00000E+00	0.0000	
129	0.0006		4.59329E-04	2.3600	
4.22501E-04	2.2497		0.00000E+00	0.0000	
130	0.0002		1.17388E-04	3.5487	
2.86294E-04	3.4429		0.00000E+00	0.0000	
131	0.0004		3.01831E-04	2.4215	
2.41812E-04	2.0579		0.00000E+00	0.0000	
132	0.0007		5.05193E-04	2.3084	
3.10924E-04	2.1145		0.00000E+00	0.0000	
133	0.0013		1.03020E-03	2.0715	
6.51583E-04	1.9656		0.00000E+00	0.0000	
134	0.0001		9.17210E-05	1.7843	
2.38446E-04	1.4947		0.00000E+00	0.0000	
135	0.0002		1.70043E-04	3.1425	
2.52337E-04	3.0615		0.00000E+00	0.0000	
136	0.0001		4.49882E-05	2.1598	
6.98479E-04	2.1263		0.00000E+00	0.0000	
137	0.0000		1.93001E-05	0.9438	
3.47293E-03	0.9413		0.00000E+00	0.0000	
138	0.0004		3.06232E-04	2.2700	
7.98030E-04	2.2383		0.00000E+00	0.0000	
139	0.0002		1.82155E-04	3.3052	
2.23797E-04	3.1098		0.00000E+00	0.0000	
140	0.0003		2.18411E-04	1.9844	
2.89734E-04	1.7428		0.00000E+00	0.0000	
141	0.0001		8.12051E-05	2.5926	
2.55348E-04	2.3106		0.00000E+00	0.0000	
142	0.0001		6.42572E-05	3.1318	
2.22522E-04	2.8589		0.00000E+00	0.0000	
143	0.0001		8.05260E-05	2.2697	
1.72884E-04	1.3740		0.00000E+00	0.0000	
144	0.0000		3.27437E-05	3.1069	
7.21545E-05	1.8525		0.00000E+00	0.0000	
145	0.0005		3.85476E-04	3.0686	
3.02372E-04	2.7769		0.00000E+00	0.0000	

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  146    0.0004                3.44085E-04     2.7224
2.51085E-04     2.2124       0.00000E+00     0.0000
  147    0.0002                1.62539E-04     4.5244
1.05454E-04     3.8597       0.00000E+00     0.0000
  148    0.0001                5.61054E-05     6.2939
3.78819E-05     5.0244       0.00000E+00     0.0000
  149    0.0000                2.93867E-05     6.9423
2.05096E-05     5.3142       0.00000E+00     0.0000
  150    0.0001                8.57802E-05     4.2498
6.28314E-05     3.1630       0.00000E+00     0.0000
  151    0.0001                6.64836E-05     4.3010
5.65196E-05     2.9842       0.00000E+00     0.0000
  152    0.0001                4.30304E-05     5.0169
4.82342E-05     3.1419       0.00000E+00     0.0000
  153    0.0001                4.03051E-05     4.5757
4.57451E-05     2.6601       0.00000E+00     0.0000
  154    0.0001                4.86314E-05     4.8233
5.05671E-05     2.8601       0.00000E+00     0.0000
  155    0.0001                4.88191E-05     4.6031
4.85540E-05     2.7200       0.00000E+00     0.0000
  156    0.0001                4.48490E-05     4.9733
4.49428E-05     2.9504       0.00000E+00     0.0000
  157    0.0001                6.06899E-05     4.1110
5.86610E-05     2.5377       0.00000E+00     0.0000
  158    0.0001                6.92522E-05     3.2059
6.93809E-05     2.0748       0.00000E+00     0.0000
  159    0.0002                1.48856E-04     2.8485
2.06959E-04     2.3828       0.00000E+00     0.0000
  160    0.0001                6.48423E-05     4.7886
7.57815E-05     3.6885       0.00000E+00     0.0000
  161    0.0001                6.69964E-05     3.8991
6.83711E-05     2.4624       0.00000E+00     0.0000
  162    0.0001                9.22239E-05     3.8816
8.49095E-05     2.4260       0.00000E+00     0.0000
  163    0.0001                9.56148E-05     3.6327
8.77349E-05     2.3204       0.00000E+00     0.0000
  164    0.0001                1.05005E-04     3.9028
9.59469E-05     2.5094       0.00000E+00     0.0000
  165    0.0002                1.15960E-04     3.7508
1.05641E-04     2.3761       0.00000E+00     0.0000
  166    0.0001                6.99999E-05     4.4462
6.43234E-05     2.8485       0.00000E+00     0.0000
  167    0.0001                8.00799E-05     4.1742
7.15877E-05     2.7606       0.00000E+00     0.0000
  168    0.0001                8.36537E-05     4.0386
7.56748E-05     2.6433       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
```

	fraction			deviation	deviation
169	0.0001		1.10717E-04	3.3798	
9.58262E-05	2.4120		0.00000E+00	0.0000	
170	0.0002		1.36693E-04	3.5342	
1.16412E-04	2.6386		0.00000E+00	0.0000	
171	0.0001		9.44237E-05	5.0076	
7.35789E-05	3.9252		0.00000E+00	0.0000	
172	0.0002		1.41936E-04	4.7221	
1.00097E-04	3.9776		0.00000E+00	0.0000	
173	0.0003		1.94775E-04	4.3654	
1.28211E-04	3.7989		0.00000E+00	0.0000	
174	0.0004		2.72885E-04	4.2652	
1.68500E-04	3.8253		0.00000E+00	0.0000	
175	0.0001		1.14214E-04	6.1153	
6.87579E-05	5.5432		0.00000E+00	0.0000	
176	0.0002		1.14979E-04	5.8849	
6.85824E-05	5.2896		0.00000E+00	0.0000	
177	0.0002		1.17784E-04	6.2600	
6.94475E-05	5.6309		0.00000E+00	0.0000	
178	0.0001		1.11082E-04	6.2576	
6.54987E-05	5.6189		0.00000E+00	0.0000	
179	0.0002		1.25219E-04	5.6047	
7.22861E-05	5.0472		0.00000E+00	0.0000	
180	0.0002		1.14965E-04	6.1391	
6.66725E-05	5.4571		0.00000E+00	0.0000	
181	0.0002		1.15895E-04	6.3720	
6.67048E-05	5.6402		0.00000E+00	0.0000	
182	0.0001		1.04660E-04	6.0460	
6.07097E-05	5.3315		0.00000E+00	0.0000	
183	0.0001		1.13828E-04	5.7703	
6.52871E-05	5.1207		0.00000E+00	0.0000	
184	0.0001		9.28798E-05	6.7445	
5.44397E-05	5.7740		0.00000E+00	0.0000	
185	0.0001		1.00104E-04	6.4375	
5.79226E-05	5.5291		0.00000E+00	0.0000	
186	0.0001		9.03436E-05	6.1089	
5.28898E-05	5.1862		0.00000E+00	0.0000	
187	0.0001		9.08319E-05	6.3144	
5.30905E-05	5.2904		0.00000E+00	0.0000	
188	0.0001		8.36725E-05	6.8309	
4.98239E-05	5.7165		0.00000E+00	0.0000	
189	0.0001		7.69960E-05	7.4320	
4.63503E-05	6.0626		0.00000E+00	0.0000	
190	0.0003		2.03657E-04	4.0265	
1.22029E-04	3.2527		0.00000E+00	0.0000	
191	0.0003		1.96103E-04	4.0486	
1.18761E-04	3.2798		0.00000E+00	0.0000	
192	0.0003		2.02620E-04	3.9218	
1.22247E-04	3.1798		0.00000E+00	0.0000	
193	0.0003		2.05331E-04	4.9509	

1.24599E-04	3.9446	0.00000E+00	0.0000				
194	0.0005	3.93633E-04	2.5569				
2.43937E-04	2.0133	0.00000E+00	0.0000				
195	0.0005	4.18121E-04	2.5927				
2.60871E-04	2.0224	0.00000E+00	0.0000				
196	0.0006	4.49154E-04	2.6354				
2.80370E-04	2.0241	0.00000E+00	0.0000				
197	0.0007	5.17893E-04	2.3021				
3.22216E-04	1.8028	0.00000E+00	0.0000				
198	0.0008	5.86922E-04	2.2104				
3.61093E-04	1.7487	0.00000E+00	0.0000				
199	0.0004	3.34280E-04	3.2693				
2.04807E-04	2.5956	0.00000E+00	0.0000				
200	0.0005	3.71312E-04	3.3771				
2.26604E-04	2.6610	0.00000E+00	0.0000				
201	0.0010	7.68700E-04	2.4909				
4.72742E-04	1.9846	0.00000E+00	0.0000				
202	0.0013	9.63912E-04	1.9291				
5.86193E-04	1.5523	0.00000E+00	0.0000				
203	0.0016	1.20433E-03	1.7940				
7.22166E-04	1.4555	0.00000E+00	0.0000				
204	0.0022	1.64584E-03	1.6151				
9.71044E-04	1.3408	0.00000E+00	0.0000				
205	0.0015	1.11483E-03	1.8394				
6.55860E-04	1.5604	0.00000E+00	0.0000				
206	0.0018	1.36754E-03	1.7207				
8.00020E-04	1.4649	0.00000E+00	0.0000				
207	0.0022	1.65782E-03	1.5828				
9.63725E-04	1.3932	0.00000E+00	0.0000				
208	0.0029	2.21827E-03	1.5335				
1.29061E-03	1.3434	0.00000E+00	0.0000				
209	0.0031	2.36941E-03	1.6058				
1.39339E-03	1.4180	0.00000E+00	0.0000				
210	0.0038	2.90415E-03	1.3796				
1.72608E-03	1.2188	0.00000E+00	0.0000				
211	0.0040	3.07356E-03	1.4043				
1.85531E-03	1.2163	0.00000E+00	0.0000				
212	0.0046	3.49714E-03	1.0548				
2.13062E-03	0.9011	0.00000E+00	0.0000				
213	0.0064	4.86621E-03	0.9420				
2.95740E-03	0.7987	0.00000E+00	0.0000				
214	0.0096	7.35636E-03	0.8534				
4.43088E-03	0.7211	0.00000E+00	0.0000				
215	0.0156	1.19224E-02	0.6223				
7.12606E-03	0.5194	0.00000E+00	0.0000				
216	0.0301	2.30028E-02	0.4483				
1.35674E-02	0.3822	0.00000E+00	0.0000				
217	0.0201	1.54027E-02	0.4974				
9.05500E-03	0.4262	0.00000E+00	0.0000				
218	0.0278	2.12896E-02	0.4368				
1.24551E-02	0.3672	0.00000E+00	0.0000				
219	0.0357	2.72966E-02	0.3964				

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1.59273E-02     0.3372       0.00000E+00     0.0000
  220    0.0472                  3.61399E-02     0.3664
2.10167E-02     0.3124       0.00000E+00     0.0000
  221    0.0625                  4.78148E-02     0.3522
2.77391E-02     0.2959       0.00000E+00     0.0000
  222    0.0803                  6.14452E-02     0.3070
3.55911E-02     0.2615       0.00000E+00     0.0000
  223    0.1045                  7.99694E-02     0.2453
4.63872E-02     0.2072       0.00000E+00     0.0000
  224    0.0587                  4.49036E-02     0.3099
2.61243E-02     0.2636       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  225    0.2307                  1.76539E-01     0.1627
1.04559E-01     0.1361       0.00000E+00     0.0000
  226    0.0457                  3.49709E-02     0.3811
2.12750E-02     0.3203       0.00000E+00     0.0000
  227    0.0489                  3.74149E-02     0.3403
2.32458E-02     0.2793       0.00000E+00     0.0000
  228    0.0210                  1.60760E-02     0.5389
1.01850E-02     0.4210       0.00000E+00     0.0000
  229    0.0220                  1.68543E-02     0.5922
1.08636E-02     0.4631       0.00000E+00     0.0000
  230    0.0116                  8.91025E-03     0.6177
5.83868E-03     0.4877       0.00000E+00     0.0000
  231    0.0122                  9.33395E-03     0.7784
6.22442E-03     0.5921       0.00000E+00     0.0000
  232    0.0130                  9.92156E-03     0.7498
6.76452E-03     0.5509       0.00000E+00     0.0000
  233    0.0084                  6.41200E-03     1.0186
4.49110E-03     0.7122       0.00000E+00     0.0000
  234    0.0060                  4.58979E-03     1.1218
3.29721E-03     0.8045       0.00000E+00     0.0000
  235    0.0024                  1.85832E-03     1.8955
1.23110E-03     1.4497       0.00000E+00     0.0000
  236    0.0019                  1.45222E-03     1.9572
9.80930E-04     1.4448       0.00000E+00     0.0000
  237    0.0017                  1.32803E-03     2.4576
9.42722E-04     1.7341       0.00000E+00     0.0000
  238    0.0001                  7.79474E-05     8.6828
6.44438E-05     5.4441       0.00000E+00     0.0000

 system total =                  7.65357E-01     0.0553
4.68646E-01     0.0456       0.00000E+00     0.0000
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the weight lost in the albedo portion of the problem = 5.3156E-01 + or - 0.0002

elapsed time 3.03833 minutes

random number= F0C60B348DFAA69F

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.087E-03	0.06	7.654E-01
	2	0.000E+00	0.00	0.000E+00
	3	0.000E+00	0.00	0.000E+00
2	1	0.000E+00	0.00	0.000E+00

global unit

1 fuel bundle

fluxes for Unit 1

	region 1		region 2		region 3	
group	flux	percent deviation	flux	percent deviation	flux	percent deviation
1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	2.429E-08	22.89	2.261E-08	20.32	2.197E-08	21.18
3	8.991E-07	3.95	7.340E-07	3.71	7.871E-07	3.73
4	1.443E-06	3.25	1.191E-06	3.07	1.274E-06	3.06
5	2.325E-06	2.20	1.881E-06	2.02	2.025E-06	2.06
6	9.479E-06	1.42	7.529E-06	1.24	8.063E-06	1.24
7	1.230E-05	1.18	9.452E-06	0.99	9.980E-06	1.05
8	3.096E-05	0.76	2.283E-05	0.61	2.389E-05	0.60
9	8.183E-05	0.42	5.865E-05	0.35	6.123E-05	0.36
10	4.671E-05	0.67	3.327E-05	0.59	3.450E-05	0.60
11	2.192E-04	0.29	1.554E-04	0.24	1.609E-04	0.23
12	1.902E-04	0.30	1.383E-04	0.28	1.452E-04	0.27

13	5.664E-05	0.49	4.137E-05	0.44	4.339E-05	0.44
14	2.529E-04	0.22	1.832E-04	0.19	1.915E-04	0.19
15	2.201E-04	0.24	1.597E-04	0.21	1.666E-04	0.20
16	7.075E-05	0.44	5.149E-05	0.34	5.379E-05	0.34
17	3.156E-05	0.62	2.318E-05	0.51	2.417E-05	0.51
18	2.794E-05	0.64	2.026E-05	0.58	2.097E-05	0.56
19	5.009E-05	0.54	3.656E-05	0.46	3.809E-05	0.40
20	3.945E-05	0.63	2.896E-05	0.56	3.028E-05	0.52
21	8.026E-05	0.39	5.850E-05	0.35	6.116E-05	0.34
22	7.374E-05	0.41	5.371E-05	0.35	5.558E-05	0.31
23	7.715E-05	0.43	5.673E-05	0.37	5.886E-05	0.37
24	1.852E-05	0.78	1.370E-05	0.65	1.433E-05	0.64
25	2.334E-05	0.85	1.735E-05	0.68	1.816E-05	0.64
26	1.333E-05	0.84	9.814E-06	0.65	1.036E-05	0.68
27	4.184E-05	0.53	3.107E-05	0.47	3.298E-05	0.45
28	7.728E-05	0.48	5.734E-05	0.36	6.069E-05	0.35
29	7.922E-05	0.41	5.929E-05	0.33	6.188E-05	0.33
30	1.012E-05	1.14	7.593E-06	0.92	8.004E-06	0.90
31	7.852E-05	0.38	5.894E-05	0.34	6.206E-05	0.33
32	3.083E-05	0.60	2.328E-05	0.52	2.443E-05	0.49
33	2.658E-05	0.63	2.010E-05	0.55	2.120E-05	0.52
34	6.096E-05	0.42	4.617E-05	0.34	4.857E-05	0.33
35	3.621E-05	0.53	2.748E-05	0.44	2.886E-05	0.39
36	3.412E-05	0.54	2.582E-05	0.42	2.703E-05	0.42
37	2.194E-05	0.70	1.661E-05	0.60	1.734E-05	0.57
38	2.612E-05	0.66	1.977E-05	0.51	2.081E-05	0.47
39	9.790E-05	0.39	7.508E-05	0.35	7.939E-05	0.30
40	9.018E-05	0.35	6.953E-05	0.31	7.408E-05	0.27
41	1.128E-04	0.31	8.836E-05	0.26	9.442E-05	0.23
42	9.357E-05	0.33	7.383E-05	0.27	7.926E-05	0.26
43	5.104E-05	0.42	4.062E-05	0.37	4.278E-05	0.30
44	6.956E-05	0.36	5.578E-05	0.34	5.993E-05	0.29
45	3.516E-05	0.43	2.804E-05	0.38	3.106E-05	0.35
46	8.295E-06	0.81	6.576E-06	0.66	7.111E-06	0.57
47	2.352E-05	0.57	1.869E-05	0.52	1.944E-05	0.41
48	6.774E-06	0.94	5.399E-06	0.92	5.670E-06	0.70
49	4.339E-05	0.41	3.480E-05	0.37	3.743E-05	0.36
50	2.942E-05	0.48	2.369E-05	0.42	2.576E-05	0.38
51	7.835E-06	0.96	6.245E-06	0.86	6.827E-06	0.70
52	2.057E-05	0.52	1.664E-05	0.51	1.808E-05	0.41
53	7.589E-05	0.33	6.140E-05	0.27	6.660E-05	0.23
54	3.364E-05	0.43	2.727E-05	0.38	2.934E-05	0.33
55	6.649E-05	0.37	5.405E-05	0.32	5.885E-05	0.28
56	4.317E-05	0.36	3.516E-05	0.32	3.839E-05	0.30
57	4.926E-05	0.32	4.019E-05	0.31	4.380E-05	0.27
58	2.585E-05	0.49	2.109E-05	0.43	2.298E-05	0.38
59	4.398E-05	0.35	3.611E-05	0.31	3.919E-05	0.27
60	6.436E-05	0.34	5.269E-05	0.29	5.716E-05	0.24
61	6.069E-06	0.99	4.971E-06	0.89	5.418E-06	0.78
62	3.242E-05	0.42	2.663E-05	0.37	2.891E-05	0.29
63	2.171E-05	0.54	1.784E-05	0.48	1.931E-05	0.37
64	1.718E-05	0.53	1.410E-05	0.46	1.528E-05	0.35

65	5.710E-06	0.91	4.689E-06	0.86	5.123E-06	0.72
66	2.855E-05	0.47	2.351E-05	0.45	2.546E-05	0.37
67	2.101E-05	0.53	1.730E-05	0.42	1.881E-05	0.36
68	4.708E-06	1.12	3.831E-06	0.93	4.169E-06	0.77
69	3.730E-05	0.42	3.066E-05	0.37	3.343E-05	0.30
70	2.666E-05	0.54	2.204E-05	0.47	2.390E-05	0.34
71	4.541E-05	0.39	3.748E-05	0.34	4.077E-05	0.27
72	2.728E-06	1.39	2.237E-06	1.25	2.417E-06	1.03
73	2.686E-05	0.41	2.223E-05	0.41	2.416E-05	0.31
74	7.951E-05	0.28	6.585E-05	0.25	7.140E-05	0.22
75	9.140E-06	0.89	7.540E-06	0.76	8.193E-06	0.61
76	2.280E-05	0.46	1.892E-05	0.37	2.047E-05	0.29
77	1.774E-05	0.59	1.475E-05	0.48	1.596E-05	0.43
78	1.501E-06	1.88	1.249E-06	1.64	1.395E-06	1.34
79	9.906E-06	0.75	8.225E-06	0.67	8.878E-06	0.53
80	4.532E-06	1.04	3.794E-06	0.88	4.094E-06	0.73
81	5.502E-05	0.36	4.585E-05	0.30	4.956E-05	0.27
82	3.194E-06	1.09	2.654E-06	1.07	2.875E-06	0.88
83	4.427E-06	0.91	3.660E-06	0.78	3.970E-06	0.75
84	8.027E-06	0.85	6.695E-06	0.73	7.260E-06	0.57
85	1.004E-05	0.73	8.340E-06	0.64	8.997E-06	0.56
86	1.353E-05	0.59	1.129E-05	0.54	1.226E-05	0.42
87	1.188E-05	0.64	9.906E-06	0.56	1.073E-05	0.51
88	3.074E-06	1.21	2.580E-06	1.08	2.796E-06	0.94
89	6.578E-06	1.02	5.506E-06	0.88	5.951E-06	0.71
90	6.929E-06	0.89	5.770E-06	0.81	6.249E-06	0.65
91	8.351E-06	0.74	6.899E-06	0.75	7.491E-06	0.57
92	4.706E-06	0.94	3.961E-06	0.80	4.310E-06	0.69
93	8.156E-06	0.75	6.788E-06	0.72	7.300E-06	0.55
94	4.271E-06	1.09	3.588E-06	0.88	3.870E-06	0.77
95	1.256E-05	0.62	1.053E-05	0.53	1.140E-05	0.44
96	3.394E-06	1.16	2.861E-06	1.11	3.065E-06	0.85
97	3.418E-06	1.12	2.888E-06	1.01	3.105E-06	0.83
98	3.548E-06	1.06	2.929E-06	1.00	3.189E-06	0.76
99	2.330E-06	1.49	1.931E-06	1.30	2.110E-06	1.08
100	3.461E-06	1.17	2.874E-06	1.01	3.108E-06	0.81
101	4.998E-06	0.96	4.158E-06	0.91	4.444E-06	0.71
102	3.330E-06	1.23	2.838E-06	1.07	3.054E-06	0.91
103	4.633E-06	1.01	3.870E-06	0.87	4.182E-06	0.69
104	4.173E-06	1.13	3.496E-06	0.99	3.775E-06	0.76
105	4.344E-06	1.03	3.633E-06	0.92	3.928E-06	0.70
106	1.529E-06	1.61	1.298E-06	1.49	1.418E-06	1.21
107	3.563E-06	1.17	3.014E-06	1.00	3.240E-06	0.86
108	3.218E-06	1.03	2.760E-06	1.05	2.964E-06	0.87
109	5.078E-06	0.87	4.320E-06	0.76	4.627E-06	0.62
110	2.960E-06	1.23	2.534E-06	1.11	2.776E-06	0.86
111	3.122E-06	1.45	2.602E-06	1.20	2.833E-06	1.08
112	1.810E-06	1.58	1.521E-06	1.45	1.660E-06	1.24
113	5.707E-06	0.92	4.809E-06	0.73	5.217E-06	0.65
114	2.046E-06	1.37	1.696E-06	1.33	1.796E-06	1.12
115	5.066E-06	1.02	4.193E-06	0.86	4.587E-06	0.79
116	1.075E-05	0.72	9.006E-06	0.58	9.779E-06	0.50

117	1.158E-05	0.70	9.701E-06	0.63	1.053E-05	0.53
118	1.281E-05	0.68	1.083E-05	0.61	1.168E-05	0.49
119	8.233E-06	0.71	7.040E-06	0.66	7.619E-06	0.52
120	5.749E-06	0.95	4.897E-06	0.79	5.325E-06	0.64
121	6.082E-06	0.88	5.179E-06	0.85	5.612E-06	0.69
122	3.201E-06	1.28	2.680E-06	0.99	2.914E-06	0.81
123	1.030E-05	0.69	8.619E-06	0.62	9.378E-06	0.51
124	7.363E-06	0.83	6.172E-06	0.72	6.698E-06	0.57
125	7.043E-06	0.81	5.877E-06	0.72	6.357E-06	0.58
126	5.813E-06	0.93	4.846E-06	0.68	5.221E-06	0.63
127	5.517E-06	0.81	4.658E-06	0.78	5.047E-06	0.64
128	7.774E-06	0.71	6.541E-06	0.66	7.017E-06	0.56
129	9.569E-06	0.69	8.112E-06	0.66	8.750E-06	0.56
130	4.049E-06	1.06	3.444E-06	1.00	3.719E-06	0.73
131	1.700E-05	0.53	1.424E-05	0.46	1.537E-05	0.37
132	1.117E-05	0.56	9.421E-06	0.51	1.017E-05	0.46
133	1.368E-05	0.63	1.160E-05	0.54	1.255E-05	0.45
134	1.481E-05	0.61	1.250E-05	0.60	1.346E-05	0.43
135	2.388E-06	1.25	2.048E-06	1.04	2.245E-06	0.87
136	3.848E-06	1.10	3.379E-06	0.95	3.696E-06	0.80
137	2.504E-06	0.99	2.655E-06	0.94	2.995E-06	0.69
138	4.077E-06	0.94	3.537E-06	0.81	3.917E-06	0.70
139	4.604E-06	1.00	3.879E-06	0.82	4.233E-06	0.62
140	1.202E-05	0.63	1.019E-05	0.62	1.100E-05	0.45
141	8.679E-06	0.68	7.370E-06	0.58	8.006E-06	0.51
142	5.834E-06	0.76	4.988E-06	0.66	5.352E-06	0.59
143	1.964E-05	0.48	1.657E-05	0.41	1.784E-05	0.35
144	8.074E-06	0.83	6.827E-06	0.69	7.312E-06	0.59
145	7.262E-06	0.86	6.158E-06	0.72	6.593E-06	0.54
146	1.202E-05	0.63	1.016E-05	0.53	1.089E-05	0.40
147	3.700E-06	1.10	3.099E-06	1.03	3.374E-06	0.79
148	1.917E-06	1.74	1.611E-06	1.44	1.715E-06	1.19
149	1.152E-06	2.03	9.767E-07	1.75	1.056E-06	1.34
150	3.997E-06	1.16	3.400E-06	0.97	3.626E-06	0.77
151	4.124E-06	1.15	3.539E-06	1.09	3.764E-06	0.79
152	4.401E-06	1.04	3.689E-06	0.91	3.913E-06	0.75
153	4.408E-06	1.05	3.730E-06	0.98	4.025E-06	0.75
154	4.750E-06	1.11	3.999E-06	0.92	4.238E-06	0.79
155	4.338E-06	1.07	3.614E-06	0.93	3.910E-06	0.73
156	3.957E-06	1.14	3.362E-06	0.94	3.611E-06	0.74
157	4.734E-06	1.00	3.969E-06	0.91	4.276E-06	0.72
158	4.891E-06	1.18	4.142E-06	0.98	4.433E-06	0.75
159	6.697E-06	0.87	5.684E-06	0.76	6.150E-06	0.59
160	3.563E-06	1.27	3.020E-06	1.02	3.244E-06	0.91
161	4.996E-06	0.86	4.219E-06	0.73	4.540E-06	0.65
162	5.826E-06	0.96	4.958E-06	0.89	5.333E-06	0.67
163	6.148E-06	0.88	5.141E-06	0.77	5.568E-06	0.63
164	6.495E-06	0.85	5.505E-06	0.77	5.911E-06	0.60
165	6.792E-06	0.75	5.764E-06	0.69	6.209E-06	0.55
166	4.067E-06	1.21	3.420E-06	1.05	3.667E-06	0.90
167	4.158E-06	1.03	3.504E-06	0.87	3.803E-06	0.73
168	4.280E-06	0.90	3.624E-06	0.90	3.908E-06	0.73

169	4.492E-06	0.97	3.811E-06	0.83	4.091E-06	0.71
170	4.610E-06	0.84	3.891E-06	0.71	4.202E-06	0.60
171	2.390E-06	1.40	2.023E-06	1.31	2.184E-06	1.00
172	2.431E-06	1.30	2.066E-06	1.22	2.222E-06	0.95
173	2.432E-06	1.33	2.076E-06	1.26	2.242E-06	1.00
174	2.601E-06	1.22	2.185E-06	1.09	2.345E-06	0.82
175	1.052E-06	2.06	8.861E-07	1.83	9.425E-07	1.47
176	9.601E-07	2.17	8.372E-07	1.85	9.234E-07	1.69
177	1.015E-06	2.06	8.724E-07	1.77	9.577E-07	1.45
178	1.023E-06	1.97	8.853E-07	1.96	9.544E-07	1.57
179	1.039E-06	1.92	8.821E-07	1.64	9.578E-07	1.34
180	1.045E-06	1.35	8.771E-07	1.28	9.717E-07	1.21
181	1.058E-06	1.95	8.989E-07	1.74	9.776E-07	1.39
182	1.075E-06	1.93	9.260E-07	1.94	1.004E-06	1.41
183	1.122E-06	1.90	9.669E-07	1.72	1.027E-06	1.42
184	1.075E-06	1.72	9.180E-07	1.64	9.997E-07	1.40
185	1.127E-06	1.76	9.482E-07	1.51	1.010E-06	1.27
186	1.133E-06	2.23	9.576E-07	1.93	1.020E-06	1.36
187	1.185E-06	1.90	9.732E-07	1.61	1.061E-06	1.27
188	1.167E-06	1.72	9.961E-07	1.70	1.077E-06	1.26
189	1.179E-06	1.97	9.937E-07	1.79	1.079E-06	1.56
190	3.010E-06	1.19	2.579E-06	1.08	2.777E-06	0.94
191	3.089E-06	1.22	2.617E-06	1.09	2.833E-06	0.87
192	3.174E-06	1.01	2.669E-06	0.95	2.896E-06	0.73
193	3.306E-06	1.16	2.780E-06	0.89	2.997E-06	0.78
194	6.854E-06	0.77	5.758E-06	0.75	6.267E-06	0.61
195	7.281E-06	0.77	6.204E-06	0.66	6.689E-06	0.52
196	7.779E-06	0.77	6.571E-06	0.72	7.110E-06	0.59
197	8.563E-06	0.88	7.242E-06	0.70	7.785E-06	0.56
198	8.934E-06	0.62	7.534E-06	0.61	8.139E-06	0.53
199	4.760E-06	1.04	4.024E-06	0.90	4.369E-06	0.75
200	5.125E-06	0.96	4.362E-06	0.85	4.672E-06	0.69
201	1.047E-05	0.64	8.903E-06	0.56	9.637E-06	0.52
202	1.201E-05	0.68	1.015E-05	0.49	1.098E-05	0.48
203	1.288E-05	0.60	1.092E-05	0.53	1.184E-05	0.45
204	1.463E-05	0.58	1.242E-05	0.51	1.350E-05	0.41
205	8.533E-06	0.64	7.683E-06	0.54	8.130E-06	0.46
206	9.237E-06	0.62	8.366E-06	0.58	8.841E-06	0.48
207	9.568E-06	0.62	8.679E-06	0.53	9.155E-06	0.44
208	1.121E-05	0.58	1.020E-05	0.49	1.083E-05	0.45
209	1.150E-05	0.54	1.045E-05	0.49	1.107E-05	0.40
210	1.413E-05	0.57	1.281E-05	0.49	1.361E-05	0.34
211	1.613E-05	0.46	1.460E-05	0.43	1.552E-05	0.36
212	1.923E-05	0.46	1.737E-05	0.38	1.845E-05	0.33
213	2.637E-05	0.39	2.359E-05	0.34	2.525E-05	0.30
214	3.693E-05	0.33	3.327E-05	0.27	3.576E-05	0.21
215	5.505E-05	0.29	4.972E-05	0.24	5.373E-05	0.18
216	9.192E-05	0.19	8.375E-05	0.17	9.053E-05	0.13
217	5.528E-05	0.26	5.300E-05	0.22	5.614E-05	0.18
218	7.062E-05	0.22	6.781E-05	0.19	7.217E-05	0.17
219	8.426E-05	0.20	8.135E-05	0.16	8.656E-05	0.15
220	1.014E-04	0.18	9.891E-05	0.15	1.055E-04	0.13

221	1.204E-04	0.18	1.186E-04	0.15	1.263E-04	0.12
222	1.365E-04	0.17	1.367E-04	0.14	1.458E-04	0.13
223	1.535E-04	0.15	1.575E-04	0.13	1.676E-04	0.11
224	7.498E-05	0.19	7.981E-05	0.17	8.432E-05	0.13
225	2.336E-04	0.13	2.724E-04	0.09	2.827E-04	0.08
226	3.186E-05	0.23	4.493E-05	0.18	4.451E-05	0.11
227	2.884E-05	0.25	4.629E-05	0.18	4.449E-05	0.12
228	1.040E-05	0.35	1.914E-05	0.30	1.761E-05	0.19
229	9.656E-06	0.44	1.961E-05	0.30	1.748E-05	0.17
230	4.448E-06	0.54	1.022E-05	0.44	8.682E-06	0.23
231	4.242E-06	0.54	1.060E-05	0.42	8.768E-06	0.21
232	3.972E-06	0.66	1.127E-05	0.42	8.883E-06	0.24
233	2.253E-06	0.76	7.461E-06	0.52	5.519E-06	0.26
234	1.435E-06	0.89	5.450E-06	0.66	3.835E-06	0.31
235	5.047E-07	1.48	1.035E-06	1.05	1.117E-06	0.52
236	3.447E-07	1.77	7.421E-07	1.04	8.031E-07	0.66
237	2.192E-07	2.04	5.553E-07	1.33	6.213E-07	0.47
238	5.773E-09	9.87	2.398E-08	5.99	2.562E-08	1.74

1 fuel bundle

fluxes for Global Unit
region 1

group	flux	percent deviation
1	0.000E+00	0.00
2	0.000E+00	0.00
3	0.000E+00	0.00
4	0.000E+00	0.00
5	0.000E+00	0.00
6	0.000E+00	0.00
7	0.000E+00	0.00
8	0.000E+00	0.00
9	0.000E+00	0.00
10	0.000E+00	0.00
11	0.000E+00	0.00
12	0.000E+00	0.00
13	0.000E+00	0.00
14	0.000E+00	0.00
15	0.000E+00	0.00
16	0.000E+00	0.00
17	0.000E+00	0.00
18	0.000E+00	0.00
19	0.000E+00	0.00
20	0.000E+00	0.00
21	0.000E+00	0.00
22	0.000E+00	0.00
23	0.000E+00	0.00
24	0.000E+00	0.00
25	0.000E+00	0.00
26	0.000E+00	0.00
27	0.000E+00	0.00

28	0.000E+00	0.00
29	0.000E+00	0.00
30	0.000E+00	0.00
31	0.000E+00	0.00
32	0.000E+00	0.00
33	0.000E+00	0.00
34	0.000E+00	0.00
35	0.000E+00	0.00
36	0.000E+00	0.00
37	0.000E+00	0.00
38	0.000E+00	0.00
39	0.000E+00	0.00
40	0.000E+00	0.00
41	0.000E+00	0.00
42	0.000E+00	0.00
43	0.000E+00	0.00
44	0.000E+00	0.00
45	0.000E+00	0.00
46	0.000E+00	0.00
47	0.000E+00	0.00
48	0.000E+00	0.00
49	0.000E+00	0.00
50	0.000E+00	0.00
51	0.000E+00	0.00
52	0.000E+00	0.00
53	0.000E+00	0.00
54	0.000E+00	0.00
55	0.000E+00	0.00
56	0.000E+00	0.00
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62	0.000E+00	0.00
63	0.000E+00	0.00
64	0.000E+00	0.00
65	0.000E+00	0.00
66	0.000E+00	0.00
67	0.000E+00	0.00
68	0.000E+00	0.00
69	0.000E+00	0.00
70	0.000E+00	0.00
71	0.000E+00	0.00
72	0.000E+00	0.00
73	0.000E+00	0.00
74	0.000E+00	0.00
75	0.000E+00	0.00
76	0.000E+00	0.00
77	0.000E+00	0.00
78	0.000E+00	0.00
79	0.000E+00	0.00

80	0.000E+00	0.00
81	0.000E+00	0.00
82	0.000E+00	0.00
83	0.000E+00	0.00
84	0.000E+00	0.00
85	0.000E+00	0.00
86	0.000E+00	0.00
87	0.000E+00	0.00
88	0.000E+00	0.00
89	0.000E+00	0.00
90	0.000E+00	0.00
91	0.000E+00	0.00
92	0.000E+00	0.00
93	0.000E+00	0.00
94	0.000E+00	0.00
95	0.000E+00	0.00
96	0.000E+00	0.00
97	0.000E+00	0.00
98	0.000E+00	0.00
99	0.000E+00	0.00
100	0.000E+00	0.00
101	0.000E+00	0.00
102	0.000E+00	0.00
103	0.000E+00	0.00
104	0.000E+00	0.00
105	0.000E+00	0.00
106	0.000E+00	0.00
107	0.000E+00	0.00
108	0.000E+00	0.00
109	0.000E+00	0.00
110	0.000E+00	0.00
111	0.000E+00	0.00
112	0.000E+00	0.00
113	0.000E+00	0.00
114	0.000E+00	0.00
115	0.000E+00	0.00
116	0.000E+00	0.00
117	0.000E+00	0.00
118	0.000E+00	0.00
119	0.000E+00	0.00
120	0.000E+00	0.00
121	0.000E+00	0.00
122	0.000E+00	0.00
123	0.000E+00	0.00
124	0.000E+00	0.00
125	0.000E+00	0.00
126	0.000E+00	0.00
127	0.000E+00	0.00
128	0.000E+00	0.00
129	0.000E+00	0.00
130	0.000E+00	0.00
131	0.000E+00	0.00

132	0.000E+00	0.00
133	0.000E+00	0.00
134	0.000E+00	0.00
135	0.000E+00	0.00
136	0.000E+00	0.00
137	0.000E+00	0.00
138	0.000E+00	0.00
139	0.000E+00	0.00
140	0.000E+00	0.00
141	0.000E+00	0.00
142	0.000E+00	0.00
143	0.000E+00	0.00
144	0.000E+00	0.00
145	0.000E+00	0.00
146	0.000E+00	0.00
147	0.000E+00	0.00
148	0.000E+00	0.00
149	0.000E+00	0.00
150	0.000E+00	0.00
151	0.000E+00	0.00
152	0.000E+00	0.00
153	0.000E+00	0.00
154	0.000E+00	0.00
155	0.000E+00	0.00
156	0.000E+00	0.00
157	0.000E+00	0.00
158	0.000E+00	0.00
159	0.000E+00	0.00
160	0.000E+00	0.00
161	0.000E+00	0.00
162	0.000E+00	0.00
163	0.000E+00	0.00
164	0.000E+00	0.00
165	0.000E+00	0.00
166	0.000E+00	0.00
167	0.000E+00	0.00
168	0.000E+00	0.00
169	0.000E+00	0.00
170	0.000E+00	0.00
171	0.000E+00	0.00
172	0.000E+00	0.00
173	0.000E+00	0.00
174	0.000E+00	0.00
175	0.000E+00	0.00
176	0.000E+00	0.00
177	0.000E+00	0.00
178	0.000E+00	0.00
179	0.000E+00	0.00
180	0.000E+00	0.00
181	0.000E+00	0.00
182	0.000E+00	0.00
183	0.000E+00	0.00

184	0.000E+00	0.00
185	0.000E+00	0.00
186	0.000E+00	0.00
187	0.000E+00	0.00
188	0.000E+00	0.00
189	0.000E+00	0.00
190	0.000E+00	0.00
191	0.000E+00	0.00
192	0.000E+00	0.00
193	0.000E+00	0.00
194	0.000E+00	0.00
195	0.000E+00	0.00
196	0.000E+00	0.00
197	0.000E+00	0.00
198	0.000E+00	0.00
199	0.000E+00	0.00
200	0.000E+00	0.00
201	0.000E+00	0.00
202	0.000E+00	0.00
203	0.000E+00	0.00
204	0.000E+00	0.00
205	0.000E+00	0.00
206	0.000E+00	0.00
207	0.000E+00	0.00
208	0.000E+00	0.00
209	0.000E+00	0.00
210	0.000E+00	0.00
211	0.000E+00	0.00
212	0.000E+00	0.00
213	0.000E+00	0.00
214	0.000E+00	0.00
215	0.000E+00	0.00
216	0.000E+00	0.00
217	0.000E+00	0.00
218	0.000E+00	0.00
219	0.000E+00	0.00
220	0.000E+00	0.00
221	0.000E+00	0.00
222	0.000E+00	0.00
223	0.000E+00	0.00
224	0.000E+00	0.00
225	0.000E+00	0.00
226	0.000E+00	0.00
227	0.000E+00	0.00
228	0.000E+00	0.00
229	0.000E+00	0.00
230	0.000E+00	0.00
231	0.000E+00	0.00
232	0.000E+00	0.00
233	0.000E+00	0.00
234	0.000E+00	0.00
235	0.000E+00	0.00

```
  236   0.000E+00    0.00
  237   0.000E+00    0.00
  238   0.000E+00    0.00
1fuel bundle

                                frequency for generations      24 to
123 each asterisk represents   1.0000 generations
 0.7526 to 0.7555     **
 0.7555 to 0.7583     **
 0.7583 to 0.7611     ************
 0.7611 to 0.7639     ******************
 0.7639 to 0.7668     *************************
 0.7668 to 0.7696     ***********************
 0.7696 to 0.7724     ************
 0.7724 to 0.7753     *
 0.7753 to 0.7781     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7526 to 0.7555     **
 0.7555 to 0.7583     **
 0.7583 to 0.7611     ************
 0.7611 to 0.7639     ************
 0.7639 to 0.7668     ******************
 0.7668 to 0.7696     ******************
 0.7696 to 0.7724     *******
 0.7724 to 0.7753     *
 0.7753 to 0.7781

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7526 to 0.7555     *
 0.7555 to 0.7583     **
 0.7583 to 0.7611     ********
 0.7611 to 0.7639     ***********
 0.7639 to 0.7668     ************
 0.7668 to 0.7696     **********
 0.7696 to 0.7724     *****
 0.7724 to 0.7753     *
 0.7753 to 0.7781

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7526 to 0.7555
 0.7555 to 0.7583
 0.7583 to 0.7611     *******
 0.7611 to 0.7639     *****
 0.7639 to 0.7668     ***
 0.7668 to 0.7696     ****
 0.7696 to 0.7724     *****
 0.7724 to 0.7753     *
 0.7753 to 0.7781
```

1
```
************************************************************************
*****************************************
        ***
***
        ***   fuel bundle
***
        ***
***

************************************************************************
*****************************************
        ***
***
        ***                                        ******      final results
table      ******                                      ***
        ***
***
        ***        best estimate system k-eff
0.76535 + or - 0.00056                      ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65450E-02 + or -  1.29619E-04             ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  1.07249E-05             ***
        ***
***
        ***        system mean free path (cm)
6.52481E-01 + or -  1.49156E-04             ***
        ***
***
        ***        number of warning messages
7                                           ***
        ***
***
        ***        number of error messages
0                                           ***
        ***
***
        ***        k-effective satisfies the chi**2 test for normality at
the 95 % level                                    ***
        ***
***
        ***
***

************************************************************************
*****************************************
```

```
**************************************************************************
*****************************************

**************************************************************************
************************************************************

          Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.03967 minutes

**************************************************************************
************************************************************
1
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
VV          VV  IIIIIIIIIII
   KK          KK   EEEEEEEEEEEEE   NNN          NN  OOOOOOOOOOOO
VV          VV  IIIIIIIIIII
   KK         KK    EE              NNNN         NN  OO         OO
VV          VV       II
   KK        KK     EE              NN NN        NN  OO         OO
VV          VV       II
   KK       KK      EE              NN   NN      NN  OO         OO
VV          VV       II
   KKKKKKKK         EEEEEEEEE       NN    NN    NN  OO         OO
-------------   VV          VV       II
   KKKKKKKK         EEEEEEEEE       NN     NN   NN  OO         OO
-------------    VV        VV        II
   KK       KK      EE              NN       NN  NN  OO         OO
VV     VV         II
   KK        KK     EE              NN        NN NN  OO         OO
VV   VV          II
   KK         KK    EE              NN         NNNN  OO         OO
VV VV           II
   KK          KK   EEEEEEEEEEEEE   NN          NNN  OOOOOOOOOOOO
VVV       IIIIIIIIIII
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
V        IIIIIIIIIII



   DDDDDDDDDDD      AAAAAAAAA     VV          VV  IIIIIIIIIII
DDDDDDDDDDD
   DDDDDDDDDDDD    AAAAAAAAAA    VV          VV  IIIIIIIIIII
DDDDDDDDDDDD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
```

```
   DD          DD   AA          AA   VV           VV       II          DD
DD
   DD          DD   AAAAAAAAAAAAA   VV           VV       II          DD
DD
   DD          DD   AAAAAAAAAAAAA    VV         VV        II          DD
DD
   DD          DD   AA          AA      VV     VV          II          DD
DD
   DD          DD   AA          AA       VV   VV           II          DD
DD
   DD          DD   AA          AA        VV VV            II          DD
DD
   DDDDDDDDDDDDD   AA          AA         VVV       IIIIIIIIIIII
DDDDDDDDDDDDD
   DDDDDDDDDDDDD    AA          AA          V        IIIIIIIIIIII
DDDDDDDDDDDDD
```

```
      0000000       88888888888                //   22222222222
33333333333               //        11          666666666666
     000000000     8888888888888              //   2222222222222
3333333333333             //        111         6666666666666
    00       00    88         88             //    22         22   33
33             //        1111         66
   00         00   88         88             //                22
33           //           11         66
   00         00   88         88           //                 22
33          //            11         66
   00         00    88888888888           //                 22
333          //             11         666666666666
   00         00    88888888888          //                22
333          //             11         6666666666666
   00         00   88         88         //              22
33        //               11         66         66
   00         00   88         88       //             22
33       //               11         66         66
    00       00    88         88      //            22             33
33      //                11         66         66
     000000000     8888888888888     //            2222222222222
3333333333333     //               11111111     6666666666666
      0000000       88888888888     //            2222222222222
33333333333     //                11111111      66666666666
```

```
      0000000      5555555555555                    5555555555555
7777777777777                            44      88888888888
     000000000     5555555555555                    5555555555555
777777777777                            444     8888888888888
    00       00    55                    :::       55             77
77          :::             4444     88         88
```

```
   00         00   55                    :::       55
77           :::             44 44     88         88
   00         00   55                    :::       55
77            :::            44  44     88         88
   00         00   555555555555                    555555555555
77                            44   44      88888888888
   00         00   5555555555555                   5555555555555
77                           44    44      88888888888
   00         00              55          :::                   55
77               :::        444444444444   88         88
   00         00              55          :::                   55
77               :::       4444444444444   88         88
    00       00    55         55          :::       55         55
77                :::                  44     88         88
     000000000     5555555555555                   5555555555555
77                                    44     8888888888888
      0000000       55555555555                     55555555555
77                                    44      88888888888
1

    SSSSSSSSSS     CCCCCCCCCCC       AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAA    LL
EEEEEEEEEEEE
   SS         SS   CC         CC   AA         AA   LL              EE
   SS              CC              AA         AA   LL              EE
   SS              CC              AA         AA   LL              EE
   SSSSSSSSSSS    CC              AAAAAAAAAAAAA   LL
EEEEEEEE
    SSSSSSSSSSS   CC              AAAAAAAAAAAAA   LL
EEEEEEEE
              SS   CC              AA         AA   LL              EE
              SS   CC              AA         AA   LL              EE
   SS         SS   CC         CC   AA         AA   LL              EE
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

****
****

****
****

****
****

```
        *****
*****
        *****                                                  program
verification information                                              *****
        *****
*****
        *****                                              code system:  SCALE
version:  6.1                                                  *****
        *****
*****

************************************************************************
************************************************

************************************************************************
************************************************
        *****
*****
        *****
*****
        *****               program:  kenovi
*****
        *****
*****
        *****         creation date:  21_jun_2011
*****
        *****
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****          machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  05:57:48.03
```

```
*****
        *****
*****
        *****
*****

**************************************************************************
************************************************

**************************************************************************
************************************************

**************************************************************************
************************************************
1

**************************************************************************
*********************************************
        ***
***
        ***                                 fuel bundle
***
        ***
***

**************************************************************************
*********************************************
        ***                                     ******       numeric
parameters       ******                                    ***
        ***
***
        ***
***
        ***                     tme         maximum problem time (min)
0.00                    ***
        ***
***
        ***                     tba         time per generation (min)
10.00                    ***
        ***
***
        ***                     gen         number of generations
123                    ***
        ***
***
        ***                     npg         number per generation
20000                    ***
        ***
***
        ***                     nsk         number of generations to be
skipped                  23                       ***
        ***
```

```
***
        ***                     beg         beginning generation number
1                     ***
        ***
***
        ***                     res         generations between
checkpoints                      103                     ***
        ***
***
        ***                     x1d         number of extra 1-d cross
sections                       1                       ***
        ***
***
        ***                     nbk         neutron bank size
20025                       ***
        ***
***
        ***                     xnb         extra positions in neutron
bank                            0                       ***
        ***
***
        ***                     nfb         fission bank size
20000                       ***
        ***
***
        ***                     xfb         extra positions in fission
bank                            0                       ***
        ***
***
        ***                     sig         cut off standard deviation
0.0000                       ***
        ***
***
        ***                     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
000015714D98EE96                        ***
        ***
***
        ***                     nb8         number of d.a. blocks on unit
8                       1000                         ***
        ***
```

```
***
        ***                         nl8          length of d.a. blocks on unit
8                       512                        ***
        ***
***
        ***                         nqd          quadrature order for angular
fluxes                        0                      ***
        ***
***
        ***                         pnm          highest order of flux
moments                        0                       ***
        ***
***
        ***                         msh          mesh size for mesh flux tally
0.0000                      ***
        ***
***
        ***                         adj          mode of calculation
forward                      ***
        ***
***
        ***                         tps          sampling sites per track
length                         5                       ***
        ***
***
        ***                         cgs          number of secondary groups
to sampl                       0                      ***
        ***
***
        ***                         cas          number of secondary angles
to sampl                       0                      ***
        ***
***
        ***                                      input data written on
restart unit                      yes                      ***
        ***
***
        ***
***

*************************************************************************
*****************************************

*************************************************************************
*****************************************
1
*************************************************************************
*****************************************

*************************************************************************
*****************************************
        ***
```

```
***
        ***                                fuel bundle
***
        ***
***

*************************************************************************
*****************************************
        ***                                    ******      logical
parameters        ******                                    ***
        ***
***
        ***  run  execute problem after checking data    yes
plt  plot picture map(s)                          no ***
        ***
***
        ***       compute fluxes (cfx, flx or mfp)       yes
fdn  compute fission densities                yes ***
        ***
***
        ***  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 fiss prod matrix by unit number   no
fmp  print fiss prod matrix by unit location  no ***
        ***
***
        ***  mkh  compute matrix k-eff by hole number     no
mka  compute matrix k-eff by array number     no ***
        ***
***
        ***  ckh  compute cofactor k-eff by hole number   no
cka  compute cofactor k-eff by array number   no ***
        ***
***
        ***  fmh  print fiss prod matrix by hole number   no
fma  print fiss prod matrix by array number   no ***
        ***
***
        ***  hhl  collect matrix by highest hole level    no
hal  collect matrix by highest array level    no ***
        ***
***
```

```
        ***  amx  print all mixed cross sections          no
far  print fis. and abs. by region            no ***
        ***
***
        ***  xs1  print 1-d mixture x-sections            no
gas  print far by group                       no ***
        ***
***
        ***  xs2  print 2-d mixture x-sections            no
pax  print xsec-albedo correlation tables     no ***
        ***
***
        ***  xsl  print 2-d mixture Pl arrays             no
pwt  print weight average array               no ***
        ***
***
        ***  xap  print mixture angles & probabilities    no
pgm  print input geometry                     no ***
        ***
***
        ***  pki  print fission spectrum                  no
bug  print debug information                  no ***
        ***
***
        ***  p1d  print extra 1-d cross sections          no
trk  print tracking information               no ***
        ***
***
        ***  tfm  coordinate transform for fluxes         no
pmf  print angular fluxes and flux moments    no ***
        ***
***
        ***       print fluxes (flx)                     yes
app  append, not overwrite, restart data      no ***
        ***
***
        ***  mfx  compute mesh fluxes                     no
pms  print mesh fluxes if calculated          no ***
        ***
***
        ***  mfp  compute region mean free paths          no
pmm  print mesh flux moments if calculated    no ***
        ***
***
        ***  sen  compute derivative sensitivites         no
pmv  print mesh volumes                       no ***
        ***
***
        ***  cep  continuous energy calculation           no
ptb  use probability tables                  yes ***
        ***
***
```

```
        ***  fre  use analytic free gas kernel           yes
pnu  use prompt neutron spectrum only         no ***
        ***
***
        ***  cbt  compute contributons                    no
pct  print contributons                       no ***
        ***
***
        ***  cds  collect CADIS fissions                  no
htm  produce HTML output                     yes ***
        ***
***
        ***
***

*********************************************************************
*****************************************

*********************************************************************
*****************************************

*********************************************************************
*****************************************
                                                 parameter input completed


                                  ........ finished reading the parameter
data      ........


                                 *************** data reading completed
***************
1
*********************************************************************
*****************************************
        ***
***
        ***                                  fuel bundle
***
        ***
***

*********************************************************************
*****************************************

*********************************************************************
*****************************************
        ***
***
        ***           unit
volume                                          ***
        ***          number                data set name
```

```
name         unit function                        ***
        ***          ------                 -------------
----         -------------                        ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.33572\ft14f001             mixed cross
sections                ***
        ***
***
        ***      alb  79     C:\SCALE\data\albedos
input albedos                       ***
        ***
***
        ***      wts  80     C:\SCALE\data\scale.rev01.weights
input weights                       ***
        ***
***
        ***      skt  16      unknown
write scratch data                  ***
        ***
***
        ***      rst  95
->\Temp\scale.David.33572\restart.keno_input             read restart
data                   ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.33572\restart.keno_input             write restart
data                  ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.33572\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.33572\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access           ***
        ***
***

************************************************************************
*****************************************

                                ........ finished preparing input data
........
```

1
```
************************************************************************
*****************************
                  ***
***
                  ***           fuel bundle
***
                  ***
***

************************************************************************
*****************************

************************************************************************
*****************************
                  ***
***
                  ***                                  ****** additional
information ******                           ***
                  ***
***
                  ***  use a global unit                        yes    use
lattice geometry                     yes  ***
                  ***
***
                  ***  no. of scattering angles in xsecs        3
global array number                          0  ***
                  ***
***
                  ***  number of mixtures used                  3
number of units in the global x dir.      0  ***
                  ***
***
                  ***  number of bias id's used                 1
number of units in the global y dir.      0  ***
                  ***
***
                  ***  number of differential albedos used      2
number of units in the global z dir.      0  ***
                  ***
***
                  ***  total input geometry regions             4
number of energy groups                  238  ***
                  ***
***
                  ***  number of geometry regions used          4    no.
of fission spectrum source grps.      1  ***
                  ***
***
                  ***  use nested arrays                       no    use
nested holes                           no  ***
                  ***
```

```
***
                ***  number of arrays used                    1
number of holes                          0  ***
                ***
***
                ***  maximum array nesting level              1
maximum hole nesting level               0  ***
                ***
***
                ***  largest array number                     1
largest geometry unit number             2  ***
                ***
***
                ***
***
                ***  boundary label 1               cuboid
***
                ***
***
                ***    +x boundary condition             h2o
-x boundary condition                h2o  ***
                ***
***
                ***    +y boundary condition        graphite
-y boundary condition           graphite  ***
                ***
***
                ***    +z boundary condition             h2o
-z boundary condition                h2o  ***
                ***
***

*****************************************************************
****************************


                                  cross sections read from the ampx
working library on unit    4

1                                       fuel bundle

                                                mixing table

                                         number of scattering angles =
3
                                      cross section message threshold
=1.0E+00


 mixture =     1          density(g/cc) =  5.5474
    nuclide   atom-dens.   wgt. frac.     za      awt
```

```
nuclide title
    1001001  2.95922E-13  8.92744E-14    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    1003007  3.23535E-08  6.79473E-08    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    1004009  1.25936E-07  3.39736E-07    4009     9.0122     be9 425
endf/b7 rel8 rev7 mod2                   12/17/09
    1005010  6.04528E-08  1.81192E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  8.25134E-16  2.71923E-15    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    1007014  8.91558E-06  3.73710E-05    7014    14.0031     n14 725
endf/b7 rel8 rev7 mod0                   12/17/09
    1008016  1.00000E-20  4.78788E-20    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09
    1011023  9.87361E-07  6.79473E-06   11023    22.9898     na23 1125
endf/b7 rel8 rev7 mod0                  12/17/09
    1012024  7.37710E-07  5.29649E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33929E-08  6.98505E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02826E-07  7.99734E-07   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    1013027  3.96970E-02  3.20617E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    1014028  5.44792E-03  4.56239E-02   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    1014029  2.76758E-04  2.40054E-03   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                  12/17/09
    1014030  1.82655E-04  1.63883E-03   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    1015031  1.46571E-06  1.35895E-05   15031    30.9738     p31 1525
endf/b7 rel6 rev7 mod1                   12/17/09
    1020040  1.09810E-06  1.31358E-05   20040    39.9626     ca40 2025
endf/b7 rel1 rev7 mod1                  12/17/09
    1020042  7.32891E-09  9.20498E-08   20042    41.9586     ca42 2031
endf/b7 rel1 rev7 mod1                  12/17/09
    1020043  1.52922E-09  1.96645E-08   20043    42.9588     ca43 2034
endf/b7 rel1 rev7 mod1                  12/17/09
    1020044  2.36292E-08  3.10903E-07   20044    43.9555     ca44 2037
endf/b7 rel1 rev7 mod1                  12/17/09
    1020046  4.53101E-11  6.23272E-10   20046    45.9537     ca46 2043
endf/b7 rel1 rev7 mod1                  12/17/09
    1020048  2.11825E-09  3.04054E-08   20048    47.9525     ca48 2049
endf/b7 rel1 rev7 mod1                  12/17/09
    1023000  2.00517E-07  3.05763E-06   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                    12/17/09
    1024050  3.47753E-08  5.19916E-07   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                  12/17/09
    1024052  6.70606E-07  1.04264E-05   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                  12/17/09
    1024053  7.60414E-08  1.20504E-06   24053    52.9407     cr53 2434
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endf/b7 rel8 rev7 mod4                  12/17/09
    1024054  1.89283E-08  3.05616E-07   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                  12/17/09
    1025055  3.58088E-07  5.88877E-06   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                  12/17/09
    1026054  1.44567E-06  2.33421E-05   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                  12/17/09
    1026056  2.26940E-05  3.79975E-04   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                  12/17/09
    1026057  5.24102E-07  8.93224E-06   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                  12/17/09
    1026058  6.97484E-08  1.20955E-06   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                  12/17/09
    1027059  1.92584E-07  3.39736E-06   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                  12/17/09
    1028058  1.14089E-06  1.97856E-05   28058    57.9353     ni58 2825
endf/b7 rel8 rev7 mod4                  12/17/09
    1028060  4.39468E-07  7.88386E-06   28060    59.9308     ni60 2831
endf/b7 rel8 rev7 mod4                  12/17/09
    1028061  1.91034E-08  3.48426E-07   28061    60.9311     ni61 2834
endf/b7 rel8 rev7 mod5                  12/17/09
    1028062  6.09099E-08  1.12912E-06   28062    61.9283     ni62 2837
endf/b7 rel8 rev7 mod5                  12/17/09
    1028064  1.55120E-08  2.96838E-07   28064    63.9280     ni64 2843
endf/b7 rel8 rev7 mod4                  12/17/09
    1029063  2.49068E-06  4.69175E-05   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                  12/17/09
    1029065  1.11117E-06  2.15960E-05   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                  12/17/09
    1030000  6.94379E-07  1.35895E-05   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                   12/17/09
    1036083  3.77238E-12  9.36281E-11   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90756E-08  1.32072E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.07047E-08  2.91291E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.64008E-08  4.51197E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  3.97393E-11  1.10517E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.66210E-08  4.67212E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  4.01988E-11  1.14203E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.71233E-09  7.78682E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  4.15282E-20  1.15492E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  2.54529E-12  7.23096E-11   41095    94.9068     nb95 4131
endf/b7 rel0 rev7 mod1                  12/17/09
    1042092  1.04839E-08  2.88425E-07   42092    91.9068     mo92 4225
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endf/b7 rel0 rev7 mod1                 12/17/09
    1042094  6.55156E-09  1.84160E-07   42094    93.9051     mo94 4231
endf/b7 rel0 rev7 mod1                 12/17/09
    1042095  1.12862E-08  3.20629E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39892E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  6.82308E-09  1.97922E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.72081E-08  5.04315E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.21485E-11  3.59680E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.90515E-09  2.06506E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  2.68978E-11  7.96347E-10   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  3.43646E-11  1.03798E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  2.81384E-11  8.58330E-10   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  1.79168E-11  5.51905E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  1.25907E-11  3.91607E-10   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  2.65354E-12  8.41227E-11   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  2.04161E-12  6.28889E-11   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.09872E-12  3.45023E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  5.22848E-12  1.64185E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  1.01202E-12  3.23854E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  3.72425E-13  1.20292E-11   46108   107.9039     pd108 4643
endf/b7 rel5 rev7 mod1                12/17/09
    1047107  2.12330E-08  6.79473E-07   47107   106.9051     ag107 4725
endf/b7 rel0 rev7 mod1                12/17/09
    1047109  1.98536E-13  6.47214E-12   47109   108.9047     ag109 4731
endf/b7 rel0 rev7 mod1                12/17/09
    1048106  1.26206E-10  4.00095E-09   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                12/17/09
    1048108  8.98590E-11  2.90243E-09   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    1048110  1.26105E-09  4.14861E-08   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    1048111  1.29239E-09  4.29047E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43635E-09  8.16099E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23386E-09  4.17001E-08   48113   112.9044     cd113 4846
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endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90082E-09  9.89050E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56314E-10  2.62401E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  5.73899E-14  1.97393E-12   49115   114.9039     in115 4931
endf/b7 rel3 rev7 mod1                12/17/09
    1050112  1.85479E-10  6.21305E-09   50112   111.9048     sn112 5025
endf/b7 rel0 rev7 mod1                12/17/09
    1050114  1.26202E-10  4.30291E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50162E-11  2.23623E-09   50115   114.9033     sn115 5034
endf/b7 rel0 rev7 mod1                12/17/09
    1050116  2.78027E-09  9.64582E-08   50116   115.9017     sn116 5037
endf/b7 rel0 rev7 mod1                12/17/09
    1050117  1.46862E-09  5.13922E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63131E-09  1.63450E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64263E-09  5.84649E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22988E-09  2.23598E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85432E-10  3.23097E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10732E-09  4.10698E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  3.71015E-13  1.39832E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  5.98553E-13  2.27374E-11   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  3.72628E-12  1.43783E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30210E-12  5.25836E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  7.29178E-12  2.85727E-10   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.09742E-11  8.34434E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88658E-12  7.61856E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.93684E-11  7.70547E-10   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  5.34677E-17  2.14316E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  3.97608E-11  1.60564E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  4.06655E-11  1.66653E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29657E-08  1.36083E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  2.95801E-11  1.23883E-09   56140   139.9106     ba140 5655
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endf/b7 rel0 rev7 mod1                12/17/09
    1057139  4.50713E-11  1.87406E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  3.36166E-11  1.41792E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  4.03856E-11  1.71553E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.28745E-12  2.68971E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  3.55068E-11  1.52959E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  4.57545E-12  1.92988E-10   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  2.55129E-11  1.09141E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  7.70080E-12  3.29427E-10   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  5.41945E-13  2.33458E-11   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  2.51052E-11  1.08901E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  2.00571E-11  8.76039E-10   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.03150E-11  4.53630E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.10059E-11  4.87311E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  4.57492E-12  2.01193E-10   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.56726E-19  6.93940E-18   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.83450E-12  8.17762E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.46446E-14  6.44027E-13   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  5.68540E-12  2.53436E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  3.16386E-16  1.41981E-14   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.00970E-09  1.35967E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  1.78848E-12  8.13318E-11   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.31112E-13  1.05793E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.42908E-09  6.45602E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.55996E-09  7.14076E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  4.38600E-16  2.02085E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  2.17186E-13  1.00719E-11   63155   154.9229     eu155 6337
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endf/b7 rel0 rev7 mod1                12/17/09
    1063156  7.29417E-14  3.40449E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77604E-12  2.62667E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29364E-11  2.89975E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27262E-10  1.98139E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91001E-10  2.75840E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51795E-10  2.12223E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17207E-10  3.39043E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31098E-10  3.02121E-08   64160   159.9270     gd160 6449
endf/b7 rel0 rev7 mod1                12/17/09
    1074182  7.16309E-08  3.90130E-06   74182   181.9482     w182 7431
endf/b7 rel8 rev7 mod2                 12/17/09
    1074183  3.84687E-08  2.10670E-06   74183   182.9502     w183 7434
endf/b7 rel8 rev7 mod2                 12/17/09
    1074184  8.19198E-08  4.51079E-06   74184   183.9509     w184 7437
endf/b7 rel8 rev7 mod2                 12/17/09
    1074186  7.51922E-08  4.18544E-06   74186   185.9544     w186 7443
endf/b7 rel8 rev7 mod2                 12/17/09
    1082204  7.66801E-11  4.68184E-09   82204   203.9730     pb204 8225
endf/b7 rel1 rev7 mod1                12/17/09
    1082206  1.31999E-09  8.13854E-08   82206   205.9745     pb206 8231
endf/b7 rel1 rev7 mod1                12/17/09
    1082207  1.21045E-09  7.49943E-08   82207   206.9759     pb207 8234
endf/b7 rel1 rev7 mod1                12/17/09
    1082208  2.87003E-09  1.78674E-07   82208   207.9767     pb208 8237
endf/b7 rel6 rev7 mod2                12/17/09
    1092234  1.45935E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76387E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22559E-06  6.51856E-04   92236   236.0456     u236 9231
endf/b7 rel0 rev7 mod1                 12/17/09
    1092238  7.06299E-03  5.03292E-01   92238   238.0508     u238 9237
endf/b7 rel6 rev7 mod5                 12/17/09
    1093237  1.63282E-13  1.15861E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.61633E-20  1.15175E-18   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  2.24567E-11  1.60694E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  2.98793E-18  2.14704E-16   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.98405E-21  7.20424E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49925E-19   94242   242.0587     pu242 9446
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endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00160E-20  7.22731E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  2.34388E-26  1.69832E-24   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99999E-21  7.27574E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.73553E-20  1.25752E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.99185E-21  7.26982E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.98691E-21  7.29616E-19   96244   244.0627     cm244 9637
endf/b7 rel3 rev7 mod2                12/17/09

 mixture =     2          density(g/cc) = 0.99396
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    2001001  6.64695E-02  1.11915E-01    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    2008016  3.32348E-02  8.88085E-01    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09

 mixture =     3          density(g/cc) =  2.7020
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    3003006  1.75835E-07  6.50000E-07    3006     6.0151     li6 325
endf/b7 rel1 rev7 mod0                   12/17/09
    3003007  2.16849E-06  9.35000E-06    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    3005010  2.99015E-07  1.84000E-06    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    3005011  1.20605E-06  8.16000E-06    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    3012024  4.88634E-04  7.20258E-03   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    3012025  6.18603E-05  9.49881E-04   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    3012026  6.81081E-05  1.08754E-03   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    3013027  5.88689E-02  9.76150E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    3014028  2.67155E-04  4.59332E-03   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    3014029  1.35717E-05  2.41681E-04   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                  12/17/09
    3014030  8.95702E-06  1.64994E-04   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    3023000  3.19422E-06  1.00000E-04   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                    12/17/09
    3024050  1.83565E-06  5.63448E-05   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                  12/17/09
    3024052  3.53986E-05  1.12994E-03   24052    51.9405     cr52 2431
```

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endf/b7 rel8 rev7 mod4                12/17/09
    3024053  4.01392E-06  1.30593E-04   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                12/17/09
    3024054  9.99149E-07  3.31204E-05   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                12/17/09
    3025055  2.07330E-05  7.00000E-04   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                12/17/09
    3026054  6.02891E-06  1.99853E-04   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                12/17/09
    3026056  9.46410E-05  3.25331E-03   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                12/17/09
    3026057  2.18567E-06  7.64770E-05   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                12/17/09
    3026058  2.90873E-07  1.03561E-05   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                12/17/09
    3027059  2.76106E-07  1.00000E-05   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                12/17/09
    3029063  5.20580E-05  2.01329E-03   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                12/17/09
    3029065  2.32247E-05  9.26712E-04   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                12/17/09
    3030000  2.21504E-05  8.90000E-04   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                 12/17/09
    3031069  7.01394E-07  2.97102E-05   31069    68.9256     ga69 3125
endf/b7 rel0 rev7 mod1                12/17/09
    3031071  4.65496E-07  2.02898E-05   31071    70.9247     ga71 3131
endf/b7 rel0 rev7 mod1                12/17/09
    3048106  1.80940E-09  1.17766E-07   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1               12/17/09
    3048108  1.28830E-09  8.54314E-08   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1               12/17/09
    3048110  1.80796E-08  1.22113E-06   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1               12/17/09
    3048111  1.85283E-08  1.26284E-06   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1               12/17/09
    3048112  3.49287E-08  2.40208E-06   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1               12/17/09
    3048113  1.76887E-08  1.22736E-06   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1               12/17/09
    3048114  4.15873E-08  2.91113E-06   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1               12/17/09
    3048116  1.08419E-08  7.72275E-07   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1               12/17/09



                          3003006    li6 325 endf/b7 rel1 rev7 mod0
12/17/09
                          1003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                          3003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
```

1004009	be9 425 endf/b7 rel8 rev7 mod2
12/17/09	
1005010	b10 525 endf/b7 rel1 rev7 mod0
12/17/09	
3005010	b10 525 endf/b7 rel1 rev7 mod0
12/17/09	
3005011	b11 528 endf/b7 rel8 rev7 mod0
12/17/09	
1005011	b11 528 endf/b7 rel8 rev7 mod0
12/17/09	
1007014	n14 725 endf/b7 rel8 rev7 mod0
12/17/09	
2008016	o16 825 endf/b7 rel8 rev7 mod3
12/17/09	
1008016	o16 825 endf/b7 rel8 rev7 mod3
12/17/09	
1011023	na23 1125 endf/b7 rel8 rev7 mod0
12/17/09	
1012024	mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09	
3012024	mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09	
1012025	mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09	
3012025	mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09	
1012026	mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09	
3012026	mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09	
1013027	al27 1325 endf/b7 rel6 rev7 mod1
12/17/09	
3013027	al27 1325 endf/b7 rel6 rev7 mod1
12/17/09	
1014028	si28 1425 endf/b7 rel6 rev7 mod1
12/17/09	
3014028	si28 1425 endf/b7 rel6 rev7 mod1
12/17/09	
1014029	si29 1428 endf/b7 rel8 rev7 mod3
12/17/09	
3014029	si29 1428 endf/b7 rel8 rev7 mod3
12/17/09	
1014030	si30 1431 endf/b7 rel6 rev7 mod2
12/17/09	
3014030	si30 1431 endf/b7 rel6 rev7 mod2
12/17/09	
1015031	p31 1525 endf/b7 rel6 rev7 mod1
12/17/09	
1020040	ca40 2025 endf/b7 rel1 rev7 mod1
12/17/09	
1020042	ca42 2031 endf/b7 rel1 rev7 mod1
12/17/09	

1020043	ca43	2034	endf/b7	rel1	rev7	mod1
12/17/09						
1020044	ca44	2037	endf/b7	rel1	rev7	mod1
12/17/09						
1020046	ca46	2043	endf/b7	rel1	rev7	mod1
12/17/09						
1020048	ca48	2049	endf/b7	rel1	rev7	mod1
12/17/09						
1023000	v	2300	endf/b7	rel8	rev7	mod0
12/17/09						
3023000	v	2300	endf/b7	rel8	rev7	mod0
12/17/09						
1024050	cr50	2425	endf/b7	rel8	rev7	mod5
12/17/09						
3024050	cr50	2425	endf/b7	rel8	rev7	mod5
12/17/09						
1024052	cr52	2431	endf/b7	rel8	rev7	mod4
12/17/09						
3024052	cr52	2431	endf/b7	rel8	rev7	mod4
12/17/09						
1024053	cr53	2434	endf/b7	rel8	rev7	mod4
12/17/09						
3024053	cr53	2434	endf/b7	rel8	rev7	mod4
12/17/09						
1024054	cr54	2437	endf/b7	rel8	rev7	mod5
12/17/09						
3024054	cr54	2437	endf/b7	rel8	rev7	mod5
12/17/09						
1025055	mn55	2525	endf/b7	rel8	rev7	mod0
12/17/09						
3025055	mn55	2525	endf/b7	rel8	rev7	mod0
12/17/09						
1026054	fe54	2625	endf/b7	rel8	rev7	mod5
12/17/09						
3026054	fe54	2625	endf/b7	rel8	rev7	mod5
12/17/09						
1026056	fe56	2631	endf/b7	rel8	rev7	mod4
12/17/09						
3026056	fe56	2631	endf/b7	rel8	rev7	mod4
12/17/09						
1026057	fe57	2634	endf/b7	rel8	rev7	mod4
12/17/09						
3026057	fe57	2634	endf/b7	rel8	rev7	mod4
12/17/09						
1026058	fe58	2637	endf/b7	rel8	rev7	mod0
12/17/09						
3026058	fe58	2637	endf/b7	rel8	rev7	mod0
12/17/09						
1027059	co59	2725	endf/b7	rel2	rev7	mod0
12/17/09						
3027059	co59	2725	endf/b7	rel2	rev7	mod0
12/17/09						

1028058	ni58	2825	endf/b7	rel8	rev7	mod4
12/17/09						
1028060	ni60	2831	endf/b7	rel8	rev7	mod4
12/17/09						
1028061	ni61	2834	endf/b7	rel8	rev7	mod5
12/17/09						
1028062	ni62	2837	endf/b7	rel8	rev7	mod5
12/17/09						
1028064	ni64	2843	endf/b7	rel8	rev7	mod4
12/17/09						
1029063	cu63	2925	endf/b7	rel8	rev7	mod5
12/17/09						
3029063	cu63	2925	endf/b7	rel8	rev7	mod5
12/17/09						
1029065	cu65	2931	endf/b7	rel8	rev7	mod5
12/17/09						
3029065	cu65	2931	endf/b7	rel8	rev7	mod5
12/17/09						
1030000	zn	3000	endf/b7	rel0	rev7	mod0
12/17/09						
3030000	zn	3000	endf/b7	rel0	rev7	mod0
12/17/09						
3031069	ga69	3125	endf/b7	rel0	rev7	mod1
12/17/09						
3031071	ga71	3131	endf/b7	rel0	rev7	mod1
12/17/09						
1036083	kr83	3640	endf/b7	rel0	rev7	mod1
12/17/09						
1040090	zr90	4025	endf/b7	rel0	rev7	mod1
12/17/09						
1040091	zr91	4028	endf/b7	rel0	rev7	mod1
12/17/09						
1040092	zr92	4031	endf/b7	rel3	rev7	mod4
12/17/09						
1040093	zr93	4034	endf/b7	rel3	rev7	mod1
12/17/09						
1040094	zr94	4037	endf/b7	rel3	rev7	mod1
12/17/09						
1040095	zr95	4040	endf/b7	rel0	rev7	mod1
12/17/09						
1040096	zr96	4043	endf/b7	rel0	rev7	mod1
12/17/09						
1041093	nb93	4125	endf/b7	rel6	rev7	mod3
12/17/09						
1041095	nb95	4131	endf/b7	rel0	rev7	mod1
12/17/09						
1042092	mo92	4225	endf/b7	rel0	rev7	mod1
12/17/09						
1042094	mo94	4231	endf/b7	rel0	rev7	mod1
12/17/09						
1042095	mo95	4234	endf/b7	rel0	rev7	mod1
12/17/09						

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                                1042096    mo96 4237 endf/b7 rel0 rev7 mod1
12/17/09
                                1042097    mo97 4240 endf/b7 rel0 rev7 mod1
12/17/09
                                1042098    mo98 4243 endf/b7 rel0 rev7 mod1
12/17/09
                                1042099    mo99 4246 endf/b7 rel0 rev7 mod1
12/17/09
                                1042100    mo100 4249 endf/b7 rel0 rev7
mod1                 12/17/09
                                1043099    tc99 4325 endf/b7 rel0 rev7 mod1
12/17/09
                                1044101    ru101 4440 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044102    ru102 4443 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044103    ru103 4446 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044104    ru104 4449 endf/b7 rel0 rev7
mod1                 12/17/09
                                1044106    ru106 4455 endf/b7 rel0 rev7
mod0                 12/17/09
                                1045103    rh103 4525 endf/b7 rel0 rev7
mod1                 12/17/09
                                1045105    rh105 4531 endf/b7 rel0 rev7
mod1                 12/17/09
                                1046105    pd105 4634 endf/b7 rel0 rev7
mod1                 12/17/09
                                1046107    pd107 4640 endf/b7 rel0 rev7
mod1                 12/17/09
                                1046108    pd108 4643 endf/b7 rel5 rev7
mod1                 12/17/09
                                1047107    ag107 4725 endf/b7 rel0 rev7
mod1                 12/17/09
                                1047109    ag109 4731 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048106    cd106 4825 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048106    cd106 4825 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048108    cd108 4831 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048108    cd108 4831 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048110    cd110 4837 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048110    cd110 4837 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048111    cd111 4840 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048111    cd111 4840 endf/b7 rel0 rev7
mod1                 12/17/09
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                                1048112    cd112 4843 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048112    cd112 4843 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048113    cd113 4846 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048113    cd113 4846 endf/b7 rel0 rev7
mod1                 12/17/09
                                1048114    cd114 4849 endf/b7 rel4 rev7
mod1                 12/17/09
                                3048114    cd114 4849 endf/b7 rel4 rev7
mod1                 12/17/09
                                1048116    cd116 4855 endf/b7 rel0 rev7
mod1                 12/17/09
                                3048116    cd116 4855 endf/b7 rel0 rev7
mod1                 12/17/09
                                1049115    in115 4931 endf/b7 rel3 rev7
mod1                 12/17/09
                                1050112    sn112 5025 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050114    sn114 5031 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050115    sn115 5034 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050116    sn116 5037 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050117    sn117 5040 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050118    sn118 5043 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050119    sn119 5046 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050120    sn120 5049 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050122    sn122 5055 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050124    sn124 5061 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050126    sn126 5067 endf/b7 rel0 rev7
mod1                 12/17/09
                                1053127    i127 5325 endf/b7 rel2 rev7 mod1
12/17/09
                                1053129    i129 5331 endf/b7 rel0 rev7 mod1
12/17/09
                                1053135    i135 5349 endf/b7 rel0 rev7 mod1
12/17/09
                                1054131    xe131 5446 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054133    xe133 5452 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054135    xe135 5458 endf/b7 rel0 rev7
mod1                 12/17/09
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		1055133	cs133	5525	endf/b7	rel0	rev7
mod1	12/17/09						
		1055134	cs134	5528	endf/b7	rel0	rev7
mod1	12/17/09						
		1055135	cs135	5531	endf/b7	rel0	rev7
mod1	12/17/09						
		1055137	cs137	5537	endf/b7	rel0	rev7
mod1	12/17/09						
		1056138	ba138	5649	endf/b7	rel0	rev7
mod1	12/17/09						
		1056140	ba140	5655	endf/b7	rel0	rev7
mod1	12/17/09						
		1057139	la139	5728	endf/b7	rel0	rev7
mod1	12/17/09						
		1058141	ce141	5840	endf/b7	rel0	rev7
mod1	12/17/09						
		1058142	ce142	5843	endf/b7	rel0	rev7
mod1	12/17/09						
		1058143	ce143	5846	endf/b7	rel0	rev7
mod1	12/17/09						
		1058144	ce144	5849	endf/b7	rel0	rev7
mod1	12/17/09						
		1059141	pr141	5925	endf/b7	rel0	rev7
mod1	12/17/09						
		1059143	pr143	5931	endf/b7	rel0	rev7
mod1	12/17/09						
		1060143	nd143	6028	endf/b7	rel0	rev7
mod1	12/17/09						
		1060144	nd144	6031	endf/b7	rel0	rev7
mod1	12/17/09						
		1060145	nd145	6034	endf/b7	rel0	rev7
mod1	12/17/09						
		1060146	nd146	6037	endf/b7	rel0	rev7
mod1	12/17/09						
		1060147	nd147	6040	endf/b7	rel0	rev7
mod1	12/17/09						
		1060148	nd148	6043	endf/b7	rel0	rev7
mod1	12/17/09						
		1061147	pm147	6149	endf/b7	rel3	rev7
mod1	12/17/09						
		1061148	pm148	6152	endf/b7	rel3	rev7
mod1	12/17/09						
		1061149	pm149	6155	endf/b7	rel3	rev7
mod1	12/17/09						
		1062147	sm147	6234	endf/b7	rel0	rev7
mod1	12/17/09						
		1062149	sm149	6240	endf/b7	rel0	rev7
mod1	12/17/09						
		1062150	sm150	6243	endf/b7	rel0	rev7
mod1	12/17/09						
		1062151	sm151	6246	endf/b7	rel0	rev7
mod1	12/17/09						

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                                1062152    sm152 6249 endf/b7 rel0 rev7
mod1                 12/17/09
                                1062153    sm153 6252 endf/b7 rel0 rev7
mod1                 12/17/09
                                1063151    eu151 6325 endf/b7 rel0 rev7
mod1                 12/17/09
                                1063153    eu153 6331 endf/b7 rel1 rev7
mod1                 12/17/09
                                1063154    eu154 6334 endf/b7 rel0 rev7
mod1                 12/17/09
                                1063155    eu155 6337 endf/b7 rel0 rev7
mod1                 12/17/09
                                1063156    eu156 6340 endf/b7 rel0 rev7
mod1                 12/17/09
                                1064152    gd152 6425 endf/b7 rel0 rev7
mod1                 12/17/09
                                1064154    gd154 6431 endf/b7 rel0 rev7
mod1                 12/17/09
                                1064155    gd155 6434 endf/b7 rel0 rev7
mod1                 12/17/09
                                1064156    gd156 6437 endf/b7 rel0 rev7
mod1                 12/17/09
                                1064157    gd157 6440 endf/b7 rel0 rev7
mod1                 12/17/09
                                1064158    gd158 6443 endf/b7 rel0 rev7
mod1                 12/17/09
                                1064160    gd160 6449 endf/b7 rel0 rev7
mod1                 12/17/09
                                1074182    w182 7431 endf/b7 rel8 rev7 mod2
12/17/09
                                1074183    w183 7434 endf/b7 rel8 rev7 mod2
12/17/09
                                1074184    w184 7437 endf/b7 rel8 rev7 mod2
12/17/09
                                1074186    w186 7443 endf/b7 rel8 rev7 mod2
12/17/09
                                1082204    pb204 8225 endf/b7 rel1 rev7
mod1                 12/17/09
                                1082206    pb206 8231 endf/b7 rel1 rev7
mod1                 12/17/09
                                1082207    pb207 8234 endf/b7 rel1 rev7
mod1                 12/17/09
                                1082208    pb208 8237 endf/b7 rel6 rev7
mod2                 12/17/09
                                1092234    u234 9225 endf/b7 rel5 rev7 mod2
12/17/09
                                1092235    u235 9228 endf/b7 rel0 rev7 mod7
12/17/09
                                1092236    u236 9231 endf/b7 rel0 rev7 mod1
12/17/09
                                1092238    u238 9237 endf/b7 rel6 rev7 mod5
12/17/09
```

```
                                1093237    np237 9346 endf/b7 rel0 rev7
mod1                  12/17/09
                                1094238    pu238 9434 endf/b7 rel0 rev7
mod0                  12/17/09
                                1094239    pu239 9437 endf/b7 rel5 rev7
mod5                  12/17/09
                                1094240    pu240 9440 endf/b7 rel2 rev7
mod0                  12/17/09
                                1094241    pu241 9443 endf/b7 rel3 rev7
mod1                  12/17/09
                                1094242    pu242 9446 endf/b7 rel0 rev7
mod0                  12/17/09
                                1095241    am241 9543 endf/b7 rel0 rev7
mod4                  12/17/09
                                1095242    am242 9546 endf/b7 rel0 rev7
mod0                  12/17/09
                                1095243    am243 9549 endf/b7 rel5 rev7
mod0                  12/17/09
                                1096242    cm242 9631 endf/b7 rel0 rev7
mod0                  12/17/09
                                1096243    cm243 9634 endf/b7 rel7 rev7
mod0                  12/17/09
                                1096244    cm244 9637 endf/b7 rel3 rev7
mod2                  12/17/09
                                2001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09
                                1001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09

  ***** warning ***** keno message number k6-222 follows:
  9511 transfers for mixture 1 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  139 transfers for mixture 3 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  13467 transfers for mixture 2 were corrected for bad moments.

                                ........ finished mixing cross-sections
........

                                 1-d cross section array id numbers

                                           neutron
                                  reaction name    reaction id
                                          total              1
                                 non-absorption           2002
                                     nu-fission           1452
                                     absorption             27
                                        fission             18
                                            chi           1018
```

```
                                ........ finished preparing the cross
sections    ........


************************************************************
                                **
**
                                **   array      units in   units in
units in   nesting  **
                                **   number      x dir.     y dir.     z
dir.     level   **
                                **
**
                                **     1            1          14
1          1    **
                                **
**
************************************************************


                                ........ finished loading the data
........
1
************************************************************************
*****************************************
        ***
***
        ***
***

************************************************************************
*****************************************
        ***                                     ******      geometry
parameters       ******                                     ***
        ***
***
        ***
***
        ***                     niar        number of independent array
references              1                         ***
        ***
***
        ***                     ngblu       global unit number
2                        ***
        ***
***
        ***                     nboxt       number of units in the
problem                      2                            ***
        ***
***
```

```
        ***                         nquad       number of quadratics in the
problem                  12                          ***
        ***
***
        ***                         ngwrds      number of geometry words
read                        4                           ***
        ***
***
        ***                         maxgwd      maximum geometry words in a
unit                     3                          ***
        ***
***
        ***                         maxsfu      largest number of surfaces
in a unit                  9                           ***
        ***
***
        ***                         maxreg      largest number of media in a
unit                     3                         ***
        ***
***
        ***                         regtot      number of spatial volumes
defined                     4                          ***
        ***
***
        ***                         sectot      number of entries in the
sector array               14                          ***
        ***
***
        ***                         nucom       number of comments in the
geometry data              2                          ***
        ***
***
        ***                         numhol      number of holes in the
problem                        0                           ***
        ***
***

********************************************************************************
*****************************************

1                                          fuel bundle

                                    geometry description for those units
utilized in this problem



                                                          -----   unit 1
-----

 fuel meat
```

```
       1        cuboid         1                            quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +8.86938E+00

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +6.45160E-04

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +9.00225E+02

       2        cuboid         2                            quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.03225E-03

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

       3        cuboid         3                            quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.18080E-02

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 media 1    1          1

 media 3    1          2 -1
```

```
 media 2    1          -1 -2 3

 boundary                         3


                                              ******************   global
******************
                                                           -----   unit 2
-----

 array unit

       1        cuboid         1                             quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +5.31622E+00 +0.00000E+00 +1.12882E+00

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 array 1               1

 boundary                          1
1                         fuel bundle

                    -------  unit orientation description for array 1
-------


 z layer 1, x column 1 to 1 left to right   y row 1 to 14  bottom to top

  1

  1

  1

  1

  1

  1
```

1

1

1

1

1

1

1

1

1 fuel bundle

volumes for those units utilized in this problem

volumes not specified in the input were set to -1.0

unit	uses	geometry region	mixture	total region volume (cm**3)
1	14	1	1	2.47925E+02 +/- 7.84971E-01
		2	3	5.95366E+02 +/- 1.88502E+00
		3	2	1.84949E+03 +/- 5.85578E+00
2	1	1		

mixture	total mixture volume (cm**3)	total mixture mass (gm)
1	2.47925E+02 +/- 7.84971E-01	1.37533E+03 +/- 4.35453E+00
2	1.84949E+03 +/- 5.85578E+00	1.83832E+03 +/- 5.82041E+00
3	5.95366E+02 +/- 1.88502E+00	1.60868E+03 +/- 5.09333E+00
	---	---
	2.69278E+03	4.82233E+03

***** restart data has been written on

```
unit 95  *****


**************************************************************************
*****************************************
        ***
***
        ***                                                biasing information
***
        ***
***
        ***     a default weight of    0.500 will be used for all bias
id's.                                                      ***
        ***
***

**************************************************************************
*****************************************

                                  ........ finished in Keno-VI before
tracking       ........

                                  ........     0.01717 minutes were used
processing data.        ........

 volume fraction of fissile material in the system= 9.20704E-02

 start type 6 was used.

 neutrons were started from binary start data on file
keno_start6_file

 neutrons started in non-fissile mixtures will use the fission spectrum
for mixture     1

   0.00083 minutes were required for starting.   total elapsed time is
0.01800 minutes.
1fuel bundle

                    generation        average         avg k-eff
matrix       matrix k-eff
     generation   k-effective      k-effective       deviation
k-effective       deviation
  keno message number k6-132 follows:
 only 15864 independent fission points were generated for generation 1
          1       7.75529E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15555 independent fission points were generated for generation 2
          2       7.64115E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
```

keno message number k6-132 follows:
only 15618 independent fission points were generated for generation 3

3	7.61994E-01	7.61994E-01	0.00000E+00	0.00000E+00
4	7.73114E-01	7.67554E-01	5.56001E-03	0.00000E+00
5	7.67758E-01	7.67622E-01	3.21080E-03	0.00000E+00
6	7.58785E-01	7.65413E-01	3.16793E-03	0.00000E+00
7	7.65419E-01	7.65414E-01	2.45387E-03	0.00000E+00
8	7.62006E-01	7.64846E-01	2.08252E-03	0.00000E+00
9	7.63387E-01	7.64638E-01	1.77235E-03	0.00000E+00
10	7.66153E-01	7.64827E-01	1.54655E-03	0.00000E+00
11	7.58100E-01	7.64080E-01	1.55530E-03	0.00000E+00
12	7.68055E-01	7.64477E-01	1.44678E-03	0.00000E+00
13	7.71575E-01	7.65122E-01	1.45910E-03	0.00000E+00
14	7.71430E-01	7.65648E-01	1.43194E-03	0.00000E+00
15	7.71949E-01	7.66133E-01	1.40354E-03	0.00000E+00
16	7.70605E-01	7.66452E-01	1.33811E-03	0.00000E+00
17	7.79561E-01	7.67326E-01	1.52168E-03	0.00000E+00
18	7.59952E-01	7.66865E-01	1.49615E-03	0.00000E+00
19	7.68787E-01	7.66978E-01	1.40993E-03	0.00000E+00
20	7.66158E-01	7.66933E-01	1.33007E-03	0.00000E+00
21	7.68633E-01	7.67022E-01	1.26130E-03	0.00000E+00
22	7.60378E-01	7.66690E-01	1.24183E-03	0.00000E+00
23	7.61259E-01	7.66431E-01	1.20920E-03	0.00000E+00
24	7.65111E-01	7.66371E-01	1.15449E-03	0.00000E+00
25	7.68278E-01	7.66454E-01	1.10626E-03	0.00000E+00
26	7.64917E-01	7.66390E-01	1.06110E-03	0.00000E+00
27	7.57580E-01	7.63972E-01	5.93163E-03	0.00000E+00

28	7.66492E-01	7.64476E-01	2.35708E-03
0.00000E+00	0.00000E+00		
29	7.61345E-01	7.63954E-01	1.93443E-03
0.00000E+00	0.00000E+00		
30	7.68670E-01	7.64628E-01	2.32336E-03
0.00000E+00	0.00000E+00		
31	7.65388E-01	7.64723E-01	1.85955E-03
0.00000E+00	0.00000E+00		
32	7.71155E-01	7.65437E-01	2.20822E-03
0.00000E+00	0.00000E+00		
33	7.65263E-01	7.65420E-01	1.90403E-03
0.00000E+00	0.00000E+00		
34	7.73518E-01	7.66156E-01	2.25934E-03
0.00000E+00	0.00000E+00		
35	7.61173E-01	7.65741E-01	2.08017E-03
0.00000E+00	0.00000E+00		
36	7.71978E-01	7.66221E-01	2.18777E-03
0.00000E+00	0.00000E+00		
37	7.67025E-01	7.66278E-01	1.97861E-03
0.00000E+00	0.00000E+00		
38	7.63389E-01	7.66086E-01	1.76543E-03
0.00000E+00	0.00000E+00		
39	7.70345E-01	7.66352E-01	1.67288E-03
0.00000E+00	0.00000E+00		
40	7.62578E-01	7.66130E-01	1.60810E-03
0.00000E+00	0.00000E+00		
41	7.64160E-01	7.66020E-01	1.48378E-03
0.00000E+00	0.00000E+00		
42	7.59235E-01	7.65663E-01	1.51044E-03
0.00000E+00	0.00000E+00		
43	7.74755E-01	7.66118E-01	1.47315E-03
0.00000E+00	0.00000E+00		
44	7.70243E-01	7.66314E-01	1.35019E-03
0.00000E+00	0.00000E+00		
45	7.72255E-01	7.66584E-01	1.41844E-03
0.00000E+00	0.00000E+00		
46	7.68831E-01	7.66682E-01	1.36891E-03
0.00000E+00	0.00000E+00		
47	7.56113E-01	7.66242E-01	1.28860E-03
0.00000E+00	0.00000E+00		
48	7.68952E-01	7.66350E-01	1.24660E-03
0.00000E+00	0.00000E+00		
49	7.66426E-01	7.66353E-01	1.19204E-03
0.00000E+00	0.00000E+00		
50	7.63762E-01	7.66257E-01	1.13744E-03
0.00000E+00	0.00000E+00		
51	7.57729E-01	7.65952E-01	1.13933E-03
0.00000E+00	0.00000E+00		
52	7.76103E-01	7.66302E-01	1.12683E-03
0.00000E+00	0.00000E+00		
53	7.62563E-01	7.66178E-01	1.13178E-03
0.00000E+00	0.00000E+00		

54	7.64125E-01	7.66111E-01	1.07039E-03
0.00000E+00	0.00000E+00		
55	7.65249E-01	7.66085E-01	1.03793E-03
0.00000E+00	0.00000E+00		
56	7.69007E-01	7.66173E-01	1.00191E-03
0.00000E+00	0.00000E+00		
57	7.66630E-01	7.66187E-01	9.69725E-04
0.00000E+00	0.00000E+00		
58	7.68623E-01	7.66256E-01	9.49896E-04
0.00000E+00	0.00000E+00		
59	7.60139E-01	7.66086E-01	9.36051E-04
0.00000E+00	0.00000E+00		
60	7.66940E-01	7.66109E-01	9.11132E-04
0.00000E+00	0.00000E+00		
61	7.70642E-01	7.66229E-01	8.69470E-04
0.00000E+00	0.00000E+00		
62	7.67543E-01	7.66262E-01	8.47367E-04
0.00000E+00	0.00000E+00		
63	7.65408E-01	7.66241E-01	8.21680E-04
0.00000E+00	0.00000E+00		
64	7.62486E-01	7.66149E-01	8.01850E-04
0.00000E+00	0.00000E+00		
65	7.63629E-01	7.66089E-01	7.85751E-04
0.00000E+00	0.00000E+00		
66	7.73008E-01	7.66250E-01	7.64384E-04
0.00000E+00	0.00000E+00		
67	7.64580E-01	7.66212E-01	7.50261E-04
0.00000E+00	0.00000E+00		
68	7.61122E-01	7.66099E-01	7.07047E-04
0.00000E+00	0.00000E+00		
69	7.69421E-01	7.66171E-01	6.95088E-04
0.00000E+00	0.00000E+00		
70	7.61012E-01	7.66062E-01	7.11424E-04
0.00000E+00	0.00000E+00		
71	7.68989E-01	7.66123E-01	7.05438E-04
0.00000E+00	0.00000E+00		
72	7.72581E-01	7.66254E-01	6.76329E-04
0.00000E+00	0.00000E+00		
73	7.60365E-01	7.66137E-01	6.73204E-04
0.00000E+00	0.00000E+00		
74	7.71836E-01	7.66248E-01	6.86851E-04
0.00000E+00	0.00000E+00		
75	7.65927E-01	7.66242E-01	6.74149E-04
0.00000E+00	0.00000E+00		
76	7.64486E-01	7.66209E-01	6.44301E-04
0.00000E+00	0.00000E+00		
77	7.63884E-01	7.66166E-01	6.33550E-04
0.00000E+00	0.00000E+00		
78	7.67814E-01	7.66196E-01	6.22455E-04
0.00000E+00	0.00000E+00		
79	7.66420E-01	7.66200E-01	6.11046E-04
0.00000E+00	0.00000E+00		

```
          80       7.62375E-01      7.66133E-01      6.03912E-04
0.00000E+00      0.00000E+00
          81       7.64168E-01      7.66099E-01      5.94224E-04
0.00000E+00      0.00000E+00
          82       7.60055E-01      7.65997E-01      6.09393E-04
0.00000E+00      0.00000E+00
          83       7.61860E-01      7.65928E-01      6.07030E-04
0.00000E+00      0.00000E+00
          84       7.72600E-01      7.66037E-01      5.87925E-04
0.00000E+00      0.00000E+00
          85       7.72661E-01      7.66144E-01      5.88319E-04
0.00000E+00      0.00000E+00
          86       7.68437E-01      7.66180E-01      5.79933E-04
0.00000E+00      0.00000E+00
          87       7.67733E-01      7.66204E-01      5.71186E-04
0.00000E+00      0.00000E+00
          88       7.63276E-01      7.66159E-01      5.64050E-04
0.00000E+00      0.00000E+00
          89       7.69312E-01      7.66207E-01      5.57419E-04
0.00000E+00      0.00000E+00
          90       7.69064E-01      7.66250E-01      5.50613E-04
0.00000E+00      0.00000E+00
          91       7.72345E-01      7.66339E-01      5.49912E-04
0.00000E+00      0.00000E+00
          92       7.66246E-01      7.66338E-01      5.41766E-04
0.00000E+00      0.00000E+00
          93       7.56510E-01      7.66198E-01      5.52535E-04
0.00000E+00      0.00000E+00
          94       7.65910E-01      7.66194E-01      5.44600E-04
0.00000E+00      0.00000E+00
          95       7.54650E-01      7.66033E-01      5.83227E-04
0.00000E+00      0.00000E+00
          96       7.61665E-01      7.65973E-01      5.78636E-04
0.00000E+00      0.00000E+00
          97       7.56281E-01      7.65842E-01      6.22354E-04
0.00000E+00      0.00000E+00
          98       7.62819E-01      7.65802E-01      6.19202E-04
0.00000E+00      0.00000E+00
          99       7.65527E-01      7.65799E-01      6.11585E-04
0.00000E+00      0.00000E+00
         100       7.56507E-01      7.65678E-01      6.36780E-04
0.00000E+00      0.00000E+00
         101       7.68442E-01      7.65713E-01      6.26725E-04
0.00000E+00      0.00000E+00
         102       7.68143E-01      7.65744E-01      6.12647E-04
0.00000E+00      0.00000E+00
         103       7.60578E-01      7.65680E-01      6.17686E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=AF5E8B195A032BE3
         104       7.58495E-01      7.65591E-01      6.64626E-04
0.00000E+00      0.00000E+00
```

```
        105       7.66979E-01      7.65608E-01      6.52441E-04
0.00000E+00      0.00000E+00
        106       7.61097E-01      7.65553E-01      6.66104E-04
0.00000E+00      0.00000E+00
        107       7.64146E-01      7.65537E-01      6.59857E-04
0.00000E+00      0.00000E+00
        108       7.69627E-01      7.65585E-01      5.93947E-04
0.00000E+00      0.00000E+00
        109       7.68732E-01      7.65621E-01      5.83322E-04
0.00000E+00      0.00000E+00
        110       7.70442E-01      7.65677E-01      5.82415E-04
0.00000E+00      0.00000E+00
        111       7.72009E-01      7.65749E-01      5.91321E-04
0.00000E+00      0.00000E+00
        112       7.69312E-01      7.65789E-01      5.92476E-04
0.00000E+00      0.00000E+00
        113       7.68238E-01      7.65816E-01      5.92503E-04
0.00000E+00      0.00000E+00
        114       7.68186E-01      7.65842E-01      5.91554E-04
0.00000E+00      0.00000E+00
        115       7.61625E-01      7.65796E-01      5.81208E-04
0.00000E+00      0.00000E+00
        116       7.67652E-01      7.65816E-01      5.77026E-04
0.00000E+00      0.00000E+00
        117       7.69653E-01      7.65857E-01      5.70704E-04
0.00000E+00      0.00000E+00
        118       7.64308E-01      7.65841E-01      5.65476E-04
0.00000E+00      0.00000E+00
        119       7.64127E-01      7.65823E-01      5.57608E-04
0.00000E+00      0.00000E+00
        120       7.66248E-01      7.65827E-01      5.51859E-04
0.00000E+00      0.00000E+00
        121       7.73175E-01      7.65902E-01      5.68007E-04
0.00000E+00      0.00000E+00
        122       7.64522E-01      7.65888E-01      5.49531E-04
0.00000E+00      0.00000E+00
        123       7.71060E-01      7.65940E-01      5.52621E-04
0.00000E+00      0.00000E+00

  keno message number k6-123          execution terminated due to
completion of the specified number of generations.
                                    restart data was written for
generation  123       random number=A95A336A9B3AA7B0
                                    A start type 6 file will be written to
keno_start6_file
1                                                  fuel bundle

 lifetime =  1.55008E-05 + or -  1.17277E-08             generation time
=  2.99093E-05 + or -  2.18160E-08
 nu bar   =  2.43897E+00 + or -  9.36900E-06       average fission group
=  2.17553E+02 + or -  1.11546E-02
                    energy(ev) of the average lethargy causing fission
```

= 5.66862E-02 + or - 1.09968E-04

system mean free path (cm)

= 6.52845E-01 + or - 1.85241E-04

no. of initial generations skipped	average k-effective	95 per cent confidence interval	99 per cent confidence interval	number of histories	67 per cent variance deviation	95 per cent confidence interval	99 per cent confidence interval
23	0.76594	+ or - 0.00055	0.76539 to 0.76649	2000000	8.9662	0.76483 to 0.76705	0.76428 to 0.76760
24	0.76595	+ or - 0.00056	0.76539 to 0.76651	1980000	8.9877	0.76483 to 0.76706	0.76428 to 0.76762
25	0.76592	+ or - 0.00057	0.76536 to 0.76649	1960000	8.7819	0.76479 to 0.76706	0.76422 to 0.76763
26	0.76593	+ or - 0.00057	0.76536 to 0.76651	1940000	8.7667	0.76479 to 0.76708	0.76421 to 0.76766
27	0.76602	+ or - 0.00059	0.76543 to 0.76661	1920000	8.3407	0.76484 to 0.76720	0.76425 to 0.76780
28	0.76602	+ or - 0.00060	0.76542 to 0.76661	1900000	8.3414	0.76482 to 0.76721	0.76423 to 0.76781
29	0.76607	+ or - 0.00060	0.76546 to 0.76667	1880000	8.4087	0.76486 to 0.76727	0.76426 to 0.76787
30	0.76604	+ or - 0.00058	0.76546 to 0.76662	1860000	9.2926	0.76488 to 0.76719	0.76431 to 0.76777
31	0.76605	+ or - 0.00059	0.76546 to 0.76663	1840000	9.2304	0.76488 to 0.76722	0.76429 to 0.76780
32	0.76599	+ or - 0.00059	0.76540 to 0.76658	1820000	9.3863	0.76482 to 0.76716	0.76423 to 0.76775
37	0.76588	+ or - 0.00064	0.76524 to 0.76652	1720000	8.5851	0.76460 to 0.76717	0.76396 to 0.76781
42	0.76600	+ or - 0.00071	0.76529 to 0.76672	1620000	7.8338	0.76458 to 0.76743	0.76387 to 0.76814
47	0.76584	+ or - 0.00074	0.76511 to 0.76658	1520000	7.5851	0.76437 to 0.76732	0.76363 to 0.76805
52	0.76579	+ or - 0.00081	0.76498 to 0.76660	1420000	6.4460	0.76417 to 0.76741	0.76336 to 0.76822

57	0.76581	+ or - 0.00087	0.76494 to 0.76668	0.76407 to 0.76755	0.76320 to 0.76842	1320000	6.4124
62	0.76573	+ or - 0.00097	0.76476 to 0.76670	0.76379 to 0.76768	0.76282 to 0.76865	1220000	5.9170
67	0.76573	+ or - 0.00100	0.76472 to 0.76673	0.76372 to 0.76773	0.76272 to 0.76873	1120000	6.4175
72	0.76564	+ or - 0.00108	0.76456 to 0.76672	0.76348 to 0.76780	0.76240 to 0.76888	1020000	6.5501
77	0.76567	+ or - 0.00120	0.76447 to 0.76688	0.76327 to 0.76808	0.76207 to 0.76928	920000	6.4147
82	0.76586	+ or - 0.00144	0.76441 to 0.76730	0.76297 to 0.76875	0.76153 to 0.77019	820000	5.6801
87	0.76547	+ or - 0.00148	0.76399 to 0.76695	0.76251 to 0.76843	0.76103 to 0.76991	720000	6.4328
92	0.76505	+ or - 0.00226	0.76280 to 0.76731	0.76054 to 0.76956	0.75829 to 0.77182	620000	3.4286
97	0.76622	+ or - 0.00144	0.76478 to 0.76765	0.76334 to 0.76909	0.76191 to 0.77053	520000	8.7088
102	0.76668	+ or - 0.00160	0.76507 to 0.76828	0.76347 to 0.76988	0.76187 to 0.77148	420000	7.7846
107	0.76806	+ or - 0.00126	0.76680 to 0.76931	0.76555 to 0.77057	0.76429 to 0.77182	320000	12.9495
112	0.76716	+ or - 0.00113	0.76603 to 0.76830	0.76489 to 0.76943	0.76376 to 0.77057	220000	31.8815

1 fuel bundle

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	variance (per cent)
117	0.76724	+ or - 0.00292	0.76432 to 0.77016	0.76139 to 0.77309	0.75847 to 0.77601	120000	14.1453

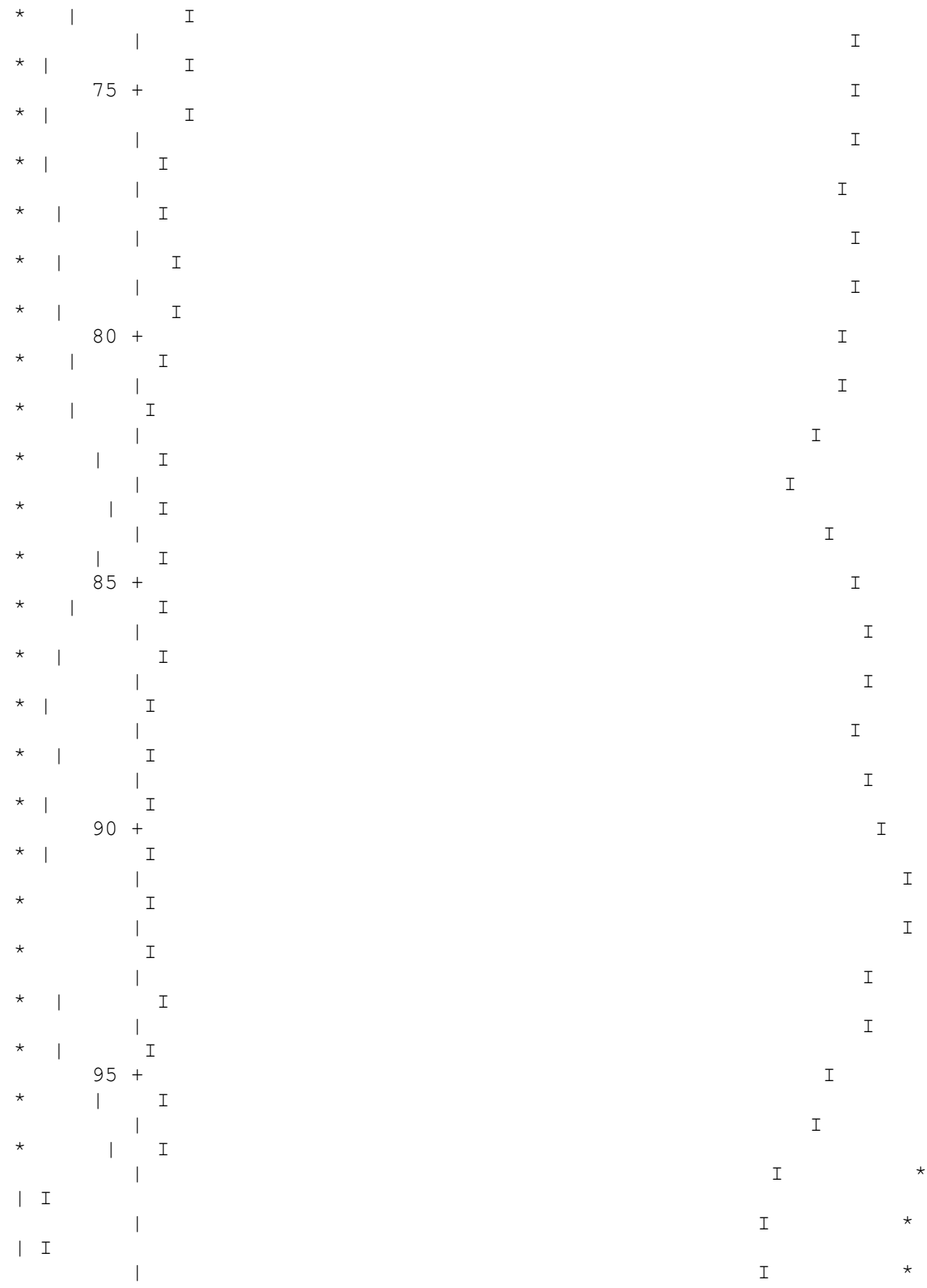
1 fuel bundle

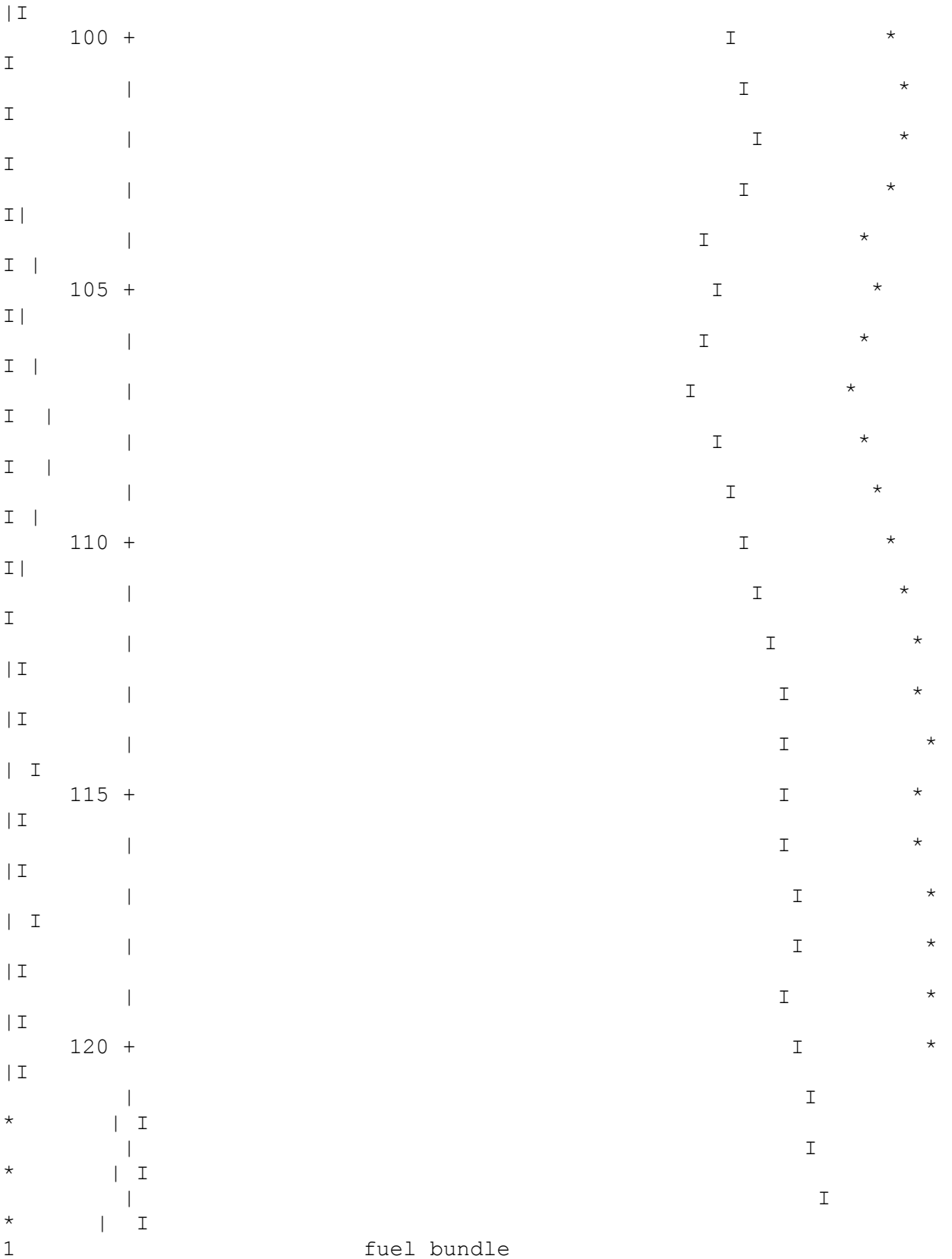
plot of average k-effective by generation run.

the line represents k-eff = 0.76633 + or - 0.00054 which occurs for 92 generations run.

0.7640
0.7653
0.7667
25
30
35
40
45

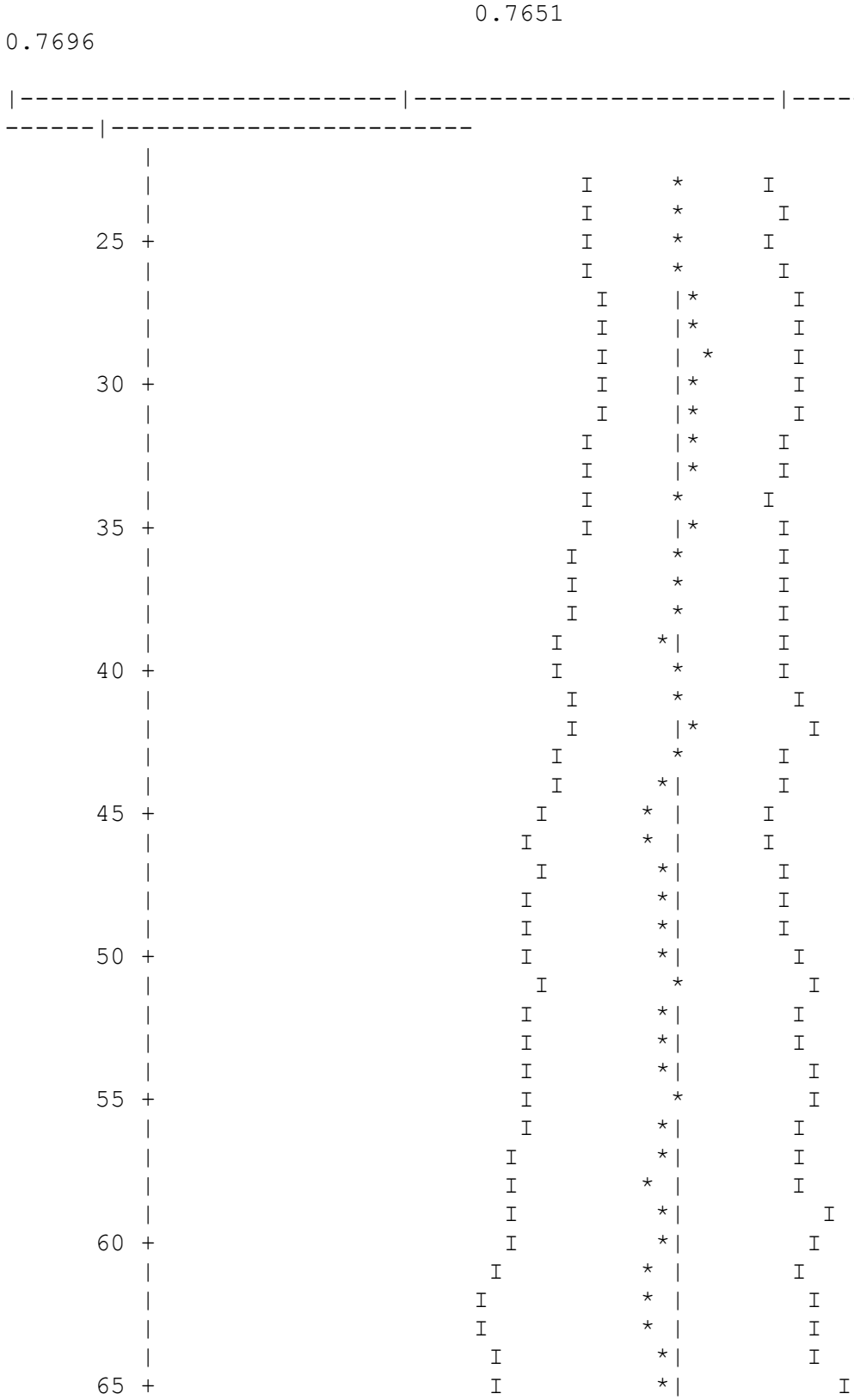
50
55
60
65
70

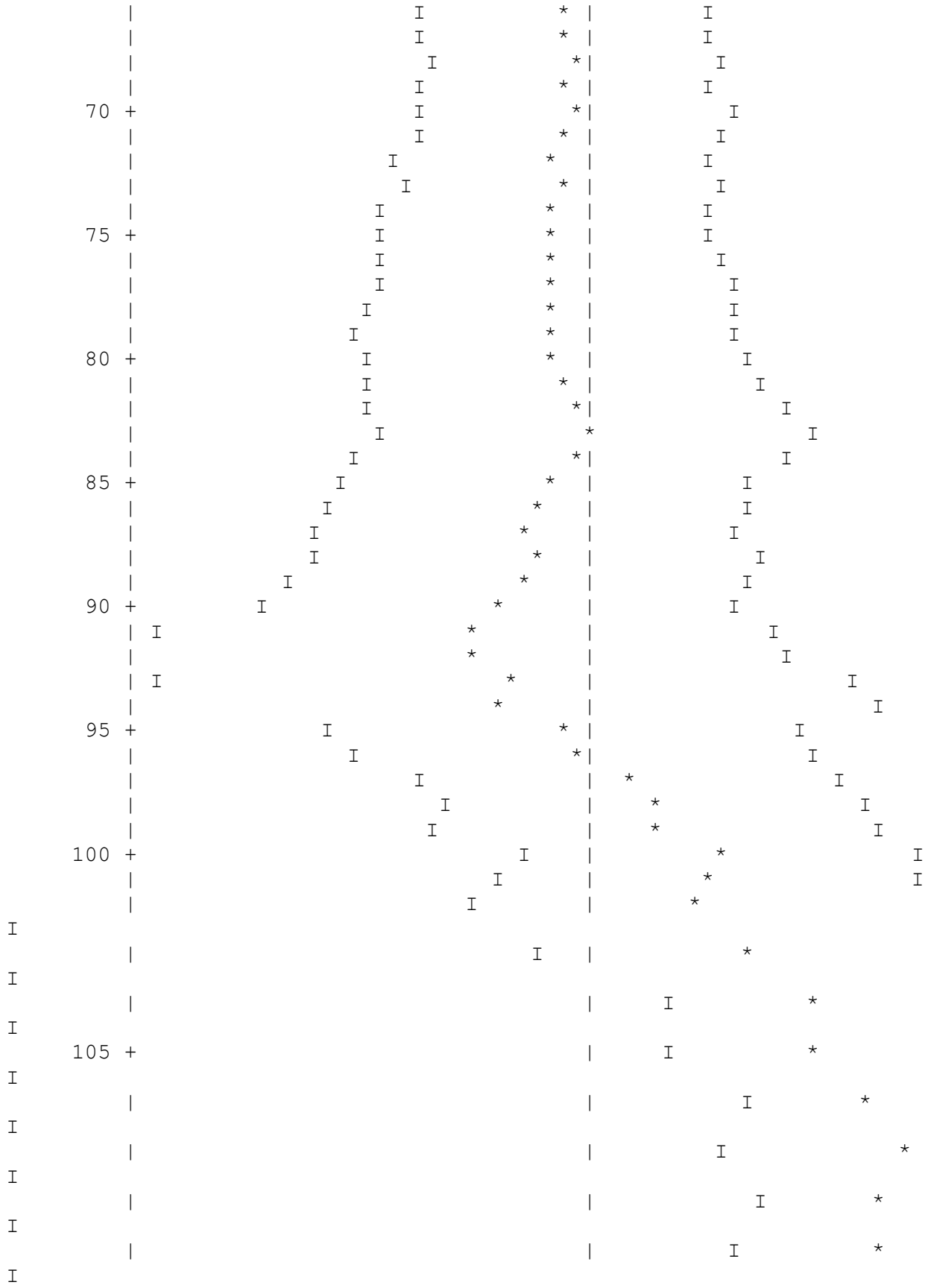

75
80
85
90
95

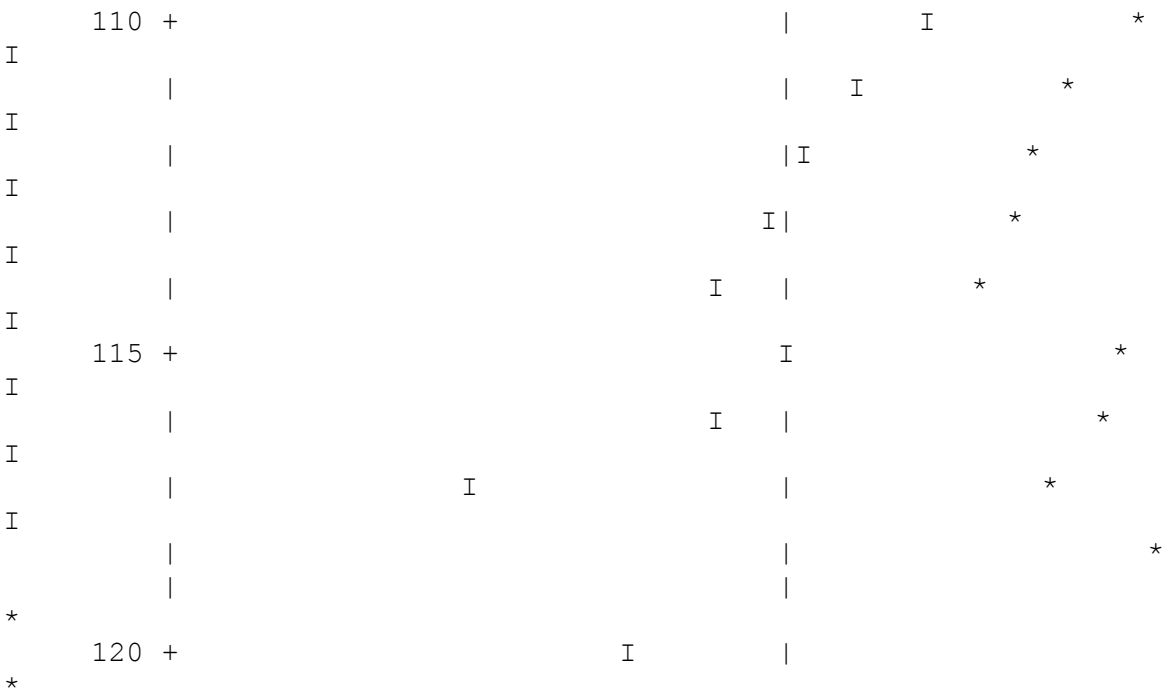


plot of average k-effective by generation skipped.

the line represents k-eff = 0.7659 + or - 0.0005 which occurs for 23 generations skipped.




70
75
80
85
90
95
100
105



k-effective satisfies the chi**2 test for normality at the 95 % level
1 fuel bundle

skipping 23 generations

group	fission fraction	unit deviation	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			0.00000E+00	0.0000	0.00000E+00	0.0000	0.00000E+00	0.0000
2	0.0000			6.97037E-07	57.1489	5.85848E-07	31.2886	0.00000E+00	0.0000
3	0.0000			1.17021E-05	12.4214	2.09883E-05	5.3694	0.00000E+00	0.0000
4	0.0000			2.08191E-05	8.9931	3.27688E-05	3.8956	0.00000E+00	0.0000
5	0.0000			2.84469E-05	7.6104	5.18184E-05	3.1924	0.00000E+00	0.0000
6	0.0001			9.61439E-05	3.8349	2.29122E-04	1.5993	0.00000E+00	0.0000
7	0.0002			1.24036E-04	3.0600	2.09377E-04	1.4124	0.00000E+00	0.0000
8	0.0003			2.47758E-04	2.2784	3.27605E-04	1.0924	0.00000E+00	0.0000
9	0.0005			3.86115E-04	1.0841	4.42097E-04	0.5244	0.00000E+00	0.0000
10	0.0003			2.05361E-04	1.4419	2.07903E-04	0.6635	0.00000E+00	0.0000

11	0.0012		9.27164E-04	0.6908			
5.31715E-04	0.4686		0.00000E+00	0.0000			
12	0.0010		7.67669E-04	0.7099			
3.00940E-04	0.6965		0.00000E+00	0.0000			
13	0.0003		2.26157E-04	1.1683			
8.98654E-05	1.1563		0.00000E+00	0.0000			
14	0.0013		9.95788E-04	0.6330			
4.07054E-04	0.6261		0.00000E+00	0.0000			
15	0.0010		7.60093E-04	0.7037			
3.27715E-04	0.6957		0.00000E+00	0.0000			
16	0.0003		1.91705E-04	1.0784			
8.80932E-05	1.0625		0.00000E+00	0.0000			
17	0.0001		7.05734E-05	1.8262			
3.42960E-05	1.7963		0.00000E+00	0.0000			
18	0.0001		5.19764E-05	1.9785			
2.62622E-05	1.9404		0.00000E+00	0.0000			
19	0.0001		8.14528E-05	1.4106			
4.30571E-05	1.3773		0.00000E+00	0.0000			
20	0.0001		6.03193E-05	1.6339			
3.30480E-05	1.5921		0.00000E+00	0.0000			
21	0.0002		1.19803E-04	1.0550			
6.76308E-05	1.0301		0.00000E+00	0.0000			
22	0.0001		1.05485E-04	1.0792			
6.24802E-05	1.0551		0.00000E+00	0.0000			
23	0.0001		1.04685E-04	1.2923			
6.39185E-05	1.2575		0.00000E+00	0.0000			
24	0.0000		2.51707E-05	2.6898			
1.56269E-05	2.6235		0.00000E+00	0.0000			
25	0.0000		3.15892E-05	1.9526			
1.97244E-05	1.8973		0.00000E+00	0.0000			
26	0.0000		1.63756E-05	2.3189			
1.02959E-05	2.2571		0.00000E+00	0.0000			
27	0.0001		5.41126E-05	1.3137			
3.37532E-05	1.2845		0.00000E+00	0.0000			
28	0.0001		9.57074E-05	1.0577			
5.97151E-05	1.0393		0.00000E+00	0.0000			
29	0.0001		9.76588E-05	1.1099			
6.15226E-05	1.0955		0.00000E+00	0.0000			
30	0.0000		1.23468E-05	3.0401			
7.74613E-06	3.0174		0.00000E+00	0.0000			
31	0.0001		9.51058E-05	1.1054			
6.00982E-05	1.0923		0.00000E+00	0.0000			
32	0.0000		3.71049E-05	1.7327			
2.37383E-05	1.6937		0.00000E+00	0.0000			
33	0.0000		3.35162E-05	1.5498			
2.09768E-05	1.5308		0.00000E+00	0.0000			
34	0.0001		7.59570E-05	0.9824			
4.77094E-05	0.9679		0.00000E+00	0.0000			
35	0.0001		4.68360E-05	1.4227			
2.93780E-05	1.3994		0.00000E+00	0.0000			
36	0.0001		4.38326E-05	1.4755			
2.71304E-05	1.4614		0.00000E+00	0.0000			

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   37    0.0000                2.93199E-05     1.6221
1.83892E-05     1.5878       0.00000E+00     0.0000
   38    0.0000                3.44846E-05     1.8320
2.17064E-05     1.7928       0.00000E+00     0.0000
   39    0.0002                1.28985E-04     0.9507
8.20840E-05     0.9282       0.00000E+00     0.0000
   40    0.0002                1.19052E-04     0.9065
7.69880E-05     0.8914       0.00000E+00     0.0000
   41    0.0002                1.58074E-04     0.7391
1.05665E-04     0.7119       0.00000E+00     0.0000
   42    0.0002                1.39610E-04     0.8369
9.49515E-05     0.8184       0.00000E+00     0.0000
   43    0.0001                8.10548E-05     1.2334
5.81209E-05     1.1728       0.00000E+00     0.0000
   44    0.0001                1.12593E-04     0.9722
8.27013E-05     0.9326       0.00000E+00     0.0000
   45    0.0001                5.98836E-05     0.9946
4.82851E-05     0.9196       0.00000E+00     0.0000
   46    0.0000                1.44569E-05     1.8620
1.16070E-05     1.7406       0.00000E+00     0.0000
   47    0.0001                4.09808E-05     1.6544
3.18224E-05     1.5935       0.00000E+00     0.0000
   48    0.0000                1.19168E-05     3.4561
9.24808E-06     3.3627       0.00000E+00     0.0000
   49    0.0001                7.93166E-05     1.4300
6.25617E-05     1.3941       0.00000E+00     0.0000
   50    0.0001                5.67860E-05     1.6947
4.67631E-05     1.6620       0.00000E+00     0.0000
   51    0.0000                1.58858E-05     3.7177
1.31851E-05     3.6483       0.00000E+00     0.0000
   52    0.0001                4.16953E-05     1.9549
3.60349E-05     1.9088       0.00000E+00     0.0000
   53    0.0002                1.59594E-04     0.6985
1.56743E-04     0.6492       0.00000E+00     0.0000
   54    0.0001                7.66979E-05     1.7643
7.12458E-05     1.7033       0.00000E+00     0.0000
   55    0.0002                1.62822E-04     1.2464
1.49290E-04     1.2116       0.00000E+00     0.0000
   56    0.0002                1.16804E-04     1.6351
1.08354E-04     1.5954       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

   57    0.0002                1.47269E-04     1.6558
1.33706E-04     1.6135       0.00000E+00     0.0000
   58    0.0001                8.45046E-05     2.0338
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7.40439E-05	1.9749	0.00000E+00	0.0000		
59	0.0002	1.60951E-04	1.4962		
1.44415E-04	1.4372	0.00000E+00	0.0000		
60	0.0004	2.78115E-04	1.1937		
2.52017E-04	1.1283	0.00000E+00	0.0000		
61	0.0000	3.01972E-05	3.3201		
2.31756E-05	3.2168	0.00000E+00	0.0000		
62	0.0002	1.63826E-04	1.5587		
1.37391E-04	1.5186	0.00000E+00	0.0000		
63	0.0002	1.19508E-04	2.2871		
9.84064E-05	2.2007	0.00000E+00	0.0000		
64	0.0001	1.02972E-04	2.2466		
8.29343E-05	2.1734	0.00000E+00	0.0000		
65	0.0000	3.49006E-05	3.5337		
3.44671E-05	3.4287	0.00000E+00	0.0000		
66	0.0002	1.67097E-04	1.7622		
1.48404E-04	1.7044	0.00000E+00	0.0000		
67	0.0002	1.43796E-04	2.1852		
1.17689E-04	2.1166	0.00000E+00	0.0000		
68	0.0000	2.76696E-05	4.7028		
2.39008E-05	4.5428	0.00000E+00	0.0000		
69	0.0004	2.93965E-04	1.5429		
2.30869E-04	1.4932	0.00000E+00	0.0000		
70	0.0003	2.05799E-04	1.7789		
1.87324E-04	1.7127	0.00000E+00	0.0000		
71	0.0006	4.36665E-04	1.4185		
3.61250E-04	1.3764	0.00000E+00	0.0000		
72	0.0001	4.83258E-05	6.1051		
2.85708E-05	5.9575	0.00000E+00	0.0000		
73	0.0004	3.17572E-04	1.6330		
2.42496E-04	1.5376	0.00000E+00	0.0000		
74	0.0014	1.06803E-03	1.0731		
7.76319E-04	1.0275	0.00000E+00	0.0000		
75	0.0001	1.11116E-04	2.4350		
8.54520E-05	2.3158	0.00000E+00	0.0000		
76	0.0006	4.72601E-04	1.7178		
2.99962E-04	1.6572	0.00000E+00	0.0000		
77	0.0005	3.65832E-04	1.8817		
2.62433E-04	1.8119	0.00000E+00	0.0000		
78	0.0000	7.02440E-06	4.2713		
6.87555E-05	4.2240	0.00000E+00	0.0000		
79	0.0002	1.76683E-04	2.2468		
1.19115E-04	2.1535	0.00000E+00	0.0000		
80	0.0001	6.18799E-05	3.5136		
8.24980E-05	3.4148	0.00000E+00	0.0000		
81	0.0014	1.06658E-03	1.1557		
7.84056E-04	1.1063	0.00000E+00	0.0000		
82	0.0001	6.80026E-05	4.2723		
4.07312E-05	4.0555	0.00000E+00	0.0000		
83	0.0002	1.24498E-04	3.2743		
1.37798E-04	3.2069	0.00000E+00	0.0000		
84	0.0001	7.88097E-05	3.2695		

8.01041E-05	3.0308	0.00000E+00	0.0000				
85	0.0003	1.92399E-04	2.4178				
2.37068E-04	2.3485	0.00000E+00	0.0000				
86	0.0003	2.63537E-04	2.4667				
2.12105E-04	2.3433	0.00000E+00	0.0000				
87	0.0004	3.33577E-04	2.5299				
2.07588E-04	2.4165	0.00000E+00	0.0000				
88	0.0001	5.42034E-05	4.4153				
9.84401E-05	4.3051	0.00000E+00	0.0000				
89	0.0001	1.01288E-04	3.2002				
6.98961E-05	2.9662	0.00000E+00	0.0000				
90	0.0003	2.21505E-04	3.1705				
1.30891E-04	3.0289	0.00000E+00	0.0000				
91	0.0002	1.85444E-04	2.8241				
1.17379E-04	2.6522	0.00000E+00	0.0000				
92	0.0000	3.03283E-05	2.7691				
1.98567E-04	2.7092	0.00000E+00	0.0000				
93	0.0002	1.29660E-04	3.0871				
1.05457E-04	2.8801	0.00000E+00	0.0000				
94	0.0002	1.17748E-04	4.4699				
6.59981E-05	4.1982	0.00000E+00	0.0000				
95	0.0008	6.11680E-04	2.4542				
3.77046E-04	2.3760	0.00000E+00	0.0000				
96	0.0002	1.52625E-04	4.1001				
7.74774E-05	3.9304	0.00000E+00	0.0000				
97	0.0004	2.90346E-04	3.9567				
1.66152E-04	3.8734	0.00000E+00	0.0000				
98	0.0001	1.00186E-04	4.0498				
9.62368E-05	3.8970	0.00000E+00	0.0000				
99	0.0001	1.04854E-04	4.6990				
7.02275E-05	4.5415	0.00000E+00	0.0000				
100	0.0002	1.37829E-04	4.0129				
9.19181E-05	3.8627	0.00000E+00	0.0000				
101	0.0002	1.17506E-04	3.7928				
7.44420E-05	3.5238	0.00000E+00	0.0000				
102	0.0002	1.61042E-04	4.0697				
8.97924E-05	3.9063	0.00000E+00	0.0000				
103	0.0001	1.03800E-04	3.2018				
1.00870E-04	3.0459	0.00000E+00	0.0000				
104	0.0002	1.85820E-04	3.2619				
1.46732E-04	3.1617	0.00000E+00	0.0000				
105	0.0002	1.23854E-04	3.7631				
8.19387E-05	3.5347	0.00000E+00	0.0000				
106	0.0002	1.68079E-04	4.3456				
1.24979E-04	4.2840	0.00000E+00	0.0000				
107	0.0001	6.38256E-05	3.1030				
6.44852E-05	2.9212	0.00000E+00	0.0000				
108	0.0000	3.39407E-05	2.6673				
1.46631E-04	2.6020	0.00000E+00	0.0000				
109	0.0002	1.30754E-04	2.2318				
4.33836E-04	2.2023	0.00000E+00	0.0000				
110	0.0008	6.12246E-04	3.1612				

```
3.77769E-04     3.1314       0.00000E+00     0.0000
  111    0.0002                  1.50890E-04     4.3525
1.38753E-04     4.2322       0.00000E+00     0.0000
  112    0.0002                  1.21069E-04     4.9002
1.27557E-04     4.8164       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                               deviation
deviation                    deviation

  113    0.0002                  1.25714E-04     4.1286
1.09962E-04     3.8589       0.00000E+00     0.0000
  114    0.0000                  1.13540E-05     6.8640
1.53795E-05     5.7372       0.00000E+00     0.0000
  115    0.0001                  6.97985E-05     4.1652
8.14281E-05     3.8326       0.00000E+00     0.0000
  116    0.0003                  1.93312E-04     2.7433
1.45385E-04     2.4785       0.00000E+00     0.0000
  117    0.0006                  4.77654E-04     2.1928
2.55382E-04     2.0520       0.00000E+00     0.0000
  118    0.0007                  5.71334E-04     1.8904
4.46359E-04     1.8118       0.00000E+00     0.0000
  119    0.0002                  1.47938E-04     2.0317
3.81275E-04     1.9657       0.00000E+00     0.0000
  120    0.0002                  1.71541E-04     1.8785
6.52705E-04     1.8521       0.00000E+00     0.0000
  121    0.0007                  5.22377E-04     2.9872
4.01828E-04     2.9120       0.00000E+00     0.0000
  122    0.0001                  9.54067E-05     4.5648
7.50574E-05     4.2420       0.00000E+00     0.0000
  123    0.0003                  2.14718E-04     2.9225
1.52301E-04     2.5926       0.00000E+00     0.0000
  124    0.0003                  2.23373E-04     3.2298
1.84843E-04     3.0052       0.00000E+00     0.0000
  125    0.0002                  1.39983E-04     3.1367
1.28713E-04     2.8375       0.00000E+00     0.0000
  126    0.0001                  1.04459E-04     3.6541
9.32720E-05     3.2203       0.00000E+00     0.0000
  127    0.0005                  3.81701E-04     3.2601
1.87859E-04     3.0682       0.00000E+00     0.0000
  128    0.0003                  2.19187E-04     3.3614
1.35389E-04     3.0049       0.00000E+00     0.0000
  129    0.0006                  4.73625E-04     2.4895
4.35346E-04     2.3818       0.00000E+00     0.0000
  130    0.0002                  1.20854E-04     2.9181
2.94451E-04     2.8368       0.00000E+00     0.0000
  131    0.0004                  2.91689E-04     2.1390
2.34656E-04     1.8185       0.00000E+00     0.0000
```

132	0.0007		5.11104E-04	2.2562	
3.14546E-04	2.0666		0.00000E+00	0.0000	
133	0.0014		1.06727E-03	1.8894	
6.73356E-04	1.7997		0.00000E+00	0.0000	
134	0.0001		8.84669E-05	2.0900	
2.31336E-04	1.7502		0.00000E+00	0.0000	
135	0.0002		1.72065E-04	3.4201	
2.55109E-04	3.3362		0.00000E+00	0.0000	
136	0.0001		4.60318E-05	2.0400	
7.14354E-04	2.0071		0.00000E+00	0.0000	
137	0.0000		1.94929E-05	1.0047	
3.50748E-03	1.0025		0.00000E+00	0.0000	
138	0.0004		3.14725E-04	2.0022	
8.19813E-04	1.9731		0.00000E+00	0.0000	
139	0.0003		1.93370E-04	3.1602	
2.36306E-04	2.9780		0.00000E+00	0.0000	
140	0.0003		2.08685E-04	2.4733	
2.77949E-04	2.1568		0.00000E+00	0.0000	
141	0.0001		8.03616E-05	2.4082	
2.53374E-04	2.1497		0.00000E+00	0.0000	
142	0.0001		6.73751E-05	2.9443	
2.32323E-04	2.7079		0.00000E+00	0.0000	
143	0.0001		8.22673E-05	2.3121	
1.75719E-04	1.4415		0.00000E+00	0.0000	
144	0.0000		3.51110E-05	2.9594	
7.58458E-05	1.8380		0.00000E+00	0.0000	
145	0.0005		3.87509E-04	2.9967	
3.04025E-04	2.7419		0.00000E+00	0.0000	
146	0.0005		3.45194E-04	2.8742	
2.52317E-04	2.3378		0.00000E+00	0.0000	
147	0.0002		1.81520E-04	4.2624	
1.15741E-04	3.7131		0.00000E+00	0.0000	
148	0.0001		6.34707E-05	5.5529	
4.17145E-05	4.4759		0.00000E+00	0.0000	
149	0.0000		2.93916E-05	8.0198	
2.04526E-05	6.1495		0.00000E+00	0.0000	
150	0.0001		9.10053E-05	4.2632	
6.57438E-05	3.1478		0.00000E+00	0.0000	
151	0.0001		6.88479E-05	4.3358	
5.78372E-05	3.0155		0.00000E+00	0.0000	
152	0.0001		3.95809E-05	4.2808	
4.57881E-05	2.6036		0.00000E+00	0.0000	
153	0.0001		4.14081E-05	4.7689	
4.63762E-05	2.8269		0.00000E+00	0.0000	
154	0.0001		4.84991E-05	4.7424	
5.04218E-05	2.8435		0.00000E+00	0.0000	
155	0.0001		5.27017E-05	4.4593	
5.10512E-05	2.7145		0.00000E+00	0.0000	
156	0.0001		4.75530E-05	4.8010	
4.65583E-05	2.8937		0.00000E+00	0.0000	
157	0.0001		5.52238E-05	3.9411	
5.52608E-05	2.4001		0.00000E+00	0.0000	

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  158    0.0001                6.90402E-05     4.0502
6.91472E-05     2.6723       0.00000E+00     0.0000
  159    0.0002                1.59203E-04     2.7226
2.19154E-04     2.2986       0.00000E+00     0.0000
  160    0.0001                6.39829E-05     5.0551
7.52486E-05     3.8414       0.00000E+00     0.0000
  161    0.0001                7.19121E-05     4.0183
7.14788E-05     2.5843       0.00000E+00     0.0000
  162    0.0001                8.16550E-05     3.3395
7.84274E-05     2.0435       0.00000E+00     0.0000
  163    0.0001                9.74217E-05     3.8724
8.93608E-05     2.4422       0.00000E+00     0.0000
  164    0.0001                1.05272E-04     3.4655
9.61699E-05     2.1584       0.00000E+00     0.0000
  165    0.0001                1.14857E-04     3.7576
1.04631E-04     2.3722       0.00000E+00     0.0000
  166    0.0001                6.44247E-05     4.3547
6.11255E-05     2.6791       0.00000E+00     0.0000
  167    0.0001                8.24442E-05     3.8663
7.30966E-05     2.5013       0.00000E+00     0.0000
  168    0.0001                8.70131E-05     4.1389
7.80131E-05     2.7478       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                deviation
deviation                    deviation

  169    0.0001                1.09512E-04     3.9612
9.52386E-05     2.7862       0.00000E+00     0.0000
  170    0.0002                1.32946E-04     3.6164
1.14284E-04     2.6812       0.00000E+00     0.0000
  171    0.0001                9.11875E-05     4.5212
7.14322E-05     3.5892       0.00000E+00     0.0000
  172    0.0002                1.33133E-04     4.9020
9.50424E-05     4.0621       0.00000E+00     0.0000
  173    0.0002                1.86566E-04     3.7287
1.23636E-04     3.2075       0.00000E+00     0.0000
  174    0.0003                2.50304E-04     4.0973
1.55722E-04     3.6674       0.00000E+00     0.0000
  175    0.0001                1.06245E-04     6.0956
6.45887E-05     5.4686       0.00000E+00     0.0000
  176    0.0002                1.20095E-04     5.5509
7.14149E-05     5.0203       0.00000E+00     0.0000
  177    0.0002                1.22995E-04     6.1047
7.24232E-05     5.5233       0.00000E+00     0.0000
  178    0.0002                1.18805E-04     6.9313
6.94667E-05     6.1975       0.00000E+00     0.0000
  179    0.0001                1.11925E-04     5.9554
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6.55880E-05	5.2756	0.00000E+00	0.0000		
180	0.0001	1.05319E-04	6.2891		
6.18317E-05	5.5205	0.00000E+00	0.0000		
181	0.0001	1.10685E-04	6.4595		
6.42286E-05	5.6724	0.00000E+00	0.0000		
182	0.0001	1.10791E-04	6.0011		
6.35896E-05	5.3201	0.00000E+00	0.0000		
183	0.0001	1.00218E-04	6.3138		
5.83853E-05	5.5080	0.00000E+00	0.0000		
184	0.0001	1.04329E-04	5.4524		
6.03212E-05	4.7706	0.00000E+00	0.0000		
185	0.0001	9.78070E-05	5.3986		
5.66724E-05	4.6431	0.00000E+00	0.0000		
186	0.0001	8.53075E-05	5.9362		
5.04375E-05	5.0204	0.00000E+00	0.0000		
187	0.0001	9.20395E-05	6.4810		
5.35362E-05	5.5243	0.00000E+00	0.0000		
188	0.0001	9.67932E-05	5.9666		
5.61710E-05	5.0325	0.00000E+00	0.0000		
189	0.0001	8.10872E-05	6.0466		
4.83655E-05	5.0027	0.00000E+00	0.0000		
190	0.0003	2.05370E-04	3.9163		
1.22611E-04	3.2261	0.00000E+00	0.0000		
191	0.0003	2.02656E-04	4.4953		
1.22219E-04	3.6360	0.00000E+00	0.0000		
192	0.0003	2.05110E-04	4.1574		
1.23245E-04	3.3641	0.00000E+00	0.0000		
193	0.0003	2.13244E-04	3.3982		
1.28020E-04	2.7543	0.00000E+00	0.0000		
194	0.0005	4.16627E-04	3.0324		
2.54486E-04	2.4099	0.00000E+00	0.0000		
195	0.0005	4.10938E-04	2.7172		
2.56849E-04	2.1029	0.00000E+00	0.0000		
196	0.0006	4.78939E-04	2.2940		
2.95584E-04	1.8119	0.00000E+00	0.0000		
197	0.0007	5.00465E-04	2.6282		
3.12711E-04	2.0252	0.00000E+00	0.0000		
198	0.0007	5.65222E-04	2.5227		
3.52140E-04	1.9619	0.00000E+00	0.0000		
199	0.0004	3.09112E-04	3.0858		
1.92465E-04	2.4325	0.00000E+00	0.0000		
200	0.0005	3.57803E-04	3.0117		
2.19671E-04	2.4095	0.00000E+00	0.0000		
201	0.0010	7.89681E-04	2.1259		
4.83460E-04	1.7007	0.00000E+00	0.0000		
202	0.0013	9.86243E-04	1.9562		
5.96749E-04	1.5844	0.00000E+00	0.0000		
203	0.0016	1.21046E-03	1.9795		
7.24231E-04	1.6215	0.00000E+00	0.0000		
204	0.0022	1.64934E-03	1.6172		
9.71984E-04	1.3441	0.00000E+00	0.0000		
205	0.0015	1.15431E-03	1.9313		

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6.75138E-04     1.6284       0.00000E+00     0.0000
  206    0.0018                  1.40205E-03     1.7160
8.16162E-04     1.4537       0.00000E+00     0.0000
  207    0.0022                  1.68901E-03     1.6970
9.78182E-04     1.4867       0.00000E+00     0.0000
  208    0.0029                  2.21482E-03     1.2424
1.28836E-03     1.1029       0.00000E+00     0.0000
  209    0.0031                  2.34370E-03     1.3152
1.37997E-03     1.1497       0.00000E+00     0.0000
  210    0.0036                  2.79337E-03     1.2437
1.66939E-03     1.0934       0.00000E+00     0.0000
  211    0.0041                  3.14674E-03     1.2812
1.89443E-03     1.1174       0.00000E+00     0.0000
  212    0.0047                  3.63783E-03     1.1745
2.20227E-03     0.9957       0.00000E+00     0.0000
  213    0.0064                  4.92940E-03     1.0112
2.98693E-03     0.8546       0.00000E+00     0.0000
  214    0.0095                  7.28985E-03     0.7270
4.39224E-03     0.6061       0.00000E+00     0.0000
  215    0.0158                  1.20994E-02     0.5708
7.21356E-03     0.4774       0.00000E+00     0.0000
  216    0.0301                  2.30217E-02     0.4358
1.35822E-02     0.3688       0.00000E+00     0.0000
  217    0.0201                  1.53724E-02     0.4607
9.03668E-03     0.3926       0.00000E+00     0.0000
  218    0.0277                  2.12006E-02     0.4899
1.24107E-02     0.4154       0.00000E+00     0.0000
  219    0.0359                  2.74651E-02     0.4377
1.60110E-02     0.3704       0.00000E+00     0.0000
  220    0.0473                  3.62067E-02     0.3463
2.10515E-02     0.2911       0.00000E+00     0.0000
  221    0.0628                  4.80680E-02     0.3214
2.78564E-02     0.2726       0.00000E+00     0.0000
  222    0.0801                  6.13853E-02     0.2920
3.55425E-02     0.2510       0.00000E+00     0.0000
  223    0.1043                  7.98518E-02     0.2146
4.63126E-02     0.1838       0.00000E+00     0.0000
  224    0.0584                  4.47383E-02     0.3426
2.60514E-02     0.2846       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  225    0.2300                  1.76196E-01     0.1513
1.04390E-01     0.1308       0.00000E+00     0.0000
  226    0.0456                  3.49129E-02     0.3786
2.12371E-02     0.3135       0.00000E+00     0.0000
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  227    0.0494                3.78288E-02     0.3700
2.34406E-02     0.2998       0.00000E+00     0.0000
  228    0.0211                1.61870E-02     0.5299
1.02328E-02     0.4292       0.00000E+00     0.0000
  229    0.0222                1.69796E-02     0.5960
1.09196E-02     0.4641       0.00000E+00     0.0000
  230    0.0117                8.94049E-03     0.8449
5.84909E-03     0.6487       0.00000E+00     0.0000
  231    0.0122                9.35912E-03     0.8312
6.22179E-03     0.6424       0.00000E+00     0.0000
  232    0.0130                9.93687E-03     0.8222
6.76300E-03     0.6014       0.00000E+00     0.0000
  233    0.0083                6.38108E-03     1.0380
4.48372E-03     0.7562       0.00000E+00     0.0000
  234    0.0058                4.45349E-03     1.0251
3.23004E-03     0.7637       0.00000E+00     0.0000
  235    0.0024                1.84552E-03     1.6389
1.22577E-03     1.2430       0.00000E+00     0.0000
  236    0.0019                1.44504E-03     2.1763
9.76854E-04     1.6588       0.00000E+00     0.0000
  237    0.0017                1.28064E-03     1.8835
9.13462E-04     1.3571       0.00000E+00     0.0000
  238    0.0001                6.82858E-05     8.6371
5.97614E-05     5.0648       0.00000E+00     0.0000

 system total =                 7.65940E-01     0.0604
4.68962E-01     0.0495       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3104E-01  +
or -  0.0002



 elapsed time   3.04650 minutes

 random number=   B38691105AC7AC02
1                                                fuel bundle

                                                     **** fission
densities ****


                                                                fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.089E-03
0.06         7.659E-01
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```
                                                        2    0.000E+00
0.00         0.000E+00
                                                        3    0.000E+00
0.00         0.000E+00

      global unit

                                                  2     1    0.000E+00
0.00         0.000E+00
1                                          fuel bundle
```

fluxes for Unit 1

	region 1		region 2		region 3	
group	flux	percent deviation	flux	percent deviation	flux	percent deviation
1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	4.447E-08	26.91	3.520E-08	31.91	3.407E-08	32.86
3	8.699E-07	3.86	7.201E-07	3.66	7.779E-07	3.65
4	1.446E-06	3.23	1.197E-06	3.07	1.279E-06	3.06
5	2.205E-06	2.64	1.826E-06	2.39	1.949E-06	2.48
6	9.483E-06	1.29	7.593E-06	1.14	8.112E-06	1.16
7	1.252E-05	1.18	9.620E-06	1.11	1.017E-05	1.13
8	3.162E-05	0.83	2.311E-05	0.68	2.427E-05	0.70
9	8.161E-05	0.50	5.821E-05	0.40	6.079E-05	0.39
10	4.640E-05	0.62	3.300E-05	0.51	3.442E-05	0.47
11	2.214E-04	0.28	1.561E-04	0.26	1.620E-04	0.25
12	1.903E-04	0.28	1.383E-04	0.26	1.448E-04	0.24
13	5.687E-05	0.51	4.146E-05	0.41	4.345E-05	0.40
14	2.521E-04	0.26	1.827E-04	0.22	1.907E-04	0.21
15	2.205E-04	0.28	1.601E-04	0.24	1.671E-04	0.25
16	7.084E-05	0.44	5.156E-05	0.38	5.397E-05	0.37
17	3.269E-05	0.75	2.377E-05	0.57	2.476E-05	0.57
18	2.807E-05	0.68	2.038E-05	0.58	2.103E-05	0.53
19	5.026E-05	0.51	3.668E-05	0.39	3.823E-05	0.39
20	3.939E-05	0.58	2.893E-05	0.49	3.032E-05	0.50
21	8.023E-05	0.38	5.863E-05	0.36	6.116E-05	0.34
22	7.352E-05	0.45	5.344E-05	0.38	5.539E-05	0.37
23	7.665E-05	0.43	5.593E-05	0.38	5.821E-05	0.36
24	1.860E-05	0.85	1.373E-05	0.78	1.432E-05	0.74
25	2.349E-05	0.71	1.735E-05	0.56	1.825E-05	0.52
26	1.323E-05	0.97	9.859E-06	0.87	1.041E-05	0.88
27	4.199E-05	0.65	3.098E-05	0.51	3.287E-05	0.50
28	7.709E-05	0.45	5.732E-05	0.39	6.086E-05	0.38
29	7.951E-05	0.37	5.944E-05	0.33	6.229E-05	0.32
30	9.878E-06	1.24	7.401E-06	1.00	7.807E-06	0.97
31	7.849E-05	0.37	5.900E-05	0.33	6.213E-05	0.29
32	3.099E-05	0.59	2.335E-05	0.55	2.461E-05	0.50
33	2.647E-05	0.61	2.004E-05	0.52	2.107E-05	0.51
34	6.094E-05	0.44	4.596E-05	0.37	4.835E-05	0.34
35	3.660E-05	0.57	2.764E-05	0.41	2.907E-05	0.39
36	3.449E-05	0.51	2.586E-05	0.47	2.711E-05	0.45

37	2.216E-05	0.57	1.674E-05	0.55	1.744E-05	0.47
38	2.625E-05	0.66	1.989E-05	0.52	2.094E-05	0.47
39	9.764E-05	0.35	7.509E-05	0.30	7.917E-05	0.26
40	8.970E-05	0.34	6.936E-05	0.30	7.394E-05	0.28
41	1.132E-04	0.24	8.840E-05	0.23	9.428E-05	0.22
42	9.385E-05	0.32	7.401E-05	0.26	7.943E-05	0.25
43	5.102E-05	0.42	4.056E-05	0.36	4.273E-05	0.30
44	6.944E-05	0.35	5.573E-05	0.29	5.989E-05	0.26
45	3.516E-05	0.44	2.803E-05	0.35	3.107E-05	0.31
46	8.354E-06	0.83	6.612E-06	0.71	7.174E-06	0.65
47	2.352E-05	0.51	1.881E-05	0.44	1.952E-05	0.39
48	6.781E-06	1.02	5.401E-06	0.87	5.707E-06	0.79
49	4.350E-05	0.39	3.482E-05	0.40	3.754E-05	0.33
50	2.962E-05	0.47	2.379E-05	0.40	2.588E-05	0.34
51	7.972E-06	1.04	6.416E-06	0.72	6.966E-06	0.65
52	2.072E-05	0.51	1.670E-05	0.44	1.813E-05	0.39
53	7.631E-05	0.27	6.155E-05	0.23	6.677E-05	0.23
54	3.344E-05	0.43	2.707E-05	0.39	2.923E-05	0.33
55	6.631E-05	0.31	5.398E-05	0.29	5.889E-05	0.25
56	4.344E-05	0.38	3.542E-05	0.37	3.851E-05	0.29
57	4.902E-05	0.33	4.018E-05	0.31	4.375E-05	0.25
58	2.600E-05	0.52	2.131E-05	0.46	2.318E-05	0.38
59	4.433E-05	0.39	3.613E-05	0.34	3.954E-05	0.32
60	6.501E-05	0.31	5.307E-05	0.29	5.752E-05	0.24
61	6.230E-06	0.88	5.080E-06	0.86	5.526E-06	0.79
62	3.242E-05	0.45	2.657E-05	0.34	2.882E-05	0.30
63	2.156E-05	0.50	1.777E-05	0.48	1.942E-05	0.39
64	1.727E-05	0.52	1.421E-05	0.47	1.536E-05	0.38
65	5.682E-06	0.98	4.727E-06	0.85	5.082E-06	0.71
66	2.854E-05	0.42	2.349E-05	0.39	2.558E-05	0.31
67	2.117E-05	0.57	1.734E-05	0.46	1.890E-05	0.38
68	4.709E-06	1.09	3.856E-06	0.97	4.197E-06	0.80
69	3.712E-05	0.44	3.056E-05	0.40	3.327E-05	0.33
70	2.675E-05	0.47	2.202E-05	0.44	2.390E-05	0.37
71	4.588E-05	0.38	3.773E-05	0.34	4.101E-05	0.27
72	2.693E-06	1.38	2.199E-06	1.25	2.384E-06	0.91
73	2.699E-05	0.46	2.230E-05	0.39	2.414E-05	0.33
74	7.945E-05	0.24	6.590E-05	0.23	7.147E-05	0.18
75	9.079E-06	0.83	7.507E-06	0.71	8.086E-06	0.54
76	2.290E-05	0.49	1.899E-05	0.45	2.051E-05	0.35
77	1.757E-05	0.54	1.457E-05	0.48	1.586E-05	0.39
78	1.510E-06	1.56	1.271E-06	1.62	1.388E-06	1.29
79	9.857E-06	0.77	8.164E-06	0.61	8.908E-06	0.50
80	4.479E-06	1.01	3.735E-06	0.96	4.070E-06	0.83
81	5.525E-05	0.33	4.578E-05	0.30	4.963E-05	0.24
82	3.313E-06	1.36	2.752E-06	1.23	2.926E-06	0.90
83	4.351E-06	0.99	3.632E-06	0.81	3.978E-06	0.76
84	8.150E-06	0.79	6.770E-06	0.69	7.356E-06	0.56
85	9.982E-06	0.80	8.309E-06	0.69	9.026E-06	0.54
86	1.357E-05	0.61	1.133E-05	0.56	1.228E-05	0.47
87	1.198E-05	0.60	9.962E-06	0.55	1.079E-05	0.41
88	3.104E-06	1.29	2.622E-06	1.09	2.844E-06	0.91

89	6.592E-06	0.92	5.493E-06	0.86	5.946E-06	0.73
90	6.941E-06	0.96	5.786E-06	0.82	6.297E-06	0.69
91	8.193E-06	0.86	6.783E-06	0.65	7.402E-06	0.53
92	4.714E-06	0.94	3.975E-06	0.88	4.280E-06	0.76
93	8.133E-06	0.70	6.786E-06	0.61	7.389E-06	0.54
94	4.314E-06	1.14	3.576E-06	0.98	3.866E-06	0.78
95	1.254E-05	0.63	1.047E-05	0.58	1.134E-05	0.47
96	3.386E-06	1.18	2.810E-06	1.19	3.035E-06	1.00
97	3.399E-06	1.22	2.855E-06	1.20	3.100E-06	0.93
98	3.554E-06	1.09	2.964E-06	1.00	3.214E-06	0.79
99	2.354E-06	1.41	1.981E-06	1.12	2.124E-06	0.83
100	3.417E-06	1.24	2.903E-06	1.17	3.131E-06	0.87
101	4.886E-06	1.07	4.110E-06	0.92	4.462E-06	0.71
102	3.390E-06	1.26	2.842E-06	1.09	3.078E-06	0.94
103	4.659E-06	1.01	3.878E-06	0.89	4.180E-06	0.72
104	4.126E-06	0.99	3.464E-06	0.98	3.771E-06	0.78
105	4.414E-06	1.17	3.691E-06	1.04	4.012E-06	0.81
106	1.517E-06	1.73	1.280E-06	1.64	1.408E-06	1.26
107	3.566E-06	1.07	2.975E-06	1.00	3.210E-06	0.85
108	3.146E-06	1.07	2.645E-06	0.94	2.907E-06	0.91
109	5.092E-06	0.94	4.268E-06	0.81	4.629E-06	0.68
110	2.997E-06	1.04	2.569E-06	1.01	2.789E-06	0.73
111	3.022E-06	1.22	2.516E-06	1.19	2.771E-06	0.94
112	1.806E-06	1.56	1.513E-06	1.48	1.648E-06	1.20
113	5.760E-06	0.96	4.776E-06	0.88	5.167E-06	0.71
114	2.002E-06	1.56	1.670E-06	1.44	1.806E-06	1.09
115	5.045E-06	1.21	4.236E-06	1.00	4.585E-06	0.79
116	1.085E-05	0.66	9.038E-06	0.54	9.760E-06	0.42
117	1.165E-05	0.67	9.788E-06	0.61	1.066E-05	0.44
118	1.279E-05	0.59	1.071E-05	0.55	1.166E-05	0.42
119	8.294E-06	0.71	7.013E-06	0.69	7.596E-06	0.56
120	5.759E-06	0.88	4.849E-06	0.71	5.315E-06	0.68
121	6.071E-06	0.86	5.139E-06	0.81	5.603E-06	0.67
122	3.336E-06	1.38	2.781E-06	1.20	2.975E-06	0.96
123	1.034E-05	0.79	8.649E-06	0.65	9.359E-06	0.49
124	7.385E-06	0.86	6.205E-06	0.79	6.703E-06	0.57
125	7.101E-06	0.88	5.912E-06	0.82	6.435E-06	0.60
126	5.763E-06	0.84	4.852E-06	0.77	5.255E-06	0.63
127	5.597E-06	0.90	4.697E-06	0.82	5.079E-06	0.66
128	7.740E-06	0.84	6.495E-06	0.75	7.043E-06	0.59
129	9.750E-06	0.66	8.203E-06	0.61	8.926E-06	0.51
130	3.993E-06	1.25	3.360E-06	1.09	3.681E-06	0.91
131	1.667E-05	0.61	1.410E-05	0.50	1.520E-05	0.41
132	1.121E-05	0.68	9.375E-06	0.58	1.014E-05	0.47
133	1.353E-05	0.63	1.143E-05	0.52	1.244E-05	0.43
134	1.480E-05	0.56	1.248E-05	0.52	1.344E-05	0.38
135	2.294E-06	1.46	1.975E-06	1.34	2.170E-06	1.15
136	3.902E-06	0.98	3.385E-06	0.99	3.702E-06	0.69
137	2.495E-06	0.93	2.636E-06	0.96	2.992E-06	0.79
138	4.057E-06	0.97	3.523E-06	0.89	3.901E-06	0.74
139	4.628E-06	0.97	3.872E-06	0.79	4.186E-06	0.75
140	1.203E-05	0.65	1.019E-05	0.52	1.100E-05	0.45

141	8.930E-06	0.72	7.553E-06	0.66	8.089E-06	0.52
142	5.883E-06	0.92	4.959E-06	0.86	5.336E-06	0.70
143	1.993E-05	0.52	1.676E-05	0.44	1.807E-05	0.37
144	8.115E-06	0.81	6.774E-06	0.72	7.307E-06	0.56
145	7.242E-06	0.74	6.153E-06	0.71	6.628E-06	0.56
146	1.195E-05	0.63	1.008E-05	0.55	1.092E-05	0.46
147	3.707E-06	1.13	3.123E-06	1.02	3.373E-06	0.87
148	1.875E-06	1.42	1.567E-06	1.25	1.696E-06	1.06
149	1.204E-06	2.13	1.039E-06	2.49	1.081E-06	1.40
150	4.004E-06	0.85	3.383E-06	0.87	3.680E-06	0.79
151	4.119E-06	1.10	3.473E-06	0.94	3.753E-06	0.72
152	4.397E-06	1.02	3.670E-06	0.89	3.929E-06	0.74
153	4.497E-06	1.09	3.755E-06	0.94	4.034E-06	0.79
154	4.615E-06	0.94	3.849E-06	0.94	4.172E-06	0.76
155	4.300E-06	1.02	3.614E-06	0.91	3.891E-06	0.73
156	3.956E-06	0.95	3.360E-06	0.96	3.589E-06	0.79
157	4.643E-06	1.21	3.931E-06	0.99	4.224E-06	0.79
158	4.764E-06	1.04	4.106E-06	1.02	4.396E-06	0.79
159	6.740E-06	0.80	5.713E-06	0.71	6.179E-06	0.63
160	3.518E-06	1.19	2.965E-06	1.06	3.224E-06	0.84
161	4.933E-06	1.06	4.169E-06	0.95	4.469E-06	0.71
162	5.785E-06	0.96	4.873E-06	0.83	5.292E-06	0.68
163	6.165E-06	1.02	5.221E-06	0.89	5.593E-06	0.69
164	6.435E-06	0.96	5.445E-06	0.77	5.880E-06	0.60
165	6.834E-06	0.74	5.747E-06	0.69	6.191E-06	0.55
166	4.016E-06	1.07	3.371E-06	0.92	3.657E-06	0.81
167	4.228E-06	1.09	3.543E-06	0.95	3.832E-06	0.79
168	4.334E-06	1.10	3.673E-06	1.07	3.958E-06	0.82
169	4.445E-06	1.00	3.755E-06	0.84	4.055E-06	0.68
170	4.647E-06	0.89	3.927E-06	0.77	4.212E-06	0.71
171	2.401E-06	1.39	2.031E-06	1.24	2.172E-06	0.98
172	2.369E-06	1.27	2.012E-06	1.21	2.193E-06	1.00
173	2.509E-06	1.26	2.104E-06	1.06	2.277E-06	0.96
174	2.521E-06	1.26	2.154E-06	1.13	2.313E-06	0.92
175	9.895E-07	2.28	8.461E-07	2.23	9.224E-07	1.57
176	1.038E-06	1.88	8.889E-07	1.76	9.480E-07	1.28
177	1.022E-06	1.99	8.665E-07	1.99	9.453E-07	1.50
178	1.060E-06	2.30	8.888E-07	1.78	9.686E-07	1.34
179	1.057E-06	1.89	8.946E-07	1.93	9.822E-07	1.40
180	1.109E-06	2.03	9.376E-07	1.71	1.002E-06	1.46
181	1.063E-06	1.80	9.116E-07	1.68	9.853E-07	1.33
182	1.078E-06	2.12	9.031E-07	1.78	9.710E-07	1.36
183	1.073E-06	2.19	9.089E-07	2.25	9.911E-07	1.55
184	1.073E-06	2.04	9.228E-07	1.72	1.008E-06	1.48
185	1.115E-06	1.79	9.564E-07	1.77	1.035E-06	1.35
186	1.139E-06	1.94	9.525E-07	1.77	1.035E-06	1.58
187	1.140E-06	1.94	9.738E-07	1.83	1.043E-06	1.42
188	1.160E-06	1.84	9.726E-07	1.53	1.052E-06	1.40
189	1.182E-06	2.11	9.972E-07	1.92	1.071E-06	1.51
190	2.984E-06	1.09	2.527E-06	1.02	2.729E-06	0.91
191	3.048E-06	1.09	2.588E-06	1.00	2.799E-06	0.82
192	3.185E-06	1.32	2.673E-06	1.20	2.894E-06	0.92

193	3.222E-06	1.31	2.774E-06	1.26	2.963E-06	0.88
194	6.779E-06	0.84	5.764E-06	0.74	6.277E-06	0.65
195	7.226E-06	0.71	6.110E-06	0.69	6.638E-06	0.58
196	7.706E-06	0.68	6.540E-06	0.60	7.073E-06	0.49
197	8.409E-06	0.70	7.099E-06	0.65	7.700E-06	0.56
198	9.032E-06	0.80	7.647E-06	0.67	8.256E-06	0.57
199	4.685E-06	0.91	4.001E-06	0.86	4.316E-06	0.74
200	5.218E-06	1.05	4.355E-06	0.93	4.734E-06	0.73
201	1.069E-05	0.75	8.963E-06	0.68	9.750E-06	0.54
202	1.190E-05	0.61	1.005E-05	0.58	1.096E-05	0.48
203	1.275E-05	0.54	1.079E-05	0.48	1.178E-05	0.37
204	1.481E-05	0.59	1.255E-05	0.53	1.365E-05	0.39
205	8.525E-06	0.69	7.730E-06	0.63	8.175E-06	0.45
206	9.272E-06	0.61	8.312E-06	0.54	8.851E-06	0.43
207	9.607E-06	0.64	8.697E-06	0.56	9.246E-06	0.47
208	1.131E-05	0.66	1.021E-05	0.58	1.086E-05	0.45
209	1.167E-05	0.61	1.060E-05	0.56	1.123E-05	0.39
210	1.409E-05	0.46	1.273E-05	0.47	1.357E-05	0.36
211	1.613E-05	0.46	1.460E-05	0.45	1.555E-05	0.37
212	1.920E-05	0.47	1.734E-05	0.41	1.847E-05	0.31
213	2.610E-05	0.40	2.346E-05	0.34	2.513E-05	0.28
214	3.691E-05	0.31	3.310E-05	0.26	3.564E-05	0.25
215	5.516E-05	0.25	4.967E-05	0.21	5.375E-05	0.20
216	9.182E-05	0.20	8.357E-05	0.19	9.059E-05	0.16
217	5.531E-05	0.24	5.282E-05	0.19	5.605E-05	0.17
218	7.065E-05	0.19	6.786E-05	0.17	7.213E-05	0.15
219	8.381E-05	0.19	8.129E-05	0.15	8.638E-05	0.13
220	1.014E-04	0.17	9.885E-05	0.15	1.053E-04	0.12
221	1.204E-04	0.15	1.186E-04	0.12	1.263E-04	0.10
222	1.362E-04	0.15	1.363E-04	0.13	1.454E-04	0.11
223	1.534E-04	0.16	1.571E-04	0.15	1.671E-04	0.12
224	7.504E-05	0.18	7.967E-05	0.15	8.437E-05	0.13
225	2.334E-04	0.14	2.719E-04	0.12	2.822E-04	0.10
226	3.184E-05	0.25	4.489E-05	0.19	4.446E-05	0.14
227	2.898E-05	0.25	4.636E-05	0.21	4.438E-05	0.14
228	1.033E-05	0.41	1.895E-05	0.32	1.751E-05	0.19
229	9.627E-06	0.42	1.957E-05	0.33	1.747E-05	0.18
230	4.499E-06	0.58	1.014E-05	0.35	8.699E-06	0.20
231	4.232E-06	0.54	1.053E-05	0.40	8.715E-06	0.19
232	3.959E-06	0.61	1.125E-05	0.40	8.880E-06	0.20
233	2.224E-06	0.74	7.459E-06	0.60	5.493E-06	0.25
234	1.422E-06	0.85	5.342E-06	0.57	3.829E-06	0.29
235	5.255E-07	1.45	1.056E-06	1.10	1.130E-06	0.59
236	3.451E-07	1.80	7.243E-07	1.18	7.936E-07	0.55
237	2.229E-07	1.92	5.545E-07	1.46	6.165E-07	0.60
238	5.421E-09	10.62	2.292E-08	5.81	2.504E-08	1.90

1 fuel bundle

fluxes for Global Unit
region 1

group flux percent

		deviation
1	0.000E+00	0.00
2	0.000E+00	0.00
3	0.000E+00	0.00
4	0.000E+00	0.00
5	0.000E+00	0.00
6	0.000E+00	0.00
7	0.000E+00	0.00
8	0.000E+00	0.00
9	0.000E+00	0.00
10	0.000E+00	0.00
11	0.000E+00	0.00
12	0.000E+00	0.00
13	0.000E+00	0.00
14	0.000E+00	0.00
15	0.000E+00	0.00
16	0.000E+00	0.00
17	0.000E+00	0.00
18	0.000E+00	0.00
19	0.000E+00	0.00
20	0.000E+00	0.00
21	0.000E+00	0.00
22	0.000E+00	0.00
23	0.000E+00	0.00
24	0.000E+00	0.00
25	0.000E+00	0.00
26	0.000E+00	0.00
27	0.000E+00	0.00
28	0.000E+00	0.00
29	0.000E+00	0.00
30	0.000E+00	0.00
31	0.000E+00	0.00
32	0.000E+00	0.00
33	0.000E+00	0.00
34	0.000E+00	0.00
35	0.000E+00	0.00
36	0.000E+00	0.00
37	0.000E+00	0.00
38	0.000E+00	0.00
39	0.000E+00	0.00
40	0.000E+00	0.00
41	0.000E+00	0.00
42	0.000E+00	0.00
43	0.000E+00	0.00
44	0.000E+00	0.00
45	0.000E+00	0.00
46	0.000E+00	0.00
47	0.000E+00	0.00
48	0.000E+00	0.00
49	0.000E+00	0.00
50	0.000E+00	0.00
51	0.000E+00	0.00

52	0.000E+00	0.00
53	0.000E+00	0.00
54	0.000E+00	0.00
55	0.000E+00	0.00
56	0.000E+00	0.00
57	0.000E+00	0.00
58	0.000E+00	0.00
59	0.000E+00	0.00
60	0.000E+00	0.00
61	0.000E+00	0.00
62	0.000E+00	0.00
63	0.000E+00	0.00
64	0.000E+00	0.00
65	0.000E+00	0.00
66	0.000E+00	0.00
67	0.000E+00	0.00
68	0.000E+00	0.00
69	0.000E+00	0.00
70	0.000E+00	0.00
71	0.000E+00	0.00
72	0.000E+00	0.00
73	0.000E+00	0.00
74	0.000E+00	0.00
75	0.000E+00	0.00
76	0.000E+00	0.00
77	0.000E+00	0.00
78	0.000E+00	0.00
79	0.000E+00	0.00
80	0.000E+00	0.00
81	0.000E+00	0.00
82	0.000E+00	0.00
83	0.000E+00	0.00
84	0.000E+00	0.00
85	0.000E+00	0.00
86	0.000E+00	0.00
87	0.000E+00	0.00
88	0.000E+00	0.00
89	0.000E+00	0.00
90	0.000E+00	0.00
91	0.000E+00	0.00
92	0.000E+00	0.00
93	0.000E+00	0.00
94	0.000E+00	0.00
95	0.000E+00	0.00
96	0.000E+00	0.00
97	0.000E+00	0.00
98	0.000E+00	0.00
99	0.000E+00	0.00
100	0.000E+00	0.00
101	0.000E+00	0.00
102	0.000E+00	0.00
103	0.000E+00	0.00

104	0.000E+00	0.00
105	0.000E+00	0.00
106	0.000E+00	0.00
107	0.000E+00	0.00
108	0.000E+00	0.00
109	0.000E+00	0.00
110	0.000E+00	0.00
111	0.000E+00	0.00
112	0.000E+00	0.00
113	0.000E+00	0.00
114	0.000E+00	0.00
115	0.000E+00	0.00
116	0.000E+00	0.00
117	0.000E+00	0.00
118	0.000E+00	0.00
119	0.000E+00	0.00
120	0.000E+00	0.00
121	0.000E+00	0.00
122	0.000E+00	0.00
123	0.000E+00	0.00
124	0.000E+00	0.00
125	0.000E+00	0.00
126	0.000E+00	0.00
127	0.000E+00	0.00
128	0.000E+00	0.00
129	0.000E+00	0.00
130	0.000E+00	0.00
131	0.000E+00	0.00
132	0.000E+00	0.00
133	0.000E+00	0.00
134	0.000E+00	0.00
135	0.000E+00	0.00
136	0.000E+00	0.00
137	0.000E+00	0.00
138	0.000E+00	0.00
139	0.000E+00	0.00
140	0.000E+00	0.00
141	0.000E+00	0.00
142	0.000E+00	0.00
143	0.000E+00	0.00
144	0.000E+00	0.00
145	0.000E+00	0.00
146	0.000E+00	0.00
147	0.000E+00	0.00
148	0.000E+00	0.00
149	0.000E+00	0.00
150	0.000E+00	0.00
151	0.000E+00	0.00
152	0.000E+00	0.00
153	0.000E+00	0.00
154	0.000E+00	0.00
155	0.000E+00	0.00

156	0.000E+00	0.00
157	0.000E+00	0.00
158	0.000E+00	0.00
159	0.000E+00	0.00
160	0.000E+00	0.00
161	0.000E+00	0.00
162	0.000E+00	0.00
163	0.000E+00	0.00
164	0.000E+00	0.00
165	0.000E+00	0.00
166	0.000E+00	0.00
167	0.000E+00	0.00
168	0.000E+00	0.00
169	0.000E+00	0.00
170	0.000E+00	0.00
171	0.000E+00	0.00
172	0.000E+00	0.00
173	0.000E+00	0.00
174	0.000E+00	0.00
175	0.000E+00	0.00
176	0.000E+00	0.00
177	0.000E+00	0.00
178	0.000E+00	0.00
179	0.000E+00	0.00
180	0.000E+00	0.00
181	0.000E+00	0.00
182	0.000E+00	0.00
183	0.000E+00	0.00
184	0.000E+00	0.00
185	0.000E+00	0.00
186	0.000E+00	0.00
187	0.000E+00	0.00
188	0.000E+00	0.00
189	0.000E+00	0.00
190	0.000E+00	0.00
191	0.000E+00	0.00
192	0.000E+00	0.00
193	0.000E+00	0.00
194	0.000E+00	0.00
195	0.000E+00	0.00
196	0.000E+00	0.00
197	0.000E+00	0.00
198	0.000E+00	0.00
199	0.000E+00	0.00
200	0.000E+00	0.00
201	0.000E+00	0.00
202	0.000E+00	0.00
203	0.000E+00	0.00
204	0.000E+00	0.00
205	0.000E+00	0.00
206	0.000E+00	0.00
207	0.000E+00	0.00

```
  208   0.000E+00    0.00
  209   0.000E+00    0.00
  210   0.000E+00    0.00
  211   0.000E+00    0.00
  212   0.000E+00    0.00
  213   0.000E+00    0.00
  214   0.000E+00    0.00
  215   0.000E+00    0.00
  216   0.000E+00    0.00
  217   0.000E+00    0.00
  218   0.000E+00    0.00
  219   0.000E+00    0.00
  220   0.000E+00    0.00
  221   0.000E+00    0.00
  222   0.000E+00    0.00
  223   0.000E+00    0.00
  224   0.000E+00    0.00
  225   0.000E+00    0.00
  226   0.000E+00    0.00
  227   0.000E+00    0.00
  228   0.000E+00    0.00
  229   0.000E+00    0.00
  230   0.000E+00    0.00
  231   0.000E+00    0.00
  232   0.000E+00    0.00
  233   0.000E+00    0.00
  234   0.000E+00    0.00
  235   0.000E+00    0.00
  236   0.000E+00    0.00
  237   0.000E+00    0.00
  238   0.000E+00    0.00
1fuel bundle

                                frequency for generations      24 to
123 each asterisk represents   1.0000 generations
 0.7532 to 0.7560     *
 0.7560 to 0.7589     *******
 0.7589 to 0.7617     ************
 0.7617 to 0.7645     ******************
 0.7645 to 0.7674     ******************
 0.7674 to 0.7702     ***********************
 0.7702 to 0.7730     ***************
 0.7730 to 0.7758     ***
 0.7758 to 0.7787     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7532 to 0.7560     *
 0.7560 to 0.7589     *****
 0.7589 to 0.7617     *********
 0.7617 to 0.7645     ****************
 0.7645 to 0.7674     *************
```

```
 0.7674 to 0.7702     ******************
 0.7702 to 0.7730     **********
 0.7730 to 0.7758     *
 0.7758 to 0.7787     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7532 to 0.7560     *
 0.7560 to 0.7589     ****
 0.7589 to 0.7617     *****
 0.7617 to 0.7645     ***********
 0.7645 to 0.7674     *******
 0.7674 to 0.7702     **************
 0.7702 to 0.7730     *******
 0.7730 to 0.7758     *
 0.7758 to 0.7787

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7532 to 0.7560
 0.7560 to 0.7589     **
 0.7589 to 0.7617     ***
 0.7617 to 0.7645     ****
 0.7645 to 0.7674     ***
 0.7674 to 0.7702     *********
 0.7702 to 0.7730     ***
 0.7730 to 0.7758     *
 0.7758 to 0.7787

1
*************************************************************************
*****************************************
        ***
***
        ***   fuel bundle
***
        ***
***

*************************************************************************
*****************************************
        ***
***
        ***                                      ******      final results
table      ******                                    ***
        ***
***
        ***        best estimate system k-eff
0.76593 + or - 0.00055                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
```

```
5.66862E-02 + or -  1.09968E-04           ***
        ***
***
        ***        system nu bar
2.43897E+00 + or -  9.36900E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52845E-01 + or -  1.85241E-04           ***
        ***
***
        ***        number of warning messages
7                                         ***
        ***
***
        ***        number of error messages
0                                         ***
        ***
***
        ***        k-effective satisfies the chi**2 test for normality at
the 95 % level                                  ***
        ***
***
        ***
***

********************************************************************************
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********************************************************************************
************************************************************

           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.05067 minutes


********************************************************************************
************************************************************
1
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
VV           VV  IIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN          NN  OOOOOOOOOOOO
VV           VV  IIIIIIIIIII
   KK        KK    EE              NNNN         NN  OO          OO
VV           VV      II
   KK       KK     EE              NN NN        NN  OO          OO
```

```
VV          VV       II
   KK      KK       EE              NN   NN     NN  OO         OO
VV          VV       II
   KKKKKKKK         EEEEEEEEE       NN    NN    NN  OO         OO
-------------   VV          VV       II
   KKKKKKKK         EEEEEEEEE       NN     NN   NN  OO         OO
-------------    VV        VV        II
   KK      KK       EE              NN      NN  NN  OO         OO
VV     VV          II
   KK       KK      EE              NN       NN NN  OO         OO
VV   VV           II
   KK        KK     EE              NN         NNNN  OO         OO
VV VV            II
   KK          KK   EEEEEEEEEEEEE   NN          NNN  OOOOOOOOOOOOO
VVV       IIIIIIIIIIII
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
V        IIIIIIIIIIII



   DDDDDDDDDDDD      AAAAAAAAA     VV          VV  IIIIIIIIIIII
DDDDDDDDDDDD
   DDDDDDDDDDDDD    AAAAAAAAAA    VV          VV  IIIIIIIIIIII
DDDDDDDDDDDDD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA    VV        VV        II         DD
DD
   DD         DD   AA         AA      VV     VV         II         DD
DD
   DD         DD   AA         AA       VV   VV          II         DD
DD
   DD         DD   AA         AA        VV VV           II         DD
DD
   DDDDDDDDDDDDD   AA         AA         VVV       IIIIIIIIIIII
DDDDDDDDDDDDD
   DDDDDDDDDDDD    AA         AA          V        IIIIIIIIIIII
DDDDDDDDDDDD



      0000000       88888888888               //   22222222222
33333333333               //        11         666666666666
     000000000     8888888888888             //   2222222222222
3333333333333             //        111        6666666666666
    00       00    88         88             //    22         22   33
```

```
33             //        1111        66
   00          00   88          88            //                22
33             //           11        66
   00          00   88          88          //                  22
33            //            11        66
   00          00    88888888888          //                22
333           //             11        666666666666
   00          00    88888888888          //                22
333           //             11        6666666666666
   00          00   88          88        //              22
33         //               11        66          66
   00          00   88          88       //             22
33        //               11        66          66
    00        00    88          88      //            22             33
33       //               11        66          66
     000000000     8888888888888     //           2222222222222
3333333333333     //               11111111     6666666666666
      0000000       88888888888     //            2222222222222
33333333333     //               11111111      66666666666



      0000000       666666666666                    0000000
11                          0000000       22222222222
     000000000     6666666666666                   000000000
111                         000000000     2222222222222
    00        00    66                    :::        00        00
1111              :::        00       00    22         22
   00          00   66                    :::       00          00
11               :::       00          00              22
   00          00   66                    :::       00          00
11               :::       00          00              22
   00          00   666666666666                    00          00
11                          00          00            22
   00          00   6666666666666                   00          00
11                          00          00          22
   00          00   66          66          :::       00          00
11               :::       00          00        22
   00          00   66          66          :::       00          00
11               :::       00          00      22
    00        00    66          66          :::        00        00
11               :::        00       00     22
     000000000     6666666666666                   000000000
11111111                    000000000     2222222222222
      0000000       66666666666                     0000000
11111111                      0000000      2222222222222
1

    SSSSSSSSSS     CCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSS   CCCCCCCCCCCC    AAAAAAAAAA    LL
EEEEEEEEEEEE
```

```
   SS          SS   CC          CC   AA          AA   LL              EE
   SS               CC               AA          AA   LL              EE
   SS               CC               AA          AA   LL              EE
   SSSSSSSSSSSS     CC               AAAAAAAAAAAAA   LL
EEEEEEEEE
    SSSSSSSSSSSS    CC               AAAAAAAAAAAAA   LL
EEEEEEEEE
              SS    CC               AA          AA   LL              EE
              SS    CC               AA          AA   LL              EE
   SS         SS    CC          CC   AA          AA   LL              EE
   SSSSSSSSSSSSS    CCCCCCCCCCCCCC   AA          AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS      CCCCCCCCCCC     AA          AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
```

```
**************************************************************************
************************************************

**************************************************************************
************************************************

**************************************************************************
************************************************
        *****
*****
        *****                                          program
verification information                                        *****
        *****
*****
        *****                                      code system:  SCALE
version:  6.1                                          *****
        *****
*****

**************************************************************************
************************************************

**************************************************************************
************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
```

```
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****          machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  06:01:02.16
*****
        *****
*****
        *****
*****

************************************************************************
************************************************

************************************************************************
************************************************

************************************************************************
************************************************
1

************************************************************************
************************************************
        ***
***
        ***                                  fuel bundle
***
        ***
***
```

```
********************************************************************************
*****************************************
        ***                                   ******       numeric
parameters       ******                                  ***
        ***
***
        ***
***
        ***                     tme         maximum problem time (min)
0.00                    ***
        ***
***
        ***                     tba         time per generation (min)
10.00                    ***
        ***
***
        ***                     gen         number of generations
123                    ***
        ***
***
        ***                     npg         number per generation
20000                    ***
        ***
***
        ***                     nsk         number of generations to be
skipped                    23                    ***
        ***
***
        ***                     beg         beginning generation number
1                     ***
        ***
***
        ***                     res         generations between
checkpoints                     103                    ***
        ***
***
        ***                     x1d         number of extra 1-d cross
sections                      1                      ***
        ***
***
        ***                     nbk         neutron bank size
20025                    ***
        ***
***
        ***                     xnb         extra positions in neutron
bank                        0                     ***
        ***
***
        ***                     nfb         fission bank size
20000                    ***
        ***
```

```
***
        ***                     xfb         extra positions in fission
bank                        0                       ***
        ***
***
        ***                     sig         cut off standard deviation
0.0000                     ***
        ***
***
        ***                     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
000015714D98EE96                        ***
        ***
***
        ***                     nb8         number of d.a. blocks on unit
8                      1000                       ***
        ***
***
        ***                     nl8         length of d.a. blocks on unit
8                       512                       ***
        ***
***
        ***                     nqd         quadrature order for angular
fluxes                    0                     ***
        ***
***
        ***                     pnm         highest order of flux
moments                    0                        ***
        ***
***
        ***                     msh         mesh size for mesh flux tally
0.0000                     ***
        ***
***
        ***                     adj         mode of calculation
forward                     ***
        ***
***
        ***                     tps         sampling sites per track
length                       5                      ***
        ***
```

```
***
        ***                       cgs         number of secondary groups
to sampl                    0                       ***
        ***
***
        ***                       cas         number of secondary angles
to sampl                    0                       ***
        ***
***
        ***                                   input data written on
restart unit                   yes                      ***
        ***
***
        ***
***

**********************************************************************
*****************************************

**********************************************************************
*****************************************
1
**********************************************************************
*****************************************

**********************************************************************
*****************************************
        ***
***
        ***                                fuel bundle
***
        ***
***

**********************************************************************
*****************************************
        ***                                   ******      logical
parameters        ******                                   ***
        ***
***
        ***  run  execute problem after checking data    yes
plt  plot picture map(s)                        no ***
        ***
***
        ***       compute fluxes (cfx, flx or mfp)       yes
fdn  compute fission densities                yes ***
        ***
***
        ***  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 fiss prod matrix by unit number   no
fmp  print fiss prod matrix by unit location  no ***
        ***
***
        ***  mkh  compute matrix k-eff by hole number     no
mka  compute matrix k-eff by array number     no ***
        ***
***
        ***  ckh  compute cofactor k-eff by hole number   no
cka  compute cofactor k-eff by array number   no ***
        ***
***
        ***  fmh  print fiss prod matrix by hole number   no
fma  print fiss prod matrix by array number   no ***
        ***
***
        ***  hhl  collect matrix by highest hole level    no
hal  collect matrix by highest array level    no ***
        ***
***
        ***  amx  print all mixed cross sections          no
far  print fis. and abs. by region            no ***
        ***
***
        ***  xs1  print 1-d mixture x-sections            no
gas  print far by group                       no ***
        ***
***
        ***  xs2  print 2-d mixture x-sections            no
pax  print xsec-albedo correlation tables     no ***
        ***
***
        ***  xsl  print 2-d mixture Pl arrays             no
pwt  print weight average array               no ***
        ***
***
        ***  xap  print mixture angles & probabilities    no
pgm  print input geometry                     no ***
        ***
***
        ***  pki  print fission spectrum                  no
bug  print debug information                  no ***
        ***
***
```

```
        ***  p1d  print extra 1-d cross sections          no
trk  print tracking information                no ***
        ***
***
        ***  tfm  coordinate transform for fluxes         no
pmf  print angular fluxes and flux moments     no ***
        ***
***
        ***       print fluxes (flx)                     yes
app  append, not overwrite, restart data       no ***
        ***
***
        ***  mfx  compute mesh fluxes                     no
pms  print mesh fluxes if calculated           no ***
        ***
***
        ***  mfp  compute region mean free paths          no
pmm  print mesh flux moments if calculated     no ***
        ***
***
        ***  sen  compute derivative sensitivites         no
pmv  print mesh volumes                        no ***
        ***
***
        ***  cep  continuous energy calculation           no
ptb  use probability tables                   yes ***
        ***
***
        ***  fre  use analytic free gas kernel           yes
pnu  use prompt neutron spectrum only          no ***
        ***
***
        ***  cbt  compute contributons                    no
pct  print contributons                        no ***
        ***
***
        ***  cds  collect CADIS fissions                  no
htm  produce HTML output                      yes ***
        ***
***
        ***
***

*******************************************************************************
*********************************************

*******************************************************************************
*********************************************

*******************************************************************************
*********************************************
                                                 parameter input completed
```

```
                                  ........ finished reading the parameter
data      ........


                                 *************** data reading completed
***************
1
******************************************************************************
*****************************************
        ***
***
        ***                                  fuel bundle
***
        ***
***

******************************************************************************
*********************************************

******************************************************************************
*****************************************
        ***
***
        ***           unit
volume                                          ***
        ***          number                data set name
name         unit function                      ***
        ***          ------                --------------
----         -------------                      ***
        ***
***
        ***       xsc  14
->Data\Local\Temp\scale.David.33572\ft14f001             mixed cross
sections                ***
        ***
***
        ***       alb  79     C:\SCALE\data\albedos
input albedos                        ***
        ***
***
        ***       wts  80     C:\SCALE\data\scale.rev01.weights
input weights                        ***
        ***
***
        ***       skt  16      unknown
write scratch data                   ***
        ***
***
        ***       rst  95
->\Temp\scale.David.33572\restart.keno_input             read restart
```

```
data                    ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.33572\restart.keno_input             write restart
data                   ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.33572\ft04f001             input ampx
working library         ***
        ***
***
        ***             8
->Data\Local\Temp\scale.David.33572\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

******************************************************************************
*********************************************

                                  ........ finished preparing input data
........
1
******************************************************************************
*****************************
                  ***
***
                  ***           fuel bundle
***
                  ***
***

******************************************************************************
*****************************

******************************************************************************
*****************************
                  ***
***
                  ***                                  ****** additional
information ******                            ***
                  ***
***
                  ***  use a global unit                        yes    use
lattice geometry                    yes  ***
                  ***
```

```
***
                ***  no. of scattering angles in xsecs        3
global array number                        0  ***
                ***
***
                ***  number of mixtures used                  3
number of units in the global x dir.       0  ***
                ***
***
                ***  number of bias id's used                 1
number of units in the global y dir.       0  ***
                ***
***
                ***  number of differential albedos used      2
number of units in the global z dir.       0  ***
                ***
***
                ***  total input geometry regions             4
number of energy groups                  238  ***
                ***
***
                ***  number of geometry regions used          4    no.
of fission spectrum source grps.       1  ***
                ***
***
                ***  use nested arrays                       no    use
nested holes                           no  ***
                ***
***
                ***  number of arrays used                    1
number of holes                            0  ***
                ***
***
                ***  maximum array nesting level              1
maximum hole nesting level                 0  ***
                ***
***
                ***  largest array number                     1
largest geometry unit number               2  ***
                ***
***
                ***
***
                ***  boundary label 1                cuboid
***
                ***
***
                ***    +x boundary condition             h2o
-x boundary condition                  h2o  ***
                ***
***
                ***    +y boundary condition        graphite
```

```
-y boundary condition            graphite  ***
                  ***
***
                  ***    +z boundary condition             h2o
-z boundary condition                 h2o  ***
                  ***
***

********************************************************************************
*****************************


                                    cross sections read from the ampx
working library on unit    4

1                                          fuel bundle

                                                    mixing table

                                           number of scattering angles =
3
                                         cross section message threshold
=1.0E+00


 mixture =     1          density(g/cc) =  5.5474
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    1001001  4.14735E-13  1.25118E-13    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    1003007  3.23535E-08  6.79473E-08    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    1004009  1.25936E-07  3.39736E-07    4009     9.0122     be9 425
endf/b7 rel8 rev7 mod2                   12/17/09
    1005010  6.04527E-08  1.81192E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  1.15723E-15  3.81364E-15    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    1007014  8.91558E-06  3.73710E-05    7014    14.0031     n14 725
endf/b7 rel8 rev7 mod0                   12/17/09
    1008016  1.00000E-20  4.78788E-20    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09
    1011023  9.87361E-07  6.79473E-06   11023    22.9898     na23 1125
endf/b7 rel8 rev7 mod0                  12/17/09
    1012024  7.37710E-07  5.29649E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33929E-08  6.98505E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02826E-07  7.99734E-07   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    1013027  3.96970E-02  3.20617E-01   13027    26.9815     al27 1325
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endf/b7 rel6 rev7 mod1                 12/17/09
    1014028  5.44792E-03  4.56239E-02   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                 12/17/09
    1014029  2.76758E-04  2.40054E-03   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                 12/17/09
    1014030  1.82655E-04  1.63883E-03   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                 12/17/09
    1015031  1.46571E-06  1.35895E-05   15031    30.9738     p31 1525
endf/b7 rel6 rev7 mod1                  12/17/09
    1020040  1.09810E-06  1.31358E-05   20040    39.9626     ca40 2025
endf/b7 rel1 rev7 mod1                 12/17/09
    1020042  7.32891E-09  9.20498E-08   20042    41.9586     ca42 2031
endf/b7 rel1 rev7 mod1                 12/17/09
    1020043  1.52922E-09  1.96645E-08   20043    42.9588     ca43 2034
endf/b7 rel1 rev7 mod1                 12/17/09
    1020044  2.36292E-08  3.10903E-07   20044    43.9555     ca44 2037
endf/b7 rel1 rev7 mod1                 12/17/09
    1020046  4.53101E-11  6.23272E-10   20046    45.9537     ca46 2043
endf/b7 rel1 rev7 mod1                 12/17/09
    1020048  2.11825E-09  3.04054E-08   20048    47.9525     ca48 2049
endf/b7 rel1 rev7 mod1                 12/17/09
    1023000  2.00517E-07  3.05763E-06   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                   12/17/09
    1024050  3.47753E-08  5.19916E-07   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                 12/17/09
    1024052  6.70606E-07  1.04264E-05   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                 12/17/09
    1024053  7.60414E-08  1.20504E-06   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                 12/17/09
    1024054  1.89283E-08  3.05616E-07   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                 12/17/09
    1025055  3.58088E-07  5.88877E-06   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                 12/17/09
    1026054  1.44567E-06  2.33421E-05   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                 12/17/09
    1026056  2.26940E-05  3.79975E-04   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                 12/17/09
    1026057  5.24102E-07  8.93224E-06   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                 12/17/09
    1026058  6.97484E-08  1.20955E-06   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                 12/17/09
    1027059  1.92584E-07  3.39736E-06   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                 12/17/09
    1028058  1.14089E-06  1.97856E-05   28058    57.9353     ni58 2825
endf/b7 rel8 rev7 mod4                 12/17/09
    1028060  4.39468E-07  7.88386E-06   28060    59.9308     ni60 2831
endf/b7 rel8 rev7 mod4                 12/17/09
    1028061  1.91034E-08  3.48426E-07   28061    60.9311     ni61 2834
endf/b7 rel8 rev7 mod5                 12/17/09
    1028062  6.09099E-08  1.12912E-06   28062    61.9283     ni62 2837
endf/b7 rel8 rev7 mod5                 12/17/09
    1028064  1.55120E-08  2.96838E-07   28064    63.9280     ni64 2843
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endf/b7 rel8 rev7 mod4                 12/17/09
    1029063  2.49068E-06  4.69175E-05   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                 12/17/09
    1029065  1.11117E-06  2.15960E-05   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                 12/17/09
    1030000  6.94379E-07  1.35895E-05   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                  12/17/09
    1036083  5.32869E-12  1.32255E-10   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90756E-08  1.32072E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.07071E-08  2.91357E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.64186E-08  4.51687E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  5.64446E-11  1.56975E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.66382E-08  4.67696E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  5.48039E-11  1.55696E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.72895E-09  7.83454E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  5.88538E-20  1.63675E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  4.75110E-12  1.34975E-10   41095    94.9068     nb95 4131
endf/b7 rel0 rev7 mod1                 12/17/09
    1042092  1.04839E-08  2.88425E-07   42092    91.9068     mo92 4225
endf/b7 rel0 rev7 mod1                 12/17/09
    1042094  6.55156E-09  1.84160E-07   42094    93.9051     mo94 4231
endf/b7 rel0 rev7 mod1                 12/17/09
    1042095  1.12866E-08  3.20639E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39892E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  6.83936E-09  1.98394E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.72232E-08  5.04758E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.25369E-11  3.71178E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.92166E-09  2.07000E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  4.24810E-11  1.25771E-09   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  4.81110E-11  1.45319E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  3.94040E-11  1.20197E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  2.40474E-11  7.40751E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  1.76203E-11  5.48040E-10   44104   103.9054     ru104 4449
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endf/b7 rel0 rev7 mod1                12/17/09
    1044106  3.69789E-12  1.17231E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  3.89560E-12  1.19998E-10   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.10194E-12  3.46033E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  7.80978E-12  2.45243E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  1.41633E-12  4.53237E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  5.21476E-13  1.68435E-11   46108   107.9039     pd108 4643
endf/b7 rel5 rev7 mod1                12/17/09
    1047107  2.12330E-08  6.79473E-07   47107   106.9051     ag107 4725
endf/b7 rel0 rev7 mod1                12/17/09
    1047109  2.83564E-13  9.24400E-12   47109   108.9047     ag109 4731
endf/b7 rel0 rev7 mod1                12/17/09
    1048106  1.26206E-10  4.00095E-09   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                12/17/09
    1048108  8.98593E-11  2.90244E-09   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    1048110  1.26105E-09  4.14861E-08   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    1048111  1.29243E-09  4.29059E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43639E-09  8.16111E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23388E-09  4.17010E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90086E-09  9.89064E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56350E-10  2.62413E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  8.87661E-14  3.05312E-12   49115   114.9039     in115 4931
endf/b7 rel3 rev7 mod1                12/17/09
    1050112  1.85479E-10  6.21305E-09   50112   111.9048     sn112 5025
endf/b7 rel0 rev7 mod1                12/17/09
    1050114  1.26202E-10  4.30291E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50178E-11  2.23628E-09   50115   114.9033     sn115 5034
endf/b7 rel0 rev7 mod1                12/17/09
    1050116  2.78027E-09  9.64582E-08   50116   115.9017     sn116 5037
endf/b7 rel0 rev7 mod1                12/17/09
    1050117  1.46866E-09  5.13935E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63135E-09  1.63451E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64266E-09  5.84661E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22992E-09  2.23600E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85474E-10  3.23112E-08   50122   121.9034     sn122 5055
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endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10739E-09  4.10725E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  5.19433E-13  1.95769E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  9.96769E-13  3.78646E-11   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  5.24796E-12  2.02499E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30210E-12  5.25836E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  1.28147E-11  5.02143E-10   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.40151E-11  9.55413E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88658E-12  7.61856E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  3.42881E-11  1.36411E-09   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  7.54604E-17  3.02471E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  5.69405E-11  2.29940E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  5.69180E-11  2.33258E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29839E-08  1.36158E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  3.68158E-11  1.54187E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  6.30010E-11  2.61958E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  4.49712E-11  1.89685E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  5.68371E-11  2.41437E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.29812E-12  2.69428E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  4.94092E-11  2.12849E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  8.76613E-12  3.69746E-10   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  3.36900E-11  1.44121E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.52960E-11  6.54338E-10   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  1.05832E-12  4.55899E-11   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  3.54423E-11  1.53741E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  2.80732E-11  1.22616E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.26362E-11  5.55708E-10   60147   146.9161     nd147 6040
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endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.54078E-11  6.82214E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  8.18682E-12  3.60034E-10   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  3.33626E-19  1.47721E-17   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.86602E-12  8.31813E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  3.74997E-14  1.64913E-12   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  8.73108E-12  3.89202E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  5.30579E-16  2.38102E-14   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.01049E-09  1.36002E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  2.50431E-12  1.13884E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.33297E-13  1.06793E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.42940E-09  6.45744E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.56038E-09  7.14267E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  6.13450E-16  2.82647E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  3.03615E-13  1.40799E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  9.35131E-14  4.36465E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77690E-12  2.62706E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29364E-11  2.89975E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27257E-10  1.98137E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91025E-10  2.75852E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51789E-10  2.12220E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17239E-10  3.39058E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31099E-10  3.02121E-08   64160   159.9270     gd160 6449
endf/b7 rel0 rev7 mod1                12/17/09
    1074182  7.16309E-08  3.90130E-06   74182   181.9482     w182 7431
endf/b7 rel8 rev7 mod2                 12/17/09
    1074183  3.84687E-08  2.10670E-06   74183   182.9502     w183 7434
endf/b7 rel8 rev7 mod2                 12/17/09
    1074184  8.19198E-08  4.51079E-06   74184   183.9509     w184 7437
endf/b7 rel8 rev7 mod2                 12/17/09
    1074186  7.51922E-08  4.18544E-06   74186   185.9544     w186 7443
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endf/b7 rel8 rev7 mod2                 12/17/09
    1082204  7.66801E-11  4.68184E-09   82204   203.9730     pb204 8225
endf/b7 rel1 rev7 mod1                12/17/09
    1082206  1.31999E-09  8.13854E-08   82206   205.9745     pb206 8231
endf/b7 rel1 rev7 mod1                12/17/09
    1082207  1.21045E-09  7.49943E-08   82207   206.9759     pb207 8234
endf/b7 rel1 rev7 mod1                12/17/09
    1082208  2.87003E-09  1.78674E-07   82208   207.9767     pb208 8237
endf/b7 rel6 rev7 mod2                12/17/09
    1092234  1.45935E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76387E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22564E-06  6.51860E-04   92236   236.0456     u236 9231
endf/b7 rel0 rev7 mod1                 12/17/09
    1092238  7.06299E-03  5.03292E-01   92238   238.0508     u238 9237
endf/b7 rel6 rev7 mod5                 12/17/09
    1093237  2.80821E-13  1.99263E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.63963E-20  1.88093E-18   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  3.45284E-11  2.47076E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  6.36267E-18  4.57203E-16   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.97870E-21  7.20038E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49925E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00224E-20  7.23194E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  5.13279E-28  3.71910E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99999E-21  7.27574E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.69898E-20  1.23104E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.98858E-21  7.26744E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.98167E-21  7.29233E-19   96244   244.0627     cm244 9637
endf/b7 rel3 rev7 mod2                12/17/09

 mixture =     2          density(g/cc) = 0.99396
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    2001001  6.64695E-02  1.11915E-01    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    2008016  3.32348E-02  8.88085E-01    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09

 mixture =     3          density(g/cc) =  2.7020
    nuclide   atom-dens.   wgt. frac.     za      awt
```

```
nuclide title
    3003006  1.75835E-07  6.50000E-07    3006     6.0151     li6 325
endf/b7 rel1 rev7 mod0                   12/17/09
    3003007  2.16849E-06  9.35000E-06    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    3005010  2.99015E-07  1.84000E-06    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    3005011  1.20605E-06  8.16000E-06    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    3012024  4.88634E-04  7.20258E-03   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    3012025  6.18603E-05  9.49881E-04   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    3012026  6.81081E-05  1.08754E-03   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    3013027  5.88689E-02  9.76150E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    3014028  2.67155E-04  4.59332E-03   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    3014029  1.35717E-05  2.41681E-04   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                  12/17/09
    3014030  8.95702E-06  1.64994E-04   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    3023000  3.19422E-06  1.00000E-04   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                    12/17/09
    3024050  1.83565E-06  5.63448E-05   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                  12/17/09
    3024052  3.53986E-05  1.12994E-03   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                  12/17/09
    3024053  4.01392E-06  1.30593E-04   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                  12/17/09
    3024054  9.99149E-07  3.31204E-05   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                  12/17/09
    3025055  2.07330E-05  7.00000E-04   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                  12/17/09
    3026054  6.02891E-06  1.99853E-04   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                  12/17/09
    3026056  9.46410E-05  3.25331E-03   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                  12/17/09
    3026057  2.18567E-06  7.64770E-05   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                  12/17/09
    3026058  2.90873E-07  1.03561E-05   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                  12/17/09
    3027059  2.76106E-07  1.00000E-05   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                  12/17/09
    3029063  5.20580E-05  2.01329E-03   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                  12/17/09
    3029065  2.32247E-05  9.26712E-04   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                  12/17/09
    3030000  2.21504E-05  8.90000E-04   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                   12/17/09
    3031069  7.01394E-07  2.97102E-05   31069    68.9256     ga69 3125
```

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endf/b7 rel0 rev7 mod1                 12/17/09
    3031071  4.65496E-07  2.02898E-05   31071    70.9247     ga71 3131
endf/b7 rel0 rev7 mod1                 12/17/09
    3048106  1.80940E-09  1.17766E-07   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                12/17/09
    3048108  1.28830E-09  8.54314E-08   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    3048110  1.80796E-08  1.22113E-06   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    3048111  1.85283E-08  1.26284E-06   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    3048112  3.49287E-08  2.40208E-06   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    3048113  1.76887E-08  1.22736E-06   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    3048114  4.15873E-08  2.91113E-06   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    3048116  1.08419E-08  7.72275E-07   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09



                              3003006    li6 325 endf/b7 rel1 rev7 mod0
12/17/09
                              1003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                              3003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                              1004009    be9 425 endf/b7 rel8 rev7 mod2
12/17/09
                              1005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                              3005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                              3005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                              1005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                              1007014    n14 725 endf/b7 rel8 rev7 mod0
12/17/09
                              2008016    o16 825 endf/b7 rel8 rev7 mod3
12/17/09
                              1008016    o16 825 endf/b7 rel8 rev7 mod3
12/17/09
                              1011023    na23 1125 endf/b7 rel8 rev7 mod0
12/17/09
                              1012024    mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09
                              3012024    mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09
                              1012025    mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09
```

3012025	mg25	1228	endf/b7	rel3	rev7	mod2	12/17/09
1012026	mg26	1231	endf/b7	rel3	rev7	mod2	12/17/09
3012026	mg26	1231	endf/b7	rel3	rev7	mod2	12/17/09
1013027	al27	1325	endf/b7	rel6	rev7	mod1	12/17/09
3013027	al27	1325	endf/b7	rel6	rev7	mod1	12/17/09
1014028	si28	1425	endf/b7	rel6	rev7	mod1	12/17/09
3014028	si28	1425	endf/b7	rel6	rev7	mod1	12/17/09
1014029	si29	1428	endf/b7	rel8	rev7	mod3	12/17/09
3014029	si29	1428	endf/b7	rel8	rev7	mod3	12/17/09
1014030	si30	1431	endf/b7	rel6	rev7	mod2	12/17/09
3014030	si30	1431	endf/b7	rel6	rev7	mod2	12/17/09
1015031	p31	1525	endf/b7	rel6	rev7	mod1	12/17/09
1020040	ca40	2025	endf/b7	rel1	rev7	mod1	12/17/09
1020042	ca42	2031	endf/b7	rel1	rev7	mod1	12/17/09
1020043	ca43	2034	endf/b7	rel1	rev7	mod1	12/17/09
1020044	ca44	2037	endf/b7	rel1	rev7	mod1	12/17/09
1020046	ca46	2043	endf/b7	rel1	rev7	mod1	12/17/09
1020048	ca48	2049	endf/b7	rel1	rev7	mod1	12/17/09
1023000	v	2300	endf/b7	rel8	rev7	mod0	12/17/09
3023000	v	2300	endf/b7	rel8	rev7	mod0	12/17/09
1024050	cr50	2425	endf/b7	rel8	rev7	mod5	12/17/09
3024050	cr50	2425	endf/b7	rel8	rev7	mod5	12/17/09
1024052	cr52	2431	endf/b7	rel8	rev7	mod4	12/17/09
3024052	cr52	2431	endf/b7	rel8	rev7	mod4	12/17/09
1024053	cr53	2434	endf/b7	rel8	rev7	mod4	12/17/09
3024053	cr53	2434	endf/b7	rel8	rev7	mod4	12/17/09

1024054	cr54 2437 endf/b7 rel8 rev7 mod5	12/17/09
3024054	cr54 2437 endf/b7 rel8 rev7 mod5	12/17/09
1025055	mn55 2525 endf/b7 rel8 rev7 mod0	12/17/09
3025055	mn55 2525 endf/b7 rel8 rev7 mod0	12/17/09
1026054	fe54 2625 endf/b7 rel8 rev7 mod5	12/17/09
3026054	fe54 2625 endf/b7 rel8 rev7 mod5	12/17/09
1026056	fe56 2631 endf/b7 rel8 rev7 mod4	12/17/09
3026056	fe56 2631 endf/b7 rel8 rev7 mod4	12/17/09
1026057	fe57 2634 endf/b7 rel8 rev7 mod4	12/17/09
3026057	fe57 2634 endf/b7 rel8 rev7 mod4	12/17/09
1026058	fe58 2637 endf/b7 rel8 rev7 mod0	12/17/09
3026058	fe58 2637 endf/b7 rel8 rev7 mod0	12/17/09
1027059	co59 2725 endf/b7 rel2 rev7 mod0	12/17/09
3027059	co59 2725 endf/b7 rel2 rev7 mod0	12/17/09
1028058	ni58 2825 endf/b7 rel8 rev7 mod4	12/17/09
1028060	ni60 2831 endf/b7 rel8 rev7 mod4	12/17/09
1028061	ni61 2834 endf/b7 rel8 rev7 mod5	12/17/09
1028062	ni62 2837 endf/b7 rel8 rev7 mod5	12/17/09
1028064	ni64 2843 endf/b7 rel8 rev7 mod4	12/17/09
1029063	cu63 2925 endf/b7 rel8 rev7 mod5	12/17/09
3029063	cu63 2925 endf/b7 rel8 rev7 mod5	12/17/09
1029065	cu65 2931 endf/b7 rel8 rev7 mod5	12/17/09
3029065	cu65 2931 endf/b7 rel8 rev7 mod5	12/17/09
1030000	zn 3000 endf/b7 rel0 rev7 mod0	12/17/09
3030000	zn 3000 endf/b7 rel0 rev7 mod0	12/17/09
3031069	ga69 3125 endf/b7 rel0 rev7 mod1	12/17/09

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                                3031071    ga71 3131 endf/b7 rel0 rev7 mod1
12/17/09
                                1036083    kr83 3640 endf/b7 rel0 rev7 mod1
12/17/09
                                1040090    zr90 4025 endf/b7 rel0 rev7 mod1
12/17/09
                                1040091    zr91 4028 endf/b7 rel0 rev7 mod1
12/17/09
                                1040092    zr92 4031 endf/b7 rel3 rev7 mod4
12/17/09
                                1040093    zr93 4034 endf/b7 rel3 rev7 mod1
12/17/09
                                1040094    zr94 4037 endf/b7 rel3 rev7 mod1
12/17/09
                                1040095    zr95 4040 endf/b7 rel0 rev7 mod1
12/17/09
                                1040096    zr96 4043 endf/b7 rel0 rev7 mod1
12/17/09
                                1041093    nb93 4125 endf/b7 rel6 rev7 mod3
12/17/09
                                1041095    nb95 4131 endf/b7 rel0 rev7 mod1
12/17/09
                                1042092    mo92 4225 endf/b7 rel0 rev7 mod1
12/17/09
                                1042094    mo94 4231 endf/b7 rel0 rev7 mod1
12/17/09
                                1042095    mo95 4234 endf/b7 rel0 rev7 mod1
12/17/09
                                1042096    mo96 4237 endf/b7 rel0 rev7 mod1
12/17/09
                                1042097    mo97 4240 endf/b7 rel0 rev7 mod1
12/17/09
                                1042098    mo98 4243 endf/b7 rel0 rev7 mod1
12/17/09
                                1042099    mo99 4246 endf/b7 rel0 rev7 mod1
12/17/09
                                1042100    mo100 4249 endf/b7 rel0 rev7
mod1                12/17/09
                                1043099    tc99 4325 endf/b7 rel0 rev7 mod1
12/17/09
                                1044101    ru101 4440 endf/b7 rel0 rev7
mod1                12/17/09
                                1044102    ru102 4443 endf/b7 rel0 rev7
mod1                12/17/09
                                1044103    ru103 4446 endf/b7 rel0 rev7
mod1                12/17/09
                                1044104    ru104 4449 endf/b7 rel0 rev7
mod1                12/17/09
                                1044106    ru106 4455 endf/b7 rel0 rev7
mod0                12/17/09
                                1045103    rh103 4525 endf/b7 rel0 rev7
mod1                12/17/09
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		1045105	rh105	4531	endf/b7	rel0	rev7
mod1	12/17/09						
		1046105	pd105	4634	endf/b7	rel0	rev7
mod1	12/17/09						
		1046107	pd107	4640	endf/b7	rel0	rev7
mod1	12/17/09						
		1046108	pd108	4643	endf/b7	rel5	rev7
mod1	12/17/09						
		1047107	ag107	4725	endf/b7	rel0	rev7
mod1	12/17/09						
		1047109	ag109	4731	endf/b7	rel0	rev7
mod1	12/17/09						
		1048106	cd106	4825	endf/b7	rel0	rev7
mod1	12/17/09						
		3048106	cd106	4825	endf/b7	rel0	rev7
mod1	12/17/09						
		1048108	cd108	4831	endf/b7	rel0	rev7
mod1	12/17/09						
		3048108	cd108	4831	endf/b7	rel0	rev7
mod1	12/17/09						
		1048110	cd110	4837	endf/b7	rel0	rev7
mod1	12/17/09						
		3048110	cd110	4837	endf/b7	rel0	rev7
mod1	12/17/09						
		1048111	cd111	4840	endf/b7	rel0	rev7
mod1	12/17/09						
		3048111	cd111	4840	endf/b7	rel0	rev7
mod1	12/17/09						
		1048112	cd112	4843	endf/b7	rel0	rev7
mod1	12/17/09						
		3048112	cd112	4843	endf/b7	rel0	rev7
mod1	12/17/09						
		1048113	cd113	4846	endf/b7	rel0	rev7
mod1	12/17/09						
		3048113	cd113	4846	endf/b7	rel0	rev7
mod1	12/17/09						
		1048114	cd114	4849	endf/b7	rel4	rev7
mod1	12/17/09						
		3048114	cd114	4849	endf/b7	rel4	rev7
mod1	12/17/09						
		1048116	cd116	4855	endf/b7	rel0	rev7
mod1	12/17/09						
		3048116	cd116	4855	endf/b7	rel0	rev7
mod1	12/17/09						
		1049115	in115	4931	endf/b7	rel3	rev7
mod1	12/17/09						
		1050112	sn112	5025	endf/b7	rel0	rev7
mod1	12/17/09						
		1050114	sn114	5031	endf/b7	rel0	rev7
mod1	12/17/09						
		1050115	sn115	5034	endf/b7	rel0	rev7
mod1	12/17/09						

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                                1050116    sn116 5037 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050117    sn117 5040 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050118    sn118 5043 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050119    sn119 5046 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050120    sn120 5049 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050122    sn122 5055 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050124    sn124 5061 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050126    sn126 5067 endf/b7 rel0 rev7
mod1                 12/17/09
                                1053127    i127 5325 endf/b7 rel2 rev7 mod1
12/17/09
                                1053129    i129 5331 endf/b7 rel0 rev7 mod1
12/17/09
                                1053135    i135 5349 endf/b7 rel0 rev7 mod1
12/17/09
                                1054131    xe131 5446 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054133    xe133 5452 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054135    xe135 5458 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055133    cs133 5525 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055134    cs134 5528 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055135    cs135 5531 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055137    cs137 5537 endf/b7 rel0 rev7
mod1                 12/17/09
                                1056138    ba138 5649 endf/b7 rel0 rev7
mod1                 12/17/09
                                1056140    ba140 5655 endf/b7 rel0 rev7
mod1                 12/17/09
                                1057139    la139 5728 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058141    ce141 5840 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058142    ce142 5843 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058143    ce143 5846 endf/b7 rel0 rev7
mod1                 12/17/09
                                1058144    ce144 5849 endf/b7 rel0 rev7
mod1                 12/17/09
                                1059141    pr141 5925 endf/b7 rel0 rev7
mod1                 12/17/09
```

		1059143	pr143	5931	endf/b7	rel0	rev7
mod1	12/17/09						
		1060143	nd143	6028	endf/b7	rel0	rev7
mod1	12/17/09						
		1060144	nd144	6031	endf/b7	rel0	rev7
mod1	12/17/09						
		1060145	nd145	6034	endf/b7	rel0	rev7
mod1	12/17/09						
		1060146	nd146	6037	endf/b7	rel0	rev7
mod1	12/17/09						
		1060147	nd147	6040	endf/b7	rel0	rev7
mod1	12/17/09						
		1060148	nd148	6043	endf/b7	rel0	rev7
mod1	12/17/09						
		1061147	pm147	6149	endf/b7	rel3	rev7
mod1	12/17/09						
		1061148	pm148	6152	endf/b7	rel3	rev7
mod1	12/17/09						
		1061149	pm149	6155	endf/b7	rel3	rev7
mod1	12/17/09						
		1062147	sm147	6234	endf/b7	rel0	rev7
mod1	12/17/09						
		1062149	sm149	6240	endf/b7	rel0	rev7
mod1	12/17/09						
		1062150	sm150	6243	endf/b7	rel0	rev7
mod1	12/17/09						
		1062151	sm151	6246	endf/b7	rel0	rev7
mod1	12/17/09						
		1062152	sm152	6249	endf/b7	rel0	rev7
mod1	12/17/09						
		1062153	sm153	6252	endf/b7	rel0	rev7
mod1	12/17/09						
		1063151	eu151	6325	endf/b7	rel0	rev7
mod1	12/17/09						
		1063153	eu153	6331	endf/b7	rel1	rev7
mod1	12/17/09						
		1063154	eu154	6334	endf/b7	rel0	rev7
mod1	12/17/09						
		1063155	eu155	6337	endf/b7	rel0	rev7
mod1	12/17/09						
		1063156	eu156	6340	endf/b7	rel0	rev7
mod1	12/17/09						
		1064152	gd152	6425	endf/b7	rel0	rev7
mod1	12/17/09						
		1064154	gd154	6431	endf/b7	rel0	rev7
mod1	12/17/09						
		1064155	gd155	6434	endf/b7	rel0	rev7
mod1	12/17/09						
		1064156	gd156	6437	endf/b7	rel0	rev7
mod1	12/17/09						
		1064157	gd157	6440	endf/b7	rel0	rev7
mod1	12/17/09						

```
                                1064158    gd158 6443 endf/b7 rel0 rev7
mod1                 12/17/09
                                1064160    gd160 6449 endf/b7 rel0 rev7
mod1                 12/17/09
                                1074182    w182 7431 endf/b7 rel8 rev7 mod2
12/17/09
                                1074183    w183 7434 endf/b7 rel8 rev7 mod2
12/17/09
                                1074184    w184 7437 endf/b7 rel8 rev7 mod2
12/17/09
                                1074186    w186 7443 endf/b7 rel8 rev7 mod2
12/17/09
                                1082204    pb204 8225 endf/b7 rel1 rev7
mod1                 12/17/09
                                1082206    pb206 8231 endf/b7 rel1 rev7
mod1                 12/17/09
                                1082207    pb207 8234 endf/b7 rel1 rev7
mod1                 12/17/09
                                1082208    pb208 8237 endf/b7 rel6 rev7
mod2                 12/17/09
                                1092234    u234 9225 endf/b7 rel5 rev7 mod2
12/17/09
                                1092235    u235 9228 endf/b7 rel0 rev7 mod7
12/17/09
                                1092236    u236 9231 endf/b7 rel0 rev7 mod1
12/17/09
                                1092238    u238 9237 endf/b7 rel6 rev7 mod5
12/17/09
                                1093237    np237 9346 endf/b7 rel0 rev7
mod1                 12/17/09
                                1094238    pu238 9434 endf/b7 rel0 rev7
mod0                 12/17/09
                                1094239    pu239 9437 endf/b7 rel5 rev7
mod5                 12/17/09
                                1094240    pu240 9440 endf/b7 rel2 rev7
mod0                 12/17/09
                                1094241    pu241 9443 endf/b7 rel3 rev7
mod1                 12/17/09
                                1094242    pu242 9446 endf/b7 rel0 rev7
mod0                 12/17/09
                                1095241    am241 9543 endf/b7 rel0 rev7
mod4                 12/17/09
                                1095242    am242 9546 endf/b7 rel0 rev7
mod0                 12/17/09
                                1095243    am243 9549 endf/b7 rel5 rev7
mod0                 12/17/09
                                1096242    cm242 9631 endf/b7 rel0 rev7
mod0                 12/17/09
                                1096243    cm243 9634 endf/b7 rel7 rev7
mod0                 12/17/09
                                1096244    cm244 9637 endf/b7 rel3 rev7
mod2                 12/17/09
```

```
                                2001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0          12/17/09
                                1001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0          12/17/09

  ***** warning ***** keno message number k6-222 follows:
  9511 transfers for mixture 1 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  139 transfers for mixture 3 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  13467 transfers for mixture 2 were corrected for bad moments.

                                ........ finished mixing cross-sections
........

                                 1-d cross section array id numbers

                                            neutron
                                 reaction name    reaction id
                                        total              1
                                non-absorption           2002
                                    nu-fission           1452
                                    absorption             27
                                       fission             18
                                           chi           1018

                                ........ finished preparing the cross
sections    ........


************************************************************
                                **
**
                                **   array      units in   units in
units in   nesting  **
                                **   number      x dir.     y dir.     z
dir.     level   **
                                **
**
                                **     1            1         14
1          1    **
                                **
**

************************************************************


                                ........ finished loading the data
........
```

```
********************************************************************************
*****************************************
        ***
***
        ***
***

********************************************************************************
*****************************************
        ***                                     ******      geometry
parameters       ******                                     ***
        ***
***
        ***
***
        ***                     niar        number of independent array
references              1                        ***
        ***
***
        ***                     ngblu       global unit number
2                        ***
        ***
***
        ***                     nboxt       number of units in the
problem                      2                           ***
        ***
***
        ***                     nquad       number of quadratics in the
problem                  12                       ***
        ***
***
        ***                     ngwrds      number of geometry words
read                        4                        ***
        ***
***
        ***                     maxgwd      maximum geometry words in a
unit                     3                       ***
        ***
***
        ***                     maxsfu      largest number of surfaces
in a unit                9                        ***
        ***
***
        ***                     maxreg      largest number of media in a
unit                     3                      ***
        ***
***
        ***                     regtot      number of spatial volumes
defined                     4                       ***
        ***
***
```

```
        ***                       sectot      number of entries in the
sector array               14                          ***
        ***
***
        ***                       nucom       number of comments in the
geometry data              2                          ***
        ***
***
        ***                       numhol      number of holes in the
problem                       0                          ***
        ***
***

********************************************************************************
*****************************************

1                                          fuel bundle

                                    geometry description for those units
utilized in this problem



                                                          -----   unit 1
-----

 fuel meat

       1        cuboid         1                              quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +8.86938E+00

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +6.45160E-04

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +9.00225E+02

       2        cuboid         2                              quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01
```

```
  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.03225E-03

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

       3        cuboid         3                            quadratic
surfaces

      X**2          Y**2          Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.18080E-02

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 media 1    1          1

 media 3    1          2 -1

 media 2    1          -1 -2 3

 boundary                        3


                                          ******************   global
******************
                                                       -----   unit 2
-----

 array unit

       1        cuboid         1                            quadratic
surfaces

      X**2          Y**2          Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +5.31622E+00 +0.00000E+00 +1.12882E+00
```

+0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

sector
imp definitions

array 1 1

boundary 1
1 fuel bundle

------- unit orientation description for array 1 -------

z layer 1, x column 1 to 1 left to right y row 1 to 14 bottom to top

1

1

1

1

1

1

1

1

1

1

1

1

1

1
1 fuel bundle

volumes for those units utilized in this problem

volumes not specified in the input were set to -1.0

geometry

```
                          unit     uses    region     mixture
total region volume (cm**3)

                            1        14       1           1
2.47925E+02 +/- 7.84971E-01
                                             2           3
5.95366E+02 +/- 1.88502E+00
                                             3           2
1.84949E+03 +/- 5.85578E+00

                           2         1       1


                                 mixture       total mixture volume (cm**3)
total mixture mass (gm)

                                      1         2.47925E+02 +/- 7.84971E-01
1.37533E+03 +/- 4.35453E+00
                                      2         1.84949E+03 +/- 5.85578E+00
1.83832E+03 +/- 5.82041E+00
                                      3         5.95366E+02 +/- 1.88502E+00
1.60868E+03 +/- 5.09333E+00
                                                -------------
-------------
                                                2.69278E+03
4.82233E+03
                                    *****  restart data has been written on
unit 95  *****


**************************************************************************
*****************************************
        ***
***
        ***                                              biasing information
***
        ***
***
        ***     a default weight of    0.500 will be used for all bias
id's.                                                    ***
        ***
***

**************************************************************************
*****************************************

                                  ........ finished in Keno-VI before
tracking       ........

                                  ........     0.01817 minutes were used
```

```
processing data.        ........

 volume fraction of fissile material in the system= 9.20704E-02

 start type 6 was used.

 neutrons were started from binary start data on file
keno_start6_file

 neutrons started in non-fissile mixtures will use the fission spectrum
for mixture     1

   0.00050 minutes were required for starting.   total elapsed time is
0.01867 minutes.
1fuel bundle

                   generation        average         avg k-eff
matrix       matrix k-eff
     generation   k-effective      k-effective       deviation
k-effective       deviation
  keno message number k6-132 follows:
 only 15544 independent fission points were generated for generation 1
          1       7.60023E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15647 independent fission points were generated for generation 2
          2       7.61966E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15717 independent fission points were generated for generation 3
          3       7.68192E-01      7.68192E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.66046E-01      7.67119E-01      1.07297E-03
0.00000E+00      0.00000E+00
          5       7.71623E-01      7.68620E-01      1.62408E-03
0.00000E+00      0.00000E+00
          6       7.70416E-01      7.69069E-01      1.23302E-03
0.00000E+00      0.00000E+00
          7       7.65556E-01      7.68366E-01      1.18561E-03
0.00000E+00      0.00000E+00
          8       7.55221E-01      7.66175E-01      2.39525E-03
0.00000E+00      0.00000E+00
          9       7.66322E-01      7.66196E-01      2.02446E-03
0.00000E+00      0.00000E+00
         10       7.61694E-01      7.65634E-01      1.84136E-03
0.00000E+00      0.00000E+00
         11       7.66851E-01      7.65769E-01      1.62955E-03
0.00000E+00      0.00000E+00
         12       7.72590E-01      7.66451E-01      1.60924E-03
0.00000E+00      0.00000E+00
         13       7.63154E-01      7.66151E-01      1.48615E-03
0.00000E+00      0.00000E+00
```

14	7.68337E-01	7.66333E-01	1.36883E-03
0.00000E+00	0.00000E+00		
15	7.72469E-01	7.66805E-01	1.34469E-03
0.00000E+00	0.00000E+00		
16	7.69734E-01	7.67015E-01	1.26240E-03
0.00000E+00	0.00000E+00		
17	7.69347E-01	7.67170E-01	1.18547E-03
0.00000E+00	0.00000E+00		
18	7.58507E-01	7.66629E-01	1.23402E-03
0.00000E+00	0.00000E+00		
19	7.60547E-01	7.66271E-01	1.21312E-03
0.00000E+00	0.00000E+00		
20	7.63904E-01	7.66139E-01	1.15127E-03
0.00000E+00	0.00000E+00		
21	7.64750E-01	7.66066E-01	1.09145E-03
0.00000E+00	0.00000E+00		
22	7.70146E-01	7.66270E-01	1.05534E-03
0.00000E+00	0.00000E+00		
23	7.62876E-01	7.66109E-01	1.01676E-03
0.00000E+00	0.00000E+00		
24	7.66008E-01	7.66104E-01	9.69455E-04
0.00000E+00	0.00000E+00		
25	7.65084E-01	7.66060E-01	9.27407E-04
0.00000E+00	0.00000E+00		
26	7.62837E-01	7.65925E-01	8.98022E-04
0.00000E+00	0.00000E+00		
27	7.62768E-01	7.64174E-01	2.73424E-03
0.00000E+00	0.00000E+00		
28	7.65608E-01	7.64461E-01	1.39218E-03
0.00000E+00	0.00000E+00		
29	7.62007E-01	7.64052E-01	8.55091E-04
0.00000E+00	0.00000E+00		
30	7.74673E-01	7.65569E-01	2.61995E-03
0.00000E+00	0.00000E+00		
31	7.70218E-01	7.66150E-01	2.40129E-03
0.00000E+00	0.00000E+00		
32	7.67130E-01	7.66259E-01	2.57204E-03
0.00000E+00	0.00000E+00		
33	7.66212E-01	7.66255E-01	2.16478E-03
0.00000E+00	0.00000E+00		
34	7.67452E-01	7.66363E-01	1.88514E-03
0.00000E+00	0.00000E+00		
35	7.58062E-01	7.65672E-01	1.83553E-03
0.00000E+00	0.00000E+00		
36	7.60483E-01	7.65273E-01	1.93904E-03
0.00000E+00	0.00000E+00		
37	7.61393E-01	7.64995E-01	2.03257E-03
0.00000E+00	0.00000E+00		
38	7.59137E-01	7.64605E-01	2.39111E-03
0.00000E+00	0.00000E+00		
39	7.62924E-01	7.64500E-01	2.26663E-03
0.00000E+00	0.00000E+00		

40	7.63295E-01	7.64429E-01	2.12454E-03
0.00000E+00	0.00000E+00		
41	7.63026E-01	7.64351E-01	1.99964E-03
0.00000E+00	0.00000E+00		
42	7.60069E-01	7.64126E-01	1.92332E-03
0.00000E+00	0.00000E+00		
43	7.60316E-01	7.63935E-01	1.86849E-03
0.00000E+00	0.00000E+00		
44	7.71130E-01	7.64278E-01	1.66500E-03
0.00000E+00	0.00000E+00		
45	7.64371E-01	7.64282E-01	1.56854E-03
0.00000E+00	0.00000E+00		
46	7.61517E-01	7.64162E-01	1.46965E-03
0.00000E+00	0.00000E+00		
47	7.55164E-01	7.63787E-01	1.44655E-03
0.00000E+00	0.00000E+00		
48	7.68631E-01	7.63981E-01	1.35947E-03
0.00000E+00	0.00000E+00		
49	7.61736E-01	7.63894E-01	1.31374E-03
0.00000E+00	0.00000E+00		
50	7.69395E-01	7.64098E-01	1.27825E-03
0.00000E+00	0.00000E+00		
51	7.65032E-01	7.64131E-01	1.21627E-03
0.00000E+00	0.00000E+00		
52	7.74077E-01	7.64474E-01	1.37673E-03
0.00000E+00	0.00000E+00		
53	7.64746E-01	7.64483E-01	1.32504E-03
0.00000E+00	0.00000E+00		
54	7.66256E-01	7.64541E-01	1.30707E-03
0.00000E+00	0.00000E+00		
55	7.65580E-01	7.64573E-01	1.26293E-03
0.00000E+00	0.00000E+00		
56	7.66915E-01	7.64644E-01	1.25078E-03
0.00000E+00	0.00000E+00		
57	7.70874E-01	7.64827E-01	1.24682E-03
0.00000E+00	0.00000E+00		
58	7.66537E-01	7.64876E-01	1.22246E-03
0.00000E+00	0.00000E+00		
59	7.69490E-01	7.65004E-01	1.22638E-03
0.00000E+00	0.00000E+00		
60	7.69821E-01	7.65135E-01	1.22947E-03
0.00000E+00	0.00000E+00		
61	7.70528E-01	7.65276E-01	1.26524E-03
0.00000E+00	0.00000E+00		
62	7.64513E-01	7.65257E-01	1.22066E-03
0.00000E+00	0.00000E+00		
63	7.60407E-01	7.65136E-01	1.16373E-03
0.00000E+00	0.00000E+00		
64	7.64206E-01	7.65113E-01	1.13241E-03
0.00000E+00	0.00000E+00		
65	7.62246E-01	7.65045E-01	1.10534E-03
0.00000E+00	0.00000E+00		

66	7.69174E-01	7.65141E-01	1.06975E-03
0.00000E+00	0.00000E+00		
67	7.66826E-01	7.65179E-01	1.03956E-03
0.00000E+00	0.00000E+00		
68	7.63839E-01	7.65149E-01	1.01036E-03
0.00000E+00	0.00000E+00		
69	7.68053E-01	7.65212E-01	9.83862E-04
0.00000E+00	0.00000E+00		
70	7.60759E-01	7.65118E-01	9.51651E-04
0.00000E+00	0.00000E+00		
71	7.68086E-01	7.65179E-01	9.32252E-04
0.00000E+00	0.00000E+00		
72	7.71302E-01	7.65304E-01	9.11526E-04
0.00000E+00	0.00000E+00		
73	7.64397E-01	7.65286E-01	8.85732E-04
0.00000E+00	0.00000E+00		
74	7.66731E-01	7.65315E-01	8.67662E-04
0.00000E+00	0.00000E+00		
75	7.65605E-01	7.65320E-01	8.49850E-04
0.00000E+00	0.00000E+00		
76	7.59216E-01	7.65205E-01	8.17104E-04
0.00000E+00	0.00000E+00		
77	7.71055E-01	7.65313E-01	7.88797E-04
0.00000E+00	0.00000E+00		
78	7.60919E-01	7.65233E-01	7.75395E-04
0.00000E+00	0.00000E+00		
79	7.61639E-01	7.65169E-01	7.69443E-04
0.00000E+00	0.00000E+00		
80	7.71173E-01	7.65275E-01	7.47771E-04
0.00000E+00	0.00000E+00		
81	7.70756E-01	7.65369E-01	7.42056E-04
0.00000E+00	0.00000E+00		
82	7.60446E-01	7.65286E-01	7.26196E-04
0.00000E+00	0.00000E+00		
83	7.67474E-01	7.65322E-01	7.16994E-04
0.00000E+00	0.00000E+00		
84	7.61367E-01	7.65257E-01	6.92338E-04
0.00000E+00	0.00000E+00		
85	7.54948E-01	7.65091E-01	7.30355E-04
0.00000E+00	0.00000E+00		
86	7.71509E-01	7.65193E-01	6.94186E-04
0.00000E+00	0.00000E+00		
87	7.66604E-01	7.65215E-01	6.78301E-04
0.00000E+00	0.00000E+00		
88	7.60120E-01	7.65137E-01	6.77404E-04
0.00000E+00	0.00000E+00		
89	7.62214E-01	7.65092E-01	6.64848E-04
0.00000E+00	0.00000E+00		
90	7.70745E-01	7.65177E-01	6.48158E-04
0.00000E+00	0.00000E+00		
91	7.66794E-01	7.65200E-01	6.37793E-04
0.00000E+00	0.00000E+00		

```
          92       7.68696E-01      7.65251E-01      6.32754E-04
0.00000E+00      0.00000E+00
          93       7.67894E-01      7.65289E-01      6.34883E-04
0.00000E+00      0.00000E+00
          94       7.61455E-01      7.65235E-01      6.17146E-04
0.00000E+00      0.00000E+00
          95       7.69194E-01      7.65290E-01      6.14032E-04
0.00000E+00      0.00000E+00
          96       7.56772E-01      7.65173E-01      6.09340E-04
0.00000E+00      0.00000E+00
          97       7.72971E-01      7.65279E-01      6.02245E-04
0.00000E+00      0.00000E+00
          98       7.62125E-01      7.65236E-01      6.00147E-04
0.00000E+00      0.00000E+00
          99       7.53783E-01      7.65086E-01      6.14896E-04
0.00000E+00      0.00000E+00
         100       7.69316E-01      7.65141E-01      6.15152E-04
0.00000E+00      0.00000E+00
         101       7.61678E-01      7.65096E-01      6.23435E-04
0.00000E+00      0.00000E+00
         102       7.61235E-01      7.65047E-01      6.25137E-04
0.00000E+00      0.00000E+00
         103       7.61056E-01      7.64998E-01      6.18274E-04
0.00000E+00      0.00000E+00
                                    restart data was written for
generation  103       random number=98DA526180A35924
         104       7.61411E-01      7.64953E-01      6.19110E-04
0.00000E+00      0.00000E+00
         105       7.71467E-01      7.65033E-01      6.03145E-04
0.00000E+00      0.00000E+00
         106       7.59571E-01      7.64967E-01      6.10276E-04
0.00000E+00      0.00000E+00
         107       7.70324E-01      7.65031E-01      6.10279E-04
0.00000E+00      0.00000E+00
         108       7.60467E-01      7.64977E-01      6.04147E-04
0.00000E+00      0.00000E+00
         109       7.63974E-01      7.64965E-01      5.96960E-04
0.00000E+00      0.00000E+00
         110       7.64893E-01      7.64964E-01      5.89786E-04
0.00000E+00      0.00000E+00
         111       7.64420E-01      7.64958E-01      5.83558E-04
0.00000E+00      0.00000E+00
         112       7.75157E-01      7.65073E-01      5.86231E-04
0.00000E+00      0.00000E+00
         113       7.66487E-01      7.65089E-01      5.79467E-04
0.00000E+00      0.00000E+00
         114       7.66437E-01      7.65103E-01      5.75998E-04
0.00000E+00      0.00000E+00
         115       7.68552E-01      7.65141E-01      5.79679E-04
0.00000E+00      0.00000E+00
         116       7.69649E-01      7.65189E-01      5.78062E-04
0.00000E+00      0.00000E+00
```

```
        117       7.71087E-01      7.65252E-01      5.81280E-04
0.00000E+00      0.00000E+00
        118       7.67693E-01      7.65278E-01      5.79537E-04
0.00000E+00      0.00000E+00
        119       7.62451E-01      7.65248E-01      5.68056E-04
0.00000E+00      0.00000E+00
        120       7.70265E-01      7.65300E-01      5.72901E-04
0.00000E+00      0.00000E+00
        121       7.65661E-01      7.65304E-01      5.66812E-04
0.00000E+00      0.00000E+00
        122       7.65924E-01      7.65310E-01      5.61168E-04
0.00000E+00      0.00000E+00
        123       7.66916E-01      7.65326E-01      5.57252E-04
0.00000E+00      0.00000E+00

  keno message number k6-123          execution terminated due to
completion of the specified number of generations.
                                    restart data was written for
generation  123       random number=79258E54B97B2223
                                    A start type 6 file will be written to
keno_start6_file
1                                                fuel bundle

 lifetime =  1.55069E-05 + or -  1.28067E-08             generation time
=  2.99401E-05 + or -  2.20404E-08
 nu bar   =  2.43894E+00 + or -  9.46364E-06       average fission group
=  2.17558E+02 + or -  9.98002E-03
                        energy(ev) of the average lethargy causing fission
=  5.68649E-02 + or -  1.20684E-04
                                                 system mean free path (cm)
=  6.52854E-01 + or -  1.78245E-04

 no. of initial
deviation of
  generations      average                            67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

      23          0.76533   + or - 0.00056     0.76477 to 0.76588
0.76421 to 0.76644    0.76365 to 0.76700    2000000       8.3017

      24          0.76532   + or - 0.00056     0.76476 to 0.76588
0.76419 to 0.76645    0.76363 to 0.76701    1980000       8.2515

      25          0.76532   + or - 0.00057     0.76475 to 0.76589
0.76418 to 0.76646    0.76361 to 0.76703    1960000       8.2244

      26          0.76535   + or - 0.00057     0.76477 to 0.76592
0.76420 to 0.76649    0.76363 to 0.76707    1940000       8.2775

      27          0.76537   + or - 0.00058     0.76479 to 0.76596
```

0.76421 to 0.76654 0.76363 to 0.76712 1920000 8.1998

28 0.76537 + or - 0.00059 0.76478 to 0.76596
0.76420 to 0.76655 0.76361 to 0.76714 1900000 8.1855

29 0.76541 + or - 0.00060 0.76481 to 0.76601
0.76421 to 0.76660 0.76361 to 0.76720 1880000 8.0900

30 0.76531 + or - 0.00059 0.76472 to 0.76590
0.76413 to 0.76649 0.76354 to 0.76708 1860000 8.1415

31 0.76525 + or - 0.00059 0.76466 to 0.76584
0.76407 to 0.76644 0.76348 to 0.76703 1840000 8.2783

32 0.76523 + or - 0.00060 0.76463 to 0.76583
0.76404 to 0.76643 0.76344 to 0.76703 1820000 8.1978

37 0.76538 + or - 0.00060 0.76478 to 0.76598
0.76418 to 0.76658 0.76358 to 0.76718 1720000 9.1296

42 0.76561 + or - 0.00061 0.76499 to 0.76622
0.76438 to 0.76683 0.76377 to 0.76745 1620000 9.9229

47 0.76581 + or - 0.00064 0.76517 to 0.76645
0.76454 to 0.76709 0.76390 to 0.76772 1520000 9.7882

52 0.76567 + or - 0.00053 0.76514 to 0.76621
0.76461 to 0.76674 0.76407 to 0.76728 1420000 15.3225

57 0.76558 + or - 0.00057 0.76501 to 0.76615
0.76445 to 0.76672 0.76388 to 0.76729 1320000 15.2550

62 0.76537 + or - 0.00060 0.76477 to 0.76597
0.76417 to 0.76657 0.76356 to 0.76718 1220000 15.5551

67 0.76544 + or - 0.00064 0.76480 to 0.76609
0.76415 to 0.76673 0.76351 to 0.76737 1120000 16.0991

72 0.76535 + or - 0.00069 0.76466 to 0.76603
0.76397 to 0.76672 0.76329 to 0.76741 1020000 16.7580

77 0.76534 + or - 0.00074 0.76460 to 0.76608
0.76386 to 0.76682 0.76312 to 0.76756 920000 17.4424

82 0.76538 + or - 0.00100 0.76438 to 0.76639
0.76338 to 0.76739 0.76237 to 0.76840 820000 12.0056

87 0.76552 + or - 0.00113 0.76440 to 0.76665
0.76327 to 0.76778 0.76215 to 0.76890 720000 11.0459

92 0.76549 + or - 0.00132 0.76418 to 0.76681
0.76286 to 0.76813 0.76154 to 0.76945 620000 10.8320

```
      97          0.76546   + or - 0.00192     0.76354 to 0.76738
0.76162 to 0.76931    0.75970 to 0.77123     520000       6.7339

     102          0.76637   + or - 0.00128     0.76509 to 0.76766
0.76381 to 0.76894    0.76253 to 0.77022     420000      13.4882

     107          0.76688   + or - 0.00119     0.76568 to 0.76807
0.76449 to 0.76926    0.76330 to 0.77046     320000      23.2235

     112          0.76737   + or - 0.00082     0.76656 to 0.76819
0.76574 to 0.76901    0.76493 to 0.76982     220000      37.7610
1                                                fuel bundle

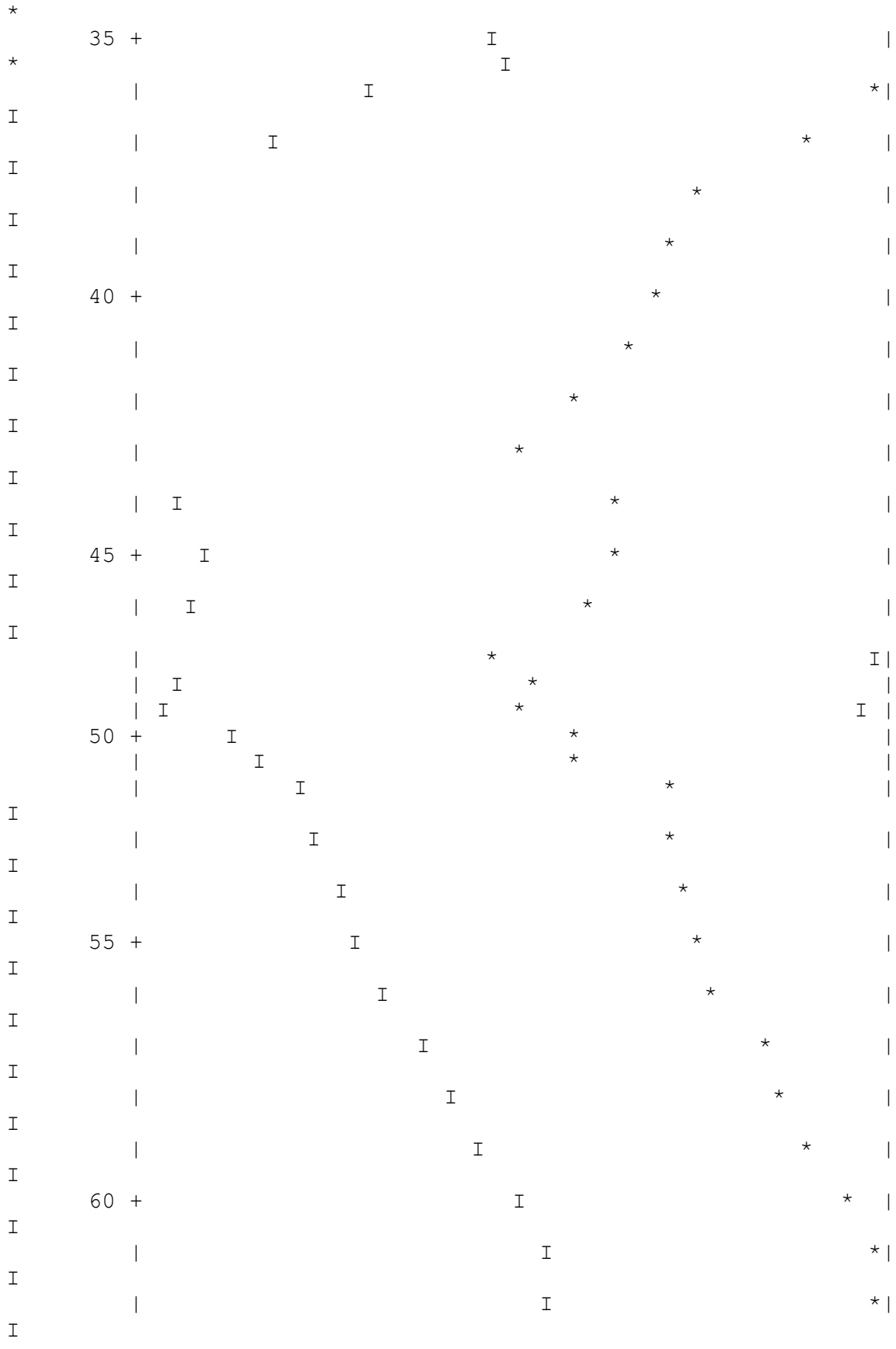
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

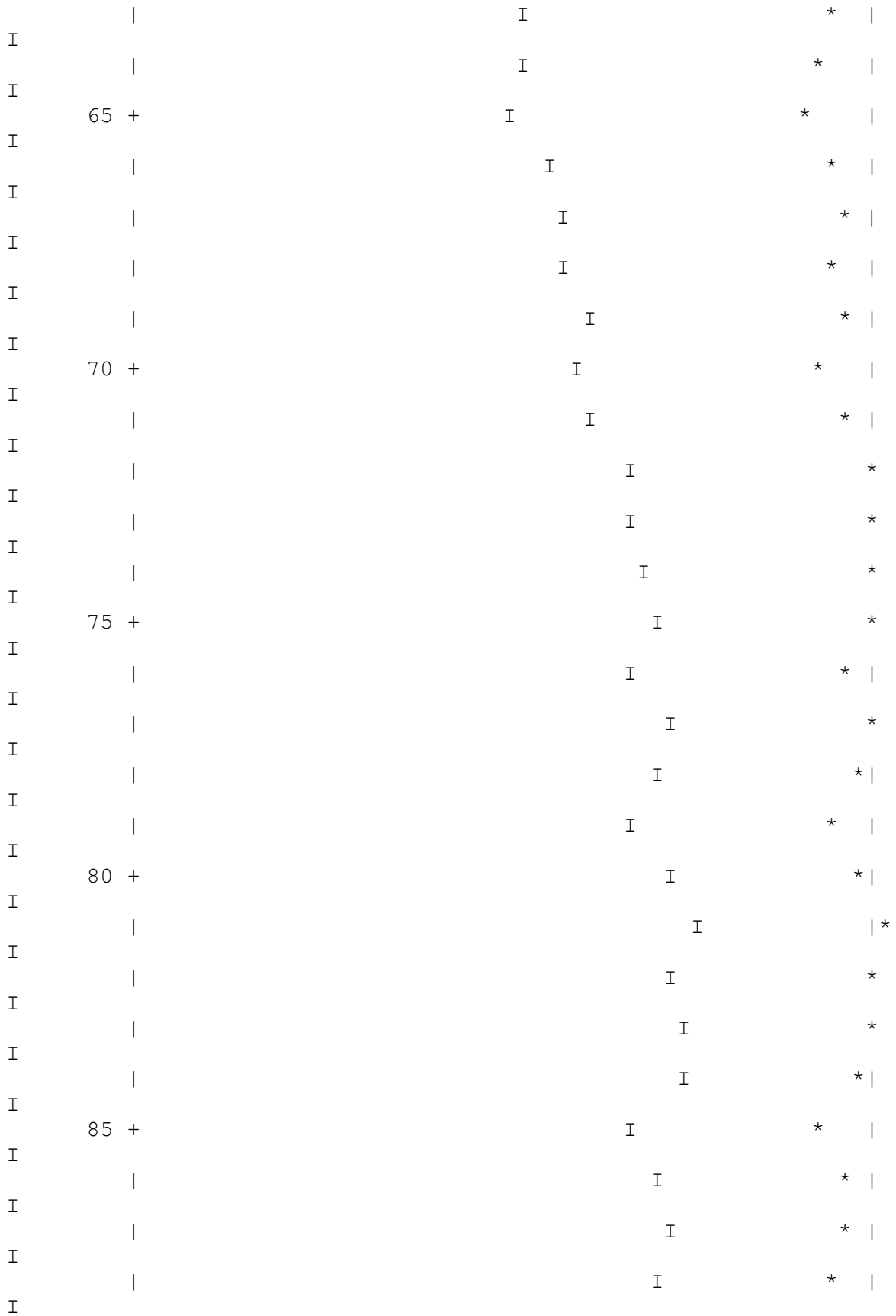
     117          0.76649   + or - 0.00306     0.76342 to 0.76955
0.76036 to 0.77261    0.75729 to 0.77568     120000       8.2530
1                          fuel bundle

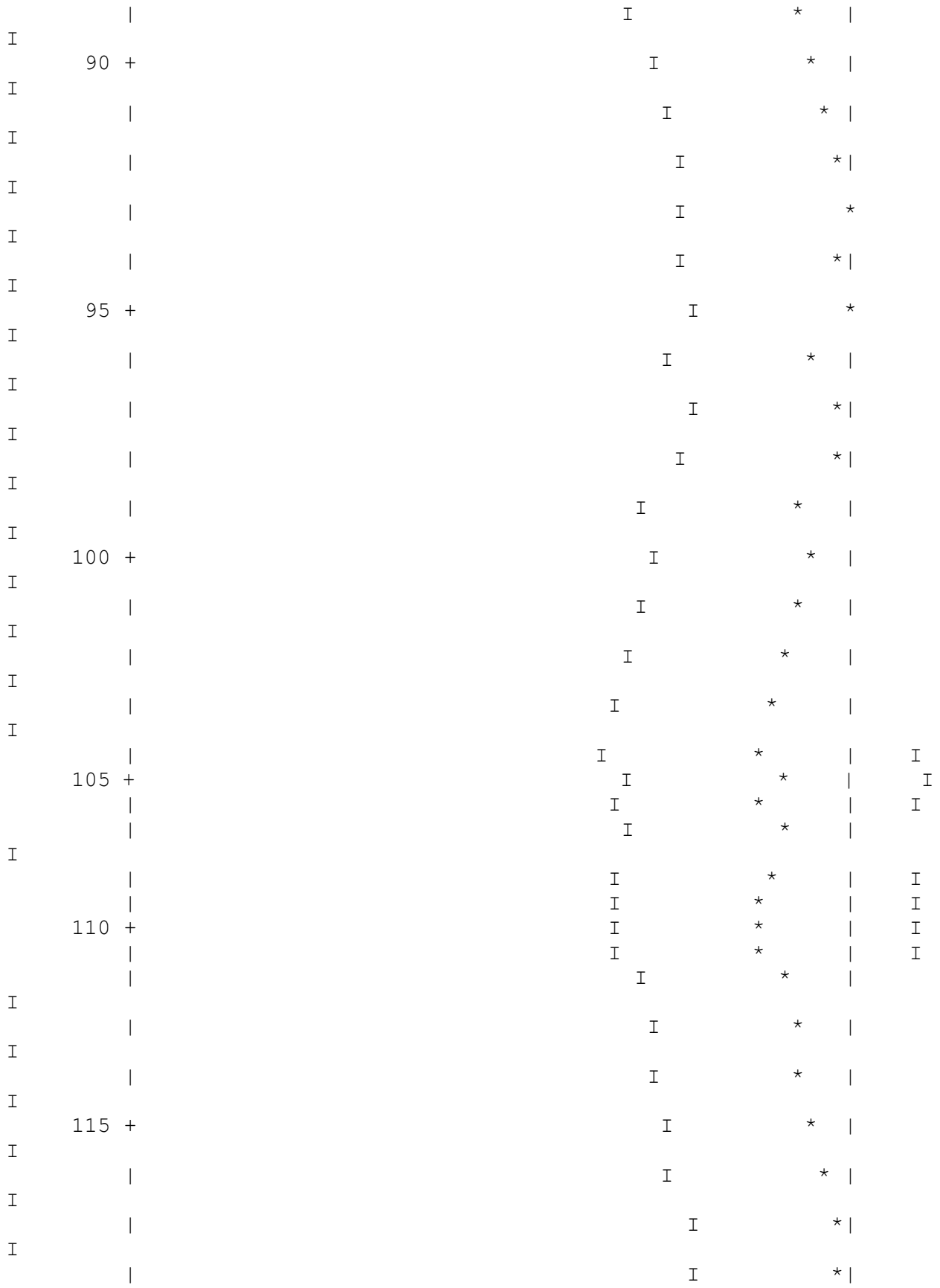
                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76532 + or - 0.00055 which occurs for
123 generations run.

                                0.7638                  0.7651
0.7664

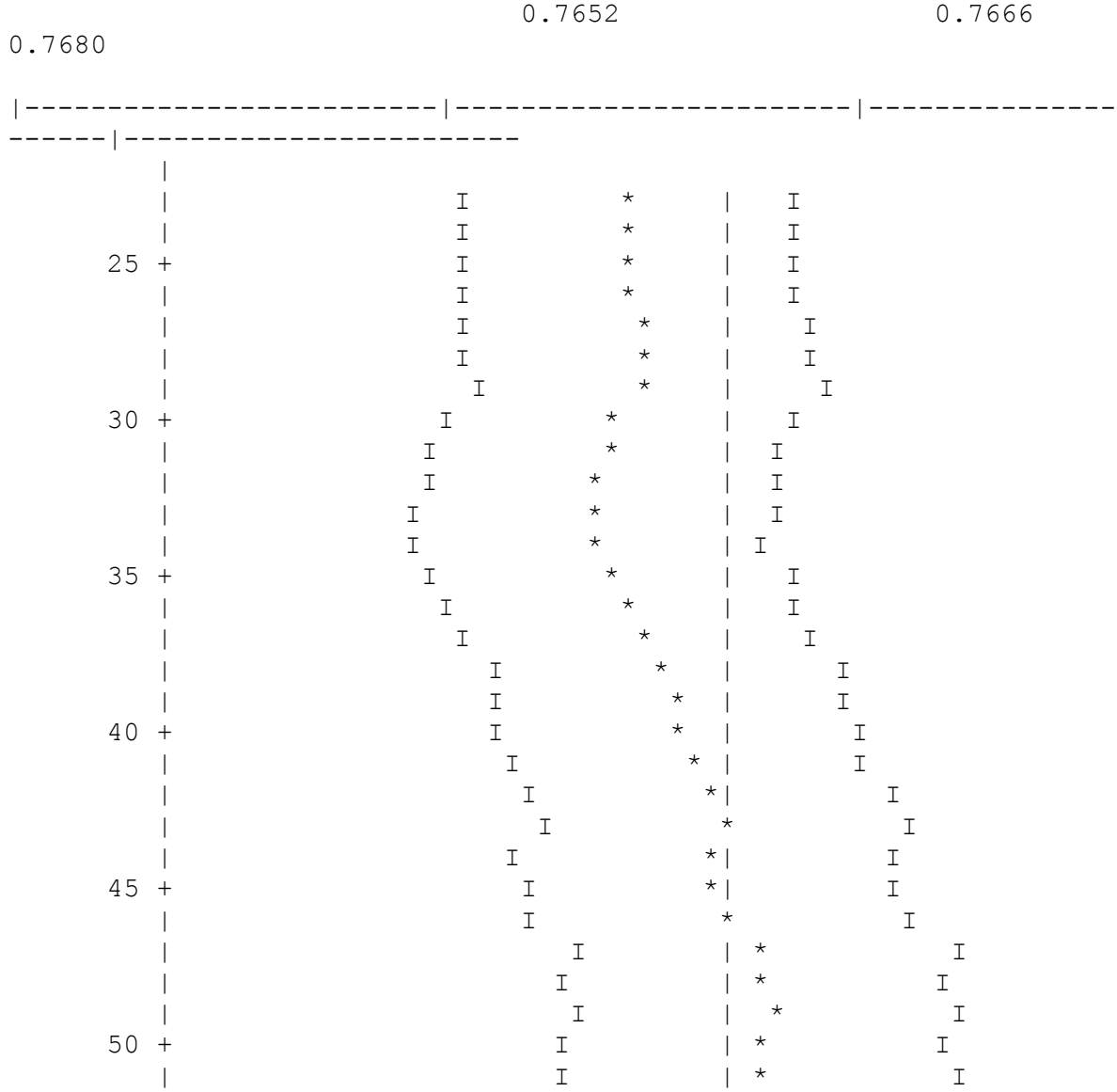
|-------------------------|-------------------------|------------------
------|------------------------
         |
      25 +                                                  I   |    *
I
         |         I                               *             |
I
         |                                   *                   |
I
         |           I                             *             |
I
         |              I                *                I       |
      30 +        I                                             |    *
         |                         I                           |
*
         |                        I                            |
*
         |                                  I                  |
*
         |                                        I            |
```

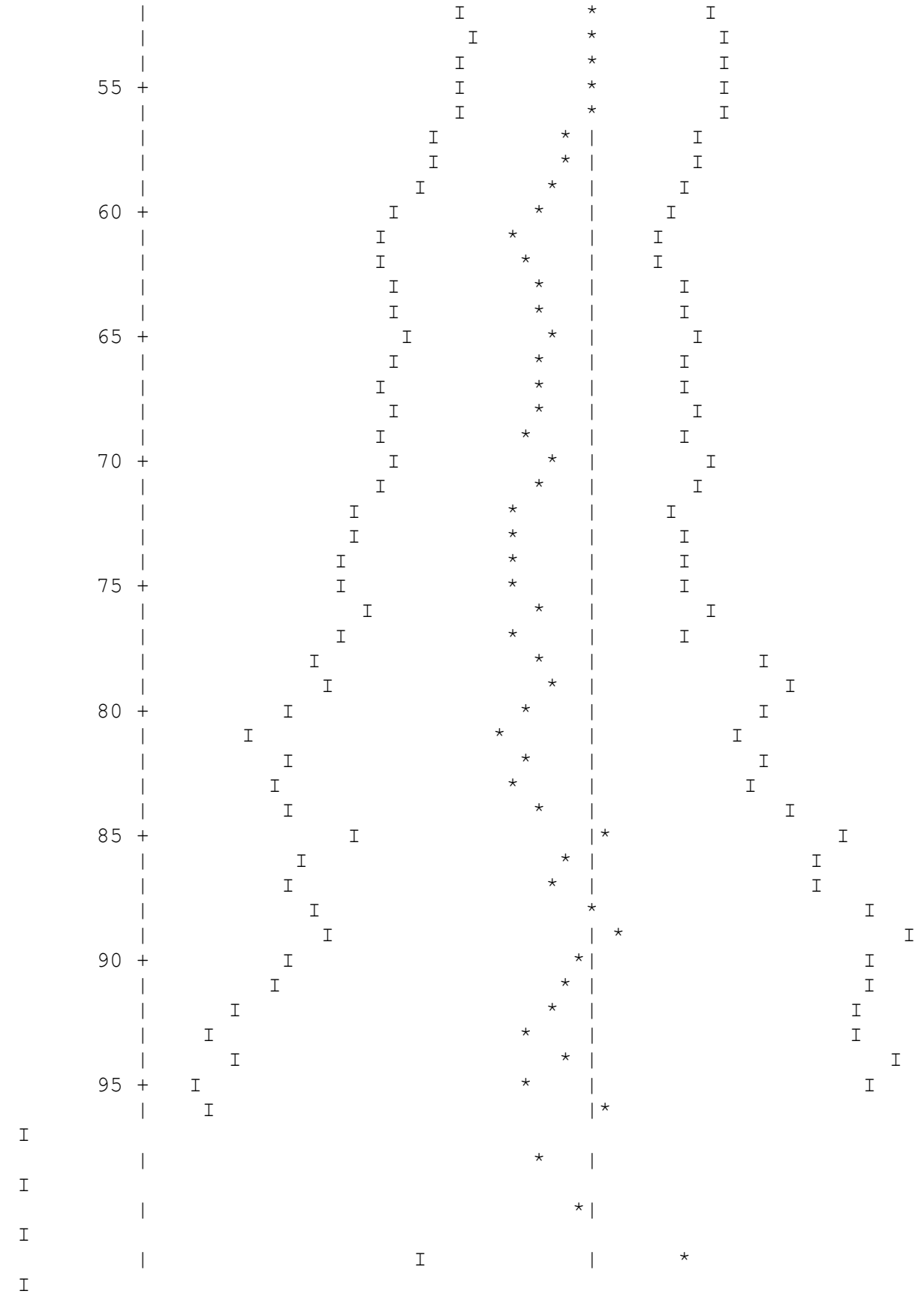

35
40
45
50
55
60

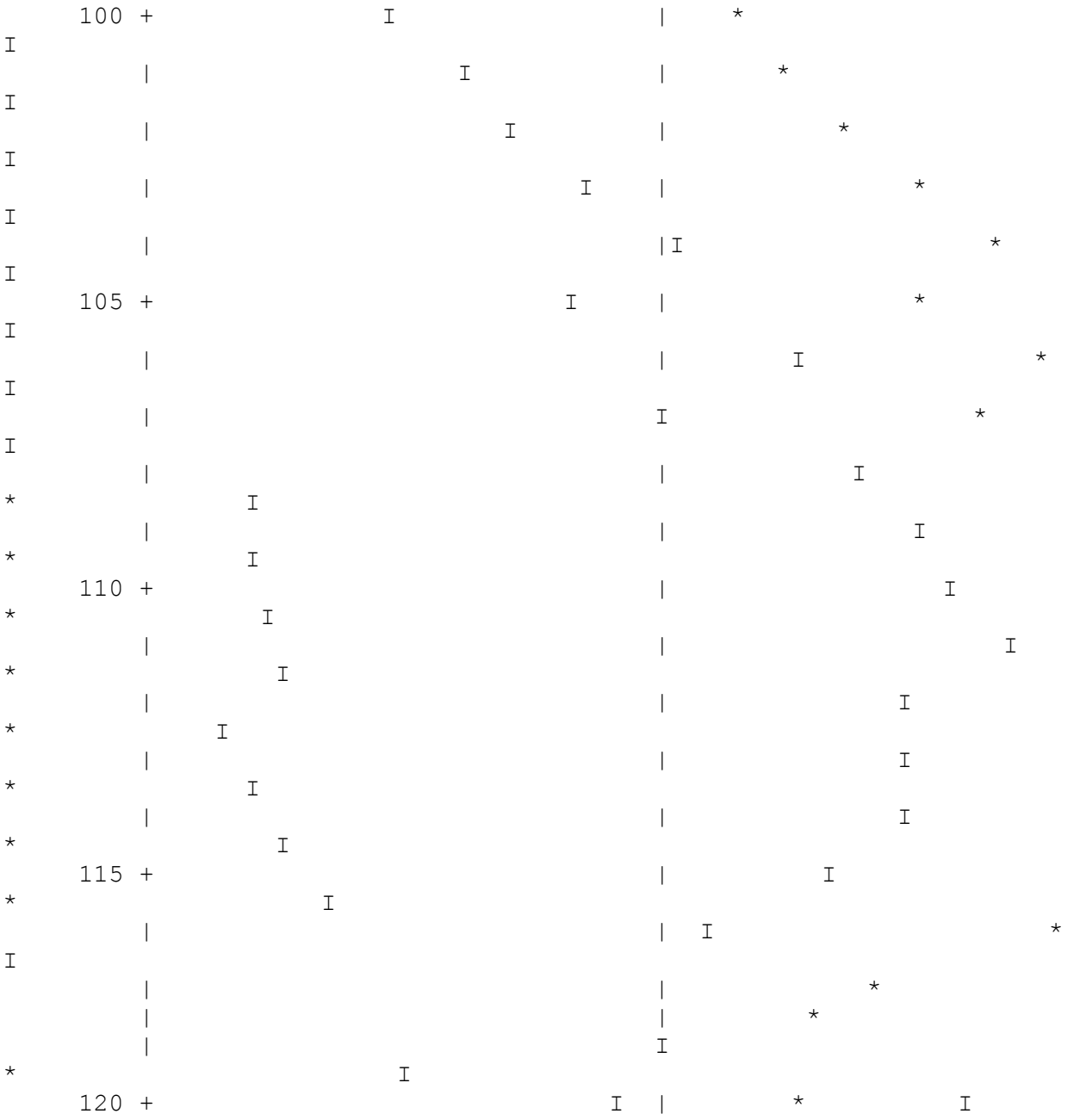

65
70
75
80
85



plot of average k-effective by generation skipped.
the line represents k-eff = 0.7656 + or - 0.0005 which occurs for 52 generations skipped.




55
60
65
70
75
80
85
90
95



k-effective fails the chi**2 test for normality at the 95 % level, but satisfies it at the 99 % level

1 fuel bundle

skipping 23 generations

group	fission fraction	unit deviation	region deviation	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			0.00000E+00	0.0000				

0.00000E+00	0.0000	0.00000E+00	0.0000
2	0.0000	0.00000E+00	0.0000
1.97506E-07	38.5735	0.00000E+00	0.0000
3	0.0000	1.22417E-05	13.3016
1.91518E-05	5.1764	0.00000E+00	0.0000
4	0.0000	2.13456E-05	8.6101
3.36198E-05	3.8709	0.00000E+00	0.0000
5	0.0000	2.52698E-05	7.5455
5.27793E-05	2.7778	0.00000E+00	0.0000
6	0.0001	9.75789E-05	4.0860
2.26849E-04	1.4393	0.00000E+00	0.0000
7	0.0001	1.13058E-04	3.1285
2.09433E-04	1.3907	0.00000E+00	0.0000
8	0.0003	2.46211E-04	2.0602
3.26182E-04	0.9497	0.00000E+00	0.0000
9	0.0005	3.83523E-04	1.3968
4.44043E-04	0.6228	0.00000E+00	0.0000
10	0.0003	2.05795E-04	1.6667
2.08507E-04	0.7718	0.00000E+00	0.0000
11	0.0012	8.97843E-04	0.6571
5.18985E-04	0.4438	0.00000E+00	0.0000
12	0.0010	7.70301E-04	0.8366
3.01966E-04	0.8254	0.00000E+00	0.0000
13	0.0003	2.27350E-04	1.1336
9.03358E-05	1.1228	0.00000E+00	0.0000
14	0.0013	1.00355E-03	0.7242
4.10183E-04	0.7173	0.00000E+00	0.0000
15	0.0010	7.64661E-04	0.6223
3.29645E-04	0.6151	0.00000E+00	0.0000
16	0.0002	1.90661E-04	1.2142
8.76014E-05	1.1959	0.00000E+00	0.0000
17	0.0001	6.98732E-05	1.8640
3.39527E-05	1.8294	0.00000E+00	0.0000
18	0.0001	5.11470E-05	1.7742
2.58520E-05	1.7378	0.00000E+00	0.0000
19	0.0001	7.96810E-05	1.4173
4.21563E-05	1.3865	0.00000E+00	0.0000
20	0.0001	5.85155E-05	1.6238
3.20667E-05	1.5867	0.00000E+00	0.0000
21	0.0002	1.18827E-04	1.0865
6.70945E-05	1.0612	0.00000E+00	0.0000
22	0.0001	1.04398E-04	1.2740
6.18300E-05	1.2433	0.00000E+00	0.0000
23	0.0001	1.04003E-04	1.1546
6.35087E-05	1.1256	0.00000E+00	0.0000
24	0.0000	2.48561E-05	2.4588
1.54418E-05	2.3990	0.00000E+00	0.0000
25	0.0000	3.20152E-05	2.0950
1.99891E-05	2.0361	0.00000E+00	0.0000
26	0.0000	1.84883E-05	2.3772
1.15862E-05	2.3243	0.00000E+00	0.0000
27	0.0001	5.35240E-05	1.2494

3.34003E-05	1.2216	0.00000E+00	0.0000				
28	0.0001	9.55878E-05	1.0590				
5.96558E-05	1.0392	0.00000E+00	0.0000				
29	0.0001	9.97118E-05	0.9674				
6.27996E-05	0.9529	0.00000E+00	0.0000				
30	0.0000	1.27223E-05	2.8388				
7.98019E-06	2.8189	0.00000E+00	0.0000				
31	0.0001	9.62879E-05	1.0938				
6.08373E-05	1.0801	0.00000E+00	0.0000				
32	0.0000	3.79876E-05	1.6677				
2.42793E-05	1.6304	0.00000E+00	0.0000				
33	0.0000	3.29386E-05	1.6489				
2.06207E-05	1.6300	0.00000E+00	0.0000				
34	0.0001	7.72009E-05	1.0101				
4.84718E-05	0.9948	0.00000E+00	0.0000				
35	0.0001	4.57582E-05	1.4293				
2.87108E-05	1.4089	0.00000E+00	0.0000				
36	0.0001	4.33880E-05	1.2341				
2.68588E-05	1.2236	0.00000E+00	0.0000				
37	0.0000	2.82668E-05	1.6283				
1.77408E-05	1.5910	0.00000E+00	0.0000				
38	0.0000	3.37229E-05	1.5430				
2.12459E-05	1.5068	0.00000E+00	0.0000				
39	0.0002	1.27587E-04	1.0395				
8.12132E-05	1.0158	0.00000E+00	0.0000				
40	0.0002	1.22527E-04	0.9218				
7.91832E-05	0.9042	0.00000E+00	0.0000				
41	0.0002	1.60089E-04	0.7950				
1.06968E-04	0.7723	0.00000E+00	0.0000				
42	0.0002	1.39976E-04	0.8063				
9.52017E-05	0.7874	0.00000E+00	0.0000				
43	0.0001	8.19229E-05	1.1677				
5.87420E-05	1.1194	0.00000E+00	0.0000				
44	0.0001	1.14618E-04	1.1020				
8.40999E-05	1.0571	0.00000E+00	0.0000				
45	0.0001	5.98877E-05	0.9991				
4.82727E-05	0.9151	0.00000E+00	0.0000				
46	0.0000	1.44594E-05	2.0002				
1.16371E-05	1.8600	0.00000E+00	0.0000				
47	0.0001	4.11768E-05	1.9250				
3.19642E-05	1.8551	0.00000E+00	0.0000				
48	0.0000	1.23405E-05	3.7795				
9.57170E-06	3.6870	0.00000E+00	0.0000				
49	0.0001	7.93140E-05	1.5453				
6.25558E-05	1.5123	0.00000E+00	0.0000				
50	0.0001	5.78080E-05	1.5388				
4.75886E-05	1.5084	0.00000E+00	0.0000				
51	0.0000	1.47706E-05	2.9767				
1.22816E-05	2.9117	0.00000E+00	0.0000				
52	0.0001	4.06530E-05	1.8026				
3.51599E-05	1.7590	0.00000E+00	0.0000				
53	0.0002	1.56704E-04	0.8406				

1.54066E-04 0.7817 0.00000E+00 0.0000
54 0.0001 7.48967E-05 2.0784
6.95425E-05 2.0047 0.00000E+00 0.0000
55 0.0002 1.66277E-04 1.2760
1.52349E-04 1.2423 0.00000E+00 0.0000
56 0.0002 1.15741E-04 1.7151
1.07370E-04 1.6717 0.00000E+00 0.0000
1 fuel bundle

skipping 23 generations

group fission unit region fissions percent
absorptions percent leakage percent
fraction deviation
deviation deviation

57 0.0002 1.51132E-04 1.5344
1.37101E-04 1.4968 0.00000E+00 0.0000
58 0.0001 8.81493E-05 2.0915
7.71060E-05 2.0389 0.00000E+00 0.0000
59 0.0002 1.58646E-04 1.6532
1.42397E-04 1.5895 0.00000E+00 0.0000
60 0.0004 2.69721E-04 1.3201
2.44832E-04 1.2402 0.00000E+00 0.0000
61 0.0000 3.03492E-05 3.7773
2.33019E-05 3.6630 0.00000E+00 0.0000
62 0.0002 1.66571E-04 1.6821
1.39632E-04 1.6369 0.00000E+00 0.0000
63 0.0002 1.24643E-04 2.0962
1.02456E-04 2.0255 0.00000E+00 0.0000
64 0.0001 9.80042E-05 2.2291
7.90498E-05 2.1510 0.00000E+00 0.0000
65 0.0000 3.38581E-05 3.6836
3.34869E-05 3.5729 0.00000E+00 0.0000
66 0.0002 1.65226E-04 1.7938
1.46806E-04 1.7350 0.00000E+00 0.0000
67 0.0002 1.45543E-04 1.9939
1.19082E-04 1.9307 0.00000E+00 0.0000
68 0.0000 2.73488E-05 4.8351
2.36274E-05 4.6594 0.00000E+00 0.0000
69 0.0004 3.05749E-04 1.6024
2.39851E-04 1.5527 0.00000E+00 0.0000
70 0.0003 2.08796E-04 1.9870
1.90006E-04 1.9119 0.00000E+00 0.0000
71 0.0006 4.32948E-04 1.4065
3.58171E-04 1.3625 0.00000E+00 0.0000
72 0.0001 4.92656E-05 5.2329
2.90967E-05 5.1093 0.00000E+00 0.0000
73 0.0004 3.12837E-04 1.6703
2.38781E-04 1.5887 0.00000E+00 0.0000
74 0.0014 1.07526E-03 1.0793
7.81580E-04 1.0329 0.00000E+00 0.0000

75	0.0001		1.06037E-04	2.9480	
8.17701E-05	2.7997		0.00000E+00	0.0000	
76	0.0006		4.66681E-04	1.7605	
2.96266E-04	1.7009		0.00000E+00	0.0000	
77	0.0005		3.85383E-04	1.9660	
2.75991E-04	1.8891		0.00000E+00	0.0000	
78	0.0000		7.32795E-06	4.0636	
7.16880E-05	4.0215		0.00000E+00	0.0000	
79	0.0002		1.87286E-04	2.5763	
1.25964E-04	2.4776		0.00000E+00	0.0000	
80	0.0001		6.19286E-05	3.3457	
8.25569E-05	3.2555		0.00000E+00	0.0000	
81	0.0014		1.09370E-03	1.2639	
8.03314E-04	1.2141		0.00000E+00	0.0000	
82	0.0001		6.96774E-05	4.5725	
4.17000E-05	4.3403		0.00000E+00	0.0000	
83	0.0002		1.32527E-04	3.1399	
1.46487E-04	3.0752		0.00000E+00	0.0000	
84	0.0001		7.87713E-05	3.4134	
7.99475E-05	3.1680		0.00000E+00	0.0000	
85	0.0003		2.00234E-04	2.0428	
2.46486E-04	1.9888		0.00000E+00	0.0000	
86	0.0003		2.56638E-04	2.2826	
2.06892E-04	2.1700		0.00000E+00	0.0000	
87	0.0005		3.54904E-04	2.3500	
2.20181E-04	2.2522		0.00000E+00	0.0000	
88	0.0001		5.08499E-05	4.1944	
9.25270E-05	4.0855		0.00000E+00	0.0000	
89	0.0001		9.69668E-05	3.5547	
6.71263E-05	3.2663		0.00000E+00	0.0000	
90	0.0003		2.08725E-04	3.3643	
1.23621E-04	3.2080		0.00000E+00	0.0000	
91	0.0002		1.87061E-04	2.8780	
1.18409E-04	2.7078		0.00000E+00	0.0000	
92	0.0000		3.01448E-05	2.6421	
1.97338E-04	2.5860		0.00000E+00	0.0000	
93	0.0002		1.25754E-04	3.2412	
1.02511E-04	3.0181		0.00000E+00	0.0000	
94	0.0001		1.12249E-04	3.7784	
6.30285E-05	3.5475		0.00000E+00	0.0000	
95	0.0008		6.03677E-04	2.3285	
3.72486E-04	2.2530		0.00000E+00	0.0000	
96	0.0002		1.54742E-04	4.1436	
7.84698E-05	3.9654		0.00000E+00	0.0000	
97	0.0004		2.75857E-04	3.7288	
1.58048E-04	3.6457		0.00000E+00	0.0000	
98	0.0001		1.09735E-04	3.8641	
1.05079E-04	3.7311		0.00000E+00	0.0000	
99	0.0001		1.04718E-04	5.1738	
7.00820E-05	5.0054		0.00000E+00	0.0000	
100	0.0002		1.22960E-04	4.8277	
8.24276E-05	4.6218		0.00000E+00	0.0000	

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  101    0.0001                1.11290E-04     3.3681
7.08047E-05     3.1165       0.00000E+00     0.0000
  102    0.0002                1.52527E-04     3.8894
8.52341E-05     3.7258       0.00000E+00     0.0000
  103    0.0001                9.68875E-05     3.6437
9.45363E-05     3.4589       0.00000E+00     0.0000
  104    0.0002                1.71503E-04     3.0715
1.35924E-04     2.9688       0.00000E+00     0.0000
  105    0.0002                1.20161E-04     3.1629
7.95633E-05     2.9742       0.00000E+00     0.0000
  106    0.0002                1.84232E-04     3.9446
1.36886E-04     3.8937       0.00000E+00     0.0000
  107    0.0001                6.46887E-05     3.3411
6.53463E-05     3.1354       0.00000E+00     0.0000
  108    0.0000                3.59250E-05     2.6039
1.55047E-04     2.5448       0.00000E+00     0.0000
  109    0.0002                1.28642E-04     2.0890
4.26915E-04     2.0617       0.00000E+00     0.0000
  110    0.0008                6.24704E-04     2.8241
3.85418E-04     2.7967       0.00000E+00     0.0000
  111    0.0002                1.56953E-04     4.3782
1.44134E-04     4.2634       0.00000E+00     0.0000
  112    0.0002                1.19018E-04     5.1827
1.25473E-04     5.0894       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                              deviation
deviation                    deviation

  113    0.0002                1.23233E-04     3.7311
1.07901E-04     3.4925       0.00000E+00     0.0000
  114    0.0000                1.15591E-05     6.2405
1.55732E-05     5.2579       0.00000E+00     0.0000
  115    0.0001                6.68650E-05     4.0259
7.82670E-05     3.6905       0.00000E+00     0.0000
  116    0.0002                1.82643E-04     3.1325
1.38191E-04     2.8019       0.00000E+00     0.0000
  117    0.0006                4.76433E-04     2.3141
2.54506E-04     2.1695       0.00000E+00     0.0000
  118    0.0008                5.82038E-04     2.0942
4.54575E-04     2.0126       0.00000E+00     0.0000
  119    0.0002                1.43647E-04     1.9901
3.70396E-04     1.9229       0.00000E+00     0.0000
  120    0.0002                1.70950E-04     2.0046
6.50477E-04     1.9784       0.00000E+00     0.0000
  121    0.0007                5.37532E-04     2.4508
4.13178E-04     2.3928       0.00000E+00     0.0000
  122    0.0001                1.01012E-04     4.5307
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7.89934E-05	4.2315	0.00000E+00	0.0000				
123	0.0003	2.20828E-04	2.7524				
1.56308E-04	2.4376	0.00000E+00	0.0000				
124	0.0003	2.31078E-04	2.7196				
1.90656E-04	2.5384	0.00000E+00	0.0000				
125	0.0002	1.44297E-04	3.0764				
1.32357E-04	2.7735	0.00000E+00	0.0000				
126	0.0001	9.86779E-05	3.7963				
8.87143E-05	3.3426	0.00000E+00	0.0000				
127	0.0005	4.13605E-04	3.3200				
2.02623E-04	3.1483	0.00000E+00	0.0000				
128	0.0003	2.28742E-04	3.3506				
1.40629E-04	2.9940	0.00000E+00	0.0000				
129	0.0006	4.39434E-04	2.4035				
4.05148E-04	2.2896	0.00000E+00	0.0000				
130	0.0002	1.18156E-04	2.7773				
2.88051E-04	2.6919	0.00000E+00	0.0000				
131	0.0004	2.84279E-04	2.4648				
2.30037E-04	2.0636	0.00000E+00	0.0000				
132	0.0007	5.37720E-04	2.4778				
3.29683E-04	2.2918	0.00000E+00	0.0000				
133	0.0014	1.06336E-03	1.7984				
6.71404E-04	1.7116	0.00000E+00	0.0000				
134	0.0001	9.17369E-05	2.4248				
2.38470E-04	2.0424	0.00000E+00	0.0000				
135	0.0002	1.68247E-04	3.2716				
2.49824E-04	3.1855	0.00000E+00	0.0000				
136	0.0001	4.57779E-05	1.7581				
7.10331E-04	1.7334	0.00000E+00	0.0000				
137	0.0000	1.95340E-05	1.0218				
3.51466E-03	1.0194	0.00000E+00	0.0000				
138	0.0004	3.10930E-04	1.9063				
8.09935E-04	1.8790	0.00000E+00	0.0000				
139	0.0002	1.79514E-04	3.4004				
2.20754E-04	3.1960	0.00000E+00	0.0000				
140	0.0003	2.15760E-04	2.4204				
2.86238E-04	2.1161	0.00000E+00	0.0000				
141	0.0001	8.20470E-05	2.3696				
2.58028E-04	2.1183	0.00000E+00	0.0000				
142	0.0001	6.70017E-05	3.1942				
2.31225E-04	2.9337	0.00000E+00	0.0000				
143	0.0001	8.50821E-05	2.2500				
1.78960E-04	1.4235	0.00000E+00	0.0000				
144	0.0000	3.24391E-05	3.3671				
7.17699E-05	2.0399	0.00000E+00	0.0000				
145	0.0005	3.91160E-04	2.4144				
3.05832E-04	2.2025	0.00000E+00	0.0000				
146	0.0005	3.48163E-04	2.5726				
2.54266E-04	2.1049	0.00000E+00	0.0000				
147	0.0002	1.62980E-04	3.5867				
1.05498E-04	3.0911	0.00000E+00	0.0000				
148	0.0001	5.28393E-05	6.4820				

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3.61298E-05     5.1025       0.00000E+00     0.0000
  149    0.0000                  2.91093E-05     8.2720
2.03350E-05     6.2944       0.00000E+00     0.0000
  150    0.0001                  8.95155E-05     4.5995
6.47862E-05     3.4383       0.00000E+00     0.0000
  151    0.0001                  6.28315E-05     4.6772
5.42321E-05     3.1694       0.00000E+00     0.0000
  152    0.0001                  4.13694E-05     4.1517
4.68308E-05     2.5453       0.00000E+00     0.0000
  153    0.0001                  4.04799E-05     4.7210
4.60845E-05     2.6975       0.00000E+00     0.0000
  154    0.0001                  4.80721E-05     4.3364
4.99800E-05     2.5671       0.00000E+00     0.0000
  155    0.0001                  4.67524E-05     4.1248
4.75319E-05     2.4453       0.00000E+00     0.0000
  156    0.0001                  5.09785E-05     4.5012
4.82294E-05     2.8087       0.00000E+00     0.0000
  157    0.0001                  5.79314E-05     4.1807
5.68048E-05     2.6056       0.00000E+00     0.0000
  158    0.0001                  6.59438E-05     3.5732
6.73243E-05     2.3224       0.00000E+00     0.0000
  159    0.0002                  1.51755E-04     2.6783
2.10450E-04     2.2429       0.00000E+00     0.0000
  160    0.0001                  5.67346E-05     4.7797
6.89906E-05     3.5134       0.00000E+00     0.0000
  161    0.0001                  7.24979E-05     3.8273
7.18950E-05     2.4840       0.00000E+00     0.0000
  162    0.0001                  8.60564E-05     3.3380
8.11626E-05     2.0516       0.00000E+00     0.0000
  163    0.0001                  9.95399E-05     3.6356
8.98939E-05     2.3710       0.00000E+00     0.0000
  164    0.0001                  1.07527E-04     3.8858
9.76823E-05     2.4720       0.00000E+00     0.0000
  165    0.0001                  1.13077E-04     3.4757
1.04280E-04     2.1512       0.00000E+00     0.0000
  166    0.0001                  6.68712E-05     4.0874
6.23393E-05     2.5321       0.00000E+00     0.0000
  167    0.0001                  7.74332E-05     3.9447
6.98712E-05     2.5662       0.00000E+00     0.0000
  168    0.0001                  9.27098E-05     3.4851
8.09812E-05     2.3889       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  169    0.0001                  1.09392E-04     4.0261
9.49817E-05     2.8451       0.00000E+00     0.0000
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170	0.0002		1.43440E-04	4.0683	
1.20772E-04	3.0952		0.00000E+00	0.0000	
171	0.0001		9.94353E-05	5.2578	
7.67235E-05	4.2108		0.00000E+00	0.0000	
172	0.0002		1.37799E-04	4.4951	
9.76074E-05	3.7689		0.00000E+00	0.0000	
173	0.0003		1.95013E-04	4.2785	
1.28456E-04	3.7315		0.00000E+00	0.0000	
174	0.0003		2.46998E-04	4.2581	
1.54038E-04	3.7984		0.00000E+00	0.0000	
175	0.0001		1.11861E-04	6.8343	
6.76778E-05	6.1382		0.00000E+00	0.0000	
176	0.0002		1.15510E-04	6.1468	
6.89770E-05	5.5357		0.00000E+00	0.0000	
177	0.0002		1.19276E-04	5.9942	
7.05605E-05	5.3769		0.00000E+00	0.0000	
178	0.0001		1.12205E-04	5.4270	
6.60499E-05	4.8487		0.00000E+00	0.0000	
179	0.0001		1.04392E-04	6.3566	
6.17111E-05	5.6326		0.00000E+00	0.0000	
180	0.0001		1.07200E-04	6.3842	
6.28691E-05	5.5786		0.00000E+00	0.0000	
181	0.0001		9.99216E-05	5.8402	
5.85902E-05	5.1209		0.00000E+00	0.0000	
182	0.0001		1.05692E-04	6.1391	
6.12568E-05	5.4054		0.00000E+00	0.0000	
183	0.0001		1.02362E-04	6.3056	
5.95079E-05	5.4743		0.00000E+00	0.0000	
184	0.0001		9.67544E-05	7.5356	
5.65271E-05	6.4424		0.00000E+00	0.0000	
185	0.0001		9.38461E-05	6.9288	
5.46157E-05	5.9422		0.00000E+00	0.0000	
186	0.0001		9.09377E-05	6.2718	
5.33391E-05	5.3462		0.00000E+00	0.0000	
187	0.0001		8.89651E-05	6.7808	
5.22466E-05	5.7302		0.00000E+00	0.0000	
188	0.0001		9.10323E-05	5.4782	
5.32186E-05	4.6377		0.00000E+00	0.0000	
189	0.0001		8.00476E-05	5.8226	
4.79721E-05	4.8485		0.00000E+00	0.0000	
190	0.0003		1.97387E-04	4.0441	
1.18989E-04	3.3095		0.00000E+00	0.0000	
191	0.0003		1.97286E-04	4.1555	
1.19536E-04	3.3866		0.00000E+00	0.0000	
192	0.0002		1.91227E-04	4.4766	
1.16879E-04	3.5696		0.00000E+00	0.0000	
193	0.0003		2.00357E-04	4.0381	
1.22087E-04	3.2045		0.00000E+00	0.0000	
194	0.0005		3.98097E-04	3.4599	
2.45147E-04	2.7342		0.00000E+00	0.0000	
195	0.0006		4.28466E-04	3.0515	
2.65563E-04	2.3837		0.00000E+00	0.0000	

196	0.0006		4.58330E-04	2.8199	
2.85696E-04	2.1885		0.00000E+00	0.0000	
197	0.0007		5.16011E-04	2.5025	
3.21039E-04	1.9638		0.00000E+00	0.0000	
198	0.0008		5.87416E-04	2.3996	
3.61766E-04	1.8905		0.00000E+00	0.0000	
199	0.0004		3.21242E-04	2.9762	
1.98801E-04	2.3623		0.00000E+00	0.0000	
200	0.0005		3.52826E-04	3.0997	
2.16948E-04	2.4583		0.00000E+00	0.0000	
201	0.0010		7.97108E-04	2.2497	
4.87381E-04	1.7916		0.00000E+00	0.0000	
202	0.0013		9.58369E-04	1.9070	
5.84159E-04	1.5421		0.00000E+00	0.0000	
203	0.0016		1.23997E-03	1.7729	
7.37209E-04	1.4564		0.00000E+00	0.0000	
204	0.0021		1.63334E-03	1.6894	
9.64101E-04	1.4120		0.00000E+00	0.0000	
205	0.0015		1.14732E-03	2.0068	
6.71833E-04	1.6866		0.00000E+00	0.0000	
206	0.0018		1.38441E-03	1.7722	
8.07659E-04	1.5276		0.00000E+00	0.0000	
207	0.0021		1.60271E-03	1.9496	
9.34758E-04	1.6894		0.00000E+00	0.0000	
208	0.0029		2.21637E-03	1.5943	
1.28901E-03	1.4102		0.00000E+00	0.0000	
209	0.0031		2.36058E-03	1.3902	
1.38853E-03	1.2275		0.00000E+00	0.0000	
210	0.0038		2.94358E-03	1.1943	
1.74604E-03	1.0469		0.00000E+00	0.0000	
211	0.0039		3.00374E-03	1.0800	
1.82009E-03	0.9298		0.00000E+00	0.0000	
212	0.0048		3.64051E-03	1.1689	
2.20186E-03	1.0006		0.00000E+00	0.0000	
213	0.0064		4.91625E-03	0.9170	
2.98245E-03	0.7683		0.00000E+00	0.0000	
214	0.0096		7.37961E-03	0.7642	
4.44529E-03	0.6397		0.00000E+00	0.0000	
215	0.0155		1.19006E-02	0.5690	
7.11595E-03	0.4771		0.00000E+00	0.0000	
216	0.0298		2.28095E-02	0.4541	
1.34714E-02	0.3866		0.00000E+00	0.0000	
217	0.0201		1.53860E-02	0.6261	
9.04324E-03	0.5305		0.00000E+00	0.0000	
218	0.0273		2.09038E-02	0.4666	
1.22672E-02	0.3951		0.00000E+00	0.0000	
219	0.0359		2.74926E-02	0.4034	
1.60239E-02	0.3445		0.00000E+00	0.0000	
220	0.0477		3.64931E-02	0.3662	
2.12050E-02	0.3086		0.00000E+00	0.0000	
221	0.0626		4.78988E-02	0.3211	
2.77726E-02	0.2737		0.00000E+00	0.0000	

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  222    0.0802                6.14069E-02     0.3248
3.55684E-02     0.2818       0.00000E+00     0.0000
  223    0.1047                8.01035E-02     0.2290
4.64393E-02     0.1986       0.00000E+00     0.0000
  224    0.0582                4.45562E-02     0.3290
2.59644E-02     0.2809       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  225    0.2302                1.76210E-01     0.1541
1.04375E-01     0.1321       0.00000E+00     0.0000
  226    0.0456                3.49094E-02     0.3612
2.12313E-02     0.2982       0.00000E+00     0.0000
  227    0.0490                3.75242E-02     0.3486
2.32927E-02     0.2815       0.00000E+00     0.0000
  228    0.0211                1.61254E-02     0.5316
1.02016E-02     0.4248       0.00000E+00     0.0000
  229    0.0223                1.70580E-02     0.6159
1.09667E-02     0.4953       0.00000E+00     0.0000
  230    0.0116                8.89335E-03     0.7667
5.82679E-03     0.5986       0.00000E+00     0.0000
  231    0.0123                9.41990E-03     0.8429
6.25965E-03     0.6408       0.00000E+00     0.0000
  232    0.0130                9.94284E-03     0.7246
6.76663E-03     0.5377       0.00000E+00     0.0000
  233    0.0083                6.35403E-03     0.9875
4.46827E-03     0.6963       0.00000E+00     0.0000
  234    0.0060                4.58729E-03     1.0703
3.29418E-03     0.7109       0.00000E+00     0.0000
  235    0.0025                1.87569E-03     1.8264
1.23922E-03     1.3930       0.00000E+00     0.0000
  236    0.0019                1.42782E-03     2.0506
9.69535E-04     1.5219       0.00000E+00     0.0000
  237    0.0017                1.31177E-03     2.0817
9.29396E-04     1.5411       0.00000E+00     0.0000
  238    0.0001                7.05553E-05     9.6036
6.07357E-05     5.3845       0.00000E+00     0.0000

 system total =                 7.65326E-01     0.0587
4.68679E-01     0.0496       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3146E-01  +
or -  0.0002
```

elapsed time 3.06067 minutes

random number= 8ED7113853C11F92

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.087E-03	0.06	7.653E-01
	2	0.000E+00	0.00	0.000E+00
	3	0.000E+00	0.00	0.000E+00
global unit				
2	1	0.000E+00	0.00	0.000E+00

1 fuel bundle

fluxes for Unit 1

	region 1		region 2		region 3	
group	flux	percent deviation	flux	percent deviation	flux	percent deviation
1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	1.853E-08	24.90	1.437E-08	24.59	1.558E-08	24.63
3	9.200E-07	4.10	7.580E-07	3.87	8.200E-07	3.86
4	1.416E-06	3.44	1.182E-06	2.98	1.263E-06	3.12
5	2.324E-06	2.54	1.909E-06	2.31	2.044E-06	2.37
6	9.445E-06	1.22	7.552E-06	1.07	8.031E-06	1.09
7	1.257E-05	1.25	9.583E-06	1.15	1.013E-05	1.09
8	3.140E-05	0.81	2.296E-05	0.67	2.402E-05	0.68
9	8.188E-05	0.47	5.881E-05	0.42	6.137E-05	0.40
10	4.613E-05	0.62	3.271E-05	0.55	3.404E-05	0.55
11	2.199E-04	0.28	1.557E-04	0.24	1.611E-04	0.24
12	1.908E-04	0.32	1.382E-04	0.27	1.448E-04	0.27
13	5.672E-05	0.47	4.147E-05	0.39	4.334E-05	0.38
14	2.531E-04	0.24	1.830E-04	0.20	1.910E-04	0.21
15	2.197E-04	0.30	1.597E-04	0.25	1.666E-04	0.26
16	7.070E-05	0.42	5.141E-05	0.35	5.385E-05	0.37
17	3.247E-05	0.64	2.357E-05	0.54	2.466E-05	0.54

18	2.788E-05	0.75	2.018E-05	0.64	2.085E-05	0.58
19	5.038E-05	0.57	3.709E-05	0.50	3.848E-05	0.47
20	3.955E-05	0.64	2.904E-05	0.54	3.041E-05	0.54
21	7.954E-05	0.40	5.819E-05	0.38	6.086E-05	0.35
22	7.217E-05	0.47	5.302E-05	0.41	5.471E-05	0.37
23	7.688E-05	0.42	5.653E-05	0.38	5.869E-05	0.36
24	1.857E-05	0.90	1.365E-05	0.66	1.433E-05	0.58
25	2.349E-05	0.64	1.724E-05	0.50	1.815E-05	0.51
26	1.335E-05	0.98	9.847E-06	0.84	1.041E-05	0.77
27	4.208E-05	0.54	3.122E-05	0.44	3.299E-05	0.45
28	7.741E-05	0.38	5.750E-05	0.35	6.106E-05	0.34
29	7.956E-05	0.42	5.939E-05	0.37	6.210E-05	0.36
30	1.005E-05	1.11	7.448E-06	0.86	7.851E-06	0.85
31	7.857E-05	0.41	5.873E-05	0.36	6.194E-05	0.35
32	3.089E-05	0.59	2.320E-05	0.47	2.446E-05	0.45
33	2.706E-05	0.70	2.030E-05	0.59	2.141E-05	0.57
34	6.047E-05	0.44	4.561E-05	0.36	4.814E-05	0.35
35	3.635E-05	0.58	2.754E-05	0.46	2.896E-05	0.43
36	3.420E-05	0.48	2.580E-05	0.46	2.694E-05	0.45
37	2.177E-05	0.60	1.651E-05	0.48	1.730E-05	0.48
38	2.608E-05	0.68	1.979E-05	0.54	2.088E-05	0.51
39	9.796E-05	0.31	7.505E-05	0.27	7.905E-05	0.28
40	9.033E-05	0.35	6.975E-05	0.29	7.434E-05	0.26
41	1.136E-04	0.28	8.891E-05	0.25	9.471E-05	0.23
42	9.345E-05	0.33	7.376E-05	0.28	7.914E-05	0.26
43	5.121E-05	0.45	4.080E-05	0.40	4.278E-05	0.35
44	7.017E-05	0.35	5.619E-05	0.31	6.041E-05	0.27
45	3.521E-05	0.47	2.793E-05	0.40	3.101E-05	0.35
46	8.445E-06	0.94	6.684E-06	0.72	7.174E-06	0.61
47	2.359E-05	0.60	1.884E-05	0.48	1.959E-05	0.51
48	6.850E-06	1.02	5.427E-06	0.98	5.721E-06	0.69
49	4.407E-05	0.41	3.513E-05	0.35	3.779E-05	0.31
50	2.959E-05	0.52	2.377E-05	0.43	2.575E-05	0.36
51	7.941E-06	0.92	6.366E-06	0.85	6.961E-06	0.68
52	2.072E-05	0.58	1.669E-05	0.48	1.823E-05	0.45
53	7.595E-05	0.32	6.135E-05	0.29	6.667E-05	0.26
54	3.322E-05	0.46	2.690E-05	0.38	2.900E-05	0.32
55	6.626E-05	0.33	5.387E-05	0.30	5.867E-05	0.24
56	4.359E-05	0.41	3.555E-05	0.37	3.857E-05	0.29
57	4.948E-05	0.38	4.019E-05	0.35	4.385E-05	0.29
58	2.581E-05	0.49	2.106E-05	0.42	2.298E-05	0.34
59	4.418E-05	0.39	3.607E-05	0.33	3.935E-05	0.28
60	6.443E-05	0.36	5.271E-05	0.30	5.717E-05	0.25
61	6.174E-06	0.87	5.026E-06	0.74	5.498E-06	0.67
62	3.247E-05	0.45	2.642E-05	0.40	2.887E-05	0.33
63	2.178E-05	0.52	1.787E-05	0.46	1.946E-05	0.38
64	1.715E-05	0.61	1.409E-05	0.56	1.529E-05	0.45
65	5.734E-06	0.98	4.704E-06	0.89	5.110E-06	0.72
66	2.841E-05	0.51	2.341E-05	0.42	2.547E-05	0.36
67	2.131E-05	0.53	1.754E-05	0.44	1.902E-05	0.30
68	4.640E-06	1.10	3.819E-06	0.93	4.145E-06	0.79
69	3.720E-05	0.40	3.055E-05	0.35	3.323E-05	0.27

70	2.648E-05	0.47	2.184E-05	0.42	2.371E-05	0.33
71	4.543E-05	0.30	3.749E-05	0.31	4.069E-05	0.23
72	2.593E-06	1.45	2.169E-06	1.30	2.352E-06	1.11
73	2.697E-05	0.49	2.234E-05	0.44	2.420E-05	0.34
74	7.951E-05	0.27	6.583E-05	0.26	7.145E-05	0.21
75	9.102E-06	0.78	7.571E-06	0.75	8.196E-06	0.64
76	2.286E-05	0.44	1.896E-05	0.43	2.057E-05	0.34
77	1.776E-05	0.56	1.474E-05	0.48	1.589E-05	0.40
78	1.492E-06	1.83	1.270E-06	1.66	1.405E-06	1.38
79	9.905E-06	0.68	8.188E-06	0.62	8.853E-06	0.53
80	4.587E-06	1.00	3.798E-06	0.96	4.076E-06	0.67
81	5.535E-05	0.39	4.599E-05	0.32	4.990E-05	0.28
82	3.244E-06	1.22	2.694E-06	1.08	2.915E-06	0.91
83	4.365E-06	1.14	3.662E-06	0.95	3.979E-06	0.83
84	8.060E-06	0.80	6.763E-06	0.79	7.328E-06	0.58
85	9.908E-06	0.76	8.254E-06	0.69	8.969E-06	0.53
86	1.353E-05	0.60	1.140E-05	0.55	1.226E-05	0.50
87	1.183E-05	0.61	9.948E-06	0.55	1.073E-05	0.46
88	3.097E-06	1.42	2.576E-06	1.23	2.799E-06	0.94
89	6.573E-06	0.98	5.456E-06	0.86	5.916E-06	0.66
90	6.865E-06	0.83	5.717E-06	0.71	6.181E-06	0.63
91	8.337E-06	0.87	6.962E-06	0.73	7.472E-06	0.61
92	4.649E-06	0.86	3.936E-06	0.85	4.314E-06	0.75
93	8.166E-06	0.76	6.800E-06	0.72	7.354E-06	0.55
94	4.291E-06	1.17	3.570E-06	1.02	3.854E-06	0.86
95	1.256E-05	0.72	1.052E-05	0.57	1.138E-05	0.47
96	3.440E-06	1.25	2.810E-06	1.12	3.062E-06	0.87
97	3.367E-06	1.02	2.823E-06	0.90	3.092E-06	0.73
98	3.541E-06	1.04	2.943E-06	1.01	3.204E-06	0.83
99	2.299E-06	1.42	1.904E-06	1.25	2.077E-06	1.01
100	3.442E-06	1.23	2.895E-06	1.08	3.109E-06	0.92
101	4.961E-06	1.05	4.146E-06	0.90	4.492E-06	0.72
102	3.405E-06	1.23	2.826E-06	1.09	3.058E-06	0.92
103	4.654E-06	0.94	3.912E-06	0.91	4.235E-06	0.73
104	4.287E-06	1.03	3.582E-06	0.94	3.869E-06	0.73
105	4.379E-06	1.23	3.633E-06	1.03	3.944E-06	0.83
106	1.526E-06	1.65	1.279E-06	1.54	1.407E-06	1.33
107	3.620E-06	1.09	3.025E-06	0.98	3.270E-06	0.76
108	3.232E-06	1.25	2.712E-06	1.11	2.958E-06	0.86
109	5.025E-06	1.00	4.243E-06	0.84	4.589E-06	0.77
110	3.015E-06	1.22	2.581E-06	1.13	2.798E-06	0.89
111	2.996E-06	1.35	2.547E-06	1.19	2.772E-06	0.99
112	1.833E-06	1.79	1.547E-06	1.51	1.674E-06	1.21
113	5.779E-06	0.92	4.816E-06	0.78	5.195E-06	0.64
114	1.946E-06	1.48	1.638E-06	1.41	1.758E-06	1.19
115	5.113E-06	1.04	4.267E-06	0.86	4.604E-06	0.75
116	1.073E-05	0.73	8.958E-06	0.63	9.739E-06	0.55
117	1.171E-05	0.62	9.785E-06	0.58	1.065E-05	0.49
118	1.283E-05	0.59	1.080E-05	0.54	1.168E-05	0.40
119	8.170E-06	0.74	6.922E-06	0.67	7.493E-06	0.55
120	5.840E-06	0.99	4.898E-06	0.91	5.310E-06	0.71
121	6.082E-06	0.84	5.126E-06	0.78	5.544E-06	0.60

122	3.265E-06	1.18	2.740E-06	1.07	2.981E-06	0.81
123	1.035E-05	0.74	8.700E-06	0.60	9.418E-06	0.53
124	7.290E-06	0.79	6.143E-06	0.70	6.638E-06	0.64
125	7.127E-06	0.73	5.964E-06	0.66	6.430E-06	0.55
126	5.744E-06	0.97	4.856E-06	0.84	5.255E-06	0.68
127	5.622E-06	0.95	4.703E-06	0.84	5.090E-06	0.71
128	7.677E-06	0.83	6.481E-06	0.71	7.006E-06	0.58
129	9.506E-06	0.73	8.045E-06	0.65	8.738E-06	0.52
130	4.003E-06	0.94	3.392E-06	0.93	3.701E-06	0.70
131	1.701E-05	0.56	1.425E-05	0.46	1.535E-05	0.42
132	1.122E-05	0.60	9.488E-06	0.53	1.023E-05	0.47
133	1.348E-05	0.65	1.142E-05	0.56	1.240E-05	0.42
134	1.486E-05	0.56	1.251E-05	0.47	1.347E-05	0.38
135	2.388E-06	1.33	2.042E-06	1.13	2.232E-06	1.00
136	3.807E-06	1.02	3.327E-06	0.94	3.633E-06	0.78
137	2.506E-06	1.08	2.644E-06	1.09	2.965E-06	0.86
138	4.115E-06	1.00	3.587E-06	0.98	3.943E-06	0.75
139	4.670E-06	1.10	3.977E-06	0.95	4.304E-06	0.76
140	1.197E-05	0.66	1.011E-05	0.53	1.099E-05	0.43
141	8.746E-06	0.84	7.427E-06	0.73	7.994E-06	0.63
142	5.805E-06	0.87	4.932E-06	0.82	5.371E-06	0.60
143	2.002E-05	0.49	1.689E-05	0.42	1.807E-05	0.34
144	7.984E-06	0.74	6.750E-06	0.68	7.280E-06	0.59
145	7.189E-06	0.69	6.129E-06	0.67	6.598E-06	0.51
146	1.207E-05	0.63	1.016E-05	0.55	1.099E-05	0.48
147	3.584E-06	0.97	3.057E-06	0.90	3.307E-06	0.76
148	1.926E-06	1.70	1.618E-06	1.40	1.720E-06	1.12
149	1.153E-06	2.04	9.898E-07	1.72	1.042E-06	1.49
150	3.957E-06	1.03	3.368E-06	1.11	3.617E-06	0.80
151	4.185E-06	1.02	3.522E-06	0.88	3.766E-06	0.76
152	4.298E-06	1.07	3.633E-06	0.89	3.894E-06	0.79
153	4.595E-06	1.04	3.852E-06	0.93	4.097E-06	0.80
154	4.639E-06	1.06	3.916E-06	0.90	4.215E-06	0.68
155	4.317E-06	1.05	3.632E-06	1.06	3.914E-06	0.80
156	3.962E-06	0.99	3.354E-06	0.83	3.642E-06	0.67
157	4.641E-06	0.90	3.920E-06	0.77	4.251E-06	0.67
158	4.860E-06	0.96	4.066E-06	0.85	4.411E-06	0.72
159	6.707E-06	0.83	5.691E-06	0.74	6.155E-06	0.63
160	3.508E-06	1.03	2.972E-06	1.00	3.217E-06	0.80
161	4.971E-06	1.01	4.182E-06	0.86	4.507E-06	0.75
162	5.760E-06	0.90	4.896E-06	0.90	5.248E-06	0.65
163	6.247E-06	0.93	5.213E-06	0.82	5.601E-06	0.63
164	6.601E-06	0.91	5.538E-06	0.75	5.935E-06	0.62
165	6.888E-06	0.98	5.814E-06	0.80	6.227E-06	0.65
166	4.039E-06	1.13	3.421E-06	1.09	3.666E-06	0.87
167	4.091E-06	1.15	3.480E-06	1.39	3.727E-06	0.80
168	4.296E-06	1.03	3.612E-06	0.76	3.926E-06	0.69
169	4.449E-06	1.02	3.747E-06	0.88	4.071E-06	0.79
170	4.653E-06	1.08	3.961E-06	0.85	4.211E-06	0.72
171	2.425E-06	1.35	2.032E-06	1.20	2.194E-06	1.06
172	2.380E-06	1.47	2.016E-06	1.28	2.188E-06	1.13
173	2.481E-06	1.37	2.081E-06	1.15	2.245E-06	0.98

174	2.534E-06	1.43	2.162E-06	1.26	2.351E-06	0.97
175	1.020E-06	2.09	8.765E-07	1.84	9.450E-07	1.33
176	1.033E-06	2.14	8.782E-07	1.95	9.560E-07	1.73
177	1.038E-06	2.42	8.684E-07	1.85	9.364E-07	1.37
178	1.028E-06	1.77	8.770E-07	1.57	9.507E-07	1.26
179	1.046E-06	1.73	8.850E-07	1.61	9.603E-07	1.34
180	1.062E-06	2.00	9.090E-07	1.91	9.814E-07	1.39
181	1.111E-06	2.12	9.433E-07	2.11	9.871E-07	1.60
182	1.058E-06	1.95	8.996E-07	1.80	9.597E-07	1.47
183	1.117E-06	1.67	9.442E-07	1.60	1.027E-06	1.22
184	1.068E-06	2.00	9.241E-07	1.71	1.016E-06	1.51
185	1.139E-06	2.15	9.486E-07	1.77	1.030E-06	1.56
186	1.126E-06	1.94	9.593E-07	1.60	1.040E-06	1.33
187	1.155E-06	2.10	9.595E-07	1.97	1.047E-06	1.53
188	1.129E-06	1.98	9.750E-07	1.62	1.048E-06	1.47
189	1.169E-06	1.97	9.968E-07	1.72	1.072E-06	1.41
190	3.043E-06	1.22	2.569E-06	1.16	2.763E-06	0.87
191	3.083E-06	1.18	2.598E-06	1.05	2.831E-06	0.96
192	3.137E-06	1.20	2.666E-06	1.18	2.883E-06	0.82
193	3.288E-06	1.26	2.767E-06	1.09	2.972E-06	0.85
194	6.808E-06	0.85	5.775E-06	0.70	6.246E-06	0.57
195	7.392E-06	0.83	6.205E-06	0.69	6.685E-06	0.52
196	7.797E-06	0.70	6.572E-06	0.63	7.097E-06	0.55
197	8.482E-06	0.84	7.131E-06	0.66	7.714E-06	0.58
198	9.020E-06	0.71	7.644E-06	0.67	8.225E-06	0.53
199	4.816E-06	0.86	4.070E-06	0.85	4.368E-06	0.66
200	5.145E-06	0.95	4.323E-06	0.90	4.671E-06	0.70
201	1.060E-05	0.70	8.981E-06	0.55	9.734E-06	0.49
202	1.186E-05	0.67	1.005E-05	0.61	1.092E-05	0.48
203	1.293E-05	0.61	1.094E-05	0.56	1.182E-05	0.44
204	1.466E-05	0.53	1.244E-05	0.47	1.356E-05	0.38
205	8.502E-06	0.76	7.628E-06	0.57	8.107E-06	0.49
206	9.281E-06	0.65	8.335E-06	0.64	8.838E-06	0.49
207	9.526E-06	0.59	8.613E-06	0.50	9.083E-06	0.46
208	1.123E-05	0.51	1.018E-05	0.44	1.079E-05	0.38
209	1.158E-05	0.54	1.055E-05	0.52	1.115E-05	0.42
210	1.408E-05	0.51	1.267E-05	0.44	1.345E-05	0.39
211	1.610E-05	0.44	1.455E-05	0.42	1.551E-05	0.34
212	1.910E-05	0.45	1.735E-05	0.42	1.844E-05	0.32
213	2.618E-05	0.38	2.355E-05	0.36	2.523E-05	0.27
214	3.716E-05	0.32	3.337E-05	0.31	3.574E-05	0.24
215	5.511E-05	0.27	4.992E-05	0.24	5.378E-05	0.19
216	9.196E-05	0.21	8.374E-05	0.19	9.057E-05	0.16
217	5.539E-05	0.26	5.311E-05	0.23	5.624E-05	0.17
218	7.080E-05	0.23	6.788E-05	0.21	7.230E-05	0.17
219	8.427E-05	0.16	8.151E-05	0.16	8.664E-05	0.13
220	1.017E-04	0.22	9.918E-05	0.17	1.056E-04	0.15
221	1.202E-04	0.16	1.185E-04	0.14	1.264E-04	0.13
222	1.366E-04	0.19	1.366E-04	0.14	1.456E-04	0.13
223	1.532E-04	0.18	1.571E-04	0.13	1.673E-04	0.11
224	7.498E-05	0.18	7.990E-05	0.15	8.461E-05	0.13
225	2.333E-04	0.13	2.724E-04	0.11	2.822E-04	0.10

226	3.159E-05	0.26	4.478E-05	0.22	4.444E-05	0.12
227	2.889E-05	0.23	4.622E-05	0.19	4.439E-05	0.13
228	1.046E-05	0.32	1.905E-05	0.25	1.759E-05	0.14
229	9.676E-06	0.38	1.966E-05	0.34	1.751E-05	0.16
230	4.503E-06	0.55	1.016E-05	0.43	8.693E-06	0.21
231	4.227E-06	0.61	1.062E-05	0.43	8.723E-06	0.23
232	3.978E-06	0.51	1.138E-05	0.42	8.876E-06	0.21
233	2.220E-06	0.66	7.368E-06	0.47	5.507E-06	0.26
234	1.429E-06	0.80	5.413E-06	0.61	3.827E-06	0.30
235	5.235E-07	1.55	1.048E-06	1.04	1.114E-06	0.51
236	3.390E-07	1.62	7.403E-07	1.40	8.043E-07	0.48
237	2.344E-07	1.89	5.505E-07	1.38	6.134E-07	0.58
238	5.352E-09	10.10	2.148E-08	7.18	2.541E-08	1.96

1 fuel bundle

fluxes for Global Unit
region 1

group	flux	percent deviation
1	0.000E+00	0.00
2	0.000E+00	0.00
3	0.000E+00	0.00
4	0.000E+00	0.00
5	0.000E+00	0.00
6	0.000E+00	0.00
7	0.000E+00	0.00
8	0.000E+00	0.00
9	0.000E+00	0.00
10	0.000E+00	0.00
11	0.000E+00	0.00
12	0.000E+00	0.00
13	0.000E+00	0.00
14	0.000E+00	0.00
15	0.000E+00	0.00
16	0.000E+00	0.00
17	0.000E+00	0.00
18	0.000E+00	0.00
19	0.000E+00	0.00
20	0.000E+00	0.00
21	0.000E+00	0.00
22	0.000E+00	0.00
23	0.000E+00	0.00
24	0.000E+00	0.00
25	0.000E+00	0.00
26	0.000E+00	0.00
27	0.000E+00	0.00
28	0.000E+00	0.00
29	0.000E+00	0.00
30	0.000E+00	0.00
31	0.000E+00	0.00
32	0.000E+00	0.00

33	0.000E+00	0.00
34	0.000E+00	0.00
35	0.000E+00	0.00
36	0.000E+00	0.00
37	0.000E+00	0.00
38	0.000E+00	0.00
39	0.000E+00	0.00
40	0.000E+00	0.00
41	0.000E+00	0.00
42	0.000E+00	0.00
43	0.000E+00	0.00
44	0.000E+00	0.00
45	0.000E+00	0.00
46	0.000E+00	0.00
47	0.000E+00	0.00
48	0.000E+00	0.00
49	0.000E+00	0.00
50	0.000E+00	0.00
51	0.000E+00	0.00
52	0.000E+00	0.00
53	0.000E+00	0.00
54	0.000E+00	0.00
55	0.000E+00	0.00
56	0.000E+00	0.00
57	0.000E+00	0.00
58	0.000E+00	0.00
59	0.000E+00	0.00
60	0.000E+00	0.00
61	0.000E+00	0.00
62	0.000E+00	0.00
63	0.000E+00	0.00
64	0.000E+00	0.00
65	0.000E+00	0.00
66	0.000E+00	0.00
67	0.000E+00	0.00
68	0.000E+00	0.00
69	0.000E+00	0.00
70	0.000E+00	0.00
71	0.000E+00	0.00
72	0.000E+00	0.00
73	0.000E+00	0.00
74	0.000E+00	0.00
75	0.000E+00	0.00
76	0.000E+00	0.00
77	0.000E+00	0.00
78	0.000E+00	0.00
79	0.000E+00	0.00
80	0.000E+00	0.00
81	0.000E+00	0.00
82	0.000E+00	0.00
83	0.000E+00	0.00
84	0.000E+00	0.00

85	0.000E+00	0.00
86	0.000E+00	0.00
87	0.000E+00	0.00
88	0.000E+00	0.00
89	0.000E+00	0.00
90	0.000E+00	0.00
91	0.000E+00	0.00
92	0.000E+00	0.00
93	0.000E+00	0.00
94	0.000E+00	0.00
95	0.000E+00	0.00
96	0.000E+00	0.00
97	0.000E+00	0.00
98	0.000E+00	0.00
99	0.000E+00	0.00
100	0.000E+00	0.00
101	0.000E+00	0.00
102	0.000E+00	0.00
103	0.000E+00	0.00
104	0.000E+00	0.00
105	0.000E+00	0.00
106	0.000E+00	0.00
107	0.000E+00	0.00
108	0.000E+00	0.00
109	0.000E+00	0.00
110	0.000E+00	0.00
111	0.000E+00	0.00
112	0.000E+00	0.00
113	0.000E+00	0.00
114	0.000E+00	0.00
115	0.000E+00	0.00
116	0.000E+00	0.00
117	0.000E+00	0.00
118	0.000E+00	0.00
119	0.000E+00	0.00
120	0.000E+00	0.00
121	0.000E+00	0.00
122	0.000E+00	0.00
123	0.000E+00	0.00
124	0.000E+00	0.00
125	0.000E+00	0.00
126	0.000E+00	0.00
127	0.000E+00	0.00
128	0.000E+00	0.00
129	0.000E+00	0.00
130	0.000E+00	0.00
131	0.000E+00	0.00
132	0.000E+00	0.00
133	0.000E+00	0.00
134	0.000E+00	0.00
135	0.000E+00	0.00
136	0.000E+00	0.00

137	0.000E+00	0.00
138	0.000E+00	0.00
139	0.000E+00	0.00
140	0.000E+00	0.00
141	0.000E+00	0.00
142	0.000E+00	0.00
143	0.000E+00	0.00
144	0.000E+00	0.00
145	0.000E+00	0.00
146	0.000E+00	0.00
147	0.000E+00	0.00
148	0.000E+00	0.00
149	0.000E+00	0.00
150	0.000E+00	0.00
151	0.000E+00	0.00
152	0.000E+00	0.00
153	0.000E+00	0.00
154	0.000E+00	0.00
155	0.000E+00	0.00
156	0.000E+00	0.00
157	0.000E+00	0.00
158	0.000E+00	0.00
159	0.000E+00	0.00
160	0.000E+00	0.00
161	0.000E+00	0.00
162	0.000E+00	0.00
163	0.000E+00	0.00
164	0.000E+00	0.00
165	0.000E+00	0.00
166	0.000E+00	0.00
167	0.000E+00	0.00
168	0.000E+00	0.00
169	0.000E+00	0.00
170	0.000E+00	0.00
171	0.000E+00	0.00
172	0.000E+00	0.00
173	0.000E+00	0.00
174	0.000E+00	0.00
175	0.000E+00	0.00
176	0.000E+00	0.00
177	0.000E+00	0.00
178	0.000E+00	0.00
179	0.000E+00	0.00
180	0.000E+00	0.00
181	0.000E+00	0.00
182	0.000E+00	0.00
183	0.000E+00	0.00
184	0.000E+00	0.00
185	0.000E+00	0.00
186	0.000E+00	0.00
187	0.000E+00	0.00
188	0.000E+00	0.00

189	0.000E+00	0.00
190	0.000E+00	0.00
191	0.000E+00	0.00
192	0.000E+00	0.00
193	0.000E+00	0.00
194	0.000E+00	0.00
195	0.000E+00	0.00
196	0.000E+00	0.00
197	0.000E+00	0.00
198	0.000E+00	0.00
199	0.000E+00	0.00
200	0.000E+00	0.00
201	0.000E+00	0.00
202	0.000E+00	0.00
203	0.000E+00	0.00
204	0.000E+00	0.00
205	0.000E+00	0.00
206	0.000E+00	0.00
207	0.000E+00	0.00
208	0.000E+00	0.00
209	0.000E+00	0.00
210	0.000E+00	0.00
211	0.000E+00	0.00
212	0.000E+00	0.00
213	0.000E+00	0.00
214	0.000E+00	0.00
215	0.000E+00	0.00
216	0.000E+00	0.00
217	0.000E+00	0.00
218	0.000E+00	0.00
219	0.000E+00	0.00
220	0.000E+00	0.00
221	0.000E+00	0.00
222	0.000E+00	0.00
223	0.000E+00	0.00
224	0.000E+00	0.00
225	0.000E+00	0.00
226	0.000E+00	0.00
227	0.000E+00	0.00
228	0.000E+00	0.00
229	0.000E+00	0.00
230	0.000E+00	0.00
231	0.000E+00	0.00
232	0.000E+00	0.00
233	0.000E+00	0.00
234	0.000E+00	0.00
235	0.000E+00	0.00
236	0.000E+00	0.00
237	0.000E+00	0.00
238	0.000E+00	0.00

1fuel bundle

```
                                frequency for generations      24 to
123 each asterisk represents   1.0000 generations
 0.7529 to 0.7558     ***
 0.7558 to 0.7586     **
 0.7586 to 0.7614     ****************
 0.7614 to 0.7643     ******************
 0.7643 to 0.7671     ************************
 0.7671 to 0.7699     ****************
 0.7699 to 0.7727     **************
 0.7727 to 0.7756     ****

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7529 to 0.7558     **
 0.7558 to 0.7586     *
 0.7586 to 0.7614     ************
 0.7614 to 0.7643     ***********
 0.7643 to 0.7671     ********************
 0.7671 to 0.7699     **************
 0.7699 to 0.7727     ************
 0.7727 to 0.7756     ***

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7529 to 0.7558     **
 0.7558 to 0.7586     *
 0.7586 to 0.7614     **********
 0.7614 to 0.7643     *******
 0.7643 to 0.7671     ***********
 0.7671 to 0.7699     ********
 0.7699 to 0.7727     *********
 0.7727 to 0.7756     **

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7529 to 0.7558     *
 0.7558 to 0.7586
 0.7586 to 0.7614     *****
 0.7614 to 0.7643     ***
 0.7643 to 0.7671     *******
 0.7671 to 0.7699     ****
 0.7699 to 0.7727     ****
 0.7727 to 0.7756     *

1
********************************************************************************
********************************************
        ***
***
        ***   fuel bundle
***
        ***
```

```
***

**********************************************************************
*****************************************
        ***
***
        ***                                      ******      final results
table      ******                                    ***
        ***
***
        ***        best estimate system k-eff
0.76567 + or - 0.00053                      ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.68649E-02 + or -  1.20684E-04           ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  9.46364E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52854E-01 + or -  1.78245E-04           ***
        ***
***
        ***        number of warning messages
7                                         ***
        ***
***
        ***        number of error messages
0                                         ***
        ***
***
        ***        k-effective fails the chi**2 test for normality at the
95 % level, but satisfies it at the 99 % level ***
        ***
***
        ***
***

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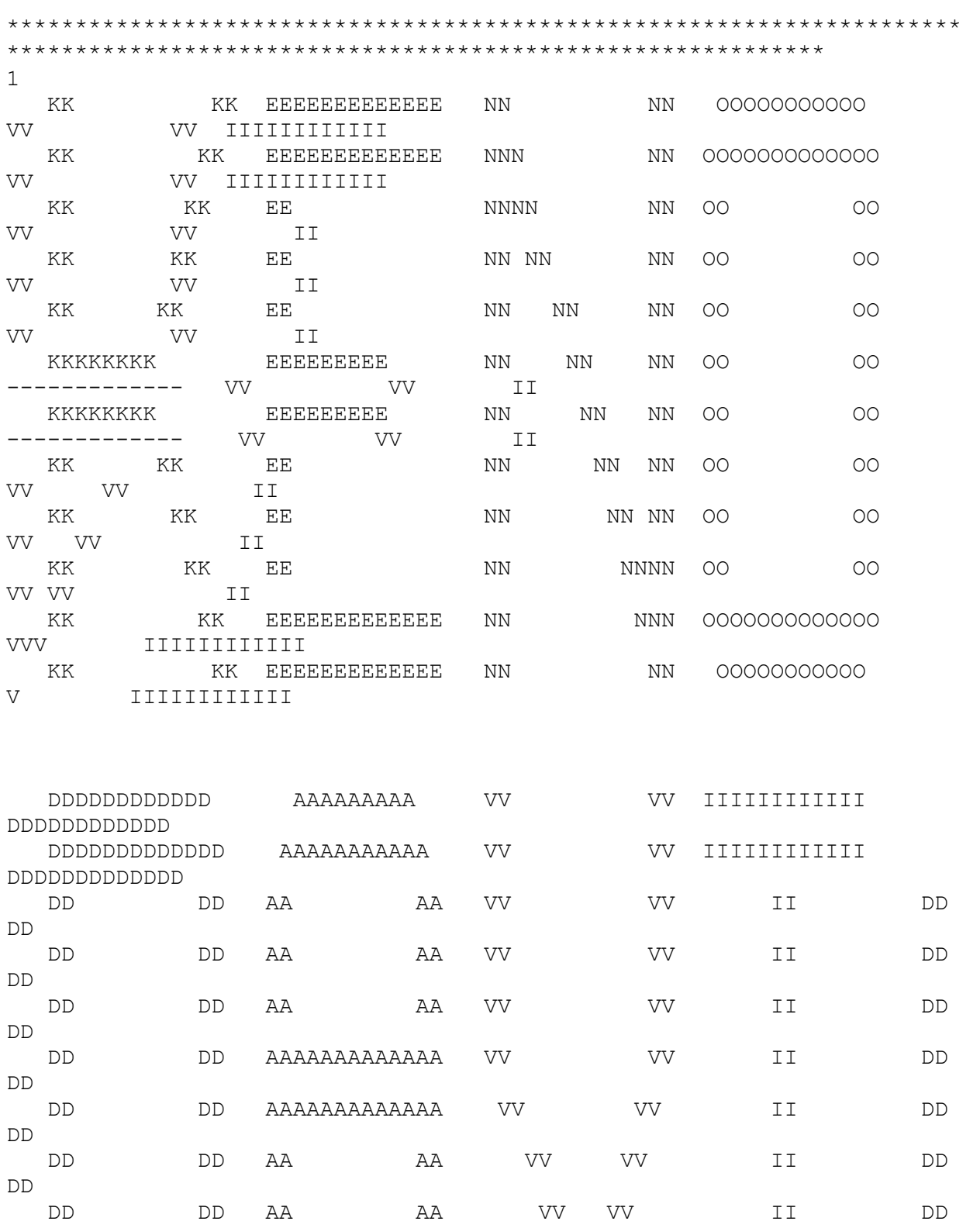
```

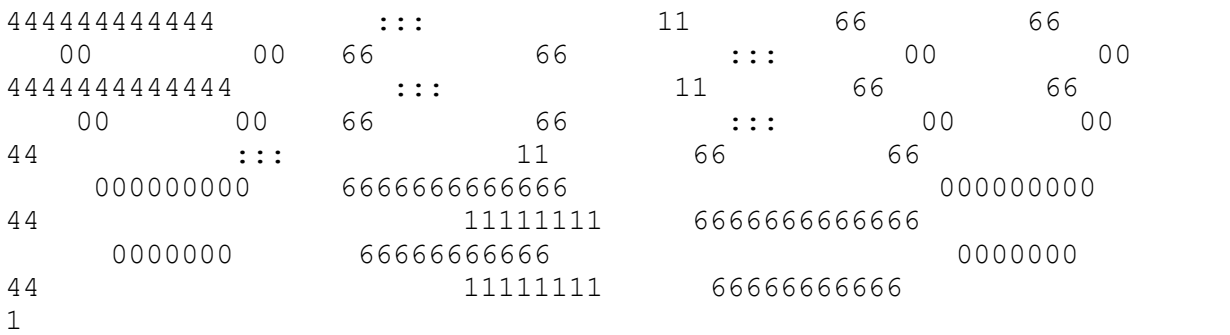
Congratulations! You have successfully traversed the perilous path through Keno-VI in 3.06100 minutes

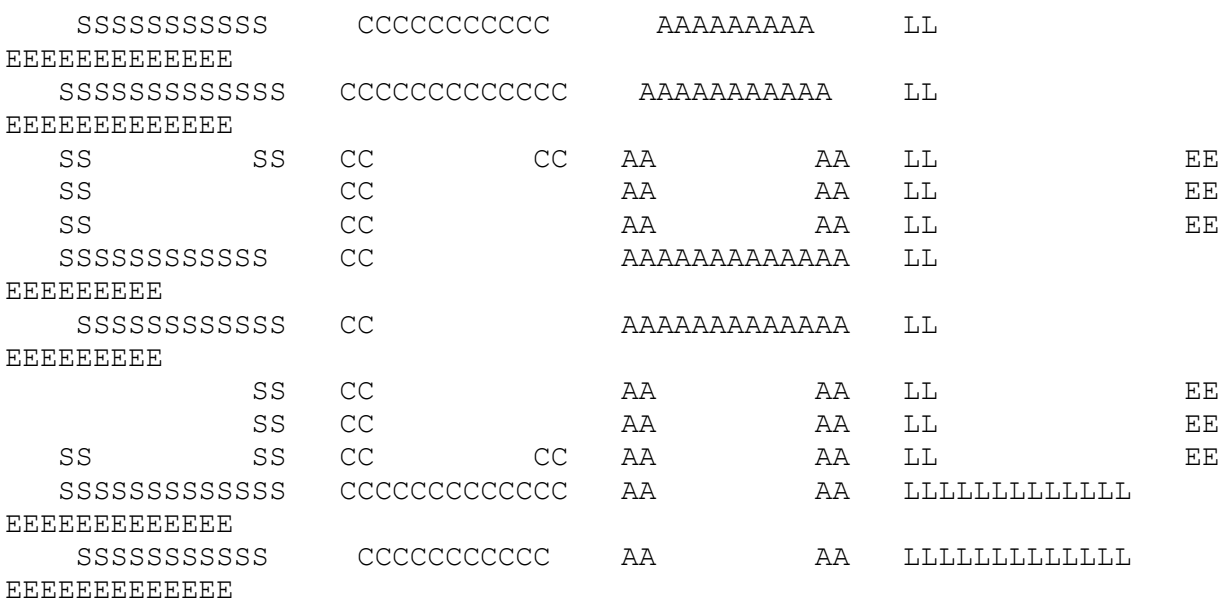


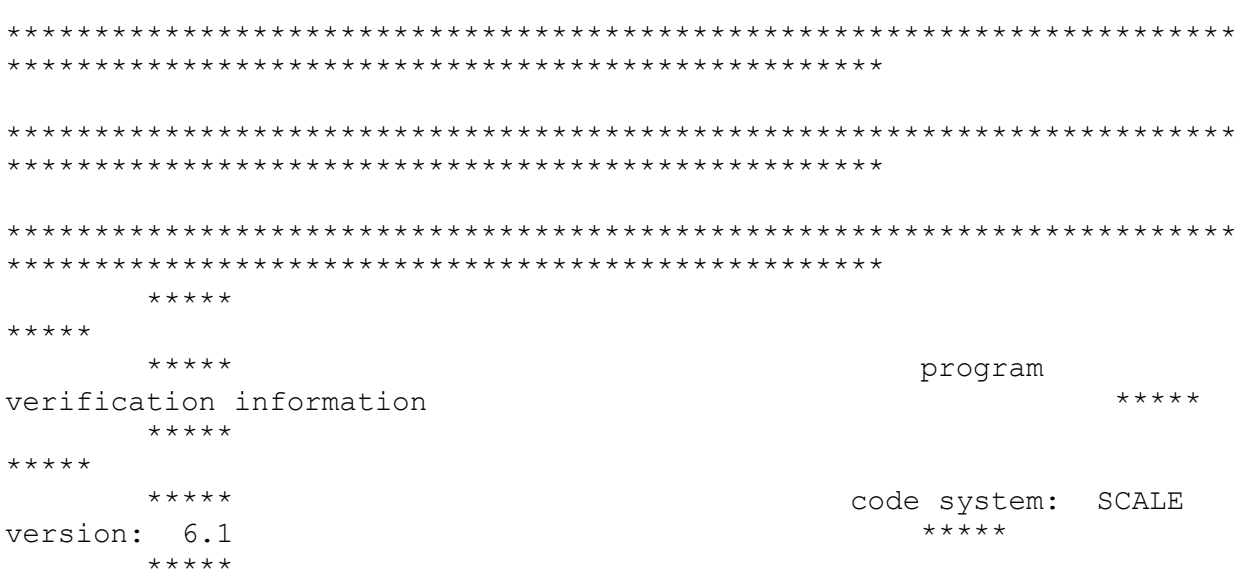
```
DD
   DD         DD   AA         AA        VV VV           II         DD
DD
   DDDDDDDDDDDDD   AA         AA         VVV       IIIIIIIIIII
DDDDDDDDDDDDD
   DDDDDDDDDDDD    AA         AA          V        IIIIIIIIIII
DDDDDDDDDDDD


      0000000       88888888888                //   22222222222
33333333333               //        11          666666666666
     000000000     8888888888888              //   2222222222222
3333333333333             //        111         6666666666666
    00       00    88         88             //    22         22   33
33             //        1111         66
   00         00   88         88            //                22
33            //           11         66
   00         00   88         88           //                 22
33           //            11         66
   00         00    88888888888           //                22
333           //             11        666666666666
   00         00    88888888888          //                22
333          //              11        6666666666666
   00         00   88         88        //              22
33        //                11         66         66
   00         00   88         88       //            22
33       //                 11         66         66
    00       00    88         88      //            22             33
33      //                  11         66         66
     000000000     8888888888888     //           2222222222222
3333333333333     //                11111111     6666666666666
      0000000       88888888888     //           2222222222222
33333333333     //                11111111      66666666666


      0000000       666666666666                       0000000
44                          11         666666666666
     000000000     6666666666666                     000000000
444                         111        6666666666666
    00       00    66                   :::        00       00
4444           :::           1111        66
   00         00   66                   :::       00         00
44 44            :::             11        66
   00         00   66                   :::       00         00
44  44            :::              11        66
   00         00   666666666666                   00         00
44   44                          11        666666666666
   00         00   6666666666666                  00         00
44    44                         11        6666666666666
   00         00   66         66         :::       00         00
```







```
*****

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**********************************************************************
************************************************
        *****
*****
        *****
*****
        *****               program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  06:04:16.21
*****
        *****
*****
        *****
*****

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```

```
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************************************************
1

********************************************************************************
************************************************
        ***
***
        ***                                fuel bundle
***
        ***
***

********************************************************************************
************************************************
        ***                                      ******       numeric
parameters       ******                                      ***
        ***
***
        ***
***
        ***                       tme          maximum problem time (min)
0.00                     ***
        ***
***
        ***                       tba          time per generation (min)
10.00                     ***
        ***
***
        ***                       gen          number of generations
123                     ***
        ***
***
        ***                       npg          number per generation
20000                     ***
        ***
***
        ***                       nsk          number of generations to be
skipped                     23                       ***
        ***
***
        ***                       beg          beginning generation number
1                     ***
        ***
***
        ***                       res          generations between
checkpoints                      103                        ***
        ***
***
```

```
        ***                     x1d         number of extra 1-d cross
sections                     1                       ***
        ***
***
        ***                     nbk         neutron bank size
20025                     ***
        ***
***
        ***                     xnb         extra positions in neutron
bank                         0                  ***
        ***
***
        ***                     nfb         fission bank size
20000                     ***
        ***
***
        ***                     xfb         extra positions in fission
bank                         0                  ***
        ***
***
        ***                     sig         cut off standard deviation
0.0000                     ***
        ***
***
        ***                     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
000015714D98EE96                     ***
        ***
***
        ***                     nb8         number of d.a. blocks on unit
8                      1000                    ***
        ***
***
        ***                     nl8         length of d.a. blocks on unit
8                       512                    ***
        ***
***
        ***                     nqd         quadrature order for angular
fluxes                   0                      ***
        ***
***
```

```
        ***                       pnm         highest order of flux
moments                            0                      ***
        ***
***
        ***                       msh         mesh size for mesh flux tally
0.0000                        ***
        ***
***
        ***                       adj         mode of calculation
forward                        ***
        ***
***
        ***                       tps         sampling sites per track
length                           5                       ***
        ***
***
        ***                       cgs         number of secondary groups
to sampl                        0                      ***
        ***
***
        ***                       cas         number of secondary angles
to sampl                        0                      ***
        ***
***
        ***                                   input data written on
restart unit                     yes                     ***
        ***
***
        ***
***

**********************************************************************
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1
**********************************************************************
*****************************************

**********************************************************************
*****************************************
        ***
***
        ***                                fuel bundle
***
        ***
***

**********************************************************************
*****************************************
        ***                                ******      logical
```

```
parameters        ******                                        ***
        ***
***
        ***  run  execute problem after checking data    yes
plt  plot picture map(s)                          no ***
        ***
***
        ***       compute fluxes (cfx, flx or mfp)       yes
fdn  compute fission densities                yes ***
        ***
***
        ***  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 fiss prod matrix by unit number   no
fmp  print fiss prod matrix by unit location  no ***
        ***
***
        ***  mkh  compute matrix k-eff by hole number     no
mka  compute matrix k-eff by array number     no ***
        ***
***
        ***  ckh  compute cofactor k-eff by hole number   no
cka  compute cofactor k-eff by array number   no ***
        ***
***
        ***  fmh  print fiss prod matrix by hole number   no
fma  print fiss prod matrix by array number   no ***
        ***
***
        ***  hhl  collect matrix by highest hole level    no
hal  collect matrix by highest array level    no ***
        ***
***
        ***  amx  print all mixed cross sections          no
far  print fis. and abs. by region            no ***
        ***
***
        ***  xs1  print 1-d mixture x-sections            no
gas  print far by group                       no ***
        ***
***
        ***  xs2  print 2-d mixture x-sections            no
```

```
pax  print xsec-albedo correlation tables     no ***
        ***
***
        ***  xsl  print 2-d mixture Pl arrays             no
pwt  print weight average array               no ***
        ***
***
        ***  xap  print mixture angles & probabilities    no
pgm  print input geometry                     no ***
        ***
***
        ***  pki  print fission spectrum                  no
bug  print debug information                  no ***
        ***
***
        ***  p1d  print extra 1-d cross sections          no
trk  print tracking information               no ***
        ***
***
        ***  tfm  coordinate transform for fluxes         no
pmf  print angular fluxes and flux moments    no ***
        ***
***
        ***       print fluxes (flx)                     yes
app  append, not overwrite, restart data      no ***
        ***
***
        ***  mfx  compute mesh fluxes                     no
pms  print mesh fluxes if calculated          no ***
        ***
***
        ***  mfp  compute region mean free paths          no
pmm  print mesh flux moments if calculated    no ***
        ***
***
        ***  sen  compute derivative sensitivites         no
pmv  print mesh volumes                       no ***
        ***
***
        ***  cep  continuous energy calculation           no
ptb  use probability tables                  yes ***
        ***
***
        ***  fre  use analytic free gas kernel            yes
pnu  use prompt neutron spectrum only         no ***
        ***
***
        ***  cbt  compute contributons                    no
pct  print contributons                       no ***
        ***
***
        ***  cds  collect CADIS fissions                  no
```

```
htm  produce HTML output                        yes ***
        ***
***
        ***
***

*************************************************************************
*****************************************

*************************************************************************
*****************************************

*************************************************************************
*****************************************
                                                  parameter input completed


                                    ........ finished reading the parameter
data      ........


                                   *************** data reading completed
***************
1
*************************************************************************
*****************************************
        ***
***
        ***                                    fuel bundle
***
        ***
***

*************************************************************************
*****************************************

*************************************************************************
*****************************************
        ***
***
        ***           unit
volume                                            ***
        ***          number                data set name
name         unit function                       ***
        ***          ------                ------------
----         -------------                       ***
        ***
***
        ***       xsc  14
->Data\Local\Temp\scale.David.33572\ft14f001             mixed cross
sections                ***
        ***
```

```
***
        ***      alb  79     C:\SCALE\data\albedos
input albedos                      ***
        ***
***
        ***      wts  80     C:\SCALE\data\scale.rev01.weights
input weights                      ***
        ***
***
        ***      skt  16      unknown
write scratch data                 ***
        ***
***
        ***      rst  95
->\Temp\scale.David.33572\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.33572\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.33572\ft04f001             input ampx
working library         ***
        ***
***
        ***             8
->Data\Local\Temp\scale.David.33572\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

************************************************************************
*****************************************

                                ........ finished preparing input data
........
1
************************************************************************
****************************
                  ***
***
                  ***          fuel bundle
***
                  ***
***
```

```
********************************************************************************
****************************

********************************************************************************
****************************
                  ***
***
                  ***                                  ****** additional
information ******                              ***
                  ***
***
                  ***  use a global unit                         yes    use
lattice geometry                    yes  ***
                  ***
***
                  ***  no. of scattering angles in xsecs         3
global array number                          0  ***
                  ***
***
                  ***  number of mixtures used                   3
number of units in the global x dir.        0  ***
                  ***
***
                  ***  number of bias id's used                  1
number of units in the global y dir.        0  ***
                  ***
***
                  ***  number of differential albedos used       2
number of units in the global z dir.        0  ***
                  ***
***
                  ***  total input geometry regions              4
number of energy groups                   238  ***
                  ***
***
                  ***  number of geometry regions used           4    no.
of fission spectrum source grps.        1  ***
                  ***
***
                  ***  use nested arrays                        no    use
nested holes                             no  ***
                  ***
***
                  ***  number of arrays used                     1
number of holes                              0  ***
                  ***
***
                  ***  maximum array nesting level               1
maximum hole nesting level                   0  ***
                  ***
***
```

```
                  ***  largest array number                     1
largest geometry unit number              2  ***
                  ***
***
                  ***
***
                  ***  boundary label 1                cuboid
***
                  ***
***
                  ***    +x boundary condition             h2o
-x boundary condition                 h2o  ***
                  ***
***
                  ***    +y boundary condition        graphite
-y boundary condition            graphite  ***
                  ***
***
                  ***    +z boundary condition             h2o
-z boundary condition                 h2o  ***
                  ***
***

******************************************************************************
*****************************

                                  cross sections read from the ampx
working library on unit    4

1                                        fuel bundle

                                                  mixing table

                                          number of scattering angles =
3
                                       cross section message threshold
=1.0E+00


 mixture =     1          density(g/cc) =  5.5474
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    1001001  5.33559E-13  1.60965E-13    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    1003007  3.23535E-08  6.79473E-08    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    1004009  1.25936E-07  3.39736E-07    4009     9.0122     be9 425
endf/b7 rel8 rev7 mod2                   12/17/09
    1005010  6.04527E-08  1.81192E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
```

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    1005011  1.48724E-15  4.90121E-15    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                    12/17/09
    1007014  8.91558E-06  3.73710E-05    7014    14.0031     n14 725
endf/b7 rel8 rev7 mod0                    12/17/09
    1008016  1.00000E-20  4.78788E-20    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                    12/17/09
    1011023  9.87361E-07  6.79473E-06   11023    22.9898     na23 1125
endf/b7 rel8 rev7 mod0                   12/17/09
    1012024  7.37710E-07  5.29649E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                   12/17/09
    1012025  9.33929E-08  6.98505E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                   12/17/09
    1012026  1.02826E-07  7.99734E-07   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                   12/17/09
    1013027  3.96970E-02  3.20617E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                   12/17/09
    1014028  5.44792E-03  4.56239E-02   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                   12/17/09
    1014029  2.76758E-04  2.40054E-03   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                   12/17/09
    1014030  1.82655E-04  1.63883E-03   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                   12/17/09
    1015031  1.46571E-06  1.35895E-05   15031    30.9738     p31 1525
endf/b7 rel6 rev7 mod1                    12/17/09
    1020040  1.09810E-06  1.31358E-05   20040    39.9626     ca40 2025
endf/b7 rel1 rev7 mod1                   12/17/09
    1020042  7.32891E-09  9.20498E-08   20042    41.9586     ca42 2031
endf/b7 rel1 rev7 mod1                   12/17/09
    1020043  1.52922E-09  1.96645E-08   20043    42.9588     ca43 2034
endf/b7 rel1 rev7 mod1                   12/17/09
    1020044  2.36292E-08  3.10903E-07   20044    43.9555     ca44 2037
endf/b7 rel1 rev7 mod1                   12/17/09
    1020046  4.53101E-11  6.23272E-10   20046    45.9537     ca46 2043
endf/b7 rel1 rev7 mod1                   12/17/09
    1020048  2.11825E-09  3.04054E-08   20048    47.9525     ca48 2049
endf/b7 rel1 rev7 mod1                   12/17/09
    1023000  2.00517E-07  3.05763E-06   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                     12/17/09
    1024050  3.47753E-08  5.19916E-07   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                   12/17/09
    1024052  6.70606E-07  1.04264E-05   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                   12/17/09
    1024053  7.60414E-08  1.20504E-06   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                   12/17/09
    1024054  1.89283E-08  3.05616E-07   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                   12/17/09
    1025055  3.58088E-07  5.88877E-06   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                   12/17/09
    1026054  1.44567E-06  2.33421E-05   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                   12/17/09
    1026056  2.26940E-05  3.79975E-04   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                   12/17/09
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    1026057  5.24102E-07  8.93224E-06   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                 12/17/09
    1026058  6.97484E-08  1.20955E-06   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                 12/17/09
    1027059  1.92584E-07  3.39736E-06   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                 12/17/09
    1028058  1.14089E-06  1.97856E-05   28058    57.9353     ni58 2825
endf/b7 rel8 rev7 mod4                 12/17/09
    1028060  4.39468E-07  7.88386E-06   28060    59.9308     ni60 2831
endf/b7 rel8 rev7 mod4                 12/17/09
    1028061  1.91034E-08  3.48426E-07   28061    60.9311     ni61 2834
endf/b7 rel8 rev7 mod5                 12/17/09
    1028062  6.09099E-08  1.12912E-06   28062    61.9283     ni62 2837
endf/b7 rel8 rev7 mod5                 12/17/09
    1028064  1.55120E-08  2.96838E-07   28064    63.9280     ni64 2843
endf/b7 rel8 rev7 mod4                 12/17/09
    1029063  2.49068E-06  4.69175E-05   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                 12/17/09
    1029065  1.11117E-06  2.15960E-05   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                 12/17/09
    1030000  6.94379E-07  1.35895E-05   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                  12/17/09
    1036083  6.88500E-12  1.70881E-10   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90756E-08  1.32072E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.07103E-08  2.91444E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.64364E-08  4.52176E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  7.31499E-11  2.03433E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.66554E-08  4.68180E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  6.86396E-11  1.95002E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.74557E-09  7.88225E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  7.89724E-20  2.19626E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  7.48084E-12  2.12525E-10   41095    94.9068     nb95 4131
endf/b7 rel0 rev7 mod1                 12/17/09
    1042092  1.04839E-08  2.88425E-07   42092    91.9068     mo92 4225
endf/b7 rel0 rev7 mod1                 12/17/09
    1042094  6.55156E-09  1.84160E-07   42094    93.9051     mo94 4231
endf/b7 rel0 rev7 mod1                 12/17/09
    1042095  1.12872E-08  3.20657E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39892E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  6.85563E-09  1.98866E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
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    1042098  1.72383E-08  5.05200E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26469E-11  3.74435E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.93817E-09  2.07494E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  5.83672E-11  1.72804E-09   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  6.18574E-11  1.86839E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  5.06695E-11  1.54561E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  2.96600E-11  9.13638E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  2.26497E-11  7.04469E-10   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  4.73252E-12  1.50031E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  6.26808E-12  1.93079E-10   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.10223E-12  3.46124E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  1.03939E-11  3.26390E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  1.82059E-12  5.82603E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  6.70505E-13  2.16571E-11   46108   107.9039     pd108 4643
endf/b7 rel5 rev7 mod1                 12/17/09
    1047107  2.12330E-08  6.79473E-07   47107   106.9051     ag107 4725
endf/b7 rel0 rev7 mod1                 12/17/09
    1047109  3.68583E-13  1.20156E-11   47109   108.9047     ag109 4731
endf/b7 rel0 rev7 mod1                 12/17/09
    1048106  1.26206E-10  4.00095E-09   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                 12/17/09
    1048108  8.98595E-11  2.90245E-09   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                 12/17/09
    1048110  1.26105E-09  4.14861E-08   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                 12/17/09
    1048111  1.29247E-09  4.29072E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                 12/17/09
    1048112  2.43643E-09  8.16123E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                 12/17/09
    1048113  1.23391E-09  4.17020E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                 12/17/09
    1048114  2.90090E-09  9.89079E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                 12/17/09
    1048116  7.56386E-10  2.62426E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                 12/17/09
    1049115  1.20533E-13  4.14574E-12   49115   114.9039     in115 4931
endf/b7 rel3 rev7 mod1                 12/17/09
    1050112  1.85479E-10  6.21305E-09   50112   111.9048     sn112 5025
endf/b7 rel0 rev7 mod1                 12/17/09
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    1050114  1.26202E-10  4.30291E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                 12/17/09
    1050115  6.50195E-11  2.23634E-09   50115   114.9033     sn115 5034
endf/b7 rel0 rev7 mod1                 12/17/09
    1050116  2.78027E-09  9.64582E-08   50116   115.9017     sn116 5037
endf/b7 rel0 rev7 mod1                 12/17/09
    1050117  1.46870E-09  5.13948E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                 12/17/09
    1050118  4.63138E-09  1.63452E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                 12/17/09
    1050119  1.64270E-09  5.84674E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                 12/17/09
    1050120  6.22995E-09  2.23601E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                 12/17/09
    1050122  8.85516E-10  3.23128E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                 12/17/09
    1050124  1.10746E-09  4.10752E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                 12/17/09
    1050126  6.67844E-13  2.51703E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                 12/17/09
    1053127  1.41560E-12  5.37748E-11   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                  12/17/09
    1053129  6.76962E-12  2.61213E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                  12/17/09
    1053135  1.30210E-12  5.25836E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                  12/17/09
    1054131  1.91000E-11  7.48431E-10   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                 12/17/09
    1054133  2.55870E-11  1.01795E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                 12/17/09
    1054135  1.88658E-12  7.61855E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                 12/17/09
    1055133  5.06795E-11  2.01621E-09   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                 12/17/09
    1055134  9.76282E-17  3.91326E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                 12/17/09
    1055135  7.41201E-11  2.99315E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                 12/17/09
    1055137  7.31654E-11  2.99843E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                 12/17/09
    1056138  3.30021E-08  1.36233E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                 12/17/09
    1056140  4.23295E-11  1.77278E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                 12/17/09
    1057139  8.09307E-11  3.36510E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                 12/17/09
    1058141  5.51777E-11  2.32735E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                 12/17/09
    1058142  7.32887E-11  3.11322E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                 12/17/09
    1058143  6.29899E-12  2.69465E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                 12/17/09
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    1058144  6.31437E-11  2.72015E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                 12/17/09
    1059141  1.41051E-11  5.94937E-10   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                 12/17/09
    1059143  4.00324E-11  1.71253E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                 12/17/09
    1060143  2.47359E-11  1.05816E-09   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                 12/17/09
    1060144  1.74279E-12  7.50754E-11   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                 12/17/09
    1060145  4.57794E-11  1.98581E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                 12/17/09
    1060146  3.60894E-11  1.57629E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                 12/17/09
    1060147  1.43290E-11  6.30156E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                 12/17/09
    1060148  1.98097E-11  8.77117E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                 12/17/09
    1061147  1.24128E-11  5.45880E-10   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                 12/17/09
    1061148  5.70869E-19  2.52765E-17   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                 12/17/09
    1061149  1.87259E-12  8.34743E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                 12/17/09
    1062147  7.45899E-14  3.28025E-12   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                 12/17/09
    1062149  1.18016E-11  5.26076E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                 12/17/09
    1062150  7.97685E-16  3.57968E-14   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                 12/17/09
    1062151  3.01127E-09  1.36037E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                 12/17/09
    1062152  3.22013E-12  1.46436E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                 12/17/09
    1062153  2.33657E-13  1.06957E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                 12/17/09
    1063151  1.42971E-09  6.45886E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                 12/17/09
    1063153  1.56080E-09  7.14458E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                 12/17/09
    1063154  7.88374E-16  3.63243E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                 12/17/09
    1063155  3.89868E-13  1.80799E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                 12/17/09
    1063156  1.09886E-13  5.12886E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                 12/17/09
    1064152  5.77776E-12  2.62746E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                 12/17/09
    1064154  6.29364E-11  2.89975E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                 12/17/09
    1064155  4.27253E-10  1.98135E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                 12/17/09
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    1064156  5.91054E-10  2.75865E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                 12/17/09
    1064157  4.51783E-10  2.12217E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                 12/17/09
    1064158  7.17271E-10  3.39073E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                 12/17/09
    1064160  6.31100E-10  3.02122E-08   64160   159.9270     gd160 6449
endf/b7 rel0 rev7 mod1                 12/17/09
    1074182  7.16309E-08  3.90130E-06   74182   181.9482     w182 7431
endf/b7 rel8 rev7 mod2                  12/17/09
    1074183  3.84687E-08  2.10670E-06   74183   182.9502     w183 7434
endf/b7 rel8 rev7 mod2                  12/17/09
    1074184  8.19198E-08  4.51079E-06   74184   183.9509     w184 7437
endf/b7 rel8 rev7 mod2                  12/17/09
    1074186  7.51922E-08  4.18544E-06   74186   185.9544     w186 7443
endf/b7 rel8 rev7 mod2                  12/17/09
    1082204  7.66801E-11  4.68184E-09   82204   203.9730     pb204 8225
endf/b7 rel1 rev7 mod1                 12/17/09
    1082206  1.31999E-09  8.13854E-08   82206   205.9745     pb206 8231
endf/b7 rel1 rev7 mod1                 12/17/09
    1082207  1.21045E-09  7.49943E-08   82207   206.9759     pb207 8234
endf/b7 rel1 rev7 mod1                 12/17/09
    1082208  2.87003E-09  1.78674E-07   82208   207.9767     pb208 8237
endf/b7 rel6 rev7 mod2                 12/17/09
    1092234  1.45935E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                  12/17/09
    1092235  1.76387E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                  12/17/09
    1092236  9.22569E-06  6.51863E-04   92236   236.0456     u236 9231
endf/b7 rel0 rev7 mod1                  12/17/09
    1092238  7.06299E-03  5.03292E-01   92238   238.0508     u238 9237
endf/b7 rel6 rev7 mod5                  12/17/09
    1093237  4.11356E-13  2.91888E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                 12/17/09
    1094238  4.36759E-20  3.11222E-18   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                 12/17/09
    1094239  4.67302E-11  3.34389E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                 12/17/09
    1094240  1.10672E-17  7.95258E-16   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                 12/17/09
    1094241  9.97452E-21  7.19736E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                 12/17/09
    1094242  1.17300E-20  8.49925E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                 12/17/09
    1095241  1.00288E-20  7.23656E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                 12/17/09
    1095242  3.85628E-28  2.79417E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                 12/17/09
    1095243  9.99998E-21  7.27574E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                 12/17/09
    1096242  1.66319E-20  1.20511E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                 12/17/09
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    1096243  9.98533E-21  7.26507E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.97644E-21  7.28851E-19   96244   244.0627     cm244 9637
endf/b7 rel3 rev7 mod2                12/17/09

 mixture =     2          density(g/cc) = 0.99396
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    2001001  6.64695E-02  1.11915E-01    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    2008016  3.32348E-02  8.88085E-01    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09

 mixture =     3          density(g/cc) =  2.7020
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    3003006  1.75835E-07  6.50000E-07    3006     6.0151     li6 325
endf/b7 rel1 rev7 mod0                   12/17/09
    3003007  2.16849E-06  9.35000E-06    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    3005010  2.99015E-07  1.84000E-06    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    3005011  1.20605E-06  8.16000E-06    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    3012024  4.88634E-04  7.20258E-03   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    3012025  6.18603E-05  9.49881E-04   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    3012026  6.81081E-05  1.08754E-03   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    3013027  5.88689E-02  9.76150E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    3014028  2.67155E-04  4.59332E-03   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    3014029  1.35717E-05  2.41681E-04   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                  12/17/09
    3014030  8.95702E-06  1.64994E-04   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    3023000  3.19422E-06  1.00000E-04   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                    12/17/09
    3024050  1.83565E-06  5.63448E-05   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                  12/17/09
    3024052  3.53986E-05  1.12994E-03   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                  12/17/09
    3024053  4.01392E-06  1.30593E-04   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                  12/17/09
    3024054  9.99149E-07  3.31204E-05   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                  12/17/09
    3025055  2.07330E-05  7.00000E-04   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                  12/17/09
    3026054  6.02891E-06  1.99853E-04   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                  12/17/09
```

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    3026056  9.46410E-05  3.25331E-03   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                 12/17/09
    3026057  2.18567E-06  7.64770E-05   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                 12/17/09
    3026058  2.90873E-07  1.03561E-05   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                 12/17/09
    3027059  2.76106E-07  1.00000E-05   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                 12/17/09
    3029063  5.20580E-05  2.01329E-03   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                 12/17/09
    3029065  2.32247E-05  9.26712E-04   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                 12/17/09
    3030000  2.21504E-05  8.90000E-04   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                  12/17/09
    3031069  7.01394E-07  2.97102E-05   31069    68.9256     ga69 3125
endf/b7 rel0 rev7 mod1                 12/17/09
    3031071  4.65496E-07  2.02898E-05   31071    70.9247     ga71 3131
endf/b7 rel0 rev7 mod1                 12/17/09
    3048106  1.80940E-09  1.17766E-07   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                12/17/09
    3048108  1.28830E-09  8.54314E-08   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    3048110  1.80796E-08  1.22113E-06   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    3048111  1.85283E-08  1.26284E-06   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    3048112  3.49287E-08  2.40208E-06   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    3048113  1.76887E-08  1.22736E-06   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    3048114  4.15873E-08  2.91113E-06   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    3048116  1.08419E-08  7.72275E-07   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09



                              3003006    li6 325 endf/b7 rel1 rev7 mod0
12/17/09
                              1003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                              3003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                              1004009    be9 425 endf/b7 rel8 rev7 mod2
12/17/09
                              1005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                              3005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                              3005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                              1005011    b11 528 endf/b7 rel8 rev7 mod0
```

12/17/09	
	1007014 n14 725 endf/b7 rel8 rev7 mod0
12/17/09	
	2008016 o16 825 endf/b7 rel8 rev7 mod3
12/17/09	
	1008016 o16 825 endf/b7 rel8 rev7 mod3
12/17/09	
	1011023 na23 1125 endf/b7 rel8 rev7 mod0
12/17/09	
	1012024 mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09	
	3012024 mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09	
	1012025 mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09	
	3012025 mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09	
	1012026 mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09	
	3012026 mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09	
	1013027 al27 1325 endf/b7 rel6 rev7 mod1
12/17/09	
	3013027 al27 1325 endf/b7 rel6 rev7 mod1
12/17/09	
	1014028 si28 1425 endf/b7 rel6 rev7 mod1
12/17/09	
	3014028 si28 1425 endf/b7 rel6 rev7 mod1
12/17/09	
	1014029 si29 1428 endf/b7 rel8 rev7 mod3
12/17/09	
	3014029 si29 1428 endf/b7 rel8 rev7 mod3
12/17/09	
	1014030 si30 1431 endf/b7 rel6 rev7 mod2
12/17/09	
	3014030 si30 1431 endf/b7 rel6 rev7 mod2
12/17/09	
	1015031 p31 1525 endf/b7 rel6 rev7 mod1
12/17/09	
	1020040 ca40 2025 endf/b7 rel1 rev7 mod1
12/17/09	
	1020042 ca42 2031 endf/b7 rel1 rev7 mod1
12/17/09	
	1020043 ca43 2034 endf/b7 rel1 rev7 mod1
12/17/09	
	1020044 ca44 2037 endf/b7 rel1 rev7 mod1
12/17/09	
	1020046 ca46 2043 endf/b7 rel1 rev7 mod1
12/17/09	
	1020048 ca48 2049 endf/b7 rel1 rev7 mod1
12/17/09	
	1023000 v 2300 endf/b7 rel8 rev7 mod0

12/17/09	
	3023000 v 2300 endf/b7 rel8 rev7 mod0
12/17/09	
	1024050 cr50 2425 endf/b7 rel8 rev7 mod5
12/17/09	
	3024050 cr50 2425 endf/b7 rel8 rev7 mod5
12/17/09	
	1024052 cr52 2431 endf/b7 rel8 rev7 mod4
12/17/09	
	3024052 cr52 2431 endf/b7 rel8 rev7 mod4
12/17/09	
	1024053 cr53 2434 endf/b7 rel8 rev7 mod4
12/17/09	
	3024053 cr53 2434 endf/b7 rel8 rev7 mod4
12/17/09	
	1024054 cr54 2437 endf/b7 rel8 rev7 mod5
12/17/09	
	3024054 cr54 2437 endf/b7 rel8 rev7 mod5
12/17/09	
	1025055 mn55 2525 endf/b7 rel8 rev7 mod0
12/17/09	
	3025055 mn55 2525 endf/b7 rel8 rev7 mod0
12/17/09	
	1026054 fe54 2625 endf/b7 rel8 rev7 mod5
12/17/09	
	3026054 fe54 2625 endf/b7 rel8 rev7 mod5
12/17/09	
	1026056 fe56 2631 endf/b7 rel8 rev7 mod4
12/17/09	
	3026056 fe56 2631 endf/b7 rel8 rev7 mod4
12/17/09	
	1026057 fe57 2634 endf/b7 rel8 rev7 mod4
12/17/09	
	3026057 fe57 2634 endf/b7 rel8 rev7 mod4
12/17/09	
	1026058 fe58 2637 endf/b7 rel8 rev7 mod0
12/17/09	
	3026058 fe58 2637 endf/b7 rel8 rev7 mod0
12/17/09	
	1027059 co59 2725 endf/b7 rel2 rev7 mod0
12/17/09	
	3027059 co59 2725 endf/b7 rel2 rev7 mod0
12/17/09	
	1028058 ni58 2825 endf/b7 rel8 rev7 mod4
12/17/09	
	1028060 ni60 2831 endf/b7 rel8 rev7 mod4
12/17/09	
	1028061 ni61 2834 endf/b7 rel8 rev7 mod5
12/17/09	
	1028062 ni62 2837 endf/b7 rel8 rev7 mod5
12/17/09	
	1028064 ni64 2843 endf/b7 rel8 rev7 mod4

12/17/09
1029063 cu63 2925 endf/b7 rel8 rev7 mod5
12/17/09
3029063 cu63 2925 endf/b7 rel8 rev7 mod5
12/17/09
1029065 cu65 2931 endf/b7 rel8 rev7 mod5
12/17/09
3029065 cu65 2931 endf/b7 rel8 rev7 mod5
12/17/09
1030000 zn 3000 endf/b7 rel0 rev7 mod0
12/17/09
3030000 zn 3000 endf/b7 rel0 rev7 mod0
12/17/09
3031069 ga69 3125 endf/b7 rel0 rev7 mod1
12/17/09
3031071 ga71 3131 endf/b7 rel0 rev7 mod1
12/17/09
1036083 kr83 3640 endf/b7 rel0 rev7 mod1
12/17/09
1040090 zr90 4025 endf/b7 rel0 rev7 mod1
12/17/09
1040091 zr91 4028 endf/b7 rel0 rev7 mod1
12/17/09
1040092 zr92 4031 endf/b7 rel3 rev7 mod4
12/17/09
1040093 zr93 4034 endf/b7 rel3 rev7 mod1
12/17/09
1040094 zr94 4037 endf/b7 rel3 rev7 mod1
12/17/09
1040095 zr95 4040 endf/b7 rel0 rev7 mod1
12/17/09
1040096 zr96 4043 endf/b7 rel0 rev7 mod1
12/17/09
1041093 nb93 4125 endf/b7 rel6 rev7 mod3
12/17/09
1041095 nb95 4131 endf/b7 rel0 rev7 mod1
12/17/09
1042092 mo92 4225 endf/b7 rel0 rev7 mod1
12/17/09
1042094 mo94 4231 endf/b7 rel0 rev7 mod1
12/17/09
1042095 mo95 4234 endf/b7 rel0 rev7 mod1
12/17/09
1042096 mo96 4237 endf/b7 rel0 rev7 mod1
12/17/09
1042097 mo97 4240 endf/b7 rel0 rev7 mod1
12/17/09
1042098 mo98 4243 endf/b7 rel0 rev7 mod1
12/17/09
1042099 mo99 4246 endf/b7 rel0 rev7 mod1
12/17/09
1042100 mo100 4249 endf/b7 rel0 rev7

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mod1                 12/17/09
                              1043099    tc99 4325 endf/b7 rel0 rev7 mod1
12/17/09
                              1044101    ru101 4440 endf/b7 rel0 rev7
mod1                 12/17/09
                              1044102    ru102 4443 endf/b7 rel0 rev7
mod1                 12/17/09
                              1044103    ru103 4446 endf/b7 rel0 rev7
mod1                 12/17/09
                              1044104    ru104 4449 endf/b7 rel0 rev7
mod1                 12/17/09
                              1044106    ru106 4455 endf/b7 rel0 rev7
mod0                 12/17/09
                              1045103    rh103 4525 endf/b7 rel0 rev7
mod1                 12/17/09
                              1045105    rh105 4531 endf/b7 rel0 rev7
mod1                 12/17/09
                              1046105    pd105 4634 endf/b7 rel0 rev7
mod1                 12/17/09
                              1046107    pd107 4640 endf/b7 rel0 rev7
mod1                 12/17/09
                              1046108    pd108 4643 endf/b7 rel5 rev7
mod1                 12/17/09
                              1047107    ag107 4725 endf/b7 rel0 rev7
mod1                 12/17/09
                              1047109    ag109 4731 endf/b7 rel0 rev7
mod1                 12/17/09
                              1048106    cd106 4825 endf/b7 rel0 rev7
mod1                 12/17/09
                              3048106    cd106 4825 endf/b7 rel0 rev7
mod1                 12/17/09
                              1048108    cd108 4831 endf/b7 rel0 rev7
mod1                 12/17/09
                              3048108    cd108 4831 endf/b7 rel0 rev7
mod1                 12/17/09
                              1048110    cd110 4837 endf/b7 rel0 rev7
mod1                 12/17/09
                              3048110    cd110 4837 endf/b7 rel0 rev7
mod1                 12/17/09
                              1048111    cd111 4840 endf/b7 rel0 rev7
mod1                 12/17/09
                              3048111    cd111 4840 endf/b7 rel0 rev7
mod1                 12/17/09
                              1048112    cd112 4843 endf/b7 rel0 rev7
mod1                 12/17/09
                              3048112    cd112 4843 endf/b7 rel0 rev7
mod1                 12/17/09
                              1048113    cd113 4846 endf/b7 rel0 rev7
mod1                 12/17/09
                              3048113    cd113 4846 endf/b7 rel0 rev7
mod1                 12/17/09
                              1048114    cd114 4849 endf/b7 rel4 rev7
```

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mod1                12/17/09
                            3048114    cd114 4849 endf/b7 rel4 rev7
mod1                12/17/09
                            1048116    cd116 4855 endf/b7 rel0 rev7
mod1                12/17/09
                            3048116    cd116 4855 endf/b7 rel0 rev7
mod1                12/17/09
                            1049115    in115 4931 endf/b7 rel3 rev7
mod1                12/17/09
                            1050112    sn112 5025 endf/b7 rel0 rev7
mod1                12/17/09
                            1050114    sn114 5031 endf/b7 rel0 rev7
mod1                12/17/09
                            1050115    sn115 5034 endf/b7 rel0 rev7
mod1                12/17/09
                            1050116    sn116 5037 endf/b7 rel0 rev7
mod1                12/17/09
                            1050117    sn117 5040 endf/b7 rel0 rev7
mod1                12/17/09
                            1050118    sn118 5043 endf/b7 rel0 rev7
mod1                12/17/09
                            1050119    sn119 5046 endf/b7 rel0 rev7
mod1                12/17/09
                            1050120    sn120 5049 endf/b7 rel0 rev7
mod1                12/17/09
                            1050122    sn122 5055 endf/b7 rel0 rev7
mod1                12/17/09
                            1050124    sn124 5061 endf/b7 rel0 rev7
mod1                12/17/09
                            1050126    sn126 5067 endf/b7 rel0 rev7
mod1                12/17/09
                            1053127    i127 5325 endf/b7 rel2 rev7 mod1
12/17/09
                            1053129    i129 5331 endf/b7 rel0 rev7 mod1
12/17/09
                            1053135    i135 5349 endf/b7 rel0 rev7 mod1
12/17/09
                            1054131    xe131 5446 endf/b7 rel0 rev7
mod1                12/17/09
                            1054133    xe133 5452 endf/b7 rel0 rev7
mod1                12/17/09
                            1054135    xe135 5458 endf/b7 rel0 rev7
mod1                12/17/09
                            1055133    cs133 5525 endf/b7 rel0 rev7
mod1                12/17/09
                            1055134    cs134 5528 endf/b7 rel0 rev7
mod1                12/17/09
                            1055135    cs135 5531 endf/b7 rel0 rev7
mod1                12/17/09
                            1055137    cs137 5537 endf/b7 rel0 rev7
mod1                12/17/09
                            1056138    ba138 5649 endf/b7 rel0 rev7
```

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mod1                12/17/09
                          1056140    ba140 5655 endf/b7 rel0 rev7
mod1                12/17/09
                          1057139    la139 5728 endf/b7 rel0 rev7
mod1                12/17/09
                          1058141    ce141 5840 endf/b7 rel0 rev7
mod1                12/17/09
                          1058142    ce142 5843 endf/b7 rel0 rev7
mod1                12/17/09
                          1058143    ce143 5846 endf/b7 rel0 rev7
mod1                12/17/09
                          1058144    ce144 5849 endf/b7 rel0 rev7
mod1                12/17/09
                          1059141    pr141 5925 endf/b7 rel0 rev7
mod1                12/17/09
                          1059143    pr143 5931 endf/b7 rel0 rev7
mod1                12/17/09
                          1060143    nd143 6028 endf/b7 rel0 rev7
mod1                12/17/09
                          1060144    nd144 6031 endf/b7 rel0 rev7
mod1                12/17/09
                          1060145    nd145 6034 endf/b7 rel0 rev7
mod1                12/17/09
                          1060146    nd146 6037 endf/b7 rel0 rev7
mod1                12/17/09
                          1060147    nd147 6040 endf/b7 rel0 rev7
mod1                12/17/09
                          1060148    nd148 6043 endf/b7 rel0 rev7
mod1                12/17/09
                          1061147    pm147 6149 endf/b7 rel3 rev7
mod1                12/17/09
                          1061148    pm148 6152 endf/b7 rel3 rev7
mod1                12/17/09
                          1061149    pm149 6155 endf/b7 rel3 rev7
mod1                12/17/09
                          1062147    sm147 6234 endf/b7 rel0 rev7
mod1                12/17/09
                          1062149    sm149 6240 endf/b7 rel0 rev7
mod1                12/17/09
                          1062150    sm150 6243 endf/b7 rel0 rev7
mod1                12/17/09
                          1062151    sm151 6246 endf/b7 rel0 rev7
mod1                12/17/09
                          1062152    sm152 6249 endf/b7 rel0 rev7
mod1                12/17/09
                          1062153    sm153 6252 endf/b7 rel0 rev7
mod1                12/17/09
                          1063151    eu151 6325 endf/b7 rel0 rev7
mod1                12/17/09
                          1063153    eu153 6331 endf/b7 rel1 rev7
mod1                12/17/09
                          1063154    eu154 6334 endf/b7 rel0 rev7
```

```
mod1                12/17/09
                            1063155    eu155 6337 endf/b7 rel0 rev7
mod1                12/17/09
                            1063156    eu156 6340 endf/b7 rel0 rev7
mod1                12/17/09
                            1064152    gd152 6425 endf/b7 rel0 rev7
mod1                12/17/09
                            1064154    gd154 6431 endf/b7 rel0 rev7
mod1                12/17/09
                            1064155    gd155 6434 endf/b7 rel0 rev7
mod1                12/17/09
                            1064156    gd156 6437 endf/b7 rel0 rev7
mod1                12/17/09
                            1064157    gd157 6440 endf/b7 rel0 rev7
mod1                12/17/09
                            1064158    gd158 6443 endf/b7 rel0 rev7
mod1                12/17/09
                            1064160    gd160 6449 endf/b7 rel0 rev7
mod1                12/17/09
                            1074182    w182 7431 endf/b7 rel8 rev7 mod2
12/17/09
                            1074183    w183 7434 endf/b7 rel8 rev7 mod2
12/17/09
                            1074184    w184 7437 endf/b7 rel8 rev7 mod2
12/17/09
                            1074186    w186 7443 endf/b7 rel8 rev7 mod2
12/17/09
                            1082204    pb204 8225 endf/b7 rel1 rev7
mod1                12/17/09
                            1082206    pb206 8231 endf/b7 rel1 rev7
mod1                12/17/09
                            1082207    pb207 8234 endf/b7 rel1 rev7
mod1                12/17/09
                            1082208    pb208 8237 endf/b7 rel6 rev7
mod2                12/17/09
                            1092234    u234 9225 endf/b7 rel5 rev7 mod2
12/17/09
                            1092235    u235 9228 endf/b7 rel0 rev7 mod7
12/17/09
                            1092236    u236 9231 endf/b7 rel0 rev7 mod1
12/17/09
                            1092238    u238 9237 endf/b7 rel6 rev7 mod5
12/17/09
                            1093237    np237 9346 endf/b7 rel0 rev7
mod1                12/17/09
                            1094238    pu238 9434 endf/b7 rel0 rev7
mod0                12/17/09
                            1094239    pu239 9437 endf/b7 rel5 rev7
mod5                12/17/09
                            1094240    pu240 9440 endf/b7 rel2 rev7
mod0                12/17/09
                            1094241    pu241 9443 endf/b7 rel3 rev7
```

```
mod1                 12/17/09
                                1094242    pu242 9446 endf/b7 rel0 rev7
mod0                 12/17/09
                                1095241    am241 9543 endf/b7 rel0 rev7
mod4                 12/17/09
                                1095242    am242 9546 endf/b7 rel0 rev7
mod0                 12/17/09
                                1095243    am243 9549 endf/b7 rel5 rev7
mod0                 12/17/09
                                1096242    cm242 9631 endf/b7 rel0 rev7
mod0                 12/17/09
                                1096243    cm243 9634 endf/b7 rel7 rev7
mod0                 12/17/09
                                1096244    cm244 9637 endf/b7 rel3 rev7
mod2                 12/17/09
                                2001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09
                                1001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09

  ***** warning ***** keno message number k6-222 follows:
  9458 transfers for mixture 1 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  139 transfers for mixture 3 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  13467 transfers for mixture 2 were corrected for bad moments.

                                ........ finished mixing cross-sections
........

                                 1-d cross section array id numbers

                                            neutron
                                 reaction name    reaction id
                                         total              1
                                non-absorption           2002
                                    nu-fission           1452
                                    absorption             27
                                       fission             18
                                           chi           1018

                                 ........ finished preparing the cross
sections    ........


************************************************************
                                **
**
                                **   array      units in   units in
```

```
units in   nesting  **
                                **   number      x dir.     y dir.     z
dir.     level   **
                                **
**
                                **     1            1         14
1          1    **
                                **
**

************************************************************


                                ........ finished loading the data
........
1
************************************************************************
*****************************************
        ***
***
        ***
***

************************************************************************
*****************************************
        ***                                     ******      geometry
parameters       ******                                     ***
        ***
***
        ***
***
        ***                     niar        number of independent array
references              1                        ***
        ***
***
        ***                     ngblu       global unit number
2                        ***
        ***
***
        ***                     nboxt       number of units in the
problem                      2                           ***
        ***
***
        ***                     nquad       number of quadratics in the
problem                 12                       ***
        ***
***
        ***                     ngwrds      number of geometry words
read                        4                          ***
        ***
***
        ***                     maxgwd      maximum geometry words in a
```

```
unit                    3                       ***
        ***
***
        ***                     maxsfu      largest number of surfaces
in a unit                9                       ***
        ***
***
        ***                     maxreg      largest number of media in a
unit                    3                       ***
        ***
***
        ***                     regtot      number of spatial volumes
defined                  4                       ***
        ***
***
        ***                     sectot      number of entries in the
sector array             14                       ***
        ***
***
        ***                     nucom       number of comments in the
geometry data            2                       ***
        ***
***
        ***                     numhol      number of holes in the
problem                     0                       ***
        ***
***

************************************************************************
*****************************************

1                                       fuel bundle

                                  geometry description for those units
utilized in this problem



                                                        -----   unit 1
-----

 fuel meat

       1        cuboid         1                           quadratic
surfaces

      X**2          Y**2          Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +8.86938E+00
```

```
  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +6.45160E-04

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +9.00225E+02

       2        cuboid         2                            quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.03225E-03

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

       3        cuboid         3                            quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.18080E-02

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                        sector
               imp      definitions

 media 1    1          1

 media 3    1          2 -1

 media 2    1          -1 -2 3

 boundary                      3


                                          ******************   global
******************
                                                      -----   unit 2
-----
```

```
 array unit

       1        cuboid         1                              quadratic
surfaces

      X**2          Y**2          Z**2           XY            XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +5.31622E+00 +0.00000E+00 +1.12882E+00

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 array 1               1

 boundary                         1
1                         fuel bundle

                   -------  unit orientation description for array 1
-------


 z layer 1, x column 1 to 1 left to right   y row 1 to 14  bottom to top

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1
```

1

1

1

1

1 fuel bundle

volumes for those units utilized in this problem

volumes not specified in the input were set to -1.0

unit	uses	geometry region	mixture	total region volume (cm**3)
1	14	1	1	2.47925E+02 +/- 7.84971E-01
		2	3	5.95366E+02 +/- 1.88502E+00
		3	2	1.84949E+03 +/- 5.85578E+00
2	1	1		

mixture	total mixture volume (cm**3)	total mixture mass (gm)
1	2.47925E+02 +/- 7.84971E-01	1.37533E+03 +/- 4.35453E+00
2	1.84949E+03 +/- 5.85578E+00	1.83832E+03 +/- 5.82041E+00
3	5.95366E+02 +/- 1.88502E+00	1.60868E+03 +/- 5.09333E+00
	2.69278E+03	4.82233E+03

***** restart data has been written on unit 95 *****

****

*** biasing information

```
***
        ***
***
        ***     a default weight of    0.500 will be used for all bias
id's.                                                   ***
        ***
***

*************************************************************************
*****************************************

                                  ........ finished in Keno-VI before
tracking       ........

                                  ........     0.01667 minutes were used
processing data.        ........

 volume fraction of fissile material in the system= 9.20704E-02

 start type 6 was used.

 neutrons were started from binary start data on file
keno_start6_file

 neutrons started in non-fissile mixtures will use the fission spectrum
for mixture     1

   0.00083 minutes were required for starting.   total elapsed time is
0.01750 minutes.
1fuel bundle

                    generation        average         avg k-eff
matrix       matrix k-eff
     generation   k-effective      k-effective       deviation
k-effective       deviation
  keno message number k6-132 follows:
 only 15738 independent fission points were generated for generation 1
          1       7.70157E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15762 independent fission points were generated for generation 2
          2       7.68126E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15563 independent fission points were generated for generation 3
          3       7.59921E-01      7.59921E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.67081E-01      7.63501E-01      3.57977E-03
0.00000E+00      0.00000E+00
          5       7.69245E-01      7.65416E-01      2.81728E-03
0.00000E+00      0.00000E+00
          6       7.70906E-01      7.66788E-01      2.41918E-03
```

0.00000E+00	0.00000E+00		
7	7.69252E-01	7.67281E-01	1.93760E-03
0.00000E+00	0.00000E+00		
8	7.72567E-01	7.68162E-01	1.81085E-03
0.00000E+00	0.00000E+00		
9	7.65169E-01	7.67734E-01	1.58907E-03
0.00000E+00	0.00000E+00		
10	7.71282E-01	7.68178E-01	1.44586E-03
0.00000E+00	0.00000E+00		
11	7.57614E-01	7.67004E-01	1.73311E-03
0.00000E+00	0.00000E+00		
12	7.66524E-01	7.66956E-01	1.55088E-03
0.00000E+00	0.00000E+00		
13	7.69231E-01	7.67163E-01	1.41799E-03
0.00000E+00	0.00000E+00		
14	7.62333E-01	7.66760E-01	1.35556E-03
0.00000E+00	0.00000E+00		
15	7.70279E-01	7.67031E-01	1.27597E-03
0.00000E+00	0.00000E+00		
16	7.62299E-01	7.66693E-01	1.22873E-03
0.00000E+00	0.00000E+00		
17	7.58996E-01	7.66180E-01	1.25371E-03
0.00000E+00	0.00000E+00		
18	7.68752E-01	7.66341E-01	1.18370E-03
0.00000E+00	0.00000E+00		
19	7.65683E-01	7.66302E-01	1.11257E-03
0.00000E+00	0.00000E+00		
20	7.65119E-01	7.66236E-01	1.05100E-03
0.00000E+00	0.00000E+00		
21	7.71773E-01	7.66528E-01	1.03598E-03
0.00000E+00	0.00000E+00		
22	7.68207E-01	7.66612E-01	9.86391E-04
0.00000E+00	0.00000E+00		
23	7.67580E-01	7.66658E-01	9.39378E-04
0.00000E+00	0.00000E+00		
24	7.69914E-01	7.66806E-01	9.07808E-04
0.00000E+00	0.00000E+00		
25	7.63735E-01	7.66672E-01	8.77656E-04
0.00000E+00	0.00000E+00		
26	7.73221E-01	7.66945E-01	8.83491E-04
0.00000E+00	0.00000E+00		
27	7.67455E-01	7.68581E-01	6.87663E-03
0.00000E+00	0.00000E+00		
28	7.66500E-01	7.68165E-01	6.57147E-03
0.00000E+00	0.00000E+00		
29	7.68058E-01	7.68147E-01	3.61032E-03
0.00000E+00	0.00000E+00		
30	7.58114E-01	7.66714E-01	4.10552E-03
0.00000E+00	0.00000E+00		
31	7.65547E-01	7.66568E-01	3.16460E-03
0.00000E+00	0.00000E+00		
32	7.73662E-01	7.67356E-01	1.81142E-03

0.00000E+00	0.00000E+00		
33	7.66446E-01	7.67265E-01	1.60077E-03
0.00000E+00	0.00000E+00		
34	7.72447E-01	7.67736E-01	1.52356E-03
0.00000E+00	0.00000E+00		
35	7.72272E-01	7.68114E-01	1.43898E-03
0.00000E+00	0.00000E+00		
36	7.68943E-01	7.68178E-01	1.31542E-03
0.00000E+00	0.00000E+00		
37	7.70611E-01	7.68352E-01	1.22448E-03
0.00000E+00	0.00000E+00		
38	7.65192E-01	7.68141E-01	1.15601E-03
0.00000E+00	0.00000E+00		
39	7.70488E-01	7.68288E-01	1.49613E-03
0.00000E+00	0.00000E+00		
40	7.68037E-01	7.68273E-01	1.38486E-03
0.00000E+00	0.00000E+00		
41	7.65123E-01	7.68098E-01	9.73571E-04
0.00000E+00	0.00000E+00		
42	7.73121E-01	7.68362E-01	9.59491E-04
0.00000E+00	0.00000E+00		
43	7.68412E-01	7.68365E-01	9.07587E-04
0.00000E+00	0.00000E+00		
44	7.66543E-01	7.68278E-01	8.65833E-04
0.00000E+00	0.00000E+00		
45	7.63906E-01	7.68079E-01	8.49536E-04
0.00000E+00	0.00000E+00		
46	7.64133E-01	7.67908E-01	8.29663E-04
0.00000E+00	0.00000E+00		
47	7.75696E-01	7.68232E-01	8.62186E-04
0.00000E+00	0.00000E+00		
48	7.55178E-01	7.67710E-01	1.27052E-03
0.00000E+00	0.00000E+00		
49	7.57430E-01	7.67315E-01	1.03390E-03
0.00000E+00	0.00000E+00		
50	7.62763E-01	7.67146E-01	1.27748E-03
0.00000E+00	0.00000E+00		
51	7.72946E-01	7.67353E-01	1.10497E-03
0.00000E+00	0.00000E+00		
52	7.71073E-01	7.67482E-01	1.03603E-03
0.00000E+00	0.00000E+00		
53	7.58780E-01	7.67192E-01	9.80287E-04
0.00000E+00	0.00000E+00		
54	7.64650E-01	7.67110E-01	1.45376E-03
0.00000E+00	0.00000E+00		
55	7.70791E-01	7.67225E-01	1.41658E-03
0.00000E+00	0.00000E+00		
56	7.73546E-01	7.67416E-01	9.79146E-04
0.00000E+00	0.00000E+00		
57	7.66291E-01	7.67383E-01	9.40998E-04
0.00000E+00	0.00000E+00		
58	7.63128E-01	7.67261E-01	9.25677E-04

0.00000E+00	0.00000E+00			
59	7.62547E-01	7.67131E-01	9.27790E-04	
0.00000E+00	0.00000E+00			
60	7.67312E-01	7.67135E-01	9.00089E-04	
0.00000E+00	0.00000E+00			
61	7.61185E-01	7.66979E-01	8.88820E-04	
0.00000E+00	0.00000E+00			
62	7.62836E-01	7.66873E-01	8.92366E-04	
0.00000E+00	0.00000E+00			
63	7.65308E-01	7.66833E-01	8.74691E-04	
0.00000E+00	0.00000E+00			
64	7.66450E-01	7.66824E-01	8.52440E-04	
0.00000E+00	0.00000E+00			
65	7.67900E-01	7.66850E-01	8.31001E-04	
0.00000E+00	0.00000E+00			
66	7.68047E-01	7.66878E-01	8.12006E-04	
0.00000E+00	0.00000E+00			
67	7.70189E-01	7.66953E-01	7.99374E-04	
0.00000E+00	0.00000E+00			
68	7.69710E-01	7.67014E-01	7.89722E-04	
0.00000E+00	0.00000E+00			
69	7.66712E-01	7.67008E-01	7.70980E-04	
0.00000E+00	0.00000E+00			
70	7.74225E-01	7.67161E-01	7.69372E-04	
0.00000E+00	0.00000E+00			
71	7.73362E-01	7.67290E-01	1.07829E-03	
0.00000E+00	0.00000E+00			
72	7.60407E-01	7.67150E-01	1.02211E-03	
0.00000E+00	0.00000E+00			
73	7.62922E-01	7.67065E-01	7.69284E-04	
0.00000E+00	0.00000E+00			
74	7.66937E-01	7.67063E-01	7.53700E-04	
0.00000E+00	0.00000E+00			
75	7.61840E-01	7.66962E-01	9.42065E-04	
0.00000E+00	0.00000E+00			
76	7.71209E-01	7.67042E-01	7.24149E-04	
0.00000E+00	0.00000E+00			
77	7.71051E-01	7.67117E-01	7.23285E-04	
0.00000E+00	0.00000E+00			
78	7.65933E-01	7.67095E-01	7.07377E-04	
0.00000E+00	0.00000E+00			
79	7.68612E-01	7.67122E-01	8.46181E-04	
0.00000E+00	0.00000E+00			
80	7.62767E-01	7.67046E-01	6.82319E-04	
0.00000E+00	0.00000E+00			
81	7.68825E-01	7.67077E-01	6.67044E-04	
0.00000E+00	0.00000E+00			
82	7.69775E-01	7.67122E-01	6.59281E-04	
0.00000E+00	0.00000E+00			
83	7.58551E-01	7.66979E-01	6.76595E-04	
0.00000E+00	0.00000E+00			
84	7.69830E-01	7.67026E-01	6.57984E-04	

```
0.00000E+00      0.00000E+00
         85       7.63311E-01      7.66966E-01      6.40192E-04
0.00000E+00      0.00000E+00
         86       7.71678E-01      7.67041E-01      6.07582E-04
0.00000E+00      0.00000E+00
         87       7.66337E-01      7.67030E-01      5.96324E-04
0.00000E+00      0.00000E+00
         88       7.64689E-01      7.66994E-01      5.88627E-04
0.00000E+00      0.00000E+00
         89       7.70753E-01      7.67051E-01      5.89572E-04
0.00000E+00      0.00000E+00
         90       7.72253E-01      7.67129E-01      5.92913E-04
0.00000E+00      0.00000E+00
         91       7.70130E-01      7.67173E-01      5.82683E-04
0.00000E+00      0.00000E+00
         92       7.63012E-01      7.67112E-01      5.72286E-04
0.00000E+00      0.00000E+00
         93       7.70238E-01      7.67157E-01      5.60657E-04
0.00000E+00      0.00000E+00
         94       7.60767E-01      7.67067E-01      5.45387E-04
0.00000E+00      0.00000E+00
         95       7.62847E-01      7.67008E-01      5.57844E-04
0.00000E+00      0.00000E+00
         96       7.67645E-01      7.67017E-01      5.49027E-04
0.00000E+00      0.00000E+00
         97       7.67952E-01      7.67030E-01      5.41731E-04
0.00000E+00      0.00000E+00
         98       7.73373E-01      7.67114E-01      5.43445E-04
0.00000E+00      0.00000E+00
         99       7.64920E-01      7.67086E-01      5.32019E-04
0.00000E+00      0.00000E+00
        100       7.62728E-01      7.67029E-01      5.31279E-04
0.00000E+00      0.00000E+00
        101       7.57695E-01      7.66909E-01      5.51413E-04
0.00000E+00      0.00000E+00
        102       7.58999E-01      7.66809E-01      5.76053E-04
0.00000E+00      0.00000E+00
        103       7.63302E-01      7.66765E-01      5.78389E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=2392609FF6451113
        104       7.63552E-01      7.66726E-01      5.75610E-04
0.00000E+00      0.00000E+00
        105       7.60119E-01      7.66645E-01      5.89912E-04
0.00000E+00      0.00000E+00
        106       7.63588E-01      7.66608E-01      5.91950E-04
0.00000E+00      0.00000E+00
        107       7.67080E-01      7.66614E-01      5.83850E-04
0.00000E+00      0.00000E+00
        108       7.75196E-01      7.66715E-01      5.75574E-04
0.00000E+00      0.00000E+00
        109       7.62321E-01      7.66664E-01      5.61480E-04
```

```
0.00000E+00      0.00000E+00
        110       7.57305E-01      7.66556E-01      5.75653E-04
0.00000E+00      0.00000E+00
        111       7.63083E-01      7.66517E-01      5.78057E-04
0.00000E+00      0.00000E+00
        112       7.71737E-01      7.66575E-01      5.70321E-04
0.00000E+00      0.00000E+00
        113       7.68290E-01      7.66594E-01      5.66216E-04
0.00000E+00      0.00000E+00
        114       7.66465E-01      7.66593E-01      5.59762E-04
0.00000E+00      0.00000E+00
        115       7.65763E-01      7.66584E-01      5.53594E-04
0.00000E+00      0.00000E+00
        116       7.66234E-01      7.66580E-01      5.47546E-04
0.00000E+00      0.00000E+00
        117       7.72645E-01      7.66645E-01      5.45136E-04
0.00000E+00      0.00000E+00
        118       7.70214E-01      7.66682E-01      5.45287E-04
0.00000E+00      0.00000E+00
        119       7.64597E-01      7.66661E-01      5.38310E-04
0.00000E+00      0.00000E+00
        120       7.67046E-01      7.66665E-01      5.32457E-04
0.00000E+00      0.00000E+00
        121       7.69383E-01      7.66692E-01      5.27873E-04
0.00000E+00      0.00000E+00
        122       7.64536E-01      7.66671E-01      5.21649E-04
0.00000E+00      0.00000E+00
        123       7.68094E-01      7.66685E-01      5.15882E-04
0.00000E+00      0.00000E+00

  keno message number k6-123          execution terminated due to
completion of the specified number of generations.
                                    restart data was written for
generation  123       random number=512B0D78FD2386E8
                                    A start type 6 file will be written to
keno_start6_file
1                                                  fuel bundle

 lifetime =  1.55176E-05 + or -  1.18564E-08             generation time
=  2.99144E-05 + or -  2.17959E-08
 nu bar   =  2.43894E+00 + or -  1.10734E-05       average fission group
=  2.17575E+02 + or -  9.06137E-03
                     energy(ev) of the average lethargy causing fission
=  5.64726E-02 + or -  1.37191E-04
                                                system mean free path (cm)
=  6.52767E-01 + or -  1.72252E-04

 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
```

confidence interval		confidence interval		histories	(per cent)		
23	0.76668	+ or - 0.00052	0.76617 to 0.76720	0.76565 to 0.76772	0.76514 to 0.76823	2000000	9.5993
24	0.76665	+ or - 0.00052	0.76613 to 0.76717	0.76561 to 0.76770	0.76509 to 0.76822	1980000	9.5354
25	0.76668	+ or - 0.00053	0.76615 to 0.76721	0.76562 to 0.76774	0.76509 to 0.76827	1960000	9.4281
26	0.76661	+ or - 0.00053	0.76608 to 0.76715	0.76555 to 0.76768	0.76502 to 0.76821	1940000	9.5446
27	0.76661	+ or - 0.00054	0.76607 to 0.76714	0.76553 to 0.76768	0.76500 to 0.76821	1920000	9.5077
28	0.76661	+ or - 0.00054	0.76606 to 0.76715	0.76552 to 0.76769	0.76498 to 0.76823	1900000	9.4709
29	0.76659	+ or - 0.00055	0.76604 to 0.76714	0.76549 to 0.76769	0.76494 to 0.76824	1880000	9.3453
30	0.76668	+ or - 0.00055	0.76614 to 0.76723	0.76559 to 0.76778	0.76504 to 0.76832	1860000	9.5276
31	0.76669	+ or - 0.00055	0.76614 to 0.76725	0.76559 to 0.76780	0.76503 to 0.76836	1840000	9.4441
32	0.76662	+ or - 0.00056	0.76606 to 0.76717	0.76551 to 0.76773	0.76495 to 0.76828	1820000	9.5059
37	0.76641	+ or - 0.00056	0.76585 to 0.76698	0.76529 to 0.76754	0.76472 to 0.76811	1720000	10.1201
42	0.76629	+ or - 0.00059	0.76570 to 0.76688	0.76511 to 0.76747	0.76452 to 0.76806	1620000	10.2609
47	0.76620	+ or - 0.00065	0.76555 to 0.76685	0.76490 to 0.76749	0.76425 to 0.76814	1520000	8.9991
52	0.76636	+ or - 0.00062	0.76574 to 0.76698	0.76513 to 0.76759	0.76451 to 0.76821	1420000	9.4361
57	0.76633	+ or - 0.00063	0.76570 to 0.76695	0.76507 to 0.76758	0.76445 to 0.76820	1320000	10.0506
62	0.76656	+ or - 0.00065	0.76591 to 0.76722	0.76526 to 0.76787	0.76461 to 0.76852	1220000	10.8739
67	0.76647	+ or - 0.00070	0.76578 to 0.76717	0.76508 to 0.76787	0.76438 to 0.76857	1120000	10.9843

```
      72          0.76624   + or - 0.00070     0.76553 to 0.76694
0.76483 to 0.76764    0.76413 to 0.76835    1020000      12.1061

      77          0.76618   + or - 0.00076     0.76542 to 0.76694
0.76466 to 0.76770    0.76390 to 0.76846     920000      12.6366

      82          0.76606   + or - 0.00087     0.76518 to 0.76693
0.76431 to 0.76780    0.76344 to 0.76867     820000      11.8898

      87          0.76607   + or - 0.00100     0.76507 to 0.76707
0.76406 to 0.76808    0.76306 to 0.76908     720000      11.1702

      92          0.76573   + or - 0.00110     0.76463 to 0.76683
0.76353 to 0.76793    0.76243 to 0.76903     620000      12.4424

      97          0.76570   + or - 0.00128     0.76442 to 0.76698
0.76314 to 0.76827    0.76186 to 0.76955     520000      13.0150

     102          0.76622   + or - 0.00124     0.76498 to 0.76746
0.76374 to 0.76870    0.76250 to 0.76994     420000      18.0272

     107          0.76706   + or - 0.00139     0.76566 to 0.76845
0.76427 to 0.76984    0.76288 to 0.77124     320000      24.6299

     112          0.76757   + or - 0.00083     0.76674 to 0.76840
0.76592 to 0.76922    0.76509 to 0.77005     220000      36.6962
1                                                 fuel bundle

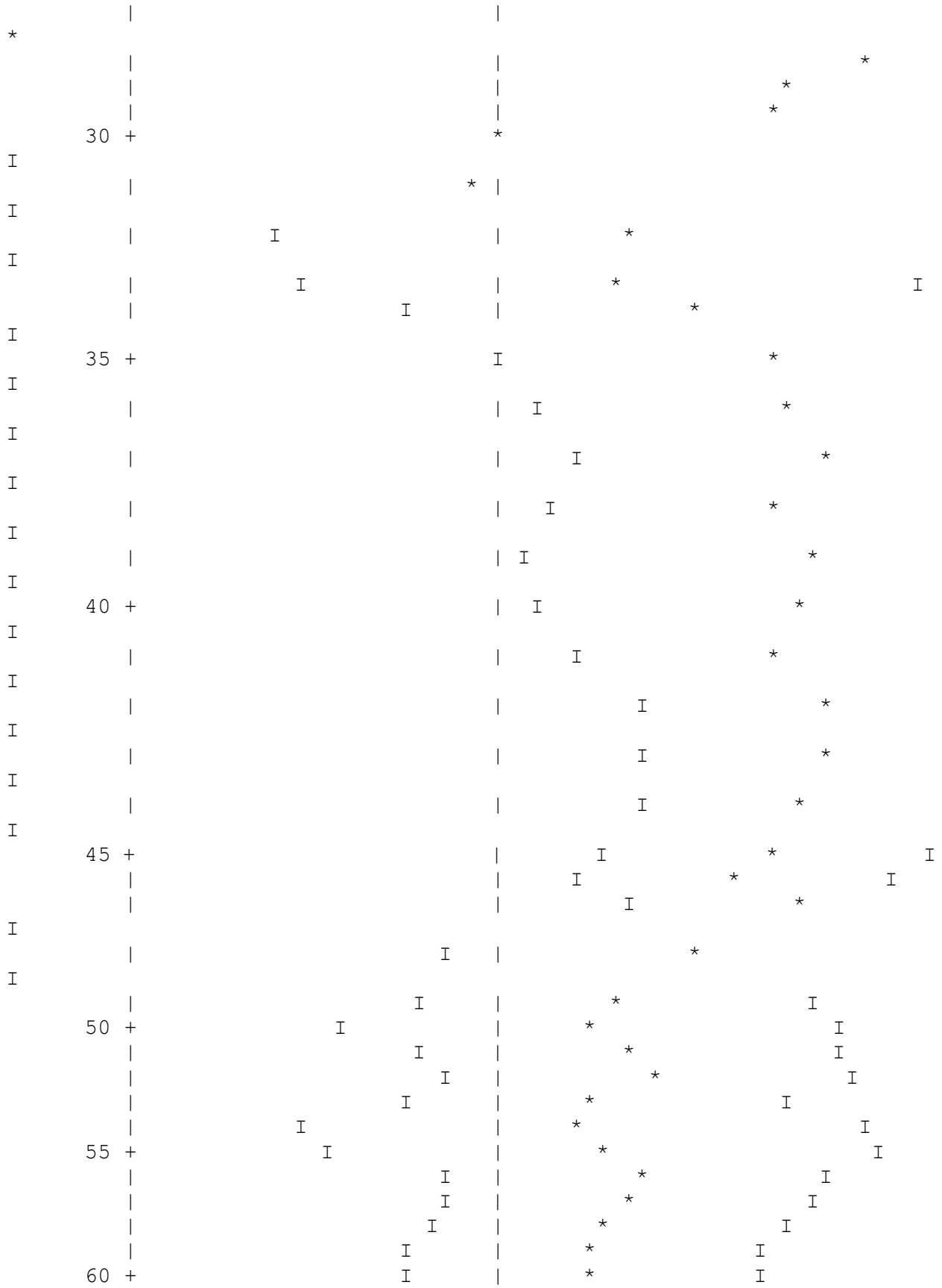
 no. of initial
deviation of
  generations      average                            67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

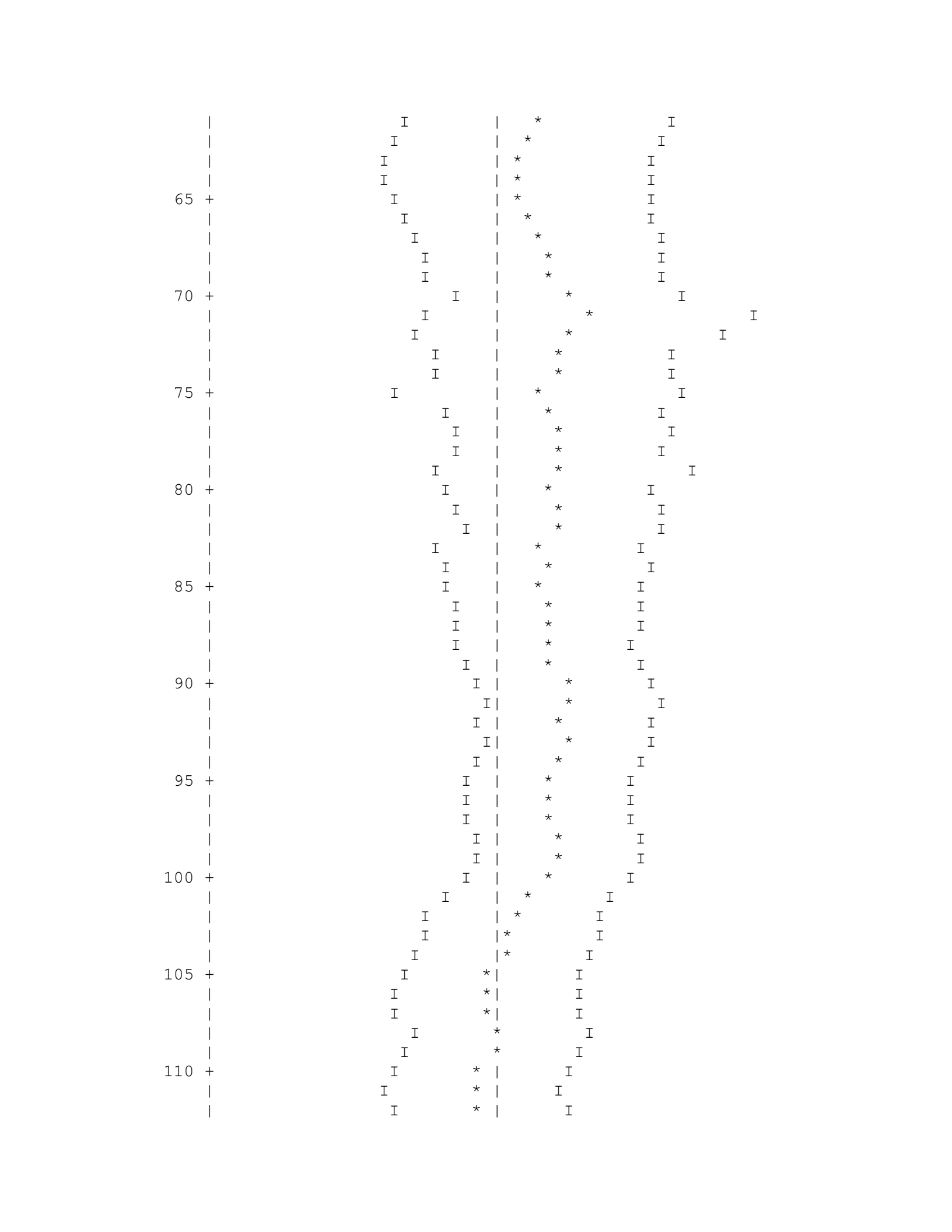
     117          0.76731   + or - 0.00119     0.76612 to 0.76851
0.76493 to 0.76970    0.76373 to 0.77089     120000      26.5018
1                          fuel bundle

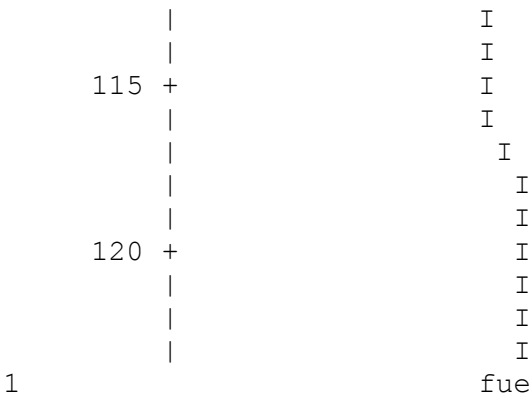
                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76668 + or - 0.00051 which occurs for
123 generations run.

                                0.7665                  0.7682
0.7699

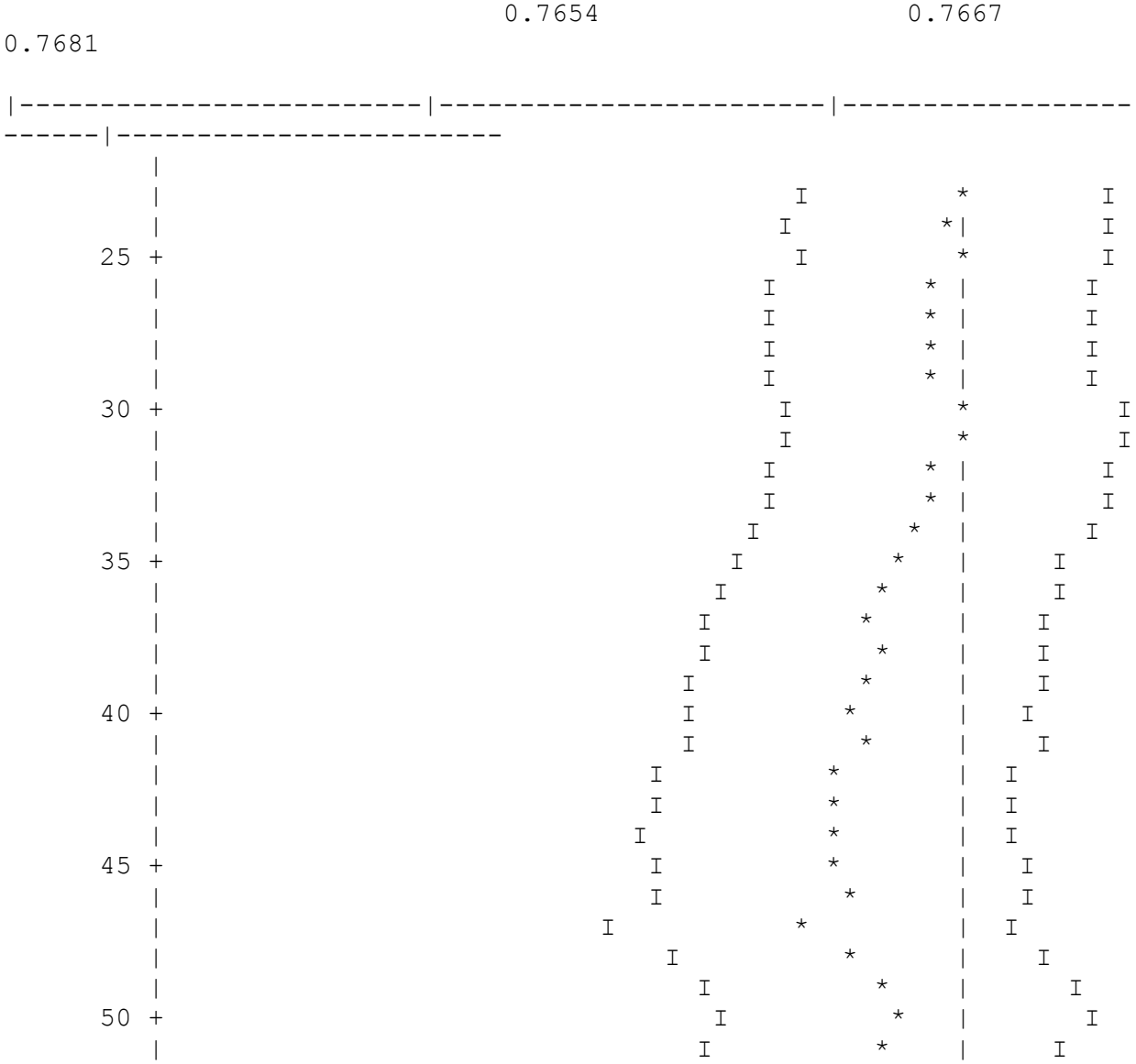
|-------------------------|-------------------------|------------------
------|-------------------------
         |
      25 +                           | *
I
```

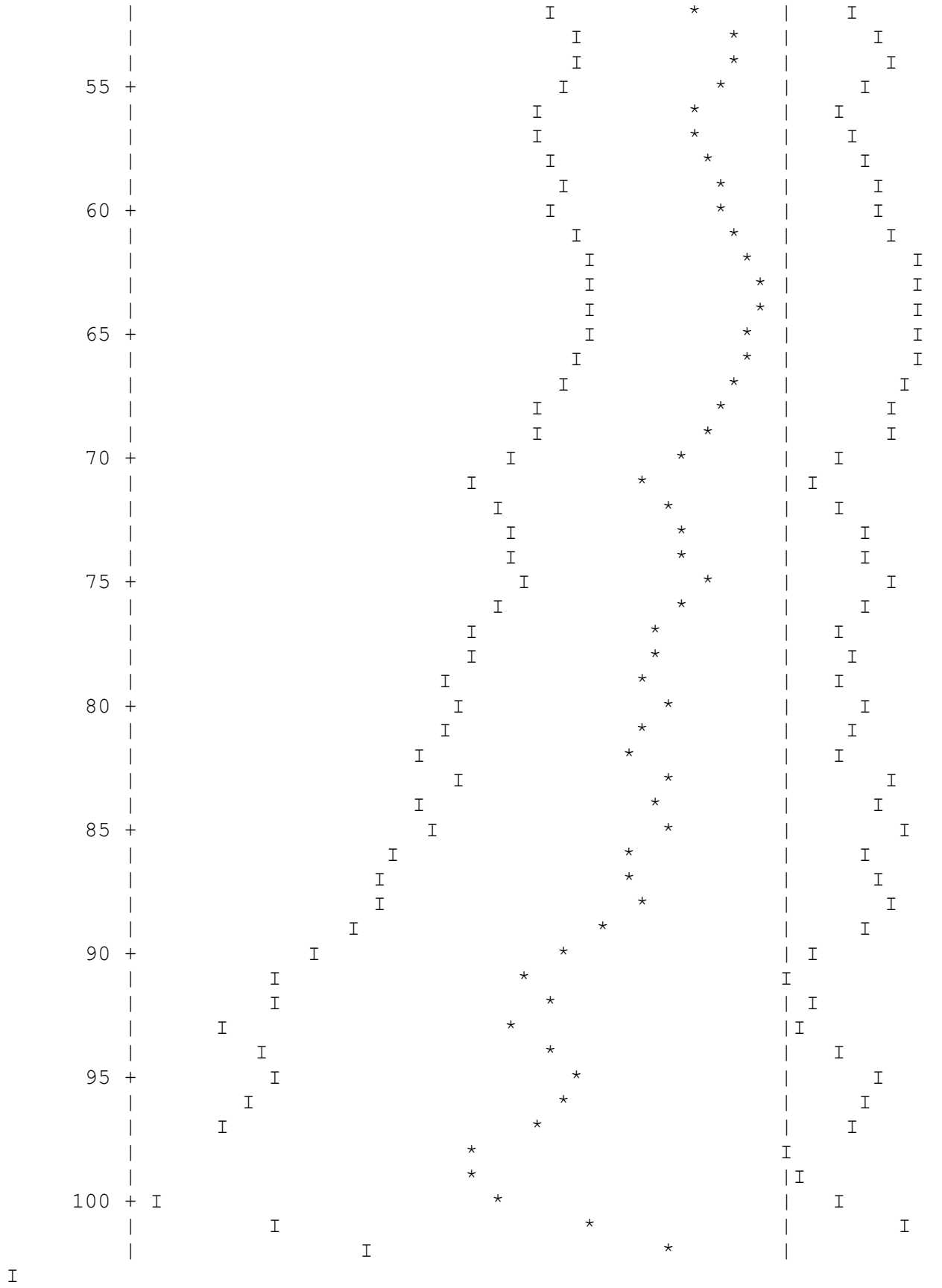


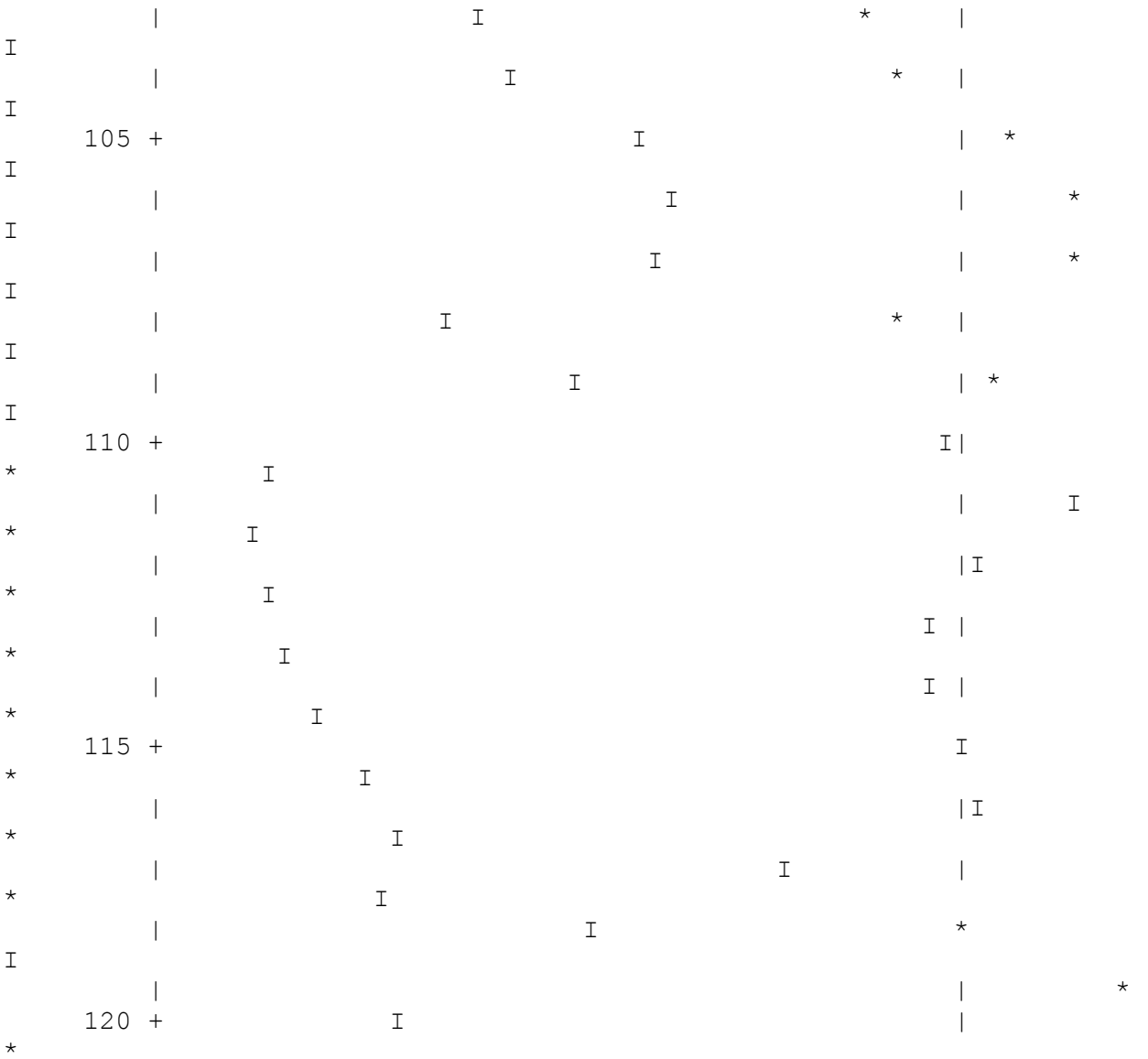




plot of average k-effective by generation skipped.
the line represents k-eff = 0.7666 + or - 0.0005 which occurs for 23 generations skipped.




55
60
65
70
75
80
85
90
95
100



k-effective satisfies the chi**2 test for normality at the 95 % level
1 fuel bundle

skipping 23 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			0.00000E+00	0.0000	0.00000E+00	0.0000	0.00000E+00	0.0000
2	0.0000			0.00000E+00	0.0000	2.23147E-07	39.1473	0.00000E+00	0.0000
3	0.0000			1.27377E-05	11.8375	1.92739E-05	5.3916	0.00000E+00	0.0000

4	0.0000		1.45453E-05	9.9925	
3.34820E-05	3.4453		0.00000E+00	0.0000	
5	0.0000		2.72959E-05	8.6160	
5.33065E-05	3.3130		0.00000E+00	0.0000	
6	0.0001		9.07546E-05	3.7494	
2.26518E-04	1.3852		0.00000E+00	0.0000	
7	0.0002		1.15289E-04	3.4243	
2.06121E-04	1.4547		0.00000E+00	0.0000	
8	0.0003		2.47249E-04	2.0524	
3.22962E-04	1.0073		0.00000E+00	0.0000	
9	0.0005		3.81375E-04	1.3925	
4.41263E-04	0.6388		0.00000E+00	0.0000	
10	0.0003		2.00974E-04	1.6034	
2.06719E-04	0.7618		0.00000E+00	0.0000	
11	0.0012		9.18685E-04	0.7005	
5.27064E-04	0.4962		0.00000E+00	0.0000	
12	0.0010		7.69574E-04	0.7160	
3.01670E-04	0.7066		0.00000E+00	0.0000	
13	0.0003		2.35480E-04	1.4886	
9.35234E-05	1.4739		0.00000E+00	0.0000	
14	0.0013		1.01265E-03	0.6025	
4.13886E-04	0.5968		0.00000E+00	0.0000	
15	0.0010		7.65368E-04	0.6770	
3.29933E-04	0.6691		0.00000E+00	0.0000	
16	0.0002		1.87806E-04	1.2860	
8.63284E-05	1.2663		0.00000E+00	0.0000	
17	0.0001		6.96261E-05	1.7946	
3.38366E-05	1.7620		0.00000E+00	0.0000	
18	0.0001		5.01718E-05	1.8851	
2.53543E-05	1.8467		0.00000E+00	0.0000	
19	0.0001		7.97113E-05	1.1949	
4.21601E-05	1.1635		0.00000E+00	0.0000	
20	0.0001		5.97159E-05	1.2891	
3.27056E-05	1.2565		0.00000E+00	0.0000	
21	0.0002		1.18995E-04	1.0578	
6.71902E-05	1.0296		0.00000E+00	0.0000	
22	0.0001		1.05252E-04	1.1341	
6.23070E-05	1.1097		0.00000E+00	0.0000	
23	0.0001		1.07266E-04	0.9371	
6.54815E-05	0.9126		0.00000E+00	0.0000	
24	0.0000		2.51908E-05	2.3141	
1.56440E-05	2.2528		0.00000E+00	0.0000	
25	0.0000		3.05956E-05	1.7653	
1.91189E-05	1.7118		0.00000E+00	0.0000	
26	0.0000		1.70128E-05	2.5695	
1.06939E-05	2.4947		0.00000E+00	0.0000	
27	0.0001		5.29720E-05	1.2657	
3.30529E-05	1.2431		0.00000E+00	0.0000	
28	0.0001		9.50880E-05	0.9443	
5.93401E-05	0.9276		0.00000E+00	0.0000	
29	0.0001		9.98922E-05	1.1778	
6.29148E-05	1.1617		0.00000E+00	0.0000	

30	0.0000		1.22047E-05	3.2974	
7.65682E-06	3.2759		0.00000E+00	0.0000	
31	0.0001		9.80938E-05	1.0772	
6.19670E-05	1.0635		0.00000E+00	0.0000	
32	0.0001		3.89268E-05	1.7842	
2.48764E-05	1.7428		0.00000E+00	0.0000	
33	0.0000		3.26887E-05	1.9067	
2.04702E-05	1.8845		0.00000E+00	0.0000	
34	0.0001		7.62471E-05	1.2162	
4.78861E-05	1.1972		0.00000E+00	0.0000	
35	0.0001		4.41182E-05	1.7071	
2.76939E-05	1.6818		0.00000E+00	0.0000	
36	0.0001		4.34049E-05	1.2874	
2.68663E-05	1.2759		0.00000E+00	0.0000	
37	0.0000		2.86482E-05	1.6918	
1.79713E-05	1.6548		0.00000E+00	0.0000	
38	0.0000		3.32176E-05	1.7331	
2.09338E-05	1.6901		0.00000E+00	0.0000	
39	0.0002		1.29387E-04	0.9400	
8.23318E-05	0.9179		0.00000E+00	0.0000	
40	0.0002		1.21369E-04	0.8900	
7.84388E-05	0.8718		0.00000E+00	0.0000	
41	0.0002		1.58141E-04	0.9303	
1.05745E-04	0.9027		0.00000E+00	0.0000	
42	0.0002		1.40782E-04	0.8138	
9.57167E-05	0.7949		0.00000E+00	0.0000	
43	0.0001		8.01628E-05	1.0624	
5.75534E-05	1.0182		0.00000E+00	0.0000	
44	0.0001		1.12347E-04	1.1219	
8.25632E-05	1.0790		0.00000E+00	0.0000	
45	0.0001		5.96568E-05	0.9066	
4.81518E-05	0.8390		0.00000E+00	0.0000	
46	0.0000		1.42500E-05	1.9342	
1.14860E-05	1.8012		0.00000E+00	0.0000	
47	0.0001		3.99208E-05	1.5740	
3.10436E-05	1.5118		0.00000E+00	0.0000	
48	0.0000		1.26220E-05	3.4571	
9.78587E-06	3.3614		0.00000E+00	0.0000	
49	0.0001		7.83856E-05	1.3981	
6.18548E-05	1.3688		0.00000E+00	0.0000	
50	0.0001		5.64910E-05	1.7810	
4.65325E-05	1.7441		0.00000E+00	0.0000	
51	0.0000		1.55402E-05	3.3499	
1.29018E-05	3.2851		0.00000E+00	0.0000	
52	0.0001		3.96709E-05	2.1292	
3.43373E-05	2.0743		0.00000E+00	0.0000	
53	0.0002		1.58302E-04	0.6746	
1.55454E-04	0.6220		0.00000E+00	0.0000	
54	0.0001		7.35486E-05	2.0409	
6.83352E-05	1.9639		0.00000E+00	0.0000	
55	0.0002		1.62088E-04	1.4744	
1.48653E-04	1.4372		0.00000E+00	0.0000	

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   56    0.0002                1.16326E-04     1.5871
1.07904E-04     1.5487       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

   57    0.0002                1.51428E-04     1.3387
1.37378E-04     1.3055       0.00000E+00     0.0000
   58    0.0001                8.41828E-05     1.8424
7.37466E-05     1.7934       0.00000E+00     0.0000
   59    0.0002                1.58416E-04     1.4154
1.42321E-04     1.3636       0.00000E+00     0.0000
   60    0.0004                2.76895E-04     1.1459
2.51039E-04     1.0872       0.00000E+00     0.0000
   61    0.0000                2.88057E-05     4.3960
2.21548E-05     4.2596       0.00000E+00     0.0000
   62    0.0002                1.62788E-04     1.5413
1.36563E-04     1.4987       0.00000E+00     0.0000
   63    0.0002                1.18630E-04     2.1979
9.77341E-05     2.1180       0.00000E+00     0.0000
   64    0.0001                1.02827E-04     2.2686
8.28549E-05     2.1954       0.00000E+00     0.0000
   65    0.0000                3.48463E-05     3.7005
3.44574E-05     3.5748       0.00000E+00     0.0000
   66    0.0002                1.72977E-04     1.8729
1.53524E-04     1.8080       0.00000E+00     0.0000
   67    0.0002                1.49067E-04     2.4051
1.21929E-04     2.3254       0.00000E+00     0.0000
   68    0.0000                2.77177E-05     4.1826
2.39445E-05     4.0364       0.00000E+00     0.0000
   69    0.0004                3.00345E-04     1.5866
2.35733E-04     1.5357       0.00000E+00     0.0000
   70    0.0003                2.11363E-04     1.7904
1.92244E-04     1.7256       0.00000E+00     0.0000
   71    0.0006                4.35752E-04     1.3456
3.60490E-04     1.3033       0.00000E+00     0.0000
   72    0.0001                4.83566E-05     4.6172
2.85874E-05     4.5040       0.00000E+00     0.0000
   73    0.0004                3.22527E-04     1.7180
2.45841E-04     1.6330       0.00000E+00     0.0000
   74    0.0014                1.04342E-03     1.1350
7.59212E-04     1.0880       0.00000E+00     0.0000
   75    0.0001                1.05337E-04     2.9163
8.12295E-05     2.7758       0.00000E+00     0.0000
   76    0.0006                4.62330E-04     1.6152
2.93605E-04     1.5591       0.00000E+00     0.0000
   77    0.0005                3.64098E-04     1.8542
```

2.61160E-04	1.7806	0.00000E+00	0.0000				
78	0.0000	6.92451E-06	4.3004				
6.77996E-05	4.2530	0.00000E+00	0.0000				
79	0.0002	1.90861E-04	2.3137				
1.28236E-04	2.2273	0.00000E+00	0.0000				
80	0.0001	6.24656E-05	3.0261				
8.33023E-05	2.9382	0.00000E+00	0.0000				
81	0.0014	1.08552E-03	1.1477				
7.97544E-04	1.1025	0.00000E+00	0.0000				
82	0.0001	7.00376E-05	4.4781				
4.19012E-05	4.2512	0.00000E+00	0.0000				
83	0.0002	1.22352E-04	3.1817				
1.35508E-04	3.1108	0.00000E+00	0.0000				
84	0.0001	7.63984E-05	3.1367				
7.77674E-05	2.9081	0.00000E+00	0.0000				
85	0.0003	1.96384E-04	1.9994				
2.41800E-04	1.9449	0.00000E+00	0.0000				
86	0.0003	2.58577E-04	2.5846				
2.08217E-04	2.4512	0.00000E+00	0.0000				
87	0.0004	3.33582E-04	2.4563				
2.07559E-04	2.3473	0.00000E+00	0.0000				
88	0.0001	5.26789E-05	4.5559				
9.57696E-05	4.4353	0.00000E+00	0.0000				
89	0.0001	8.49578E-05	3.4008				
5.95174E-05	3.0999	0.00000E+00	0.0000				
90	0.0003	2.14647E-04	3.0993				
1.26928E-04	2.9636	0.00000E+00	0.0000				
91	0.0002	1.90604E-04	2.8232				
1.20488E-04	2.6685	0.00000E+00	0.0000				
92	0.0000	3.10663E-05	2.6361				
2.03235E-04	2.5829	0.00000E+00	0.0000				
93	0.0002	1.29095E-04	3.1046				
1.05074E-04	2.8834	0.00000E+00	0.0000				
94	0.0001	1.11195E-04	4.7647				
6.24904E-05	4.4707	0.00000E+00	0.0000				
95	0.0008	6.17139E-04	2.1874				
3.80547E-04	2.1201	0.00000E+00	0.0000				
96	0.0002	1.45197E-04	4.3341				
7.38654E-05	4.1351	0.00000E+00	0.0000				
97	0.0003	2.58342E-04	3.9779				
1.48246E-04	3.8834	0.00000E+00	0.0000				
98	0.0001	1.00622E-04	4.4529				
9.66438E-05	4.2815	0.00000E+00	0.0000				
99	0.0001	1.14526E-04	4.4136				
7.64370E-05	4.2752	0.00000E+00	0.0000				
100	0.0002	1.22270E-04	3.7468				
8.19414E-05	3.5816	0.00000E+00	0.0000				
101	0.0002	1.15526E-04	3.8521				
7.33996E-05	3.5806	0.00000E+00	0.0000				
102	0.0002	1.48347E-04	4.6008				
8.29719E-05	4.4053	0.00000E+00	0.0000				
103	0.0001	9.46777E-05	3.7237				

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9.24336E-05     3.5190       0.00000E+00     0.0000
  104    0.0002                  1.73438E-04     3.1350
1.37333E-04     3.0307       0.00000E+00     0.0000
  105    0.0001                  1.14690E-04     3.4520
7.61470E-05     3.2288       0.00000E+00     0.0000
  106    0.0002                  1.85212E-04     3.9594
1.37567E-04     3.9110       0.00000E+00     0.0000
  107    0.0001                  6.22186E-05     3.5390
6.30154E-05     3.3086       0.00000E+00     0.0000
  108    0.0000                  3.38958E-05     2.7043
1.46512E-04     2.6404       0.00000E+00     0.0000
  109    0.0002                  1.30307E-04     2.2172
4.32414E-04     2.1886       0.00000E+00     0.0000
  110    0.0008                  6.29505E-04     3.2388
3.88371E-04     3.2068       0.00000E+00     0.0000
  111    0.0002                  1.59253E-04     4.0958
1.46193E-04     3.9875       0.00000E+00     0.0000
  112    0.0002                  1.21794E-04     4.8509
1.28268E-04     4.7614       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
      fraction                                 deviation
deviation                    deviation

  113    0.0002                  1.21885E-04     3.4579
1.06901E-04     3.2148       0.00000E+00     0.0000
  114    0.0000                  1.17224E-05     6.4748
1.58171E-05     5.4132       0.00000E+00     0.0000
  115    0.0001                  7.05090E-05     4.2578
8.22740E-05     3.9214       0.00000E+00     0.0000
  116    0.0003                  1.99065E-04     2.6230
1.49440E-04     2.3651       0.00000E+00     0.0000
  117    0.0006                  4.58062E-04     2.6444
2.45385E-04     2.4744       0.00000E+00     0.0000
  118    0.0008                  5.81317E-04     2.0700
4.54129E-04     1.9827       0.00000E+00     0.0000
  119    0.0002                  1.39086E-04     2.3591
3.59102E-04     2.2773       0.00000E+00     0.0000
  120    0.0002                  1.62259E-04     2.0210
6.17719E-04     1.9916       0.00000E+00     0.0000
  121    0.0007                  5.09920E-04     2.7169
3.92568E-04     2.6502       0.00000E+00     0.0000
  122    0.0001                  1.00945E-04     5.3690
7.90949E-05     4.9969       0.00000E+00     0.0000
  123    0.0003                  2.19954E-04     3.3887
1.55558E-04     3.0095       0.00000E+00     0.0000
  124    0.0003                  2.27756E-04     3.0025
1.88468E-04     2.7905       0.00000E+00     0.0000
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125	0.0002		1.36600E-04	3.5510	
1.26019E-04	3.1885		0.00000E+00	0.0000	
126	0.0001		1.00544E-04	4.0639	
8.99494E-05	3.6045		0.00000E+00	0.0000	
127	0.0006		4.37263E-04	2.8995	
2.13608E-04	2.7601		0.00000E+00	0.0000	
128	0.0003		2.22647E-04	2.9998	
1.37674E-04	2.6592		0.00000E+00	0.0000	
129	0.0006		4.43618E-04	2.3077	
4.08903E-04	2.1954		0.00000E+00	0.0000	
130	0.0001		1.13290E-04	2.9203	
2.76366E-04	2.8333		0.00000E+00	0.0000	
131	0.0004		3.08122E-04	2.2603	
2.46119E-04	1.9278		0.00000E+00	0.0000	
132	0.0007		5.39251E-04	2.3548	
3.30513E-04	2.1576		0.00000E+00	0.0000	
133	0.0013		1.01730E-03	1.8997	
6.44179E-04	1.8035		0.00000E+00	0.0000	
134	0.0001		9.33117E-05	2.0183	
2.41776E-04	1.7135		0.00000E+00	0.0000	
135	0.0002		1.77388E-04	3.1765	
2.62975E-04	3.0963		0.00000E+00	0.0000	
136	0.0001		4.69194E-05	1.7601	
7.27826E-04	1.7344		0.00000E+00	0.0000	
137	0.0000		1.94068E-05	1.1132	
3.49208E-03	1.1103		0.00000E+00	0.0000	
138	0.0004		3.20238E-04	2.3266	
8.34043E-04	2.2928		0.00000E+00	0.0000	
139	0.0002		1.89506E-04	3.2337	
2.32057E-04	3.0405		0.00000E+00	0.0000	
140	0.0003		2.15431E-04	2.5912	
2.85879E-04	2.2535		0.00000E+00	0.0000	
141	0.0001		7.67976E-05	2.7373	
2.43078E-04	2.4282		0.00000E+00	0.0000	
142	0.0001		6.58189E-05	3.0612	
2.27717E-04	2.8051		0.00000E+00	0.0000	
143	0.0001		8.11322E-05	2.1240	
1.74690E-04	1.3105		0.00000E+00	0.0000	
144	0.0000		3.29875E-05	3.4095	
7.29837E-05	2.0538		0.00000E+00	0.0000	
145	0.0005		3.74059E-04	2.5644	
2.93923E-04	2.3268		0.00000E+00	0.0000	
146	0.0005		3.48645E-04	2.1567	
2.54107E-04	1.7516		0.00000E+00	0.0000	
147	0.0002		1.69507E-04	3.5767	
1.08998E-04	3.0956		0.00000E+00	0.0000	
148	0.0001		5.77461E-05	6.8574	
3.86980E-05	5.4667		0.00000E+00	0.0000	
149	0.0000		3.07417E-05	7.6228	
2.11387E-05	5.9365		0.00000E+00	0.0000	
150	0.0001		8.81335E-05	4.1981	
6.43287E-05	3.1084		0.00000E+00	0.0000	

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  151    0.0001                6.71831E-05     4.1532
5.71418E-05     2.8910       0.00000E+00     0.0000
  152    0.0001                4.20710E-05     4.4511
4.75436E-05     2.8114       0.00000E+00     0.0000
  153    0.0001                4.18746E-05     4.3388
4.70769E-05     2.4933       0.00000E+00     0.0000
  154    0.0001                4.45020E-05     4.3499
4.79465E-05     2.5017       0.00000E+00     0.0000
  155    0.0001                5.27178E-05     3.7138
5.09370E-05     2.3057       0.00000E+00     0.0000
  156    0.0001                4.97324E-05     4.4981
4.79154E-05     2.7738       0.00000E+00     0.0000
  157    0.0001                5.79516E-05     4.3800
5.69059E-05     2.6646       0.00000E+00     0.0000
  158    0.0001                6.86693E-05     3.5692
6.89659E-05     2.3564       0.00000E+00     0.0000
  159    0.0002                1.47388E-04     3.2747
2.05593E-04     2.7117       0.00000E+00     0.0000
  160    0.0001                6.50416E-05     4.3257
7.64976E-05     3.3030       0.00000E+00     0.0000
  161    0.0001                7.47874E-05     3.7024
7.34296E-05     2.4432       0.00000E+00     0.0000
  162    0.0001                8.31159E-05     3.9934
7.90609E-05     2.4752       0.00000E+00     0.0000
  163    0.0001                9.19388E-05     3.7710
8.59150E-05     2.3576       0.00000E+00     0.0000
  164    0.0001                9.85893E-05     3.2363
9.23151E-05     1.9680       0.00000E+00     0.0000
  165    0.0001                1.13942E-04     3.3601
1.04674E-04     2.0635       0.00000E+00     0.0000
  166    0.0001                6.67422E-05     4.0175
6.19338E-05     2.4969       0.00000E+00     0.0000
  167    0.0001                7.78873E-05     4.3643
7.04112E-05     2.8638       0.00000E+00     0.0000
  168    0.0001                8.74553E-05     4.9240
7.80057E-05     3.2440       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  169    0.0001                1.00153E-04     4.0736
8.93127E-05     2.7725       0.00000E+00     0.0000
  170    0.0002                1.28311E-04     3.8669
1.11374E-04     2.8256       0.00000E+00     0.0000
  171    0.0001                9.69152E-05     4.4848
7.48724E-05     3.6009       0.00000E+00     0.0000
  172    0.0002                1.47551E-04     4.1985
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1.03762E-04	3.5572	0.00000E+00	0.0000				
173	0.0003	2.04495E-04	3.9855				
1.34099E-04	3.5001	0.00000E+00	0.0000				
174	0.0003	2.52661E-04	4.0214				
1.57078E-04	3.6087	0.00000E+00	0.0000				
175	0.0001	1.14212E-04	5.7430				
6.88886E-05	5.1885	0.00000E+00	0.0000				
176	0.0001	1.10123E-04	5.9083				
6.59472E-05	5.2738	0.00000E+00	0.0000				
177	0.0001	1.07188E-04	5.7970				
6.39013E-05	5.1603	0.00000E+00	0.0000				
178	0.0002	1.17091E-04	6.5764				
6.87224E-05	5.8809	0.00000E+00	0.0000				
179	0.0002	1.15287E-04	5.8549				
6.74466E-05	5.2389	0.00000E+00	0.0000				
180	0.0002	1.16527E-04	5.8579				
6.72457E-05	5.2870	0.00000E+00	0.0000				
181	0.0002	1.21279E-04	5.4388				
6.97182E-05	4.8215	0.00000E+00	0.0000				
182	0.0001	1.06058E-04	7.0194				
6.14685E-05	6.2077	0.00000E+00	0.0000				
183	0.0001	9.49511E-05	6.3233				
5.54940E-05	5.4251	0.00000E+00	0.0000				
184	0.0001	9.91700E-05	7.0311				
5.77375E-05	6.0535	0.00000E+00	0.0000				
185	0.0001	9.05935E-05	6.8487				
5.31020E-05	5.8738	0.00000E+00	0.0000				
186	0.0001	9.03174E-05	5.7499				
5.28827E-05	4.8914	0.00000E+00	0.0000				
187	0.0001	8.73150E-05	5.8853				
5.15593E-05	4.9670	0.00000E+00	0.0000				
188	0.0001	8.56146E-05	7.3172				
5.06582E-05	6.1148	0.00000E+00	0.0000				
189	0.0001	8.82819E-05	7.4202				
5.18231E-05	6.2339	0.00000E+00	0.0000				
190	0.0003	2.11009E-04	4.0118				
1.25652E-04	3.3011	0.00000E+00	0.0000				
191	0.0002	1.83005E-04	4.6919				
1.12129E-04	3.7541	0.00000E+00	0.0000				
192	0.0003	2.04832E-04	4.2617				
1.23625E-04	3.4640	0.00000E+00	0.0000				
193	0.0003	2.08879E-04	3.7979				
1.25835E-04	3.0650	0.00000E+00	0.0000				
194	0.0005	4.13500E-04	2.8571				
2.53075E-04	2.2460	0.00000E+00	0.0000				
195	0.0005	4.21392E-04	2.5543				
2.61821E-04	1.9976	0.00000E+00	0.0000				
196	0.0006	4.72555E-04	2.4884				
2.92059E-04	1.9513	0.00000E+00	0.0000				
197	0.0007	5.21584E-04	2.7019				
3.23468E-04	2.1005	0.00000E+00	0.0000				
198	0.0008	5.79022E-04	2.6081				

3.58720E-04	2.0452	0.00000E+00	0.0000				
199	0.0004	3.29685E-04	2.9705				
2.02058E-04	2.3673	0.00000E+00	0.0000				
200	0.0005	3.55615E-04	3.2726				
2.18850E-04	2.5922	0.00000E+00	0.0000				
201	0.0010	7.71608E-04	1.9968				
4.74150E-04	1.5809	0.00000E+00	0.0000				
202	0.0013	1.02305E-03	1.8993				
6.15689E-04	1.5162	0.00000E+00	0.0000				
203	0.0016	1.24703E-03	1.7752				
7.43854E-04	1.4405	0.00000E+00	0.0000				
204	0.0022	1.65687E-03	1.6799				
9.76397E-04	1.3970	0.00000E+00	0.0000				
205	0.0015	1.14951E-03	2.0203				
6.72643E-04	1.7064	0.00000E+00	0.0000				
206	0.0018	1.41662E-03	1.6584				
8.23883E-04	1.4229	0.00000E+00	0.0000				
207	0.0021	1.64569E-03	1.4332				
9.57480E-04	1.2411	0.00000E+00	0.0000				
208	0.0028	2.16415E-03	1.3115				
1.26252E-03	1.1574	0.00000E+00	0.0000				
209	0.0031	2.40749E-03	1.4208				
1.41404E-03	1.2470	0.00000E+00	0.0000				
210	0.0037	2.81266E-03	1.4075				
1.67937E-03	1.2382	0.00000E+00	0.0000				
211	0.0040	3.10230E-03	1.3181				
1.87171E-03	1.1495	0.00000E+00	0.0000				
212	0.0046	3.54476E-03	1.0421				
2.15259E-03	0.8951	0.00000E+00	0.0000				
213	0.0065	4.97322E-03	0.9430				
3.01409E-03	0.7992	0.00000E+00	0.0000				
214	0.0096	7.39669E-03	0.7487				
4.44966E-03	0.6294	0.00000E+00	0.0000				
215	0.0158	1.21477E-02	0.6372				
7.23433E-03	0.5337	0.00000E+00	0.0000				
216	0.0303	2.32053E-02	0.4236				
1.36717E-02	0.3594	0.00000E+00	0.0000				
217	0.0197	1.51122E-02	0.5024				
8.91214E-03	0.4264	0.00000E+00	0.0000				
218	0.0277	2.12604E-02	0.4544				
1.24410E-02	0.3841	0.00000E+00	0.0000				
219	0.0356	2.73281E-02	0.4013				
1.59440E-02	0.3359	0.00000E+00	0.0000				
220	0.0473	3.62486E-02	0.3676				
2.10785E-02	0.3076	0.00000E+00	0.0000				
221	0.0624	4.78745E-02	0.2854				
2.77694E-02	0.2436	0.00000E+00	0.0000				
222	0.0801	6.14295E-02	0.3032				
3.55834E-02	0.2557	0.00000E+00	0.0000				
223	0.1042	7.99079E-02	0.2444				
4.63437E-02	0.2111	0.00000E+00	0.0000				
224	0.0584	4.48089E-02	0.3109				

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2.60912E-02     0.2654       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  225    0.2307                  1.76886E-01     0.1533
1.04757E-01     0.1313       0.00000E+00     0.0000
  226    0.0456                  3.49329E-02     0.3510
2.12357E-02     0.2868       0.00000E+00     0.0000
  227    0.0489                  3.75087E-02     0.3778
2.32963E-02     0.3064       0.00000E+00     0.0000
  228    0.0211                  1.62057E-02     0.5437
1.02359E-02     0.4267       0.00000E+00     0.0000
  229    0.0224                  1.71454E-02     0.6069
1.10011E-02     0.4785       0.00000E+00     0.0000
  230    0.0116                  8.91653E-03     0.8001
5.83644E-03     0.6111       0.00000E+00     0.0000
  231    0.0121                  9.31082E-03     0.7560
6.20574E-03     0.5714       0.00000E+00     0.0000
  232    0.0130                  9.93391E-03     0.7721
6.78129E-03     0.5919       0.00000E+00     0.0000
  233    0.0084                  6.47818E-03     0.9759
4.53367E-03     0.7181       0.00000E+00     0.0000
  234    0.0059                  4.54463E-03     1.0618
3.26867E-03     0.7493       0.00000E+00     0.0000
  235    0.0025                  1.91481E-03     1.6745
1.25186E-03     1.3309       0.00000E+00     0.0000
  236    0.0020                  1.50810E-03     2.0723
1.01059E-03     1.5719       0.00000E+00     0.0000
  237    0.0017                  1.31086E-03     2.0004
9.31143E-04     1.4483       0.00000E+00     0.0000
  238    0.0001                  6.33100E-05     8.9075
5.71123E-05     5.2550       0.00000E+00     0.0000

 system total =                 7.66685E-01     0.0591
4.69351E-01     0.0509       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3080E-01  +
or -  0.0002



 elapsed time   3.03300 minutes
```

random number= 0EC8F2F7A0405106

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.092E-03	0.06	7.667E-01
	2	0.000E+00	0.00	0.000E+00
	3	0.000E+00	0.00	0.000E+00
2	1	0.000E+00	0.00	0.000E+00

global unit

1 fuel bundle

fluxes for Unit 1

group	region 1 flux	region 1 percent deviation	region 2 flux	region 2 percent deviation	region 3 flux	region 3 percent deviation
1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	1.346E-08	27.54	1.013E-08	28.76	1.050E-08	27.84
3	9.216E-07	3.30	7.559E-07	2.95	8.159E-07	2.97
4	1.457E-06	3.10	1.208E-06	2.75	1.290E-06	2.77
5	2.248E-06	2.37	1.851E-06	2.30	1.980E-06	2.27
6	9.389E-06	1.27	7.505E-06	1.13	8.035E-06	1.15
7	1.234E-05	1.17	9.422E-06	1.05	9.967E-06	1.07
8	3.081E-05	0.67	2.250E-05	0.62	2.365E-05	0.63
9	8.188E-05	0.49	5.870E-05	0.40	6.121E-05	0.42
10	4.630E-05	0.63	3.285E-05	0.53	3.410E-05	0.57
11	2.197E-04	0.29	1.551E-04	0.24	1.608E-04	0.25
12	1.894E-04	0.29	1.378E-04	0.24	1.445E-04	0.25
13	5.635E-05	0.49	4.120E-05	0.40	4.314E-05	0.43
14	2.537E-04	0.25	1.833E-04	0.23	1.916E-04	0.23
15	2.189E-04	0.28	1.592E-04	0.23	1.663E-04	0.22
16	7.172E-05	0.50	5.196E-05	0.40	5.428E-05	0.41
17	3.244E-05	0.65	2.353E-05	0.59	2.460E-05	0.55
18	2.777E-05	0.73	2.028E-05	0.58	2.098E-05	0.60
19	5.072E-05	0.56	3.694E-05	0.42	3.826E-05	0.41
20	3.923E-05	0.52	2.884E-05	0.47	3.014E-05	0.47
21	8.015E-05	0.43	5.861E-05	0.35	6.108E-05	0.36
22	7.331E-05	0.48	5.373E-05	0.37	5.551E-05	0.36

23	7.718E-05	0.38	5.646E-05	0.33	5.859E-05	0.31
24	1.866E-05	0.87	1.376E-05	0.69	1.436E-05	0.67
25	2.332E-05	0.68	1.727E-05	0.60	1.813E-05	0.56
26	1.322E-05	0.99	9.771E-06	0.78	1.036E-05	0.78
27	4.158E-05	0.56	3.097E-05	0.50	3.277E-05	0.46
28	7.716E-05	0.40	5.721E-05	0.36	6.057E-05	0.32
29	7.942E-05	0.41	5.949E-05	0.33	6.232E-05	0.30
30	9.859E-06	1.08	7.529E-06	0.90	7.875E-06	0.85
31	7.903E-05	0.44	5.916E-05	0.41	6.198E-05	0.35
32	3.120E-05	0.66	2.342E-05	0.55	2.459E-05	0.50
33	2.666E-05	0.70	2.010E-05	0.59	2.116E-05	0.59
34	6.079E-05	0.39	4.588E-05	0.33	4.839E-05	0.31
35	3.578E-05	0.61	2.714E-05	0.51	2.869E-05	0.45
36	3.376E-05	0.58	2.549E-05	0.44	2.679E-05	0.43
37	2.180E-05	0.56	1.642E-05	0.49	1.727E-05	0.46
38	2.602E-05	0.55	1.974E-05	0.49	2.076E-05	0.42
39	9.769E-05	0.38	7.472E-05	0.28	7.910E-05	0.27
40	8.977E-05	0.34	6.917E-05	0.27	7.372E-05	0.24
41	1.131E-04	0.31	8.821E-05	0.24	9.430E-05	0.22
42	9.345E-05	0.35	7.375E-05	0.30	7.923E-05	0.28
43	5.133E-05	0.39	4.090E-05	0.37	4.299E-05	0.30
44	6.968E-05	0.33	5.592E-05	0.28	6.013E-05	0.24
45	3.533E-05	0.43	2.816E-05	0.36	3.125E-05	0.32
46	8.248E-06	0.72	6.549E-06	0.60	7.136E-06	0.55
47	2.340E-05	0.53	1.865E-05	0.45	1.946E-05	0.36
48	6.830E-06	0.93	5.453E-06	0.76	5.755E-06	0.66
49	4.344E-05	0.37	3.479E-05	0.36	3.758E-05	0.29
50	2.977E-05	0.52	2.389E-05	0.48	2.587E-05	0.42
51	7.921E-06	0.85	6.406E-06	0.78	6.909E-06	0.65
52	2.096E-05	0.67	1.687E-05	0.58	1.841E-05	0.47
53	7.640E-05	0.30	6.154E-05	0.27	6.689E-05	0.21
54	3.323E-05	0.49	2.712E-05	0.43	2.927E-05	0.32
55	6.681E-05	0.32	5.430E-05	0.29	5.895E-05	0.23
56	4.323E-05	0.40	3.520E-05	0.38	3.839E-05	0.30
57	4.940E-05	0.33	4.034E-05	0.30	4.393E-05	0.24
58	2.584E-05	0.50	2.116E-05	0.45	2.309E-05	0.37
59	4.419E-05	0.39	3.618E-05	0.34	3.939E-05	0.30
60	6.456E-05	0.26	5.285E-05	0.24	5.748E-05	0.22
61	6.136E-06	0.98	5.081E-06	0.84	5.496E-06	0.63
62	3.243E-05	0.44	2.655E-05	0.39	2.896E-05	0.33
63	2.181E-05	0.46	1.796E-05	0.37	1.952E-05	0.33
64	1.750E-05	0.64	1.426E-05	0.55	1.541E-05	0.44
65	5.760E-06	1.02	4.748E-06	0.83	5.110E-06	0.67
66	2.882E-05	0.44	2.373E-05	0.40	2.567E-05	0.33
67	2.125E-05	0.54	1.755E-05	0.46	1.902E-05	0.40
68	4.632E-06	1.16	3.822E-06	0.98	4.181E-06	0.75
69	3.732E-05	0.40	3.072E-05	0.35	3.341E-05	0.29
70	2.678E-05	0.53	2.200E-05	0.46	2.394E-05	0.37
71	4.582E-05	0.34	3.777E-05	0.28	4.098E-05	0.26
72	2.665E-06	1.42	2.181E-06	1.24	2.425E-06	1.06
73	2.714E-05	0.45	2.244E-05	0.40	2.436E-05	0.33
74	7.976E-05	0.31	6.603E-05	0.26	7.153E-05	0.22

75	9.014E-06	0.68	7.450E-06	0.57	8.091E-06	0.49
76	2.276E-05	0.46	1.895E-05	0.40	2.050E-05	0.33
77	1.760E-05	0.52	1.466E-05	0.45	1.586E-05	0.39
78	1.502E-06	1.54	1.269E-06	1.28	1.403E-06	1.19
79	9.911E-06	0.72	8.206E-06	0.64	8.899E-06	0.54
80	4.606E-06	1.09	3.838E-06	0.95	4.143E-06	0.80
81	5.565E-05	0.37	4.616E-05	0.29	4.998E-05	0.25
82	3.205E-06	1.24	2.665E-06	1.10	2.922E-06	1.00
83	4.481E-06	0.98	3.723E-06	0.93	4.009E-06	0.80
84	8.111E-06	0.80	6.786E-06	0.77	7.350E-06	0.58
85	9.919E-06	0.69	8.221E-06	0.62	9.003E-06	0.55
86	1.353E-05	0.60	1.128E-05	0.53	1.226E-05	0.49
87	1.187E-05	0.62	9.915E-06	0.53	1.075E-05	0.45
88	3.137E-06	1.32	2.608E-06	1.08	2.867E-06	0.98
89	6.600E-06	0.78	5.511E-06	0.84	5.941E-06	0.58
90	6.804E-06	0.83	5.655E-06	0.70	6.195E-06	0.61
91	8.262E-06	0.85	6.892E-06	0.73	7.493E-06	0.63
92	4.764E-06	0.95	3.974E-06	0.82	4.330E-06	0.73
93	8.099E-06	0.77	6.757E-06	0.66	7.300E-06	0.58
94	4.227E-06	1.07	3.536E-06	0.90	3.814E-06	0.80
95	1.265E-05	0.51	1.059E-05	0.55	1.144E-05	0.42
96	3.338E-06	1.24	2.794E-06	1.10	3.020E-06	0.97
97	3.402E-06	1.08	2.847E-06	0.98	3.109E-06	0.71
98	3.599E-06	1.13	2.983E-06	0.93	3.235E-06	0.85
99	2.305E-06	1.38	1.952E-06	1.28	2.083E-06	1.16
100	3.393E-06	1.40	2.840E-06	1.22	3.100E-06	1.04
101	5.062E-06	1.05	4.222E-06	0.93	4.557E-06	0.76
102	3.326E-06	1.09	2.776E-06	0.93	3.020E-06	0.78
103	4.673E-06	1.16	3.876E-06	0.89	4.173E-06	0.72
104	4.123E-06	1.08	3.448E-06	1.00	3.745E-06	0.83
105	4.357E-06	1.06	3.640E-06	1.00	3.934E-06	0.78
106	1.530E-06	1.60	1.298E-06	1.43	1.404E-06	1.30
107	3.560E-06	1.26	2.987E-06	1.13	3.202E-06	0.92
108	3.172E-06	1.25	2.689E-06	1.18	2.946E-06	0.95
109	5.159E-06	0.93	4.342E-06	0.79	4.698E-06	0.70
110	3.040E-06	1.08	2.596E-06	0.99	2.853E-06	0.83
111	3.047E-06	1.12	2.576E-06	1.05	2.795E-06	0.88
112	1.802E-06	1.59	1.539E-06	1.33	1.693E-06	1.17
113	5.802E-06	0.92	4.831E-06	0.76	5.218E-06	0.67
114	2.055E-06	1.75	1.679E-06	1.43	1.795E-06	1.06
115	5.169E-06	1.06	4.299E-06	0.95	4.657E-06	0.73
116	1.084E-05	0.67	9.025E-06	0.62	9.795E-06	0.50
117	1.173E-05	0.61	9.842E-06	0.59	1.068E-05	0.49
118	1.277E-05	0.59	1.079E-05	0.48	1.170E-05	0.43
119	8.237E-06	0.75	6.964E-06	0.68	7.567E-06	0.56
120	5.752E-06	0.93	4.858E-06	0.73	5.288E-06	0.63
121	6.165E-06	0.80	5.203E-06	0.77	5.637E-06	0.56
122	3.237E-06	1.33	2.733E-06	1.15	2.960E-06	0.95
123	1.042E-05	0.70	8.689E-06	0.56	9.424E-06	0.47
124	7.417E-06	0.83	6.212E-06	0.74	6.707E-06	0.67
125	7.132E-06	0.76	6.006E-06	0.67	6.463E-06	0.63
126	5.785E-06	0.93	4.852E-06	0.89	5.216E-06	0.68

127	5.525E-06	1.08	4.662E-06	0.95	5.056E-06	0.77
128	7.902E-06	0.80	6.608E-06	0.69	7.115E-06	0.56
129	9.686E-06	0.68	8.199E-06	0.66	8.864E-06	0.51
130	4.014E-06	1.15	3.410E-06	1.16	3.668E-06	0.82
131	1.705E-05	0.58	1.427E-05	0.50	1.536E-05	0.40
132	1.120E-05	0.63	9.415E-06	0.59	1.020E-05	0.46
133	1.368E-05	0.56	1.153E-05	0.48	1.250E-05	0.41
134	1.485E-05	0.53	1.253E-05	0.48	1.347E-05	0.37
135	2.404E-06	1.40	2.049E-06	1.23	2.225E-06	0.93
136	3.886E-06	0.96	3.382E-06	1.04	3.698E-06	0.75
137	2.471E-06	0.95	2.618E-06	0.90	2.958E-06	0.74
138	4.127E-06	0.99	3.589E-06	0.83	3.957E-06	0.77
139	4.590E-06	1.04	3.883E-06	0.93	4.188E-06	0.78
140	1.202E-05	0.60	1.016E-05	0.52	1.102E-05	0.46
141	8.745E-06	0.72	7.419E-06	0.66	8.038E-06	0.55
142	5.925E-06	0.92	5.008E-06	0.83	5.399E-06	0.70
143	1.996E-05	0.48	1.677E-05	0.43	1.805E-05	0.36
144	8.091E-06	0.78	6.831E-06	0.70	7.366E-06	0.52
145	7.066E-06	0.82	6.026E-06	0.75	6.507E-06	0.60
146	1.200E-05	0.62	1.006E-05	0.55	1.088E-05	0.46
147	3.654E-06	1.20	3.111E-06	1.05	3.334E-06	0.82
148	1.898E-06	1.73	1.609E-06	1.34	1.710E-06	1.07
149	1.143E-06	2.06	9.843E-07	1.93	1.053E-06	1.60
150	4.013E-06	1.08	3.383E-06	0.90	3.633E-06	0.82
151	4.160E-06	0.91	3.517E-06	0.92	3.752E-06	0.76
152	4.447E-06	0.96	3.721E-06	1.04	3.978E-06	0.85
153	4.498E-06	1.03	3.802E-06	0.89	4.092E-06	0.70
154	4.648E-06	0.88	3.920E-06	0.84	4.211E-06	0.67
155	4.337E-06	1.10	3.682E-06	0.92	3.942E-06	0.72
156	4.016E-06	0.99	3.387E-06	0.89	3.668E-06	0.83
157	4.645E-06	1.10	3.913E-06	0.98	4.227E-06	0.73
158	4.898E-06	1.07	4.139E-06	0.91	4.459E-06	0.72
159	6.703E-06	0.85	5.708E-06	0.69	6.190E-06	0.59
160	3.632E-06	1.05	3.061E-06	0.89	3.314E-06	0.85
161	4.933E-06	1.05	4.176E-06	0.87	4.476E-06	0.63
162	5.741E-06	0.95	4.869E-06	0.76	5.262E-06	0.63
163	6.169E-06	0.85	5.242E-06	0.74	5.647E-06	0.65
164	6.578E-06	0.88	5.524E-06	0.79	5.893E-06	0.68
165	6.855E-06	0.84	5.790E-06	0.67	6.232E-06	0.57
166	4.003E-06	0.92	3.368E-06	0.91	3.647E-06	0.71
167	4.202E-06	1.02	3.516E-06	1.01	3.802E-06	0.79
168	4.311E-06	1.10	3.658E-06	0.97	3.957E-06	0.82
169	4.476E-06	0.92	3.762E-06	0.85	4.064E-06	0.73
170	4.613E-06	0.99	3.884E-06	0.96	4.216E-06	0.69
171	2.364E-06	1.53	2.012E-06	1.35	2.166E-06	1.10
172	2.399E-06	1.36	2.050E-06	1.22	2.229E-06	1.03
173	2.502E-06	1.40	2.089E-06	1.21	2.298E-06	1.01
174	2.498E-06	1.35	2.095E-06	1.14	2.293E-06	0.93
175	1.023E-06	1.93	8.603E-07	1.57	9.408E-07	1.48
176	1.020E-06	1.82	8.634E-07	1.71	9.434E-07	1.45
177	1.009E-06	2.27	8.726E-07	1.99	9.295E-07	1.67
178	1.019E-06	2.25	8.622E-07	1.95	9.365E-07	1.65

179	1.090E-06	1.90	9.128E-07	1.66	9.936E-07	1.48
180	1.057E-06	1.89	9.053E-07	1.96	9.949E-07	1.54
181	1.091E-06	2.03	9.227E-07	1.90	9.853E-07	1.45
182	1.083E-06	2.02	9.120E-07	1.69	9.876E-07	1.45
183	1.122E-06	1.84	9.302E-07	1.60	1.017E-06	1.41
184	1.109E-06	2.00	9.433E-07	1.63	1.017E-06	1.26
185	1.074E-06	1.76	9.099E-07	1.84	9.885E-07	1.33
186	1.173E-06	2.26	9.668E-07	1.89	1.052E-06	1.50
187	1.177E-06	1.89	9.820E-07	1.71	1.066E-06	1.29
188	1.171E-06	1.68	9.726E-07	1.53	1.069E-06	1.25
189	1.188E-06	1.93	1.027E-06	1.71	1.087E-06	1.42
190	3.027E-06	1.19	2.556E-06	1.14	2.752E-06	0.95
191	3.090E-06	1.36	2.614E-06	1.19	2.824E-06	0.95
192	3.174E-06	1.17	2.655E-06	1.07	2.899E-06	0.86
193	3.208E-06	1.09	2.742E-06	0.96	2.941E-06	0.77
194	6.825E-06	0.76	5.820E-06	0.74	6.253E-06	0.56
195	7.273E-06	0.76	6.155E-06	0.73	6.702E-06	0.58
196	7.700E-06	0.73	6.504E-06	0.65	7.045E-06	0.58
197	8.398E-06	0.80	7.100E-06	0.79	7.663E-06	0.58
198	9.009E-06	0.68	7.573E-06	0.59	8.250E-06	0.49
199	4.746E-06	0.93	4.034E-06	0.90	4.359E-06	0.74
200	5.090E-06	0.97	4.326E-06	0.91	4.676E-06	0.73
201	1.052E-05	0.56	8.890E-06	0.55	9.683E-06	0.47
202	1.199E-05	0.60	1.014E-05	0.53	1.100E-05	0.43
203	1.297E-05	0.63	1.103E-05	0.57	1.196E-05	0.49
204	1.488E-05	0.50	1.262E-05	0.44	1.367E-05	0.39
205	8.660E-06	0.68	7.745E-06	0.63	8.201E-06	0.47
206	9.305E-06	0.68	8.372E-06	0.63	8.890E-06	0.54
207	9.635E-06	0.69	8.764E-06	0.63	9.257E-06	0.51
208	1.132E-05	0.60	1.022E-05	0.53	1.087E-05	0.40
209	1.150E-05	0.53	1.051E-05	0.46	1.118E-05	0.40
210	1.408E-05	0.54	1.272E-05	0.45	1.357E-05	0.37
211	1.620E-05	0.50	1.469E-05	0.44	1.559E-05	0.41
212	1.921E-05	0.46	1.730E-05	0.42	1.849E-05	0.34
213	2.639E-05	0.36	2.372E-05	0.32	2.536E-05	0.24
214	3.689E-05	0.35	3.314E-05	0.31	3.563E-05	0.25
215	5.524E-05	0.29	4.978E-05	0.23	5.378E-05	0.20
216	9.221E-05	0.21	8.403E-05	0.17	9.070E-05	0.14
217	5.522E-05	0.24	5.292E-05	0.19	5.612E-05	0.17
218	7.062E-05	0.22	6.800E-05	0.18	7.225E-05	0.16
219	8.402E-05	0.20	8.121E-05	0.17	8.647E-05	0.14
220	1.013E-04	0.17	9.878E-05	0.15	1.055E-04	0.13
221	1.203E-04	0.17	1.184E-04	0.15	1.264E-04	0.11
222	1.366E-04	0.14	1.365E-04	0.11	1.454E-04	0.09
223	1.533E-04	0.16	1.573E-04	0.13	1.674E-04	0.12
224	7.529E-05	0.17	7.995E-05	0.14	8.470E-05	0.12
225	2.341E-04	0.13	2.725E-04	0.11	2.826E-04	0.09
226	3.172E-05	0.22	4.482E-05	0.20	4.439E-05	0.13
227	2.890E-05	0.23	4.632E-05	0.21	4.439E-05	0.13
228	1.045E-05	0.37	1.907E-05	0.27	1.754E-05	0.16
229	9.645E-06	0.39	1.959E-05	0.33	1.748E-05	0.17
230	4.464E-06	0.56	1.011E-05	0.45	8.694E-06	0.24

231	4.238E-06	0.51	1.059E-05	0.42	8.748E-06	0.21
232	4.008E-06	0.63	1.139E-05	0.44	8.900E-06	0.21
233	2.240E-06	0.70	7.449E-06	0.54	5.523E-06	0.26
234	1.412E-06	0.98	5.298E-06	0.62	3.803E-06	0.31
235	5.223E-07	1.54	1.037E-06	1.08	1.109E-06	0.49
236	3.524E-07	1.76	7.367E-07	1.28	8.002E-07	0.52
237	2.325E-07	1.86	5.512E-07	1.40	6.195E-07	0.56
238	5.052E-09	10.39	2.128E-08	7.03	2.491E-08	2.10

1 fuel bundle

fluxes for Global Unit
region 1

group	flux	percent deviation
1	0.000E+00	0.00
2	0.000E+00	0.00
3	0.000E+00	0.00
4	0.000E+00	0.00
5	0.000E+00	0.00
6	0.000E+00	0.00
7	0.000E+00	0.00
8	0.000E+00	0.00
9	0.000E+00	0.00
10	0.000E+00	0.00
11	0.000E+00	0.00
12	0.000E+00	0.00
13	0.000E+00	0.00
14	0.000E+00	0.00
15	0.000E+00	0.00
16	0.000E+00	0.00
17	0.000E+00	0.00
18	0.000E+00	0.00
19	0.000E+00	0.00
20	0.000E+00	0.00
21	0.000E+00	0.00
22	0.000E+00	0.00
23	0.000E+00	0.00
24	0.000E+00	0.00
25	0.000E+00	0.00
26	0.000E+00	0.00
27	0.000E+00	0.00
28	0.000E+00	0.00
29	0.000E+00	0.00
30	0.000E+00	0.00
31	0.000E+00	0.00
32	0.000E+00	0.00
33	0.000E+00	0.00
34	0.000E+00	0.00
35	0.000E+00	0.00
36	0.000E+00	0.00
37	0.000E+00	0.00

38	0.000E+00	0.00
39	0.000E+00	0.00
40	0.000E+00	0.00
41	0.000E+00	0.00
42	0.000E+00	0.00
43	0.000E+00	0.00
44	0.000E+00	0.00
45	0.000E+00	0.00
46	0.000E+00	0.00
47	0.000E+00	0.00
48	0.000E+00	0.00
49	0.000E+00	0.00
50	0.000E+00	0.00
51	0.000E+00	0.00
52	0.000E+00	0.00
53	0.000E+00	0.00
54	0.000E+00	0.00
55	0.000E+00	0.00
56	0.000E+00	0.00
57	0.000E+00	0.00
58	0.000E+00	0.00
59	0.000E+00	0.00
60	0.000E+00	0.00
61	0.000E+00	0.00
62	0.000E+00	0.00
63	0.000E+00	0.00
64	0.000E+00	0.00
65	0.000E+00	0.00
66	0.000E+00	0.00
67	0.000E+00	0.00
68	0.000E+00	0.00
69	0.000E+00	0.00
70	0.000E+00	0.00
71	0.000E+00	0.00
72	0.000E+00	0.00
73	0.000E+00	0.00
74	0.000E+00	0.00
75	0.000E+00	0.00
76	0.000E+00	0.00
77	0.000E+00	0.00
78	0.000E+00	0.00
79	0.000E+00	0.00
80	0.000E+00	0.00
81	0.000E+00	0.00
82	0.000E+00	0.00
83	0.000E+00	0.00
84	0.000E+00	0.00
85	0.000E+00	0.00
86	0.000E+00	0.00
87	0.000E+00	0.00
88	0.000E+00	0.00
89	0.000E+00	0.00

90	0.000E+00	0.00
91	0.000E+00	0.00
92	0.000E+00	0.00
93	0.000E+00	0.00
94	0.000E+00	0.00
95	0.000E+00	0.00
96	0.000E+00	0.00
97	0.000E+00	0.00
98	0.000E+00	0.00
99	0.000E+00	0.00
100	0.000E+00	0.00
101	0.000E+00	0.00
102	0.000E+00	0.00
103	0.000E+00	0.00
104	0.000E+00	0.00
105	0.000E+00	0.00
106	0.000E+00	0.00
107	0.000E+00	0.00
108	0.000E+00	0.00
109	0.000E+00	0.00
110	0.000E+00	0.00
111	0.000E+00	0.00
112	0.000E+00	0.00
113	0.000E+00	0.00
114	0.000E+00	0.00
115	0.000E+00	0.00
116	0.000E+00	0.00
117	0.000E+00	0.00
118	0.000E+00	0.00
119	0.000E+00	0.00
120	0.000E+00	0.00
121	0.000E+00	0.00
122	0.000E+00	0.00
123	0.000E+00	0.00
124	0.000E+00	0.00
125	0.000E+00	0.00
126	0.000E+00	0.00
127	0.000E+00	0.00
128	0.000E+00	0.00
129	0.000E+00	0.00
130	0.000E+00	0.00
131	0.000E+00	0.00
132	0.000E+00	0.00
133	0.000E+00	0.00
134	0.000E+00	0.00
135	0.000E+00	0.00
136	0.000E+00	0.00
137	0.000E+00	0.00
138	0.000E+00	0.00
139	0.000E+00	0.00
140	0.000E+00	0.00
141	0.000E+00	0.00

142	0.000E+00	0.00
143	0.000E+00	0.00
144	0.000E+00	0.00
145	0.000E+00	0.00
146	0.000E+00	0.00
147	0.000E+00	0.00
148	0.000E+00	0.00
149	0.000E+00	0.00
150	0.000E+00	0.00
151	0.000E+00	0.00
152	0.000E+00	0.00
153	0.000E+00	0.00
154	0.000E+00	0.00
155	0.000E+00	0.00
156	0.000E+00	0.00
157	0.000E+00	0.00
158	0.000E+00	0.00
159	0.000E+00	0.00
160	0.000E+00	0.00
161	0.000E+00	0.00
162	0.000E+00	0.00
163	0.000E+00	0.00
164	0.000E+00	0.00
165	0.000E+00	0.00
166	0.000E+00	0.00
167	0.000E+00	0.00
168	0.000E+00	0.00
169	0.000E+00	0.00
170	0.000E+00	0.00
171	0.000E+00	0.00
172	0.000E+00	0.00
173	0.000E+00	0.00
174	0.000E+00	0.00
175	0.000E+00	0.00
176	0.000E+00	0.00
177	0.000E+00	0.00
178	0.000E+00	0.00
179	0.000E+00	0.00
180	0.000E+00	0.00
181	0.000E+00	0.00
182	0.000E+00	0.00
183	0.000E+00	0.00
184	0.000E+00	0.00
185	0.000E+00	0.00
186	0.000E+00	0.00
187	0.000E+00	0.00
188	0.000E+00	0.00
189	0.000E+00	0.00
190	0.000E+00	0.00
191	0.000E+00	0.00
192	0.000E+00	0.00
193	0.000E+00	0.00

```
  194   0.000E+00    0.00
  195   0.000E+00    0.00
  196   0.000E+00    0.00
  197   0.000E+00    0.00
  198   0.000E+00    0.00
  199   0.000E+00    0.00
  200   0.000E+00    0.00
  201   0.000E+00    0.00
  202   0.000E+00    0.00
  203   0.000E+00    0.00
  204   0.000E+00    0.00
  205   0.000E+00    0.00
  206   0.000E+00    0.00
  207   0.000E+00    0.00
  208   0.000E+00    0.00
  209   0.000E+00    0.00
  210   0.000E+00    0.00
  211   0.000E+00    0.00
  212   0.000E+00    0.00
  213   0.000E+00    0.00
  214   0.000E+00    0.00
  215   0.000E+00    0.00
  216   0.000E+00    0.00
  217   0.000E+00    0.00
  218   0.000E+00    0.00
  219   0.000E+00    0.00
  220   0.000E+00    0.00
  221   0.000E+00    0.00
  222   0.000E+00    0.00
  223   0.000E+00    0.00
  224   0.000E+00    0.00
  225   0.000E+00    0.00
  226   0.000E+00    0.00
  227   0.000E+00    0.00
  228   0.000E+00    0.00
  229   0.000E+00    0.00
  230   0.000E+00    0.00
  231   0.000E+00    0.00
  232   0.000E+00    0.00
  233   0.000E+00    0.00
  234   0.000E+00    0.00
  235   0.000E+00    0.00
  236   0.000E+00    0.00
  237   0.000E+00    0.00
  238   0.000E+00    0.00
1fuel bundle

                                  frequency for generations      24 to
123 each asterisk represents   1.0000 generations
 0.7540 to 0.7568     *
 0.7568 to 0.7596     *******
 0.7596 to 0.7624     ******
```

```
 0.7624 to 0.7653     ************************
 0.7653 to 0.7681     ************************
 0.7681 to 0.7709     ******************
 0.7709 to 0.7738     ****************
 0.7738 to 0.7766     ***

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7540 to 0.7568
 0.7568 to 0.7596     ******
 0.7596 to 0.7624     ******
 0.7624 to 0.7653     ********************
 0.7653 to 0.7681     ******************
 0.7681 to 0.7709     *************
 0.7709 to 0.7738     ***********
 0.7738 to 0.7766     **

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7540 to 0.7568
 0.7568 to 0.7596     ****
 0.7596 to 0.7624     ****
 0.7624 to 0.7653     *************
 0.7653 to 0.7681     ***********
 0.7681 to 0.7709     **********
 0.7709 to 0.7738     *******
 0.7738 to 0.7766     *

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7540 to 0.7568
 0.7568 to 0.7596     ***
 0.7596 to 0.7624     **
 0.7624 to 0.7653     ********
 0.7653 to 0.7681     ******
 0.7681 to 0.7709     ***
 0.7709 to 0.7738     **
 0.7738 to 0.7766     *

1
************************************************************************
*****************************************
        ***
***
        ***   fuel bundle
***
        ***
***

************************************************************************
*****************************************
        ***
```

```
***
        ***                                    ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76668 + or - 0.00051                      ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.64726E-02 + or -  1.37191E-04             ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  1.10734E-05             ***
        ***
***
        ***        system mean free path (cm)
6.52767E-01 + or -  1.72252E-04             ***
        ***
***
        ***        number of warning messages
7                                           ***
        ***
***
        ***        number of error messages
0                                           ***
        ***
***
        ***        k-effective satisfies the chi**2 test for normality at
the 95 % level                                  ***
        ***
***
        ***
***

************************************************************************
****************************************

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************************************************************************
************************************************************

          Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.02933 minutes
```

```
**********************************************************************
**********************************************************
1
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
VV          VV  IIIIIIIIIII
   KK          KK   EEEEEEEEEEEEE   NNN          NN  OOOOOOOOOOOO
VV          VV  IIIIIIIIIII
   KK         KK    EE              NNNN         NN  OO         OO
VV          VV       II
   KK        KK     EE              NN NN        NN  OO         OO
VV          VV       II
   KK       KK      EE              NN   NN      NN  OO         OO
VV          VV       II
   KKKKKKKK         EEEEEEEEE       NN    NN    NN  OO         OO
-------------   VV          VV       II
   KKKKKKKK         EEEEEEEEE       NN     NN   NN  OO         OO
-------------    VV        VV        II
   KK       KK      EE              NN       NN  NN  OO         OO
VV     VV          II
   KK        KK     EE              NN        NN NN  OO         OO
VV   VV           II
   KK         KK    EE              NN         NNNN  OO         OO
VV VV            II
   KK          KK   EEEEEEEEEEEEE   NN          NNN  OOOOOOOOOOOO
VVV       IIIIIIIIIII
   KK           KK  EEEEEEEEEEEEE   NN           NN   OOOOOOOOOO
V        IIIIIIIIIII



   DDDDDDDDDDDD      AAAAAAAAA     VV          VV  IIIIIIIIIII
DDDDDDDDDDDD
   DDDDDDDDDDDDD    AAAAAAAAAA    VV          VV  IIIIIIIIIII
DDDDDDDDDDDDD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA    VV        VV        II         DD
DD
   DD         DD   AA         AA      VV     VV         II         DD
DD
   DD         DD   AA         AA       VV   VV          II         DD
DD
   DD         DD   AA         AA        VV VV           II         DD
DD
   DDDDDDDDDDDDD   AA         AA         VVV       IIIIIIIIIII
DDDDDDDDDDDDD
```

```
   DDDDDDDDDDDD    AA         AA          V        IIIIIIIIIIII
DDDDDDDDDDDD

      0000000       88888888888                //   22222222222
33333333333               //        11          666666666666
     000000000     8888888888888              //   2222222222222
3333333333333             //        111         6666666666666
    00       00    88         88             //    22         22   33
33             //        1111         66
   00         00   88         88            //                22
33            //           11         66
   00         00   88         88           //                 22
33           //            11         66
   00         00    88888888888           //                22
333          //             11         666666666666
   00         00    88888888888          //                22
333          //             11         6666666666666
   00         00   88         88         //              22
33        //               11         66         66
   00         00   88         88       //             22
33       //                11         66         66
    00       00    88         88      //            22             33
33      //                 11         66         66
     000000000     8888888888888     //           2222222222222
3333333333333     //                11111111     6666666666666
      0000000       88888888888     //           2222222222222
33333333333     //                11111111      66666666666


      0000000       666666666666                       0000000
7777777777777                    22222222222     88888888888
     000000000     6666666666666                      000000000
777777777777                   2222222222222   8888888888888
    00       00    66                   :::       00       00    77
77          :::       22         22   88         88
   00         00   66                   :::       00         00
77           :::                  22   88         88
   00         00   66                   :::       00         00
77           :::                    22   88         88
   00         00   666666666666                    00         00
77                                 22      88888888888
   00         00   6666666666666                   00         00
77                                22        88888888888
   00         00   66         66         :::       00         00
77             :::            22         88         88
   00         00   66         66         :::       00         00
77             :::           22          88         88
    00       00    66         66         :::       00       00
77               :::        22            88         88
```

```
     000000000     6666666666666                      000000000
77                        2222222222222   8888888888888
      0000000       66666666666                         0000000
77                        2222222222222    88888888888
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAA    LL
EEEEEEEEEEEE
   SS         SS   CC         CC   AA         AA   LL              EE
   SS              CC              AA         AA   LL              EE
   SS              CC              AA         AA   LL              EE
   SSSSSSSSSS     CC              AAAAAAAAAAAAA   LL
EEEEEEEEE
    SSSSSSSSSS    CC              AAAAAAAAAAAAA   LL
EEEEEEEEE
              SS   CC              AA         AA   LL              EE
              SS   CC              AA         AA   LL              EE
   SS         SS   CC         CC   AA         AA   LL              EE
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE



**********************************************************************
**********************************************

**********************************************************************
**********************************************

**********************************************************************
**********************************************
        *****
*****
        *****                                        program
verification information                                    *****
        *****
*****
        *****                                   code system:  SCALE
version:  6.1                                       *****
        *****
*****

**********************************************************************
**********************************************
```

```
********************************************************************************
*********************************************
        *****
*****
        *****
*****
        *****                program:  kenovi
*****
        *****
*****
        *****         creation date:  21_jun_2011
*****
        *****
*****
        *****                library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****                jobname:  David
*****
        *****
*****
        *****          machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  06:07:28.42
*****
        *****
*****
        *****
*****

********************************************************************************
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```

```
********************************************************************************
*****************************************
        ***
***
        ***                                 fuel bundle
***
        ***
***

********************************************************************************
*****************************************
        ***                                      ******       numeric
parameters       ******                                      ***
        ***
***
        ***
***
        ***                       tme          maximum problem time (min)
0.00                     ***
        ***
***
        ***                       tba          time per generation (min)
10.00                     ***
        ***
***
        ***                       gen          number of generations
123                     ***
        ***
***
        ***                       npg          number per generation
20000                     ***
        ***
***
        ***                       nsk          number of generations to be
skipped                     23                      ***
        ***
***
        ***                       beg          beginning generation number
1                     ***
        ***
***
        ***                       res          generations between
checkpoints                      103                      ***
        ***
***
        ***                       x1d          number of extra 1-d cross
sections                     1                       ***
        ***
***
        ***                       nbk          neutron bank size
```

```
20025                    ***
        ***
***
        ***                    xnb          extra positions in neutron
bank                      0                      ***
        ***
***
        ***                    nfb          fission bank size
20000                    ***
        ***
***
        ***                    xfb          extra positions in fission
bank                      0                      ***
        ***
***
        ***                    sig          cut off standard deviation
0.0000                    ***
        ***
***
        ***                    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
000015714D98EE96                      ***
        ***
***
        ***                    nb8          number of d.a. blocks on unit
8                    1000                      ***
        ***
***
        ***                    nl8          length of d.a. blocks on unit
8                     512                      ***
        ***
***
        ***                    nqd          quadrature order for angular
fluxes                   0                     ***
        ***
***
        ***                    pnm          highest order of flux
moments                   0                        ***
        ***
***
        ***                    msh          mesh size for mesh flux tally
```

```
0.0000                      ***
        ***
***
        ***                      adj         mode of calculation
forward                     ***
        ***
***
        ***                      tps         sampling sites per track
length                        5                      ***
        ***
***
        ***                      cgs         number of secondary groups
to sampl                    0                      ***
        ***
***
        ***                      cas         number of secondary angles
to sampl                    0                      ***
        ***
***
        ***                                  input data written on
restart unit                   yes                      ***
        ***
***
        ***
***

**********************************************************************
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*******************************************
1
**********************************************************************
*******************************************

**********************************************************************
*******************************************
        ***
***
        ***                                fuel bundle
***
        ***
***

**********************************************************************
*******************************************
        ***                                ******      logical
parameters        ******                                 ***
        ***
***
        ***  run  execute problem after checking data    yes
plt  plot picture map(s)                      no ***
```

```
        ***
***
        ***       compute fluxes (cfx, flx or mfp)       yes
fdn  compute fission densities               yes ***
        ***
***
        ***  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 fiss prod matrix by unit number   no
fmp  print fiss prod matrix by unit location  no ***
        ***
***
        ***  mkh  compute matrix k-eff by hole number     no
mka  compute matrix k-eff by array number     no ***
        ***
***
        ***  ckh  compute cofactor k-eff by hole number   no
cka  compute cofactor k-eff by array number   no ***
        ***
***
        ***  fmh  print fiss prod matrix by hole number   no
fma  print fiss prod matrix by array number   no ***
        ***
***
        ***  hhl  collect matrix by highest hole level    no
hal  collect matrix by highest array level    no ***
        ***
***
        ***  amx  print all mixed cross sections          no
far  print fis. and abs. by region            no ***
        ***
***
        ***  xs1  print 1-d mixture x-sections            no
gas  print far by group                       no ***
        ***
***
        ***  xs2  print 2-d mixture x-sections            no
pax  print xsec-albedo correlation tables     no ***
        ***
***
        ***  xsl  print 2-d mixture Pl arrays             no
pwt  print weight average array               no ***
```

```
        ***
***
        ***  xap  print mixture angles & probabilities    no
pgm  print input geometry                      no ***
        ***
***
        ***  pki  print fission spectrum                  no
bug  print debug information                   no ***
        ***
***
        ***  p1d  print extra 1-d cross sections          no
trk  print tracking information                no ***
        ***
***
        ***  tfm  coordinate transform for fluxes         no
pmf  print angular fluxes and flux moments     no ***
        ***
***
        ***       print fluxes (flx)                    yes
app  append, not overwrite, restart data       no ***
        ***
***
        ***  mfx  compute mesh fluxes                     no
pms  print mesh fluxes if calculated           no ***
        ***
***
        ***  mfp  compute region mean free paths          no
pmm  print mesh flux moments if calculated     no ***
        ***
***
        ***  sen  compute derivative sensitivites         no
pmv  print mesh volumes                        no ***
        ***
***
        ***  cep  continuous energy calculation           no
ptb  use probability tables                   yes ***
        ***
***
        ***  fre  use analytic free gas kernel           yes
pnu  use prompt neutron spectrum only          no ***
        ***
***
        ***  cbt  compute contributons                    no
pct  print contributons                        no ***
        ***
***
        ***  cds  collect CADIS fissions                  no
htm  produce HTML output                      yes ***
        ***
***
        ***
***
```

```
******************************************************************************
*****************************************

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*****************************************

******************************************************************************
*********************************************
                                                    parameter input completed


                                  ........ finished reading the parameter
data      ........

                                 ************** data reading completed
***************
1
******************************************************************************
*********************************************
        ***
***
        ***                                  fuel bundle
***
        ***
***

******************************************************************************
*********************************************

******************************************************************************
*********************************************
        ***
***
        ***           unit
volume                                              ***
        ***         number                data set name
name         unit function                       ***
        ***         ------                ----------
----         ----------                         ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.33572\ft14f001             mixed cross
sections               ***
        ***
***
        ***      alb  79     C:\SCALE\data\albedos
input albedos                        ***
        ***
***
```

```
        ***      wts  80     C:\SCALE\data\scale.rev01.weights
input weights                        ***
        ***
***
        ***      skt  16      unknown
write scratch data                   ***
        ***
***
        ***      rst  95
->\Temp\scale.David.33572\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.33572\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.33572\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.33572\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access            ***
        ***
***

******************************************************************************
*******************************************

                                  ........ finished preparing input data
........
1
******************************************************************************
*****************************
                  ***
***
                  ***           fuel bundle
***
                  ***
***

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*****************************

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```

```
*****************************
                  ***
***
                  ***                                  ****** additional
information ******                            ***
                  ***
***
                  ***  use a global unit                         yes    use
lattice geometry                    yes  ***
                  ***
***
                  ***  no. of scattering angles in xsecs         3
global array number                          0  ***
                  ***
***
                  ***  number of mixtures used                   3
number of units in the global x dir.        0  ***
                  ***
***
                  ***  number of bias id's used                  1
number of units in the global y dir.        0  ***
                  ***
***
                  ***  number of differential albedos used       2
number of units in the global z dir.        0  ***
                  ***
***
                  ***  total input geometry regions              4
number of energy groups                   238  ***
                  ***
***
                  ***  number of geometry regions used           4    no.
of fission spectrum source grps.        1  ***
                  ***
***
                  ***  use nested arrays                        no    use
nested holes                           no  ***
                  ***
***
                  ***  number of arrays used                     1
number of holes                              0  ***
                  ***
***
                  ***  maximum array nesting level               1
maximum hole nesting level                   0  ***
                  ***
***
                  ***  largest array number                      1
largest geometry unit number                 2  ***
                  ***
***
                  ***
```

```
***
                  ***  boundary label 1                cuboid
***
                  ***
***
                  ***    +x boundary condition             h2o
-x boundary condition                 h2o  ***
                  ***
***
                  ***    +y boundary condition        graphite
-y boundary condition            graphite  ***
                  ***
***
                  ***    +z boundary condition             h2o
-z boundary condition                 h2o  ***
                  ***
***

******************************************************************************
*****************************

                                    cross sections read from the ampx
working library on unit    4

1                                        fuel bundle

                                                 mixing table

                                          number of scattering angles =
3
                                       cross section message threshold
=1.0E+00


 mixture =     1          density(g/cc) =  5.5474
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    1001001  6.50813E-13  1.96338E-13    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    1003007  3.23535E-08  6.79473E-08    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    1004009  1.25936E-07  3.39736E-07    4009     9.0122     be9 425
endf/b7 rel8 rev7 mod2                   12/17/09
    1005010  6.04526E-08  1.81192E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  1.81631E-15  5.98566E-15    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    1007014  8.91558E-06  3.73710E-05    7014    14.0031     n14 725
endf/b7 rel8 rev7 mod0                   12/17/09
    1008016  1.00000E-20  4.78788E-20    8016    15.9949     o16 825
```

```
endf/b7 rel8 rev7 mod3                    12/17/09
    1011023  9.87361E-07  6.79473E-06   11023    22.9898     na23 1125
endf/b7 rel8 rev7 mod0                   12/17/09
    1012024  7.37710E-07  5.29649E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                   12/17/09
    1012025  9.33929E-08  6.98505E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                   12/17/09
    1012026  1.02826E-07  7.99735E-07   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                   12/17/09
    1013027  3.96970E-02  3.20617E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                   12/17/09
    1014028  5.44792E-03  4.56239E-02   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                   12/17/09
    1014029  2.76758E-04  2.40054E-03   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                   12/17/09
    1014030  1.82655E-04  1.63883E-03   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                   12/17/09
    1015031  1.46571E-06  1.35895E-05   15031    30.9738     p31 1525
endf/b7 rel6 rev7 mod1                    12/17/09
    1020040  1.09810E-06  1.31359E-05   20040    39.9626     ca40 2025
endf/b7 rel1 rev7 mod1                   12/17/09
    1020042  7.32891E-09  9.20498E-08   20042    41.9586     ca42 2031
endf/b7 rel1 rev7 mod1                   12/17/09
    1020043  1.52922E-09  1.96645E-08   20043    42.9588     ca43 2034
endf/b7 rel1 rev7 mod1                   12/17/09
    1020044  2.36292E-08  3.10903E-07   20044    43.9555     ca44 2037
endf/b7 rel1 rev7 mod1                   12/17/09
    1020046  4.53101E-11  6.23272E-10   20046    45.9537     ca46 2043
endf/b7 rel1 rev7 mod1                   12/17/09
    1020048  2.11825E-09  3.04054E-08   20048    47.9525     ca48 2049
endf/b7 rel1 rev7 mod1                   12/17/09
    1023000  2.00517E-07  3.05763E-06   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                     12/17/09
    1024050  3.47753E-08  5.19916E-07   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                   12/17/09
    1024052  6.70606E-07  1.04264E-05   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                   12/17/09
    1024053  7.60414E-08  1.20504E-06   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                   12/17/09
    1024054  1.89283E-08  3.05616E-07   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                   12/17/09
    1025055  3.58088E-07  5.88877E-06   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                   12/17/09
    1026054  1.44567E-06  2.33421E-05   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                   12/17/09
    1026056  2.26940E-05  3.79975E-04   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                   12/17/09
    1026057  5.24102E-07  8.93224E-06   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                   12/17/09
    1026058  6.97484E-08  1.20955E-06   26058    57.9333     fe58 2637
endf/b7 rel8 rev7 mod0                   12/17/09
    1027059  1.92584E-07  3.39736E-06   27059    58.9332     co59 2725
```

```
endf/b7 rel2 rev7 mod0                  12/17/09
    1028058  1.14089E-06  1.97856E-05   28058    57.9353     ni58 2825
endf/b7 rel8 rev7 mod4                  12/17/09
    1028060  4.39468E-07  7.88386E-06   28060    59.9308     ni60 2831
endf/b7 rel8 rev7 mod4                  12/17/09
    1028061  1.91034E-08  3.48426E-07   28061    60.9311     ni61 2834
endf/b7 rel8 rev7 mod5                  12/17/09
    1028062  6.09099E-08  1.12912E-06   28062    61.9283     ni62 2837
endf/b7 rel8 rev7 mod5                  12/17/09
    1028064  1.55120E-08  2.96838E-07   28064    63.9280     ni64 2843
endf/b7 rel8 rev7 mod4                  12/17/09
    1029063  2.49068E-06  4.69175E-05   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                  12/17/09
    1029065  1.11117E-06  2.15960E-05   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                  12/17/09
    1030000  6.94379E-07  1.35895E-05   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                   12/17/09
    1036083  8.44132E-12  2.09508E-10   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90757E-08  1.32072E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.07142E-08  2.91549E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.64542E-08  4.52665E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  8.98554E-11  2.49892E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.66727E-08  4.68664E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  8.17464E-11  2.32238E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.76219E-09  7.92996E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  1.01940E-19  2.83499E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.06467E-11  3.02466E-10   41095    94.9068     nb95 4131
endf/b7 rel0 rev7 mod1                  12/17/09
    1042092  1.04839E-08  2.88425E-07   42092    91.9068     mo92 4225
endf/b7 rel0 rev7 mod1                  12/17/09
    1042094  6.55156E-09  1.84160E-07   42094    93.9051     mo94 4231
endf/b7 rel0 rev7 mod1                  12/17/09
    1042095  1.12881E-08  3.20682E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                  12/17/09
    1042096  1.18397E-08  3.39892E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                  12/17/09
    1042097  6.87190E-09  1.99338E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                  12/17/09
    1042098  1.72534E-08  5.05643E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                  12/17/09
    1042099  1.26781E-11  3.75358E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                  12/17/09
    1042100  6.95468E-09  2.07987E-07   42100    99.9075     mo100 4249
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  7.43392E-11  2.20091E-09   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  7.56038E-11  2.28360E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  6.19349E-11  1.88925E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  3.47982E-11  1.07191E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  2.76790E-11  8.60895E-10   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.75751E-12  1.82525E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  9.11524E-12  2.80782E-10   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.10221E-12  3.46120E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.29782E-11  4.07543E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.22479E-12  7.11948E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  8.19499E-13  2.64696E-11   46108   107.9039     pd108 4643
endf/b7 rel5 rev7 mod1                12/17/09
    1047107  2.12330E-08  6.79473E-07   47107   106.9051     ag107 4725
endf/b7 rel0 rev7 mod1                12/17/09
    1047109  4.53581E-13  1.47864E-11   47109   108.9047     ag109 4731
endf/b7 rel0 rev7 mod1                12/17/09
    1048106  1.26206E-10  4.00095E-09   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                12/17/09
    1048108  8.98597E-11  2.90245E-09   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                12/17/09
    1048110  1.26105E-09  4.14861E-08   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                12/17/09
    1048111  1.29251E-09  4.29086E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43646E-09  8.16135E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23394E-09  4.17030E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90094E-09  9.89093E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56422E-10  2.62438E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.52454E-13  5.24367E-12   49115   114.9039     in115 4931
endf/b7 rel3 rev7 mod1                12/17/09
    1050112  1.85479E-10  6.21305E-09   50112   111.9048     sn112 5025
endf/b7 rel0 rev7 mod1                12/17/09
    1050114  1.26202E-10  4.30291E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50211E-11  2.23640E-09   50115   114.9033     sn115 5034
endf/b7 rel0 rev7 mod1                12/17/09
    1050116  2.78027E-09  9.64582E-08   50116   115.9017     sn116 5037
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endf/b7 rel0 rev7 mod1                12/17/09
    1050117  1.46873E-09  5.13961E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63141E-09  1.63454E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64273E-09  5.84686E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22999E-09  2.23602E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85558E-10  3.23143E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10753E-09  4.10779E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  8.16237E-13  3.07631E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  1.84317E-12  7.00172E-11   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  8.29123E-12  3.19927E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30210E-12  5.25836E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  2.58831E-11  1.01423E-09   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.63989E-11  1.05025E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88658E-12  7.61856E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  6.78313E-11  2.69858E-09   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.19988E-16  4.80953E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  9.12998E-11  3.68691E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  8.94077E-11  3.66406E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.30203E-08  1.36309E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  4.65312E-11  1.94875E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  9.88605E-11  4.11062E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  6.43520E-11  2.71432E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  8.97405E-11  3.81207E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.29909E-12  2.69469E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.67121E-11  3.30467E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  2.04761E-11  8.63663E-10   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  4.49459E-11  1.92272E-09   59143   142.9108     pr143 5931
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  3.56054E-11  1.52314E-09   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  2.59333E-12  1.11715E-10   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  5.61166E-11  2.43422E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  4.41056E-11  1.92641E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.55637E-11  6.84452E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  2.42116E-11  1.07202E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  1.70808E-11  7.51168E-10   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  8.62498E-19  3.81891E-17   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.87396E-12  8.35352E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.27809E-13  5.62068E-12   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.48773E-11  6.63181E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.11724E-15  5.01372E-14   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.01206E-09  1.36073E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  3.93595E-12  1.78989E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.33713E-13  1.06983E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.43002E-09  6.46028E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.56122E-09  7.14650E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  9.63176E-16  4.43783E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  4.75943E-13  2.20715E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.22917E-13  5.73705E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77862E-12  2.62785E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29364E-11  2.89975E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27249E-10  1.98133E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91085E-10  2.75880E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51777E-10  2.12215E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17303E-10  3.39088E-08   64158   157.9241     gd158 6443
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31101E-10  3.02122E-08   64160   159.9270     gd160 6449
endf/b7 rel0 rev7 mod1                12/17/09
    1074182  7.16309E-08  3.90130E-06   74182   181.9482     w182 7431
endf/b7 rel8 rev7 mod2                12/17/09
    1074183  3.84687E-08  2.10670E-06   74183   182.9502     w183 7434
endf/b7 rel8 rev7 mod2                12/17/09
    1074184  8.19198E-08  4.51079E-06   74184   183.9509     w184 7437
endf/b7 rel8 rev7 mod2                12/17/09
    1074186  7.51922E-08  4.18544E-06   74186   185.9544     w186 7443
endf/b7 rel8 rev7 mod2                12/17/09
    1082204  7.66801E-11  4.68185E-09   82204   203.9730     pb204 8225
endf/b7 rel1 rev7 mod1                12/17/09
    1082206  1.31999E-09  8.13854E-08   82206   205.9745     pb206 8231
endf/b7 rel1 rev7 mod1                12/17/09
    1082207  1.21045E-09  7.49943E-08   82207   206.9759     pb207 8234
endf/b7 rel1 rev7 mod1                12/17/09
    1082208  2.87003E-09  1.78674E-07   82208   207.9767     pb208 8237
endf/b7 rel6 rev7 mod2                12/17/09
    1092234  1.45935E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                12/17/09
    1092235  1.76387E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                12/17/09
    1092236  9.22574E-06  6.51867E-04   92236   236.0456     u236 9231
endf/b7 rel0 rev7 mod1                12/17/09
    1092238  7.06299E-03  5.03292E-01   92238   238.0508     u238 9237
endf/b7 rel6 rev7 mod5                12/17/09
    1093237  5.49226E-13  3.89717E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  6.89216E-20  4.91116E-18   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  5.89368E-11  4.21737E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  1.71131E-17  1.22970E-15   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.97187E-21  7.19545E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49925E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00352E-20  7.24117E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.85136E-28  2.79060E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99998E-21  7.27573E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.62816E-20  1.17972E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.98207E-21  7.26271E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.97121E-21  7.28469E-19   96244   244.0627     cm244 9637
endf/b7 rel3 rev7 mod2                12/17/09
```

```
 mixture =     2          density(g/cc) = 0.99396
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    2001001  6.64695E-02  1.11915E-01    1001     1.0078     h_h2o 1
fast: h1 endf/b7 rel0 rev7 mod0          12/17/09
    2008016  3.32348E-02  8.88085E-01    8016    15.9949     o16 825
endf/b7 rel8 rev7 mod3                   12/17/09

 mixture =     3          density(g/cc) =  2.7020
    nuclide   atom-dens.   wgt. frac.     za      awt
nuclide title
    3003006  1.75835E-07  6.50000E-07    3006     6.0151     li6 325
endf/b7 rel1 rev7 mod0                   12/17/09
    3003007  2.16849E-06  9.35000E-06    3007     7.0160     li7 328
endf/b7 rel0 rev7 mod0                   12/17/09
    3005010  2.99015E-07  1.84000E-06    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    3005011  1.20605E-06  8.16000E-06    5011    11.0093     b11 528
endf/b7 rel8 rev7 mod0                   12/17/09
    3012024  4.88634E-04  7.20258E-03   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    3012025  6.18603E-05  9.49881E-04   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    3012026  6.81081E-05  1.08754E-03   12026    25.9826     mg26 1231
endf/b7 rel3 rev7 mod2                  12/17/09
    3013027  5.88689E-02  9.76150E-01   13027    26.9815     al27 1325
endf/b7 rel6 rev7 mod1                  12/17/09
    3014028  2.67155E-04  4.59332E-03   14028    27.9769     si28 1425
endf/b7 rel6 rev7 mod1                  12/17/09
    3014029  1.35717E-05  2.41681E-04   14029    28.9765     si29 1428
endf/b7 rel8 rev7 mod3                  12/17/09
    3014030  8.95702E-06  1.64994E-04   14030    29.9738     si30 1431
endf/b7 rel6 rev7 mod2                  12/17/09
    3023000  3.19422E-06  1.00000E-04   23000    50.9415     v 2300
endf/b7 rel8 rev7 mod0                    12/17/09
    3024050  1.83565E-06  5.63448E-05   24050    49.9460     cr50 2425
endf/b7 rel8 rev7 mod5                  12/17/09
    3024052  3.53986E-05  1.12994E-03   24052    51.9405     cr52 2431
endf/b7 rel8 rev7 mod4                  12/17/09
    3024053  4.01392E-06  1.30593E-04   24053    52.9407     cr53 2434
endf/b7 rel8 rev7 mod4                  12/17/09
    3024054  9.99149E-07  3.31204E-05   24054    53.9389     cr54 2437
endf/b7 rel8 rev7 mod5                  12/17/09
    3025055  2.07330E-05  7.00000E-04   25055    54.9380     mn55 2525
endf/b7 rel8 rev7 mod0                  12/17/09
    3026054  6.02891E-06  1.99853E-04   26054    53.9396     fe54 2625
endf/b7 rel8 rev7 mod5                  12/17/09
    3026056  9.46410E-05  3.25331E-03   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                  12/17/09
    3026057  2.18567E-06  7.64770E-05   26057    56.9354     fe57 2634
endf/b7 rel8 rev7 mod4                  12/17/09
    3026058  2.90873E-07  1.03561E-05   26058    57.9333     fe58 2637
```

```
endf/b7 rel8 rev7 mod0                  12/17/09
    3027059  2.76106E-07  1.00000E-05   27059    58.9332     co59 2725
endf/b7 rel2 rev7 mod0                  12/17/09
    3029063  5.20580E-05  2.01329E-03   29063    62.9296     cu63 2925
endf/b7 rel8 rev7 mod5                  12/17/09
    3029065  2.32247E-05  9.26712E-04   29065    64.9278     cu65 2931
endf/b7 rel8 rev7 mod5                  12/17/09
    3030000  2.21504E-05  8.90000E-04   30000    65.3800     zn 3000
endf/b7 rel0 rev7 mod0                   12/17/09
    3031069  7.01394E-07  2.97102E-05   31069    68.9256     ga69 3125
endf/b7 rel0 rev7 mod1                  12/17/09
    3031071  4.65496E-07  2.02898E-05   31071    70.9247     ga71 3131
endf/b7 rel0 rev7 mod1                  12/17/09
    3048106  1.80940E-09  1.17766E-07   48106   105.9065     cd106 4825
endf/b7 rel0 rev7 mod1                 12/17/09
    3048108  1.28830E-09  8.54314E-08   48108   107.9042     cd108 4831
endf/b7 rel0 rev7 mod1                 12/17/09
    3048110  1.80796E-08  1.22113E-06   48110   109.9030     cd110 4837
endf/b7 rel0 rev7 mod1                 12/17/09
    3048111  1.85283E-08  1.26284E-06   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                 12/17/09
    3048112  3.49287E-08  2.40208E-06   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                 12/17/09
    3048113  1.76887E-08  1.22736E-06   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                 12/17/09
    3048114  4.15873E-08  2.91113E-06   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                 12/17/09
    3048116  1.08419E-08  7.72275E-07   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                 12/17/09



                            3003006    li6 325 endf/b7 rel1 rev7 mod0
12/17/09
                            1003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                            3003007    li7 328 endf/b7 rel0 rev7 mod0
12/17/09
                            1004009    be9 425 endf/b7 rel8 rev7 mod2
12/17/09
                            1005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                            3005010    b10 525 endf/b7 rel1 rev7 mod0
12/17/09
                            3005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                            1005011    b11 528 endf/b7 rel8 rev7 mod0
12/17/09
                            1007014    n14 725 endf/b7 rel8 rev7 mod0
12/17/09
                            2008016    o16 825 endf/b7 rel8 rev7 mod3
12/17/09
```

1008016	o16 825 endf/b7 rel8 rev7 mod3
12/17/09	
1011023	na23 1125 endf/b7 rel8 rev7 mod0
12/17/09	
1012024	mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09	
3012024	mg24 1225 endf/b7 rel3 rev7 mod3
12/17/09	
1012025	mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09	
3012025	mg25 1228 endf/b7 rel3 rev7 mod2
12/17/09	
1012026	mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09	
3012026	mg26 1231 endf/b7 rel3 rev7 mod2
12/17/09	
1013027	al27 1325 endf/b7 rel6 rev7 mod1
12/17/09	
3013027	al27 1325 endf/b7 rel6 rev7 mod1
12/17/09	
1014028	si28 1425 endf/b7 rel6 rev7 mod1
12/17/09	
3014028	si28 1425 endf/b7 rel6 rev7 mod1
12/17/09	
1014029	si29 1428 endf/b7 rel8 rev7 mod3
12/17/09	
3014029	si29 1428 endf/b7 rel8 rev7 mod3
12/17/09	
1014030	si30 1431 endf/b7 rel6 rev7 mod2
12/17/09	
3014030	si30 1431 endf/b7 rel6 rev7 mod2
12/17/09	
1015031	p31 1525 endf/b7 rel6 rev7 mod1
12/17/09	
1020040	ca40 2025 endf/b7 rel1 rev7 mod1
12/17/09	
1020042	ca42 2031 endf/b7 rel1 rev7 mod1
12/17/09	
1020043	ca43 2034 endf/b7 rel1 rev7 mod1
12/17/09	
1020044	ca44 2037 endf/b7 rel1 rev7 mod1
12/17/09	
1020046	ca46 2043 endf/b7 rel1 rev7 mod1
12/17/09	
1020048	ca48 2049 endf/b7 rel1 rev7 mod1
12/17/09	
1023000	v 2300 endf/b7 rel8 rev7 mod0
12/17/09	
3023000	v 2300 endf/b7 rel8 rev7 mod0
12/17/09	
1024050	cr50 2425 endf/b7 rel8 rev7 mod5
12/17/09	

	3024050	cr50	2425	endf/b7	rel8	rev7	mod5
12/17/09							
	1024052	cr52	2431	endf/b7	rel8	rev7	mod4
12/17/09							
	3024052	cr52	2431	endf/b7	rel8	rev7	mod4
12/17/09							
	1024053	cr53	2434	endf/b7	rel8	rev7	mod4
12/17/09							
	3024053	cr53	2434	endf/b7	rel8	rev7	mod4
12/17/09							
	1024054	cr54	2437	endf/b7	rel8	rev7	mod5
12/17/09							
	3024054	cr54	2437	endf/b7	rel8	rev7	mod5
12/17/09							
	1025055	mn55	2525	endf/b7	rel8	rev7	mod0
12/17/09							
	3025055	mn55	2525	endf/b7	rel8	rev7	mod0
12/17/09							
	1026054	fe54	2625	endf/b7	rel8	rev7	mod5
12/17/09							
	3026054	fe54	2625	endf/b7	rel8	rev7	mod5
12/17/09							
	1026056	fe56	2631	endf/b7	rel8	rev7	mod4
12/17/09							
	3026056	fe56	2631	endf/b7	rel8	rev7	mod4
12/17/09							
	1026057	fe57	2634	endf/b7	rel8	rev7	mod4
12/17/09							
	3026057	fe57	2634	endf/b7	rel8	rev7	mod4
12/17/09							
	1026058	fe58	2637	endf/b7	rel8	rev7	mod0
12/17/09							
	3026058	fe58	2637	endf/b7	rel8	rev7	mod0
12/17/09							
	1027059	co59	2725	endf/b7	rel2	rev7	mod0
12/17/09							
	3027059	co59	2725	endf/b7	rel2	rev7	mod0
12/17/09							
	1028058	ni58	2825	endf/b7	rel8	rev7	mod4
12/17/09							
	1028060	ni60	2831	endf/b7	rel8	rev7	mod4
12/17/09							
	1028061	ni61	2834	endf/b7	rel8	rev7	mod5
12/17/09							
	1028062	ni62	2837	endf/b7	rel8	rev7	mod5
12/17/09							
	1028064	ni64	2843	endf/b7	rel8	rev7	mod4
12/17/09							
	1029063	cu63	2925	endf/b7	rel8	rev7	mod5
12/17/09							
	3029063	cu63	2925	endf/b7	rel8	rev7	mod5
12/17/09							

```
                                1029065    cu65 2931 endf/b7 rel8 rev7 mod5
12/17/09
                                3029065    cu65 2931 endf/b7 rel8 rev7 mod5
12/17/09
                                1030000    zn 3000 endf/b7 rel0 rev7 mod0
12/17/09
                                3030000    zn 3000 endf/b7 rel0 rev7 mod0
12/17/09
                                3031069    ga69 3125 endf/b7 rel0 rev7 mod1
12/17/09
                                3031071    ga71 3131 endf/b7 rel0 rev7 mod1
12/17/09
                                1036083    kr83 3640 endf/b7 rel0 rev7 mod1
12/17/09
                                1040090    zr90 4025 endf/b7 rel0 rev7 mod1
12/17/09
                                1040091    zr91 4028 endf/b7 rel0 rev7 mod1
12/17/09
                                1040092    zr92 4031 endf/b7 rel3 rev7 mod4
12/17/09
                                1040093    zr93 4034 endf/b7 rel3 rev7 mod1
12/17/09
                                1040094    zr94 4037 endf/b7 rel3 rev7 mod1
12/17/09
                                1040095    zr95 4040 endf/b7 rel0 rev7 mod1
12/17/09
                                1040096    zr96 4043 endf/b7 rel0 rev7 mod1
12/17/09
                                1041093    nb93 4125 endf/b7 rel6 rev7 mod3
12/17/09
                                1041095    nb95 4131 endf/b7 rel0 rev7 mod1
12/17/09
                                1042092    mo92 4225 endf/b7 rel0 rev7 mod1
12/17/09
                                1042094    mo94 4231 endf/b7 rel0 rev7 mod1
12/17/09
                                1042095    mo95 4234 endf/b7 rel0 rev7 mod1
12/17/09
                                1042096    mo96 4237 endf/b7 rel0 rev7 mod1
12/17/09
                                1042097    mo97 4240 endf/b7 rel0 rev7 mod1
12/17/09
                                1042098    mo98 4243 endf/b7 rel0 rev7 mod1
12/17/09
                                1042099    mo99 4246 endf/b7 rel0 rev7 mod1
12/17/09
                                1042100    mo100 4249 endf/b7 rel0 rev7
mod1                 12/17/09
                                1043099    tc99 4325 endf/b7 rel0 rev7 mod1
12/17/09
                                1044101    ru101 4440 endf/b7 rel0 rev7
mod1                 12/17/09
```

		1044102	ru102	4443	endf/b7	rel0	rev7
mod1	12/17/09						
		1044103	ru103	4446	endf/b7	rel0	rev7
mod1	12/17/09						
		1044104	ru104	4449	endf/b7	rel0	rev7
mod1	12/17/09						
		1044106	ru106	4455	endf/b7	rel0	rev7
mod0	12/17/09						
		1045103	rh103	4525	endf/b7	rel0	rev7
mod1	12/17/09						
		1045105	rh105	4531	endf/b7	rel0	rev7
mod1	12/17/09						
		1046105	pd105	4634	endf/b7	rel0	rev7
mod1	12/17/09						
		1046107	pd107	4640	endf/b7	rel0	rev7
mod1	12/17/09						
		1046108	pd108	4643	endf/b7	rel5	rev7
mod1	12/17/09						
		1047107	ag107	4725	endf/b7	rel0	rev7
mod1	12/17/09						
		1047109	ag109	4731	endf/b7	rel0	rev7
mod1	12/17/09						
		1048106	cd106	4825	endf/b7	rel0	rev7
mod1	12/17/09						
		3048106	cd106	4825	endf/b7	rel0	rev7
mod1	12/17/09						
		1048108	cd108	4831	endf/b7	rel0	rev7
mod1	12/17/09						
		3048108	cd108	4831	endf/b7	rel0	rev7
mod1	12/17/09						
		1048110	cd110	4837	endf/b7	rel0	rev7
mod1	12/17/09						
		3048110	cd110	4837	endf/b7	rel0	rev7
mod1	12/17/09						
		1048111	cd111	4840	endf/b7	rel0	rev7
mod1	12/17/09						
		3048111	cd111	4840	endf/b7	rel0	rev7
mod1	12/17/09						
		1048112	cd112	4843	endf/b7	rel0	rev7
mod1	12/17/09						
		3048112	cd112	4843	endf/b7	rel0	rev7
mod1	12/17/09						
		1048113	cd113	4846	endf/b7	rel0	rev7
mod1	12/17/09						
		3048113	cd113	4846	endf/b7	rel0	rev7
mod1	12/17/09						
		1048114	cd114	4849	endf/b7	rel4	rev7
mod1	12/17/09						
		3048114	cd114	4849	endf/b7	rel4	rev7
mod1	12/17/09						
		1048116	cd116	4855	endf/b7	rel0	rev7
mod1	12/17/09						

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                                3048116    cd116 4855 endf/b7 rel0 rev7
mod1                 12/17/09
                                1049115    in115 4931 endf/b7 rel3 rev7
mod1                 12/17/09
                                1050112    sn112 5025 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050114    sn114 5031 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050115    sn115 5034 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050116    sn116 5037 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050117    sn117 5040 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050118    sn118 5043 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050119    sn119 5046 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050120    sn120 5049 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050122    sn122 5055 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050124    sn124 5061 endf/b7 rel0 rev7
mod1                 12/17/09
                                1050126    sn126 5067 endf/b7 rel0 rev7
mod1                 12/17/09
                                1053127    i127 5325 endf/b7 rel2 rev7 mod1
12/17/09
                                1053129    i129 5331 endf/b7 rel0 rev7 mod1
12/17/09
                                1053135    i135 5349 endf/b7 rel0 rev7 mod1
12/17/09
                                1054131    xe131 5446 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054133    xe133 5452 endf/b7 rel0 rev7
mod1                 12/17/09
                                1054135    xe135 5458 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055133    cs133 5525 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055134    cs134 5528 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055135    cs135 5531 endf/b7 rel0 rev7
mod1                 12/17/09
                                1055137    cs137 5537 endf/b7 rel0 rev7
mod1                 12/17/09
                                1056138    ba138 5649 endf/b7 rel0 rev7
mod1                 12/17/09
                                1056140    ba140 5655 endf/b7 rel0 rev7
mod1                 12/17/09
                                1057139    la139 5728 endf/b7 rel0 rev7
mod1                 12/17/09
```

		1058141	ce141	5840	endf/b7	rel0	rev7
mod1	12/17/09						
		1058142	ce142	5843	endf/b7	rel0	rev7
mod1	12/17/09						
		1058143	ce143	5846	endf/b7	rel0	rev7
mod1	12/17/09						
		1058144	ce144	5849	endf/b7	rel0	rev7
mod1	12/17/09						
		1059141	pr141	5925	endf/b7	rel0	rev7
mod1	12/17/09						
		1059143	pr143	5931	endf/b7	rel0	rev7
mod1	12/17/09						
		1060143	nd143	6028	endf/b7	rel0	rev7
mod1	12/17/09						
		1060144	nd144	6031	endf/b7	rel0	rev7
mod1	12/17/09						
		1060145	nd145	6034	endf/b7	rel0	rev7
mod1	12/17/09						
		1060146	nd146	6037	endf/b7	rel0	rev7
mod1	12/17/09						
		1060147	nd147	6040	endf/b7	rel0	rev7
mod1	12/17/09						
		1060148	nd148	6043	endf/b7	rel0	rev7
mod1	12/17/09						
		1061147	pm147	6149	endf/b7	rel3	rev7
mod1	12/17/09						
		1061148	pm148	6152	endf/b7	rel3	rev7
mod1	12/17/09						
		1061149	pm149	6155	endf/b7	rel3	rev7
mod1	12/17/09						
		1062147	sm147	6234	endf/b7	rel0	rev7
mod1	12/17/09						
		1062149	sm149	6240	endf/b7	rel0	rev7
mod1	12/17/09						
		1062150	sm150	6243	endf/b7	rel0	rev7
mod1	12/17/09						
		1062151	sm151	6246	endf/b7	rel0	rev7
mod1	12/17/09						
		1062152	sm152	6249	endf/b7	rel0	rev7
mod1	12/17/09						
		1062153	sm153	6252	endf/b7	rel0	rev7
mod1	12/17/09						
		1063151	eu151	6325	endf/b7	rel0	rev7
mod1	12/17/09						
		1063153	eu153	6331	endf/b7	rel1	rev7
mod1	12/17/09						
		1063154	eu154	6334	endf/b7	rel0	rev7
mod1	12/17/09						
		1063155	eu155	6337	endf/b7	rel0	rev7
mod1	12/17/09						
		1063156	eu156	6340	endf/b7	rel0	rev7
mod1	12/17/09						

```
                                1064152    gd152 6425 endf/b7 rel0 rev7
mod1                12/17/09
                                1064154    gd154 6431 endf/b7 rel0 rev7
mod1                12/17/09
                                1064155    gd155 6434 endf/b7 rel0 rev7
mod1                12/17/09
                                1064156    gd156 6437 endf/b7 rel0 rev7
mod1                12/17/09
                                1064157    gd157 6440 endf/b7 rel0 rev7
mod1                12/17/09
                                1064158    gd158 6443 endf/b7 rel0 rev7
mod1                12/17/09
                                1064160    gd160 6449 endf/b7 rel0 rev7
mod1                12/17/09
                                1074182    w182 7431 endf/b7 rel8 rev7 mod2
12/17/09
                                1074183    w183 7434 endf/b7 rel8 rev7 mod2
12/17/09
                                1074184    w184 7437 endf/b7 rel8 rev7 mod2
12/17/09
                                1074186    w186 7443 endf/b7 rel8 rev7 mod2
12/17/09
                                1082204    pb204 8225 endf/b7 rel1 rev7
mod1                12/17/09
                                1082206    pb206 8231 endf/b7 rel1 rev7
mod1                12/17/09
                                1082207    pb207 8234 endf/b7 rel1 rev7
mod1                12/17/09
                                1082208    pb208 8237 endf/b7 rel6 rev7
mod2                12/17/09
                                1092234    u234 9225 endf/b7 rel5 rev7 mod2
12/17/09
                                1092235    u235 9228 endf/b7 rel0 rev7 mod7
12/17/09
                                1092236    u236 9231 endf/b7 rel0 rev7 mod1
12/17/09
                                1092238    u238 9237 endf/b7 rel6 rev7 mod5
12/17/09
                                1093237    np237 9346 endf/b7 rel0 rev7
mod1                12/17/09
                                1094238    pu238 9434 endf/b7 rel0 rev7
mod0                12/17/09
                                1094239    pu239 9437 endf/b7 rel5 rev7
mod5                12/17/09
                                1094240    pu240 9440 endf/b7 rel2 rev7
mod0                12/17/09
                                1094241    pu241 9443 endf/b7 rel3 rev7
mod1                12/17/09
                                1094242    pu242 9446 endf/b7 rel0 rev7
mod0                12/17/09
                                1095241    am241 9543 endf/b7 rel0 rev7
mod4                12/17/09
```

```
                                1095242    am242 9546 endf/b7 rel0 rev7
mod0                  12/17/09
                                1095243    am243 9549 endf/b7 rel5 rev7
mod0                  12/17/09
                                1096242    cm242 9631 endf/b7 rel0 rev7
mod0                  12/17/09
                                1096243    cm243 9634 endf/b7 rel7 rev7
mod0                  12/17/09
                                1096244    cm244 9637 endf/b7 rel3 rev7
mod2                  12/17/09
                                2001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09
                                1001001    h_h2o 1 fast: h1 endf/b7 rel0
rev7 mod0           12/17/09

  ***** warning ***** keno message number k6-222 follows:
  9429 transfers for mixture 1 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  139 transfers for mixture 3 were corrected for bad moments.

  ***** warning ***** keno message number k6-222 follows:
  13467 transfers for mixture 2 were corrected for bad moments.

                                ........ finished mixing cross-sections
........

                                 1-d cross section array id numbers

                                            neutron
                                 reaction name    reaction id
                                         total              1
                                non-absorption           2002
                                    nu-fission           1452
                                    absorption             27
                                       fission             18
                                           chi           1018

                                 ........ finished preparing the cross
sections    ........


************************************************************
                                **
**
                                **   array      units in   units in
units in   nesting  **
                                **   number      x dir.     y dir.     z
dir.     level   **
                                **
**
```

```
                                **     1             1         14
1           1     **
                                **
**

*************************************************************


                                ........ finished loading the data
........
1
*************************************************************************
*****************************************
        ***
***
        ***
***

*************************************************************************
*****************************************
        ***                                     ******      geometry
parameters        ******                                    ***
        ***
***
        ***
***
        ***                     niar        number of independent array
references               1                        ***
        ***
***
        ***                     ngblu       global unit number
2                        ***
        ***
***
        ***                     nboxt       number of units in the
problem                      2                           ***
        ***
***
        ***                     nquad       number of quadratics in the
problem                  12                       ***
        ***
***
        ***                     ngwrds      number of geometry words
read                        4                          ***
        ***
***
        ***                     maxgwd      maximum geometry words in a
unit                     3                       ***
        ***
***
        ***                     maxsfu      largest number of surfaces
in a unit                 9                        ***
```

```
        ***
***
        ***                         maxreg      largest number of media in a
unit                    3                           ***
        ***
***
        ***                         regtot      number of spatial volumes
defined                     4                       ***
        ***
***
        ***                         sectot      number of entries in the
sector array                14                       ***
        ***
***
        ***                         nucom       number of comments in the
geometry data               2                       ***
        ***
***
        ***                         numhol      number of holes in the
problem                       0                       ***
        ***
***

************************************************************************
*******************************************

1                                          fuel bundle

                                    geometry description for those units
utilized in this problem



                                                          -----   unit 1
-----

 fuel meat

       1        cuboid         1                              quadratic
surfaces

      X**2          Y**2          Z**2           XY           XZ
YZ            X             Y             Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +8.86938E+00

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +6.45160E-04

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +9.00225E+02
```

```
       2        cuboid         2                              quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.03225E-03

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

       3        cuboid         3                              quadratic
surfaces

      X**2         Y**2         Z**2           XY           XZ
YZ            X            Y            Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +4.18080E-02

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                        sector
               imp      definitions

 media 1    1          1

 media 3    1          2 -1

 media 2    1          -1 -2 3

 boundary                         3


                                                  ******************   global
******************
                                                                -----   unit 2
-----

 array unit

       1        cuboid         1                              quadratic
surfaces
```

```
      X**2          Y**2          Z**2           XY            XZ
YZ             X             Y             Z      Constant

  -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.30549E+01

  +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +5.31622E+00 +0.00000E+00 +1.12882E+00

  +0.00000E+00 +0.00000E+00 -1.00000E+00 +0.00000E+00 +0.00000E+00
+0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00 +1.05910E+03

                          sector
               imp      definitions

 array 1               1

 boundary                         1
1                         fuel bundle

                   -------  unit orientation description for array 1
-------


 z layer 1, x column 1 to 1 left to right   y row 1 to 14  bottom to top

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1

  1
```

1
1 fuel bundle

volumes for those units utilized in this problem

volumes not specified in the input were set to -1.0

unit	uses	geometry region	mixture	total region volume (cm**3)
1	14	1	1	2.47925E+02 +/- 7.84971E-01
		2	3	5.95366E+02 +/- 1.88502E+00
		3	2	1.84949E+03 +/- 5.85578E+00
2	1	1		

mixture	total mixture volume (cm**3)	total mixture mass (gm)
1	2.47925E+02 +/- 7.84971E-01	1.37533E+03 +/- 4.35453E+00
2	1.84949E+03 +/- 5.85578E+00	1.83832E+03 +/- 5.82041E+00
3	5.95366E+02 +/- 1.88502E+00	1.60868E+03 +/- 5.09333E+00
	---	---
	2.69278E+03	4.82233E+03

***** restart data has been written on unit 95 *****

****
****
*** ***
*** biasing information ***
*** ***
*** a default weight of 0.500 will be used for all bias id's. ***

```
        ***
***

**********************************************************************
*****************************************

                                  ........ finished in Keno-VI before
tracking       ........

                                  ........     0.01650 minutes were used
processing data.        ........

 volume fraction of fissile material in the system= 9.20704E-02

 start type 6 was used.

 neutrons were started from binary start data on file
keno_start6_file

 neutrons started in non-fissile mixtures will use the fission spectrum
for mixture     1

   0.00067 minutes were required for starting.   total elapsed time is
0.01717 minutes.
1fuel bundle

                    generation        average         avg k-eff
matrix       matrix k-eff
     generation   k-effective      k-effective       deviation
k-effective       deviation
  keno message number k6-132 follows:
 only 15664 independent fission points were generated for generation 1
          1       7.67851E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15558 independent fission points were generated for generation 2
          2       7.60197E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15735 independent fission points were generated for generation 3
          3       7.67883E-01      7.67883E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.65126E-01      7.66505E-01      1.37845E-03
0.00000E+00      0.00000E+00
          5       7.70116E-01      7.67708E-01      1.44298E-03
0.00000E+00      0.00000E+00
          6       7.61613E-01      7.66185E-01      1.83385E-03
0.00000E+00      0.00000E+00
          7       7.64096E-01      7.65767E-01      1.48067E-03
0.00000E+00      0.00000E+00
          8       7.67362E-01      7.66033E-01      1.23785E-03
0.00000E+00      0.00000E+00
```

9	7.62665E-01	7.65552E-01	1.15149E-03
0.00000E+00	0.00000E+00		
10	7.60289E-01	7.64894E-01	1.19466E-03
0.00000E+00	0.00000E+00		
11	7.62257E-01	7.64601E-01	1.09357E-03
0.00000E+00	0.00000E+00		
12	7.64284E-01	7.64569E-01	9.78630E-04
0.00000E+00	0.00000E+00		
13	7.66262E-01	7.64723E-01	8.98486E-04
0.00000E+00	0.00000E+00		
14	7.63776E-01	7.64644E-01	8.23990E-04
0.00000E+00	0.00000E+00		
15	7.59762E-01	7.64269E-01	8.45908E-04
0.00000E+00	0.00000E+00		
16	7.65890E-01	7.64384E-01	7.91676E-04
0.00000E+00	0.00000E+00		
17	7.63924E-01	7.64354E-01	7.37648E-04
0.00000E+00	0.00000E+00		
18	7.65165E-01	7.64404E-01	6.91867E-04
0.00000E+00	0.00000E+00		
19	7.70611E-01	7.64769E-01	7.45425E-04
0.00000E+00	0.00000E+00		
20	7.75283E-01	7.65354E-01	9.13823E-04
0.00000E+00	0.00000E+00		
21	7.71032E-01	7.65652E-01	9.14604E-04
0.00000E+00	0.00000E+00		
22	7.61710E-01	7.65455E-01	8.89781E-04
0.00000E+00	0.00000E+00		
23	7.66272E-01	7.65494E-01	8.47243E-04
0.00000E+00	0.00000E+00		
24	7.66644E-01	7.65546E-01	8.09505E-04
0.00000E+00	0.00000E+00		
25	7.71598E-01	7.65810E-01	8.17028E-04
0.00000E+00	0.00000E+00		
26	7.60789E-01	7.65600E-01	8.09730E-04
0.00000E+00	0.00000E+00		
27	7.64515E-01	7.65887E-01	3.18982E-03
0.00000E+00	0.00000E+00		
28	7.59820E-01	7.64673E-01	4.48646E-03
0.00000E+00	0.00000E+00		
29	7.66763E-01	7.65022E-01	3.20521E-03
0.00000E+00	0.00000E+00		
30	7.65860E-01	7.65141E-01	2.38822E-03
0.00000E+00	0.00000E+00		
31	7.72706E-01	7.66087E-01	2.63442E-03
0.00000E+00	0.00000E+00		
32	7.61106E-01	7.65533E-01	2.25369E-03
0.00000E+00	0.00000E+00		
33	7.70371E-01	7.66017E-01	2.37056E-03
0.00000E+00	0.00000E+00		
34	7.67170E-01	7.66122E-01	2.05357E-03
0.00000E+00	0.00000E+00		

35	7.67179E-01	7.66210E-01	1.86955E-03
0.00000E+00	0.00000E+00		
36	7.69068E-01	7.66430E-01	1.73199E-03
0.00000E+00	0.00000E+00		
37	7.64283E-01	7.66277E-01	1.57360E-03
0.00000E+00	0.00000E+00		
38	7.68412E-01	7.66419E-01	1.48543E-03
0.00000E+00	0.00000E+00		
39	7.59962E-01	7.66015E-01	1.49183E-03
0.00000E+00	0.00000E+00		
40	7.68088E-01	7.66137E-01	1.41236E-03
0.00000E+00	0.00000E+00		
41	7.66684E-01	7.66168E-01	1.30978E-03
0.00000E+00	0.00000E+00		
42	7.62314E-01	7.65965E-01	1.22249E-03
0.00000E+00	0.00000E+00		
43	7.65451E-01	7.65939E-01	1.15091E-03
0.00000E+00	0.00000E+00		
44	7.67164E-01	7.65997E-01	1.07830E-03
0.00000E+00	0.00000E+00		
45	7.67499E-01	7.66066E-01	1.02438E-03
0.00000E+00	0.00000E+00		
46	7.70517E-01	7.66259E-01	1.01249E-03
0.00000E+00	0.00000E+00		
47	7.70369E-01	7.66430E-01	9.98418E-04
0.00000E+00	0.00000E+00		
48	7.59985E-01	7.66173E-01	9.32217E-04
0.00000E+00	0.00000E+00		
49	7.68224E-01	7.66252E-01	9.14341E-04
0.00000E+00	0.00000E+00		
50	7.67762E-01	7.66307E-01	8.60858E-04
0.00000E+00	0.00000E+00		
51	7.61830E-01	7.66148E-01	8.26035E-04
0.00000E+00	0.00000E+00		
52	7.64029E-01	7.66074E-01	7.92024E-04
0.00000E+00	0.00000E+00		
53	7.62066E-01	7.65941E-01	8.04993E-04
0.00000E+00	0.00000E+00		
54	7.66672E-01	7.65964E-01	7.74842E-04
0.00000E+00	0.00000E+00		
55	7.69630E-01	7.66079E-01	7.36919E-04
0.00000E+00	0.00000E+00		
56	7.66710E-01	7.66098E-01	7.13851E-04
0.00000E+00	0.00000E+00		
57	7.67234E-01	7.66132E-01	6.98376E-04
0.00000E+00	0.00000E+00		
58	7.68750E-01	7.66206E-01	6.84376E-04
0.00000E+00	0.00000E+00		
59	7.68422E-01	7.66268E-01	6.70908E-04
0.00000E+00	0.00000E+00		
60	7.68773E-01	7.66336E-01	6.64170E-04
0.00000E+00	0.00000E+00		

61	7.72213E-01	7.66490E-01	6.82056E-04
0.00000E+00	0.00000E+00		
62	7.69712E-01	7.66573E-01	6.78448E-04
0.00000E+00	0.00000E+00		
63	7.68635E-01	7.66624E-01	6.75681E-04
0.00000E+00	0.00000E+00		
64	7.69211E-01	7.66687E-01	6.70159E-04
0.00000E+00	0.00000E+00		
65	7.65398E-01	7.66657E-01	6.51164E-04
0.00000E+00	0.00000E+00		
66	7.57441E-01	7.66442E-01	6.50637E-04
0.00000E+00	0.00000E+00		
67	7.69485E-01	7.66512E-01	6.35833E-04
0.00000E+00	0.00000E+00		
68	7.67044E-01	7.66523E-01	6.16628E-04
0.00000E+00	0.00000E+00		
69	7.60776E-01	7.66398E-01	6.43255E-04
0.00000E+00	0.00000E+00		
70	7.61323E-01	7.66290E-01	6.54136E-04
0.00000E+00	0.00000E+00		
71	7.67446E-01	7.66315E-01	6.37641E-04
0.00000E+00	0.00000E+00		
72	7.72845E-01	7.66448E-01	5.44809E-04
0.00000E+00	0.00000E+00		
73	7.68193E-01	7.66483E-01	5.46427E-04
0.00000E+00	0.00000E+00		
74	7.64301E-01	7.66440E-01	5.25772E-04
0.00000E+00	0.00000E+00		
75	7.64763E-01	7.66408E-01	5.16408E-04
0.00000E+00	0.00000E+00		
76	7.65613E-01	7.66393E-01	5.06611E-04
0.00000E+00	0.00000E+00		
77	7.64888E-01	7.66365E-01	4.97770E-04
0.00000E+00	0.00000E+00		
78	7.67742E-01	7.66390E-01	4.89131E-04
0.00000E+00	0.00000E+00		
79	7.66568E-01	7.66393E-01	4.80166E-04
0.00000E+00	0.00000E+00		
80	7.69707E-01	7.66451E-01	4.75214E-04
0.00000E+00	0.00000E+00		
81	7.66215E-01	7.66447E-01	4.66821E-04
0.00000E+00	0.00000E+00		
82	7.72627E-01	7.66552E-01	4.86781E-04
0.00000E+00	0.00000E+00		
83	7.70252E-01	7.66614E-01	5.18807E-04
0.00000E+00	0.00000E+00		
84	7.61396E-01	7.66528E-01	4.67408E-04
0.00000E+00	0.00000E+00		
85	7.68277E-01	7.66556E-01	4.60576E-04
0.00000E+00	0.00000E+00		
86	7.68281E-01	7.66584E-01	4.53940E-04
0.00000E+00	0.00000E+00		

```
          87       7.73229E-01      7.66687E-01      4.58964E-04
0.00000E+00      0.00000E+00
          88       7.62079E-01      7.66617E-01      4.57440E-04
0.00000E+00      0.00000E+00
          89       7.68976E-01      7.66652E-01      4.51809E-04
0.00000E+00      0.00000E+00
          90       7.63104E-01      7.66599E-01      4.61356E-04
0.00000E+00      0.00000E+00
          91       7.67909E-01      7.66619E-01      4.56376E-04
0.00000E+00      0.00000E+00
          92       7.66168E-01      7.66612E-01      4.50348E-04
0.00000E+00      0.00000E+00
          93       7.71117E-01      7.66676E-01      4.51627E-04
0.00000E+00      0.00000E+00
          94       7.62936E-01      7.66624E-01      4.48999E-04
0.00000E+00      0.00000E+00
          95       7.67154E-01      7.66631E-01      4.43736E-04
0.00000E+00      0.00000E+00
          96       7.67874E-01      7.66648E-01      4.35686E-04
0.00000E+00      0.00000E+00
          97       7.66607E-01      7.66648E-01      4.29580E-04
0.00000E+00      0.00000E+00
          98       7.75000E-01      7.66759E-01      4.43544E-04
0.00000E+00      0.00000E+00
          99       7.74917E-01      7.66866E-01      4.51241E-04
0.00000E+00      0.00000E+00
         100       7.67308E-01      7.66872E-01      4.46723E-04
0.00000E+00      0.00000E+00
         101       7.71457E-01      7.66931E-01      4.59525E-04
0.00000E+00      0.00000E+00
         102       7.65324E-01      7.66910E-01      4.53692E-04
0.00000E+00      0.00000E+00
         103       7.69622E-01      7.66944E-01      4.53821E-04
0.00000E+00      0.00000E+00
                                    restart data was written for
generation  103       random number=35AB004573504CFA
         104       7.62949E-01      7.66895E-01      4.53108E-04
0.00000E+00      0.00000E+00
         105       7.63575E-01      7.66855E-01      4.46075E-04
0.00000E+00      0.00000E+00
         106       7.60506E-01      7.66778E-01      4.92885E-04
0.00000E+00      0.00000E+00
         107       7.57084E-01      7.66663E-01      5.22293E-04
0.00000E+00      0.00000E+00
         108       7.60364E-01      7.66589E-01      5.57641E-04
0.00000E+00      0.00000E+00
         109       7.67357E-01      7.66597E-01      5.46801E-04
0.00000E+00      0.00000E+00
         110       7.59011E-01      7.66510E-01      5.81107E-04
0.00000E+00      0.00000E+00
         111       7.60840E-01      7.66446E-01      6.09273E-04
0.00000E+00      0.00000E+00
```

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        112       7.57877E-01      7.66350E-01      6.71424E-04
0.00000E+00      0.00000E+00
        113       7.63253E-01      7.66315E-01      6.88753E-04
0.00000E+00      0.00000E+00
        114       7.64571E-01      7.66296E-01      6.91749E-04
0.00000E+00      0.00000E+00
        115       7.68490E-01      7.66320E-01      6.72613E-04
0.00000E+00      0.00000E+00
        116       7.70968E-01      7.66370E-01      6.43644E-04
0.00000E+00      0.00000E+00
        117       7.70220E-01      7.66411E-01      6.19966E-04
0.00000E+00      0.00000E+00
        118       7.68654E-01      7.66434E-01      6.17585E-04
0.00000E+00      0.00000E+00
        119       7.59640E-01      7.66364E-01      5.97916E-04
0.00000E+00      0.00000E+00
        120       7.69512E-01      7.66396E-01      5.94876E-04
0.00000E+00      0.00000E+00
        121       7.64349E-01      7.66375E-01      5.87911E-04
0.00000E+00      0.00000E+00
        122       7.63965E-01      7.66351E-01      5.83804E-04
0.00000E+00      0.00000E+00
        123       7.68351E-01      7.66371E-01      5.74985E-04
0.00000E+00      0.00000E+00

  keno message number k6-123          execution terminated due to
completion of the specified number of generations.
                                    restart data was written for
generation  123       random number=9C9D1EBE82B08682
                                    A start type 6 file will be written to
keno_start6_file
1                                                  fuel bundle

 lifetime =  1.55051E-05 + or -  1.20889E-08             generation time
=  2.99117E-05 + or -  2.15503E-08
 nu bar   =  2.43894E+00 + or -  9.33258E-06       average fission group
=  2.17541E+02 + or -  8.90032E-03
                     energy(ev) of the average lethargy causing fission
=  5.67058E-02 + or -  1.02237E-04
                                                system mean free path (cm)
=  6.52761E-01 + or -  1.83823E-04

 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

      23          0.76637   + or - 0.00057     0.76580 to 0.76695
0.76522 to 0.76752    0.76465 to 0.76810    2000000       6.0817
```

24	0.76637	+ or - 0.00058	0.76579 to 0.76695	0.76520 to 0.76753	0.76462 to 0.76811	1980000	6.0469
25	0.76631	+ or - 0.00060	0.76572 to 0.76691	0.76512 to 0.76751	0.76452 to 0.76811	1960000	5.7761
26	0.76637	+ or - 0.00060	0.76577 to 0.76698	0.76516 to 0.76758	0.76456 to 0.76818	1940000	5.8254
27	0.76639	+ or - 0.00061	0.76578 to 0.76700	0.76518 to 0.76761	0.76457 to 0.76821	1920000	5.8693
28	0.76646	+ or - 0.00062	0.76584 to 0.76708	0.76523 to 0.76769	0.76461 to 0.76831	1900000	5.8082
29	0.76646	+ or - 0.00062	0.76583 to 0.76708	0.76521 to 0.76770	0.76459 to 0.76833	1880000	5.7881
30	0.76646	+ or - 0.00063	0.76583 to 0.76709	0.76520 to 0.76772	0.76457 to 0.76836	1860000	5.7537
31	0.76640	+ or - 0.00063	0.76577 to 0.76703	0.76514 to 0.76766	0.76451 to 0.76829	1840000	5.8058
32	0.76645	+ or - 0.00064	0.76581 to 0.76709	0.76517 to 0.76774	0.76453 to 0.76838	1820000	5.7499
37	0.76639	+ or - 0.00067	0.76572 to 0.76705	0.76505 to 0.76772	0.76438 to 0.76839	1720000	5.8508
42	0.76647	+ or - 0.00072	0.76574 to 0.76719	0.76502 to 0.76791	0.76430 to 0.76863	1620000	5.5899
47	0.76635	+ or - 0.00078	0.76557 to 0.76714	0.76479 to 0.76792	0.76400 to 0.76870	1520000	5.3026
52	0.76649	+ or - 0.00082	0.76567 to 0.76731	0.76485 to 0.76813	0.76403 to 0.76896	1420000	5.5130
57	0.76649	+ or - 0.00088	0.76561 to 0.76738	0.76473 to 0.76826	0.76385 to 0.76914	1320000	5.4754
62	0.76624	+ or - 0.00092	0.76532 to 0.76716	0.76441 to 0.76808	0.76349 to 0.76900	1220000	5.7456
67	0.76626	+ or - 0.00103	0.76523 to 0.76729	0.76421 to 0.76831	0.76318 to 0.76934	1120000	5.0882
72	0.76630	+ or - 0.00114	0.76516 to 0.76744	0.76402 to 0.76858	0.76288 to 0.76972	1020000	4.8533
77	0.76638	+ or - 0.00131	0.76507 to 0.76768				

0.76377 to 0.76899 0.76246 to 0.77029 920000 4.4832

82 0.76611 + or - 0.00131 0.76480 to 0.76742
0.76348 to 0.76874 0.76217 to 0.77005 820000 5.3561

87 0.76581 + or - 0.00159 0.76421 to 0.76740
0.76262 to 0.76900 0.76102 to 0.77059 720000 4.5667

92 0.76583 + or - 0.00185 0.76399 to 0.76768
0.76214 to 0.76953 0.76029 to 0.77138 620000 4.5132

97 0.76558 + or - 0.00205 0.76354 to 0.76763
0.76149 to 0.76968 0.75944 to 0.77173 520000 5.1167

102 0.76434 + or - 0.00180 0.76254 to 0.76614
0.76073 to 0.76795 0.75893 to 0.76975 420000 5.5531

107 0.76484 + or - 0.00214 0.76270 to 0.76698
0.76055 to 0.76912 0.75841 to 0.77127 320000 5.6489

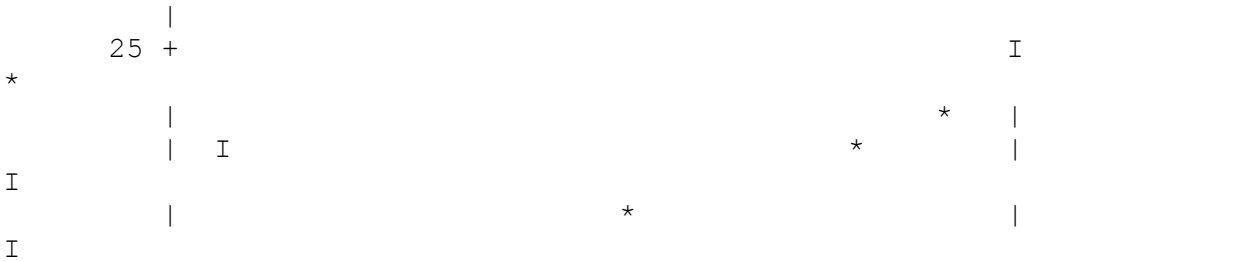
112 0.76654 + or - 0.00119 0.76535 to 0.76773
0.76416 to 0.76892 0.76298 to 0.77011 220000 30.7738
1 fuel bundle

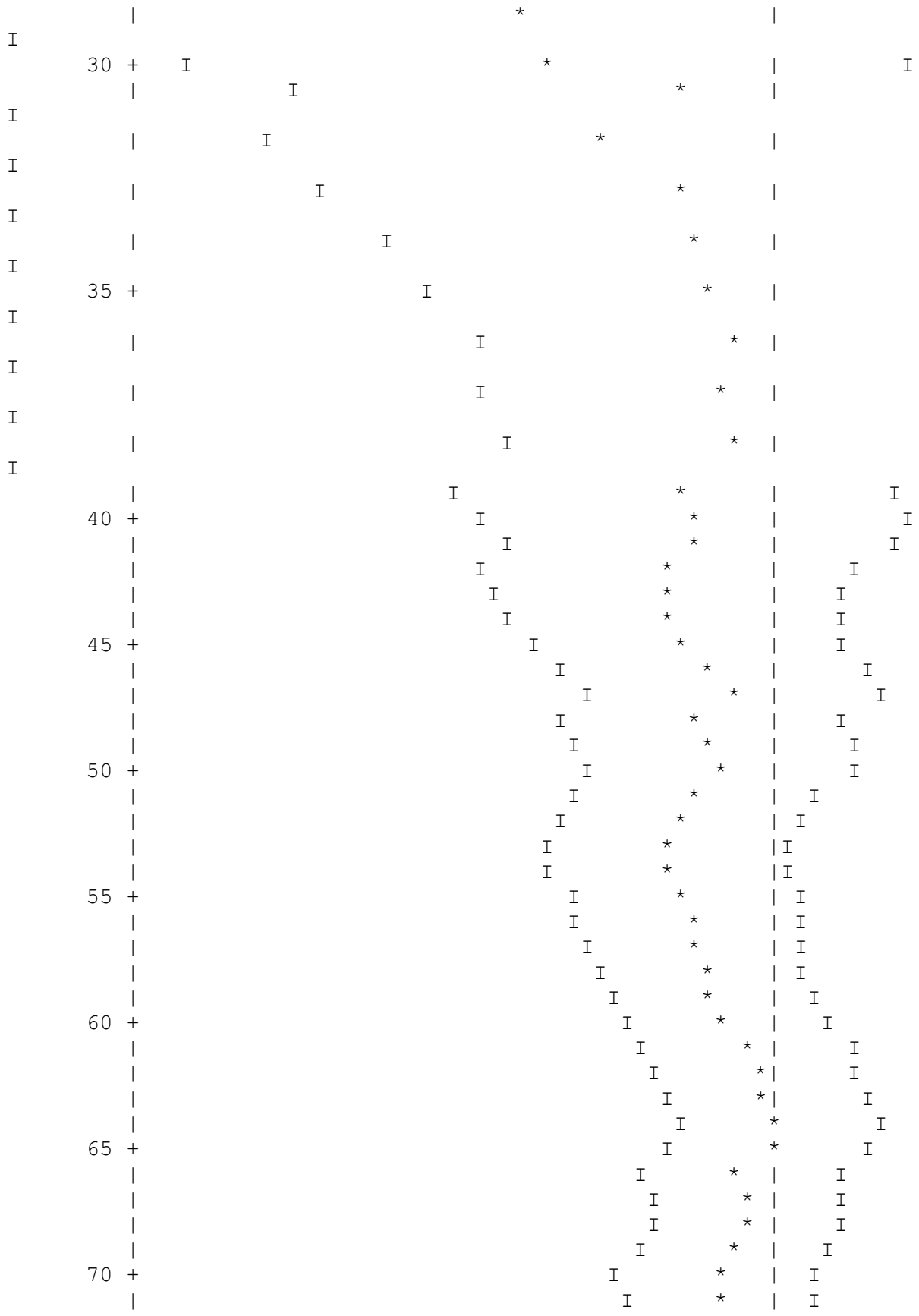
no. of initial
deviation of
generations average 67 per cent
95 per cent 99 per cent number of variance
skipped k-effective deviation confidence interval
confidence interval confidence interval histories (per cent)

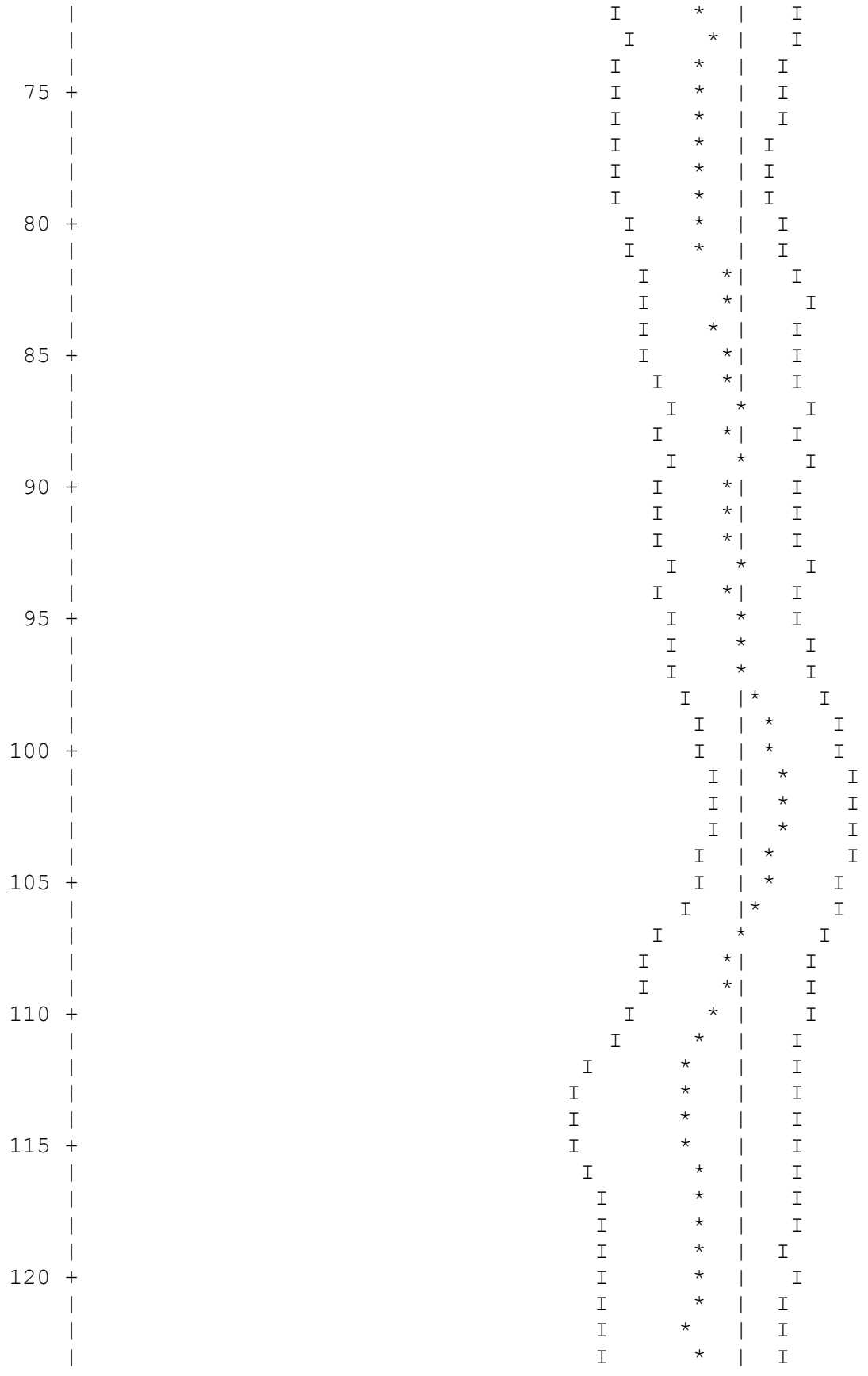
117 0.76575 + or - 0.00493 0.76081 to 0.77068
0.75588 to 0.77561 0.75095 to 0.78055 120000 5.5067
1 fuel bundle

plot of average k-effective by generation run.
the line represents k-eff = 0.76664 + or - 0.00042 which occurs for
97 generations run.

0.7647 0.7669
0.7691

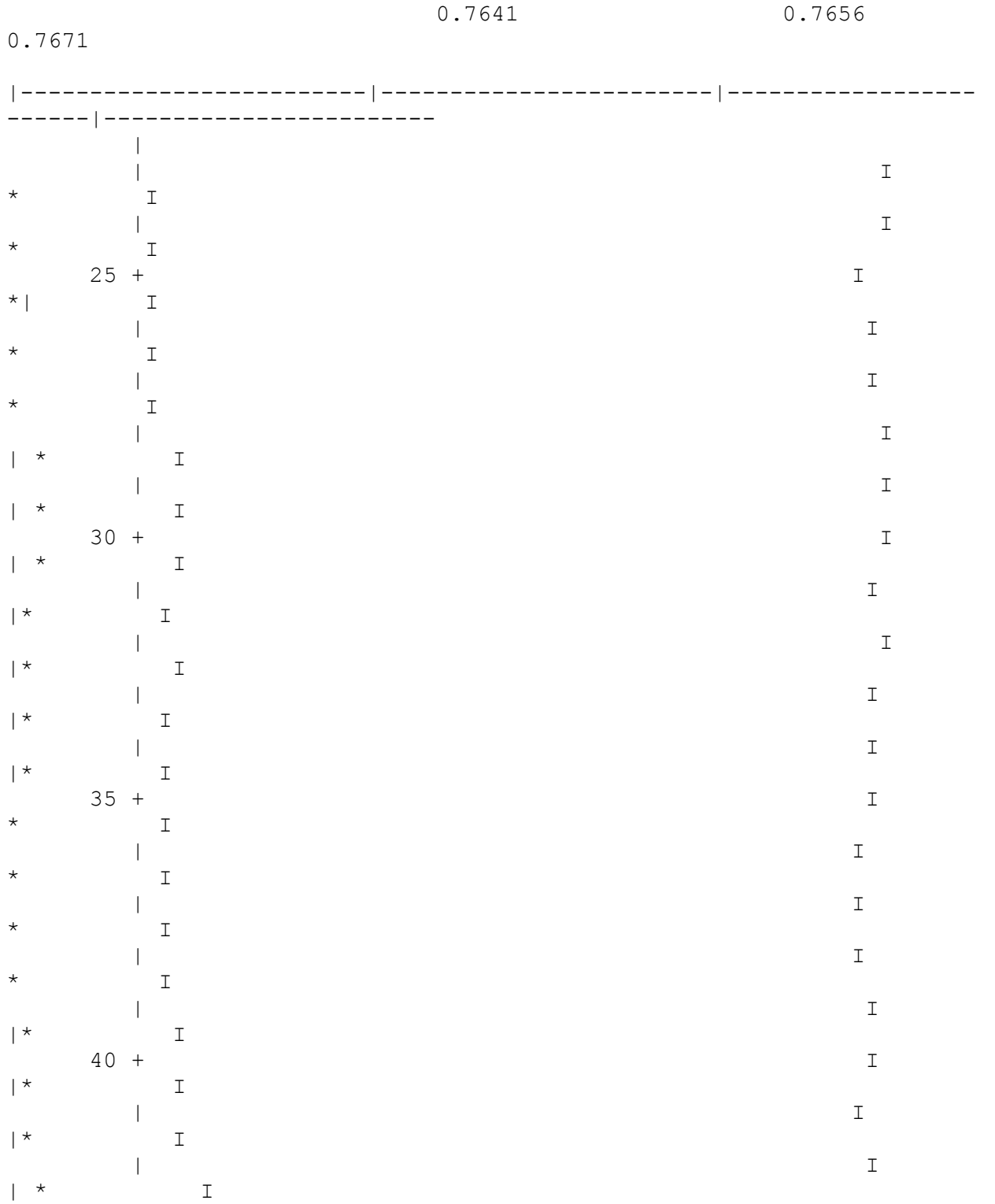






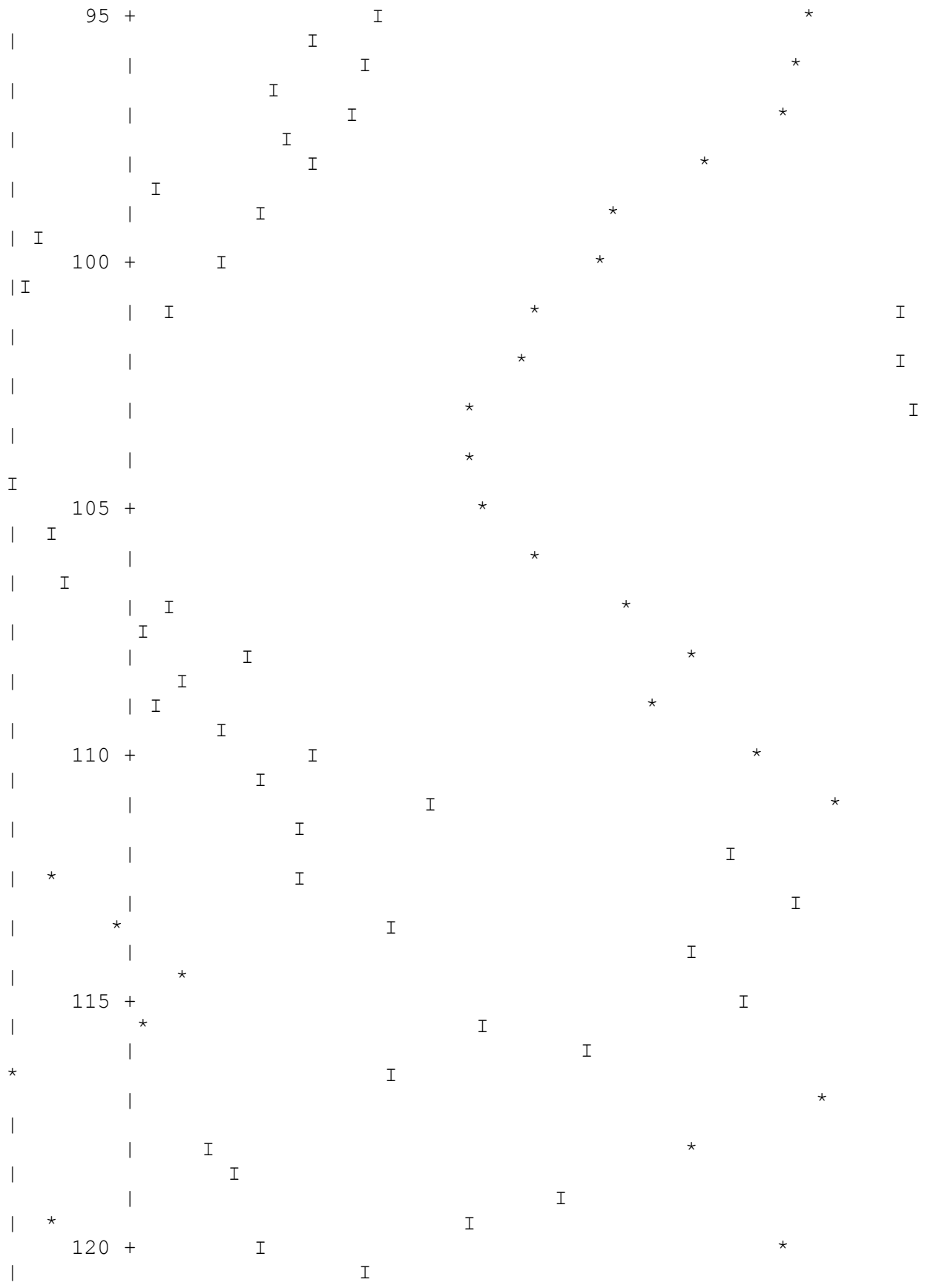
1 fuel bundle

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7663 + or - 0.0005 which occurs for 23 generations skipped.



45
50
55
60
65

70
75
80
85
90


95
100
105
110
115
120

k-effective satisfies the chi**2 test for normality at the 95 % level
1 fuel bundle

skipping 23 generations

group	fission fraction	unit deviation	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			0.00000E+00	0.0000	0.00000E+00	0.0000	0.00000E+00	0.0000
2	0.0000			0.00000E+00	0.0000	5.01929E-08	100.0000	0.00000E+00	0.0000
3	0.0000			1.43515E-05	11.9670	2.07747E-05	4.8668	0.00000E+00	0.0000
4	0.0000			2.04836E-05	9.9893	3.34324E-05	4.4950	0.00000E+00	0.0000
5	0.0000			2.50497E-05	7.6493	5.30356E-05	2.8827	0.00000E+00	0.0000
6	0.0001			9.03667E-05	3.5218	2.26504E-04	1.4834	0.00000E+00	0.0000
7	0.0001			1.13538E-04	3.6223	2.10083E-04	1.5690	0.00000E+00	0.0000
8	0.0003			2.45098E-04	2.0163	3.20621E-04	0.9107	0.00000E+00	0.0000
9	0.0005			3.83085E-04	1.3322	4.42773E-04	0.6302	0.00000E+00	0.0000
10	0.0003			2.01460E-04	1.7149	2.07104E-04	0.7190	0.00000E+00	0.0000
11	0.0012			9.13599E-04	0.6907	5.26569E-04	0.4680	0.00000E+00	0.0000
12	0.0010			7.67666E-04	0.7588	3.00932E-04	0.7481	0.00000E+00	0.0000
13	0.0003			2.28236E-04	1.3043	9.06765E-05	1.2906	0.00000E+00	0.0000
14	0.0013			9.96843E-04	0.5316	4.07485E-04	0.5258	0.00000E+00	0.0000
15	0.0010			7.59263E-04	0.7329	3.27354E-04	0.7247	0.00000E+00	0.0000
16	0.0002			1.90904E-04	1.2153	8.77157E-05	1.1977	0.00000E+00	0.0000
17	0.0001			6.85934E-05	1.8561	3.33493E-05	1.8220	0.00000E+00	0.0000
18	0.0001			5.08071E-05	1.7546	2.56823E-05	1.7226	0.00000E+00	0.0000
19	0.0001			8.31228E-05	1.5445	4.39128E-05	1.5084	0.00000E+00	0.0000
20	0.0001			6.07471E-05	1.3788	3.32594E-05	1.3500	0.00000E+00	0.0000
21	0.0002			1.18695E-04	0.9505				

6.70186E-05	0.9268	0.00000E+00	0.0000				
22	0.0001	1.04669E-04	1.3350				
6.19647E-05	1.3017	0.00000E+00	0.0000				
23	0.0001	1.07331E-04	1.0757				
6.55136E-05	1.0483	0.00000E+00	0.0000				
24	0.0000	2.51029E-05	1.9569				
1.55819E-05	1.9064	0.00000E+00	0.0000				
25	0.0000	3.05208E-05	1.9644				
1.90649E-05	1.9100	0.00000E+00	0.0000				
26	0.0000	1.68176E-05	2.7800				
1.05817E-05	2.7012	0.00000E+00	0.0000				
27	0.0001	5.37647E-05	1.2260				
3.35434E-05	1.2031	0.00000E+00	0.0000				
28	0.0001	9.61602E-05	1.0226				
6.00010E-05	1.0059	0.00000E+00	0.0000				
29	0.0001	9.70825E-05	1.1469				
6.11684E-05	1.1321	0.00000E+00	0.0000				
30	0.0000	1.22369E-05	3.3231				
7.67693E-06	3.2995	0.00000E+00	0.0000				
31	0.0001	9.67151E-05	1.1247				
6.11042E-05	1.1113	0.00000E+00	0.0000				
32	0.0001	3.84844E-05	1.6900				
2.45982E-05	1.6549	0.00000E+00	0.0000				
33	0.0000	3.29848E-05	1.6422				
2.06531E-05	1.6210	0.00000E+00	0.0000				
34	0.0001	7.45641E-05	0.9874				
4.68592E-05	0.9715	0.00000E+00	0.0000				
35	0.0001	4.46431E-05	1.5554				
2.80194E-05	1.5306	0.00000E+00	0.0000				
36	0.0001	4.26033E-05	1.6309				
2.63740E-05	1.6172	0.00000E+00	0.0000				
37	0.0000	2.75254E-05	1.6012				
1.72882E-05	1.5679	0.00000E+00	0.0000				
38	0.0000	3.44563E-05	1.8058				
2.16898E-05	1.7645	0.00000E+00	0.0000				
39	0.0002	1.29892E-04	0.9630				
8.26383E-05	0.9452	0.00000E+00	0.0000				
40	0.0002	1.20819E-04	0.8719				
7.80922E-05	0.8544	0.00000E+00	0.0000				
41	0.0002	1.59642E-04	0.8555				
1.06647E-04	0.8272	0.00000E+00	0.0000				
42	0.0002	1.37520E-04	0.7684				
9.35625E-05	0.7489	0.00000E+00	0.0000				
43	0.0001	8.10526E-05	1.1698				
5.81638E-05	1.1135	0.00000E+00	0.0000				
44	0.0002	1.15573E-04	1.0942				
8.48552E-05	1.0482	0.00000E+00	0.0000				
45	0.0001	5.84621E-05	0.9527				
4.72464E-05	0.8721	0.00000E+00	0.0000				
46	0.0000	1.40711E-05	1.9484				
1.13305E-05	1.8146	0.00000E+00	0.0000				
47	0.0001	4.15997E-05	1.6810				

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3.22676E-05     1.6159       0.00000E+00     0.0000
   48    0.0000                  1.16019E-05     3.9746
9.01970E-06     3.8635       0.00000E+00     0.0000
   49    0.0001                  7.80476E-05     1.6105
6.15931E-05     1.5727       0.00000E+00     0.0000
   50    0.0001                  5.57980E-05     1.6689
4.59628E-05     1.6354       0.00000E+00     0.0000
   51    0.0000                  1.47920E-05     2.9878
1.22984E-05     2.9217       0.00000E+00     0.0000
   52    0.0001                  3.97322E-05     1.9434
3.43691E-05     1.8951       0.00000E+00     0.0000
   53    0.0002                  1.57060E-04     0.7805
1.54381E-04     0.7155       0.00000E+00     0.0000
   54    0.0001                  7.42998E-05     1.7262
6.90471E-05     1.6582       0.00000E+00     0.0000
   55    0.0002                  1.62827E-04     1.3903
1.49319E-04     1.3578       0.00000E+00     0.0000
   56    0.0002                  1.19279E-04     1.7341
1.10582E-04     1.6923       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
      fraction                                 deviation
deviation                    deviation

   57    0.0002                  1.46056E-04     1.4412
1.32576E-04     1.4024       0.00000E+00     0.0000
   58    0.0001                  8.54049E-05     1.9079
7.47723E-05     1.8562       0.00000E+00     0.0000
   59    0.0002                  1.59340E-04     1.6491
1.43105E-04     1.5869       0.00000E+00     0.0000
   60    0.0004                  2.71177E-04     1.2327
2.46039E-04     1.1636       0.00000E+00     0.0000
   61    0.0000                  2.90165E-05     3.5809
2.23071E-05     3.4658       0.00000E+00     0.0000
   62    0.0002                  1.66608E-04     1.7863
1.39667E-04     1.7378       0.00000E+00     0.0000
   63    0.0002                  1.22497E-04     2.0794
1.00809E-04     2.0079       0.00000E+00     0.0000
   64    0.0001                  1.01238E-04     2.6160
8.16039E-05     2.5302       0.00000E+00     0.0000
   65    0.0000                  3.65294E-05     4.2666
3.60602E-05     4.1296       0.00000E+00     0.0000
   66    0.0002                  1.74211E-04     1.7756
1.54480E-04     1.7196       0.00000E+00     0.0000
   67    0.0002                  1.48667E-04     1.9492
1.21569E-04     1.8853       0.00000E+00     0.0000
   68    0.0000                  2.56407E-05     4.5288
2.22021E-05     4.3608       0.00000E+00     0.0000
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69	0.0004		3.04124E-04	1.5013	
2.38605E-04	1.4551		0.00000E+00	0.0000	
70	0.0003		2.12082E-04	1.7009	
1.92916E-04	1.6407		0.00000E+00	0.0000	
71	0.0006		4.38292E-04	1.4172	
3.62484E-04	1.3749		0.00000E+00	0.0000	
72	0.0001		4.80952E-05	5.4807	
2.84272E-05	5.3485		0.00000E+00	0.0000	
73	0.0004		3.26265E-04	1.7163	
2.48506E-04	1.6408		0.00000E+00	0.0000	
74	0.0014		1.05137E-03	0.9545	
7.64843E-04	0.9140		0.00000E+00	0.0000	
75	0.0002		1.16788E-04	2.8628	
8.95913E-05	2.7317		0.00000E+00	0.0000	
76	0.0006		4.63878E-04	1.7890	
2.94571E-04	1.7292		0.00000E+00	0.0000	
77	0.0005		3.71700E-04	1.9120	
2.66561E-04	1.8414		0.00000E+00	0.0000	
78	0.0000		7.35758E-06	3.9460	
7.19859E-05	3.9061		0.00000E+00	0.0000	
79	0.0002		1.90117E-04	2.6229	
1.27731E-04	2.5210		0.00000E+00	0.0000	
80	0.0001		6.29758E-05	3.2421	
8.39116E-05	3.1493		0.00000E+00	0.0000	
81	0.0014		1.05935E-03	1.2485	
7.78983E-04	1.1987		0.00000E+00	0.0000	
82	0.0001		6.48464E-05	4.4488	
3.89996E-05	4.2017		0.00000E+00	0.0000	
83	0.0002		1.28262E-04	3.2701	
1.41908E-04	3.2051		0.00000E+00	0.0000	
84	0.0001		7.85431E-05	3.1044	
7.98149E-05	2.8662		0.00000E+00	0.0000	
85	0.0002		1.89771E-04	2.1921	
2.33965E-04	2.1260		0.00000E+00	0.0000	
86	0.0004		2.72486E-04	2.5741	
2.19101E-04	2.4564		0.00000E+00	0.0000	
87	0.0004		3.27506E-04	2.0582	
2.03978E-04	1.9655		0.00000E+00	0.0000	
88	0.0001		5.41441E-05	4.0834	
9.83378E-05	3.9799		0.00000E+00	0.0000	
89	0.0001		9.81577E-05	3.5419	
6.80296E-05	3.2691		0.00000E+00	0.0000	
90	0.0003		2.35469E-04	2.7698	
1.38778E-04	2.6564		0.00000E+00	0.0000	
91	0.0002		1.78983E-04	3.0367	
1.13508E-04	2.8593		0.00000E+00	0.0000	
92	0.0000		2.89957E-05	2.9405	
1.90009E-04	2.8782		0.00000E+00	0.0000	
93	0.0002		1.29854E-04	3.2596	
1.05553E-04	3.0378		0.00000E+00	0.0000	
94	0.0002		1.19997E-04	4.1289	
6.71335E-05	3.8841		0.00000E+00	0.0000	

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   95    0.0008                6.32076E-04     2.1584
3.89401E-04     2.0920       0.00000E+00     0.0000
   96    0.0002                1.56672E-04     4.2522
7.94060E-05     4.0741       0.00000E+00     0.0000
   97    0.0004                2.86684E-04     3.6090
1.64111E-04     3.5383       0.00000E+00     0.0000
   98    0.0001                1.01068E-04     4.2371
9.69713E-05     4.0860       0.00000E+00     0.0000
   99    0.0001                1.04882E-04     4.8072
7.02081E-05     4.6545       0.00000E+00     0.0000
  100    0.0002                1.27875E-04     4.3464
8.56105E-05     4.1576       0.00000E+00     0.0000
  101    0.0002                1.15116E-04     3.3982
7.30470E-05     3.1584       0.00000E+00     0.0000
  102    0.0002                1.59368E-04     3.9469
8.89403E-05     3.7859       0.00000E+00     0.0000
  103    0.0001                9.41700E-05     3.4070
9.20318E-05     3.2139       0.00000E+00     0.0000
  104    0.0002                1.77399E-04     3.5206
1.40411E-04     3.4043       0.00000E+00     0.0000
  105    0.0002                1.24546E-04     3.5014
8.23291E-05     3.3015       0.00000E+00     0.0000
  106    0.0002                1.64220E-04     4.3218
1.22161E-04     4.2602       0.00000E+00     0.0000
  107    0.0001                6.63514E-05     3.2667
6.68654E-05     3.0652       0.00000E+00     0.0000
  108    0.0000                3.62131E-05     2.3699
1.56234E-04     2.3178       0.00000E+00     0.0000
  109    0.0002                1.29381E-04     2.1950
4.29336E-04     2.1653       0.00000E+00     0.0000
  110    0.0008                6.29242E-04     3.0201
3.88145E-04     2.9900       0.00000E+00     0.0000
  111    0.0002                1.59389E-04     4.0179
1.46403E-04     3.9103       0.00000E+00     0.0000
  112    0.0002                1.18528E-04     4.9836
1.24989E-04     4.8927       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                               deviation
deviation                    deviation

  113    0.0002                1.21907E-04     4.2146
1.06911E-04     3.9270       0.00000E+00     0.0000
  114    0.0000                1.13517E-05     6.5051
1.53741E-05     5.4441       0.00000E+00     0.0000
  115    0.0001                7.18900E-05     3.8731
8.36833E-05     3.5660       0.00000E+00     0.0000
  116    0.0002                1.86013E-04     3.2107
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1.40453E-04	2.8790	0.00000E+00	0.0000				
117	0.0007	5.05208E-04	2.3016				
2.68988E-04	2.1667	0.00000E+00	0.0000				
118	0.0007	5.70317E-04	1.8608				
4.45799E-04	1.7784	0.00000E+00	0.0000				
119	0.0002	1.44575E-04	2.2180				
3.73004E-04	2.1409	0.00000E+00	0.0000				
120	0.0002	1.70383E-04	2.2139				
6.48260E-04	2.1827	0.00000E+00	0.0000				
121	0.0007	5.12282E-04	2.4832				
3.94364E-04	2.4224	0.00000E+00	0.0000				
122	0.0001	1.00806E-04	4.6607				
7.88668E-05	4.3383	0.00000E+00	0.0000				
123	0.0003	2.21265E-04	2.5182				
1.56463E-04	2.2301	0.00000E+00	0.0000				
124	0.0003	2.50725E-04	2.9569				
2.05984E-04	2.7756	0.00000E+00	0.0000				
125	0.0002	1.45118E-04	3.0139				
1.33161E-04	2.7153	0.00000E+00	0.0000				
126	0.0001	9.34351E-05	3.4313				
8.45468E-05	2.9944	0.00000E+00	0.0000				
127	0.0005	3.95785E-04	3.0112				
1.94313E-04	2.8492	0.00000E+00	0.0000				
128	0.0003	2.20483E-04	3.4139				
1.36139E-04	3.0360	0.00000E+00	0.0000				
129	0.0006	4.72205E-04	2.2600				
4.33930E-04	2.1531	0.00000E+00	0.0000				
130	0.0002	1.18687E-04	2.9828				
2.89400E-04	2.8928	0.00000E+00	0.0000				
131	0.0004	2.95416E-04	2.1226				
2.37199E-04	1.7928	0.00000E+00	0.0000				
132	0.0007	5.27944E-04	2.2139				
3.24232E-04	2.0356	0.00000E+00	0.0000				
133	0.0014	1.09321E-03	1.6603				
6.89244E-04	1.5777	0.00000E+00	0.0000				
134	0.0001	9.20369E-05	2.3265				
2.39470E-04	1.9517	0.00000E+00	0.0000				
135	0.0002	1.79575E-04	3.1198				
2.66034E-04	3.0442	0.00000E+00	0.0000				
136	0.0001	4.49798E-05	2.2484				
6.98126E-04	2.2156	0.00000E+00	0.0000				
137	0.0000	1.91087E-05	0.9270				
3.43852E-03	0.9245	0.00000E+00	0.0000				
138	0.0004	3.14875E-04	1.9883				
8.20076E-04	1.9610	0.00000E+00	0.0000				
139	0.0002	1.87338E-04	2.9280				
2.29669E-04	2.7521	0.00000E+00	0.0000				
140	0.0003	2.20898E-04	2.1353				
2.92155E-04	1.8724	0.00000E+00	0.0000				
141	0.0001	7.95533E-05	2.3900				
2.50947E-04	2.1201	0.00000E+00	0.0000				
142	0.0001	6.52796E-05	2.5129				

2.25852E-04	2.3040	0.00000E+00	0.0000				
143	0.0001	8.34835E-05	2.1991				
1.77650E-04	1.4098	0.00000E+00	0.0000				
144	0.0000	3.41066E-05	2.9920				
7.42339E-05	1.8533	0.00000E+00	0.0000				
145	0.0005	3.85625E-04	2.6198				
3.02150E-04	2.3873	0.00000E+00	0.0000				
146	0.0005	3.50203E-04	2.2178				
2.55491E-04	1.8017	0.00000E+00	0.0000				
147	0.0002	1.83657E-04	3.7322				
1.17241E-04	3.2581	0.00000E+00	0.0000				
148	0.0001	5.51532E-05	6.0882				
3.74018E-05	4.8294	0.00000E+00	0.0000				
149	0.0000	3.12008E-05	7.8906				
2.15755E-05	6.0840	0.00000E+00	0.0000				
150	0.0001	8.37701E-05	4.4687				
6.17453E-05	3.2605	0.00000E+00	0.0000				
151	0.0001	6.30907E-05	4.8130				
5.44305E-05	3.2695	0.00000E+00	0.0000				
152	0.0001	4.49258E-05	3.6897				
4.94538E-05	2.3603	0.00000E+00	0.0000				
153	0.0001	4.46620E-05	4.3558				
4.89891E-05	2.5768	0.00000E+00	0.0000				
154	0.0001	4.89564E-05	4.4421				
5.06665E-05	2.6362	0.00000E+00	0.0000				
155	0.0001	4.63689E-05	4.8650				
4.75585E-05	2.8707	0.00000E+00	0.0000				
156	0.0001	4.45862E-05	4.8654				
4.47929E-05	2.8686	0.00000E+00	0.0000				
157	0.0001	5.76985E-05	3.9480				
5.68854E-05	2.4390	0.00000E+00	0.0000				
158	0.0001	6.53551E-05	4.1069				
6.66535E-05	2.6391	0.00000E+00	0.0000				
159	0.0002	1.46201E-04	3.1666				
2.04434E-04	2.6500	0.00000E+00	0.0000				
160	0.0001	6.29634E-05	4.3084				
7.44283E-05	3.2865	0.00000E+00	0.0000				
161	0.0001	7.21115E-05	4.0803				
7.14444E-05	2.6508	0.00000E+00	0.0000				
162	0.0001	8.96181E-05	2.9737				
8.33877E-05	1.8920	0.00000E+00	0.0000				
163	0.0001	9.66928E-05	3.0634				
8.90392E-05	1.9726	0.00000E+00	0.0000				
164	0.0001	9.83016E-05	3.4972				
9.24036E-05	2.1595	0.00000E+00	0.0000				
165	0.0001	1.13018E-04	3.1189				
1.04299E-04	1.9806	0.00000E+00	0.0000				
166	0.0001	6.59967E-05	4.9685				
6.17479E-05	3.0889	0.00000E+00	0.0000				
167	0.0001	7.34527E-05	4.1004				
6.74847E-05	2.5446	0.00000E+00	0.0000				
168	0.0001	9.10984E-05	3.8600				

8.01773E-05 2.5759 0.00000E+00 0.0000
1 fuel bundle

skipping 23 generations

group	fission fraction	deviation	unit	region	fissions	deviation	absorptions	deviation	leakage	deviation
169	0.0001				1.05717E-04	4.0696	9.25586E-05	2.8743	0.00000E+00	0.0000
170	0.0002				1.29227E-04	4.1146	1.11740E-04	3.0448	0.00000E+00	0.0000
171	0.0001				9.88188E-05	4.4845	7.61677E-05	3.5728	0.00000E+00	0.0000
172	0.0002				1.26161E-04	4.9862	9.10626E-05	4.1121	0.00000E+00	0.0000
173	0.0002				1.89614E-04	4.1553	1.24927E-04	3.5997	0.00000E+00	0.0000
174	0.0003				2.51608E-04	3.7465	1.56912E-04	3.3291	0.00000E+00	0.0000
175	0.0002				1.21668E-04	6.4583	7.30827E-05	5.8156	0.00000E+00	0.0000
176	0.0001				1.01147E-04	6.4565	6.11506E-05	5.7258	0.00000E+00	0.0000
177	0.0001				1.11291E-04	5.7541	6.60794E-05	5.1350	0.00000E+00	0.0000
178	0.0001				1.13085E-04	7.3362	6.64228E-05	6.5598	0.00000E+00	0.0000
179	0.0001				1.05977E-04	6.4256	6.24201E-05	5.6645	0.00000E+00	0.0000
180	0.0002				1.16775E-04	6.3723	6.76888E-05	5.6692	0.00000E+00	0.0000
181	0.0002				1.22086E-04	5.3624	6.99654E-05	4.7625	0.00000E+00	0.0000
182	0.0001				1.00608E-04	6.4496	5.86056E-05	5.6244	0.00000E+00	0.0000
183	0.0001				1.05912E-04	6.8623	6.10034E-05	6.0157	0.00000E+00	0.0000
184	0.0001				1.09575E-04	5.9753	6.30483E-05	5.2070	0.00000E+00	0.0000
185	0.0001				1.00595E-04	6.2397	5.80566E-05	5.4337	0.00000E+00	0.0000
186	0.0001				8.96990E-05	6.2660	5.26082E-05	5.3550	0.00000E+00	0.0000
187	0.0001				9.86301E-05	6.7768	5.71493E-05	5.7957	0.00000E+00	0.0000
188	0.0001				9.40361E-05	6.6875	5.47611E-05	5.6214	0.00000E+00	0.0000
189	0.0001				8.15361E-05	7.2326	4.84973E-05	5.9565	0.00000E+00	0.0000

190	0.0003		2.12317E-04	4.2516	
1.25874E-04	3.5200		0.00000E+00	0.0000	
191	0.0003		1.99526E-04	4.0823	
1.19948E-04	3.3542		0.00000E+00	0.0000	
192	0.0003		1.98324E-04	4.2983	
1.20120E-04	3.4663		0.00000E+00	0.0000	
193	0.0002		1.91016E-04	4.4068	
1.17289E-04	3.5365		0.00000E+00	0.0000	
194	0.0005		4.16761E-04	3.1724	
2.54082E-04	2.5432		0.00000E+00	0.0000	
195	0.0005		4.20877E-04	2.7703	
2.61747E-04	2.1680		0.00000E+00	0.0000	
196	0.0006		4.52233E-04	2.6300	
2.81985E-04	2.0371		0.00000E+00	0.0000	
197	0.0007		5.33552E-04	2.5349	
3.28706E-04	1.9960		0.00000E+00	0.0000	
198	0.0007		5.62878E-04	2.2657	
3.50808E-04	1.7650		0.00000E+00	0.0000	
199	0.0004		3.20340E-04	3.4778	
1.97639E-04	2.7510		0.00000E+00	0.0000	
200	0.0005		3.60115E-04	2.8688	
2.20945E-04	2.2557		0.00000E+00	0.0000	
201	0.0010		7.80342E-04	1.8038	
4.78386E-04	1.4618		0.00000E+00	0.0000	
202	0.0013		9.62691E-04	2.0083	
5.86142E-04	1.6124		0.00000E+00	0.0000	
203	0.0016		1.24099E-03	1.8715	
7.40807E-04	1.5244		0.00000E+00	0.0000	
204	0.0022		1.65955E-03	1.7560	
9.76593E-04	1.4566		0.00000E+00	0.0000	
205	0.0015		1.15372E-03	1.9611	
6.74992E-04	1.6427		0.00000E+00	0.0000	
206	0.0018		1.40406E-03	1.7041	
8.17771E-04	1.4559		0.00000E+00	0.0000	
207	0.0022		1.66088E-03	1.7819	
9.64747E-04	1.5552		0.00000E+00	0.0000	
208	0.0029		2.19414E-03	1.4990	
1.27752E-03	1.3254		0.00000E+00	0.0000	
209	0.0030		2.33036E-03	1.5194	
1.37350E-03	1.3333		0.00000E+00	0.0000	
210	0.0038		2.89374E-03	1.3042	
1.71982E-03	1.1452		0.00000E+00	0.0000	
211	0.0041		3.12152E-03	1.0691	
1.88295E-03	0.9287		0.00000E+00	0.0000	
212	0.0047		3.58964E-03	1.1493	
2.17810E-03	0.9733		0.00000E+00	0.0000	
213	0.0065		4.99825E-03	0.9733	
3.02031E-03	0.8167		0.00000E+00	0.0000	
214	0.0097		7.43161E-03	0.7609	
4.46286E-03	0.6343		0.00000E+00	0.0000	
215	0.0159		1.21478E-02	0.6644	
7.23799E-03	0.5648		0.00000E+00	0.0000	

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  216    0.0301                2.30448E-02     0.4464
1.35881E-02     0.3771       0.00000E+00     0.0000
  217    0.0201                1.53754E-02     0.5701
9.04479E-03     0.4861       0.00000E+00     0.0000
  218    0.0276                2.11629E-02     0.4689
1.23926E-02     0.3948       0.00000E+00     0.0000
  219    0.0359                2.75197E-02     0.3336
1.60420E-02     0.2904       0.00000E+00     0.0000
  220    0.0473                3.62695E-02     0.4045
2.10920E-02     0.3439       0.00000E+00     0.0000
  221    0.0626                4.79743E-02     0.3494
2.78126E-02     0.2985       0.00000E+00     0.0000
  222    0.0800                6.12893E-02     0.2734
3.55065E-02     0.2307       0.00000E+00     0.0000
  223    0.1042                7.98489E-02     0.2458
4.63246E-02     0.2088       0.00000E+00     0.0000
  224    0.0581                4.45624E-02     0.3314
2.59608E-02     0.2811       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                 deviation
deviation                    deviation

  225    0.2304                1.76534E-01     0.1409
1.04563E-01     0.1197       0.00000E+00     0.0000
  226    0.0454                3.47784E-02     0.3781
2.11748E-02     0.3135       0.00000E+00     0.0000
  227    0.0493                3.78125E-02     0.3541
2.34445E-02     0.2863       0.00000E+00     0.0000
  228    0.0210                1.60902E-02     0.6139
1.01833E-02     0.4778       0.00000E+00     0.0000
  229    0.0223                1.70595E-02     0.5409
1.09580E-02     0.4245       0.00000E+00     0.0000
  230    0.0115                8.85158E-03     0.7869
5.81261E-03     0.6304       0.00000E+00     0.0000
  231    0.0122                9.34607E-03     0.8486
6.21472E-03     0.6521       0.00000E+00     0.0000
  232    0.0129                9.88413E-03     0.7526
6.75101E-03     0.5588       0.00000E+00     0.0000
  233    0.0085                6.47927E-03     0.9593
4.51616E-03     0.7070       0.00000E+00     0.0000
  234    0.0061                4.64871E-03     0.9575
3.32288E-03     0.6768       0.00000E+00     0.0000
  235    0.0024                1.86242E-03     1.5950
1.23322E-03     1.1921       0.00000E+00     0.0000
  236    0.0019                1.45815E-03     2.0561
9.81119E-04     1.5227       0.00000E+00     0.0000
  237    0.0017                1.31830E-03     2.0941
```

9.38363E-04 1.5166 0.00000E+00 0.0000
  238 0.0001 7.58417E-05 8.7402
6.33263E-05 5.3652 0.00000E+00 0.0000

 system total = 7.66371E-01 0.0517
4.69165E-01 0.0437 0.00000E+00 0.0000

 the weight lost in the albedo portion of the problem = 5.3100E-01 + or - 0.0002

 elapsed time 3.05850 minutes

 random number= D8378E917CCC2366

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.091E-03	0.05	7.664E-01
	2	0.000E+00	0.00	0.000E+00
	3	0.000E+00	0.00	0.000E+00
2	1	0.000E+00	0.00	0.000E+00

global unit

1 fuel bundle

 fluxes for Unit 1

	region 1		region 2		region 3	
group	flux	percent deviation	flux	percent deviation	flux	percent deviation
1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	1.322E-08	36.81	1.029E-08	34.67	1.125E-08	35.83
3	8.645E-07	3.89	7.145E-07	3.44	7.720E-07	3.70
4	1.429E-06	2.82	1.163E-06	2.73	1.247E-06	2.68
5	2.244E-06	2.18	1.856E-06	1.90	1.988E-06	2.01

6	9.415E-06	1.33	7.524E-06	1.19	8.042E-06	1.22
7	1.264E-05	1.15	9.548E-06	1.08	1.010E-05	1.06
8	3.083E-05	0.78	2.260E-05	0.65	2.367E-05	0.64
9	8.166E-05	0.50	5.869E-05	0.42	6.125E-05	0.42
10	4.612E-05	0.68	3.277E-05	0.56	3.406E-05	0.56
11	2.204E-04	0.27	1.559E-04	0.26	1.615E-04	0.25
12	1.895E-04	0.33	1.373E-04	0.28	1.442E-04	0.27
13	5.682E-05	0.59	4.133E-05	0.46	4.320E-05	0.44
14	2.535E-04	0.22	1.836E-04	0.17	1.915E-04	0.18
15	2.199E-04	0.26	1.598E-04	0.23	1.665E-04	0.22
16	7.117E-05	0.48	5.162E-05	0.42	5.400E-05	0.39
17	3.229E-05	0.77	2.348E-05	0.58	2.446E-05	0.60
18	2.784E-05	0.71	2.029E-05	0.61	2.105E-05	0.59
19	5.029E-05	0.50	3.655E-05	0.47	3.807E-05	0.44
20	3.931E-05	0.56	2.903E-05	0.50	3.033E-05	0.50
21	8.026E-05	0.40	5.872E-05	0.36	6.126E-05	0.35
22	7.261E-05	0.44	5.316E-05	0.40	5.495E-05	0.37
23	7.653E-05	0.41	5.621E-05	0.35	5.822E-05	0.30
24	1.851E-05	0.86	1.368E-05	0.66	1.435E-05	0.69
25	2.371E-05	0.67	1.746E-05	0.55	1.845E-05	0.54
26	1.328E-05	0.92	9.787E-06	0.83	1.032E-05	0.80
27	4.197E-05	0.46	3.108E-05	0.38	3.299E-05	0.38
28	7.672E-05	0.39	5.731E-05	0.36	6.060E-05	0.36
29	7.859E-05	0.46	5.898E-05	0.42	6.178E-05	0.37
30	9.925E-06	1.00	7.513E-06	0.89	7.908E-06	0.82
31	7.862E-05	0.40	5.909E-05	0.35	6.212E-05	0.33
32	3.092E-05	0.57	2.339E-05	0.46	2.469E-05	0.48
33	2.657E-05	0.65	2.000E-05	0.57	2.114E-05	0.59
34	6.141E-05	0.48	4.625E-05	0.41	4.878E-05	0.38
35	3.611E-05	0.56	2.741E-05	0.45	2.886E-05	0.39
36	3.410E-05	0.59	2.563E-05	0.46	2.686E-05	0.42
37	2.216E-05	0.73	1.667E-05	0.58	1.746E-05	0.55
38	2.593E-05	0.63	1.976E-05	0.58	2.081E-05	0.54
39	9.791E-05	0.28	7.508E-05	0.26	7.934E-05	0.23
40	9.024E-05	0.30	6.972E-05	0.28	7.424E-05	0.26
41	1.136E-04	0.31	8.878E-05	0.23	9.451E-05	0.22
42	9.321E-05	0.32	7.353E-05	0.29	7.901E-05	0.24
43	5.130E-05	0.32	4.082E-05	0.29	4.290E-05	0.29
44	7.014E-05	0.35	5.623E-05	0.31	6.040E-05	0.26
45	3.514E-05	0.43	2.806E-05	0.38	3.102E-05	0.33
46	8.331E-06	0.71	6.596E-06	0.60	7.149E-06	0.54
47	2.359E-05	0.55	1.878E-05	0.47	1.949E-05	0.40
48	6.924E-06	1.08	5.477E-06	0.90	5.731E-06	0.77
49	4.362E-05	0.37	3.492E-05	0.31	3.765E-05	0.31
50	2.960E-05	0.49	2.374E-05	0.42	2.590E-05	0.35
51	7.894E-06	0.90	6.344E-06	0.82	6.896E-06	0.69
52	2.069E-05	0.60	1.671E-05	0.54	1.825E-05	0.45
53	7.617E-05	0.27	6.163E-05	0.24	6.673E-05	0.22
54	3.318E-05	0.45	2.683E-05	0.40	2.907E-05	0.35
55	6.647E-05	0.30	5.395E-05	0.26	5.879E-05	0.24
56	4.329E-05	0.38	3.533E-05	0.35	3.838E-05	0.29
57	4.894E-05	0.39	4.012E-05	0.32	4.361E-05	0.26

58	2.568E-05	0.51	2.096E-05	0.45	2.286E-05	0.35
59	4.443E-05	0.34	3.630E-05	0.32	3.940E-05	0.26
60	6.417E-05	0.30	5.240E-05	0.26	5.704E-05	0.26
61	6.165E-06	0.93	5.053E-06	0.86	5.488E-06	0.70
62	3.264E-05	0.45	2.662E-05	0.42	2.892E-05	0.36
63	2.181E-05	0.47	1.787E-05	0.42	1.948E-05	0.36
64	1.733E-05	0.60	1.421E-05	0.49	1.543E-05	0.40
65	5.706E-06	1.08	4.726E-06	0.85	5.123E-06	0.71
66	2.871E-05	0.43	2.352E-05	0.40	2.557E-05	0.37
67	2.133E-05	0.54	1.752E-05	0.47	1.906E-05	0.42
68	4.497E-06	0.98	3.704E-06	0.85	4.055E-06	0.72
69	3.727E-05	0.40	3.070E-05	0.36	3.338E-05	0.28
70	2.663E-05	0.48	2.199E-05	0.41	2.389E-05	0.36
71	4.580E-05	0.36	3.775E-05	0.33	4.093E-05	0.26
72	2.614E-06	1.51	2.146E-06	1.30	2.337E-06	1.02
73	2.711E-05	0.48	2.238E-05	0.43	2.438E-05	0.35
74	7.931E-05	0.30	6.557E-05	0.25	7.128E-05	0.21
75	9.103E-06	0.76	7.532E-06	0.66	8.150E-06	0.55
76	2.279E-05	0.46	1.900E-05	0.45	2.059E-05	0.36
77	1.766E-05	0.59	1.464E-05	0.53	1.592E-05	0.43
78	1.519E-06	1.68	1.278E-06	1.67	1.403E-06	1.36
79	9.937E-06	0.62	8.231E-06	0.54	8.889E-06	0.46
80	4.558E-06	0.96	3.758E-06	0.86	4.057E-06	0.70
81	5.524E-05	0.30	4.583E-05	0.27	4.978E-05	0.22
82	3.203E-06	1.30	2.662E-06	1.16	2.917E-06	0.97
83	4.481E-06	1.12	3.695E-06	0.97	4.023E-06	0.84
84	8.133E-06	0.75	6.741E-06	0.66	7.349E-06	0.59
85	9.884E-06	0.73	8.222E-06	0.59	8.924E-06	0.52
86	1.352E-05	0.61	1.131E-05	0.57	1.228E-05	0.44
87	1.198E-05	0.61	1.005E-05	0.60	1.085E-05	0.47
88	3.079E-06	1.09	2.592E-06	1.10	2.818E-06	0.85
89	6.677E-06	0.86	5.587E-06	0.79	6.001E-06	0.63
90	6.946E-06	0.80	5.785E-06	0.71	6.280E-06	0.56
91	8.158E-06	0.77	6.842E-06	0.71	7.409E-06	0.52
92	4.775E-06	1.00	3.972E-06	0.92	4.326E-06	0.77
93	8.249E-06	0.87	6.820E-06	0.81	7.364E-06	0.66
94	4.247E-06	1.14	3.537E-06	0.93	3.808E-06	0.78
95	1.262E-05	0.68	1.055E-05	0.61	1.147E-05	0.49
96	3.334E-06	1.23	2.793E-06	1.19	3.026E-06	0.93
97	3.366E-06	1.13	2.820E-06	1.07	3.058E-06	0.83
98	3.503E-06	1.03	2.926E-06	0.92	3.179E-06	0.82
99	2.281E-06	1.34	1.908E-06	1.16	2.079E-06	0.98
100	3.453E-06	1.03	2.918E-06	0.90	3.146E-06	0.73
101	4.926E-06	0.99	4.119E-06	0.90	4.454E-06	0.79
102	3.329E-06	1.03	2.817E-06	0.91	3.055E-06	0.77
103	4.694E-06	1.07	3.941E-06	0.87	4.216E-06	0.77
104	4.183E-06	1.03	3.521E-06	0.96	3.801E-06	0.76
105	4.418E-06	1.10	3.754E-06	1.08	3.991E-06	0.78
106	1.517E-06	1.70	1.292E-06	1.51	1.397E-06	1.19
107	3.540E-06	1.09	2.965E-06	0.92	3.201E-06	0.73
108	3.179E-06	1.18	2.724E-06	1.10	2.938E-06	0.93
109	5.046E-06	0.95	4.240E-06	0.89	4.653E-06	0.69

110	2.929E-06	1.15	2.502E-06	1.03	2.773E-06	0.95
111	3.068E-06	1.27	2.571E-06	1.10	2.809E-06	0.83
112	1.817E-06	1.61	1.528E-06	1.48	1.673E-06	1.23
113	5.753E-06	1.00	4.813E-06	0.85	5.212E-06	0.67
114	1.998E-06	1.60	1.665E-06	1.45	1.821E-06	1.17
115	5.114E-06	1.03	4.255E-06	0.89	4.609E-06	0.70
116	1.075E-05	0.74	9.006E-06	0.63	9.775E-06	0.57
117	1.182E-05	0.65	9.935E-06	0.63	1.072E-05	0.50
118	1.279E-05	0.62	1.074E-05	0.62	1.168E-05	0.50
119	8.237E-06	0.78	7.003E-06	0.67	7.569E-06	0.54
120	5.791E-06	0.90	4.923E-06	0.88	5.341E-06	0.68
121	6.056E-06	1.02	5.109E-06	0.88	5.611E-06	0.75
122	3.217E-06	1.36	2.691E-06	1.22	2.909E-06	0.86
123	1.039E-05	0.66	8.761E-06	0.58	9.451E-06	0.52
124	7.388E-06	0.75	6.244E-06	0.65	6.723E-06	0.56
125	7.192E-06	0.85	6.039E-06	0.69	6.494E-06	0.57
126	5.852E-06	0.89	4.863E-06	0.75	5.248E-06	0.59
127	5.615E-06	0.85	4.715E-06	0.83	5.047E-06	0.65
128	7.844E-06	0.73	6.528E-06	0.62	7.036E-06	0.50
129	9.543E-06	0.76	8.054E-06	0.64	8.731E-06	0.52
130	3.989E-06	1.01	3.402E-06	0.93	3.688E-06	0.79
131	1.687E-05	0.54	1.415E-05	0.52	1.527E-05	0.44
132	1.133E-05	0.65	9.567E-06	0.50	1.035E-05	0.43
133	1.349E-05	0.61	1.144E-05	0.54	1.243E-05	0.45
134	1.482E-05	0.63	1.250E-05	0.55	1.349E-05	0.47
135	2.388E-06	1.26	2.016E-06	1.24	2.192E-06	0.97
136	3.870E-06	1.16	3.355E-06	1.12	3.677E-06	0.91
137	2.500E-06	0.98	2.595E-06	0.99	2.954E-06	0.88
138	4.101E-06	0.94	3.540E-06	0.88	3.912E-06	0.81
139	4.608E-06	0.88	3.904E-06	0.83	4.258E-06	0.62
140	1.206E-05	0.64	1.019E-05	0.60	1.101E-05	0.47
141	8.744E-06	0.80	7.421E-06	0.69	8.011E-06	0.61
142	5.873E-06	1.00	4.959E-06	0.82	5.371E-06	0.74
143	1.997E-05	0.55	1.680E-05	0.46	1.805E-05	0.40
144	8.115E-06	0.71	6.829E-06	0.62	7.341E-06	0.52
145	7.201E-06	0.74	6.066E-06	0.68	6.575E-06	0.53
146	1.198E-05	0.57	1.011E-05	0.50	1.091E-05	0.45
147	3.689E-06	1.17	3.161E-06	0.99	3.415E-06	0.84
148	1.858E-06	1.61	1.584E-06	1.45	1.693E-06	1.13
149	1.200E-06	2.07	1.015E-06	1.79	1.084E-06	1.34
150	3.973E-06	1.01	3.347E-06	0.89	3.582E-06	0.69
151	4.199E-06	1.10	3.533E-06	0.96	3.782E-06	0.86
152	4.371E-06	1.08	3.643E-06	1.00	3.926E-06	0.75
153	4.557E-06	1.02	3.836E-06	0.88	4.074E-06	0.80
154	4.635E-06	1.08	3.931E-06	0.93	4.197E-06	0.76
155	4.347E-06	1.24	3.666E-06	1.04	3.960E-06	0.88
156	4.031E-06	1.04	3.396E-06	0.94	3.665E-06	0.80
157	4.620E-06	1.02	3.927E-06	0.94	4.240E-06	0.70
158	4.840E-06	0.95	4.082E-06	0.81	4.438E-06	0.72
159	6.687E-06	0.88	5.683E-06	0.74	6.175E-06	0.65
160	3.569E-06	1.26	3.010E-06	1.06	3.241E-06	0.89
161	4.920E-06	1.04	4.160E-06	0.97	4.506E-06	0.74

162	5.834E-06	0.92	4.901E-06	0.82	5.265E-06	0.67
163	6.146E-06	1.05	5.169E-06	0.89	5.582E-06	0.76
164	6.377E-06	0.93	5.387E-06	0.76	5.850E-06	0.64
165	6.911E-06	0.85	5.796E-06	0.70	6.241E-06	0.59
166	3.982E-06	1.09	3.325E-06	0.93	3.637E-06	0.74
167	4.088E-06	0.97	3.468E-06	0.88	3.743E-06	0.71
168	4.271E-06	1.01	3.620E-06	0.96	3.942E-06	0.70
169	4.478E-06	1.09	3.766E-06	0.96	4.070E-06	0.78
170	4.609E-06	0.82	3.920E-06	0.79	4.229E-06	0.67
171	2.361E-06	1.13	2.008E-06	1.16	2.167E-06	0.86
172	2.417E-06	1.23	2.031E-06	1.04	2.189E-06	0.96
173	2.409E-06	1.18	2.055E-06	1.07	2.237E-06	0.88
174	2.455E-06	1.17	2.096E-06	1.15	2.312E-06	0.96
175	1.018E-06	2.06	8.732E-07	1.62	9.297E-07	1.33
176	1.010E-06	1.90	8.432E-07	1.64	9.282E-07	1.46
177	9.994E-07	2.03	8.591E-07	1.90	9.318E-07	1.49
178	1.016E-06	1.82	8.628E-07	1.64	9.416E-07	1.50
179	1.034E-06	1.87	8.848E-07	1.90	9.586E-07	1.42
180	1.073E-06	1.97	9.043E-07	1.84	9.739E-07	1.46
181	1.075E-06	1.97	9.234E-07	1.91	1.001E-06	1.45
182	1.097E-06	1.97	9.333E-07	1.65	1.012E-06	1.35
183	1.086E-06	1.86	9.274E-07	1.67	1.001E-06	1.35
184	1.096E-06	1.94	9.269E-07	1.76	1.011E-06	1.55
185	1.104E-06	2.05	9.353E-07	1.95	1.005E-06	1.52
186	1.147E-06	2.37	9.529E-07	2.04	1.042E-06	1.54
187	1.140E-06	1.64	9.909E-07	1.55	1.059E-06	1.22
188	1.155E-06	1.83	9.852E-07	1.70	1.070E-06	1.57
189	1.150E-06	1.56	9.705E-07	1.62	1.045E-06	1.33
190	3.043E-06	1.42	2.536E-06	1.08	2.750E-06	0.88
191	2.988E-06	1.20	2.570E-06	1.04	2.767E-06	0.84
192	3.133E-06	1.21	2.641E-06	1.04	2.869E-06	0.83
193	3.232E-06	1.17	2.740E-06	0.92	2.985E-06	0.75
194	6.774E-06	0.83	5.748E-06	0.70	6.202E-06	0.68
195	7.198E-06	0.74	6.113E-06	0.67	6.653E-06	0.58
196	7.700E-06	0.68	6.524E-06	0.60	7.013E-06	0.48
197	8.481E-06	0.77	7.163E-06	0.66	7.765E-06	0.56
198	8.980E-06	0.70	7.552E-06	0.63	8.191E-06	0.51
199	4.785E-06	1.04	4.058E-06	0.98	4.359E-06	0.80
200	5.112E-06	0.92	4.314E-06	0.85	4.651E-06	0.67
201	1.064E-05	0.62	8.976E-06	0.60	9.748E-06	0.47
202	1.203E-05	0.62	1.017E-05	0.57	1.098E-05	0.42
203	1.288E-05	0.57	1.089E-05	0.57	1.181E-05	0.44
204	1.470E-05	0.59	1.245E-05	0.54	1.349E-05	0.44
205	8.611E-06	0.67	7.713E-06	0.60	8.179E-06	0.53
206	9.334E-06	0.69	8.376E-06	0.60	8.909E-06	0.52
207	9.547E-06	0.71	8.659E-06	0.56	9.162E-06	0.47
208	1.133E-05	0.65	1.022E-05	0.47	1.094E-05	0.45
209	1.163E-05	0.66	1.057E-05	0.51	1.121E-05	0.41
210	1.411E-05	0.59	1.279E-05	0.51	1.361E-05	0.42
211	1.611E-05	0.45	1.450E-05	0.45	1.550E-05	0.39
212	1.925E-05	0.42	1.741E-05	0.40	1.853E-05	0.32
213	2.617E-05	0.34	2.351E-05	0.33	2.509E-05	0.25

214	3.688E-05	0.30	3.315E-05	0.26	3.566E-05	0.24
215	5.518E-05	0.25	4.979E-05	0.24	5.380E-05	0.19
216	9.207E-05	0.18	8.390E-05	0.17	9.071E-05	0.14
217	5.530E-05	0.27	5.297E-05	0.22	5.617E-05	0.18
218	7.092E-05	0.21	6.795E-05	0.18	7.225E-05	0.16
219	8.433E-05	0.20	8.140E-05	0.16	8.665E-05	0.16
220	1.014E-04	0.19	9.898E-05	0.17	1.056E-04	0.15
221	1.205E-04	0.17	1.186E-04	0.14	1.266E-04	0.12
222	1.367E-04	0.18	1.367E-04	0.15	1.458E-04	0.12
223	1.532E-04	0.14	1.571E-04	0.13	1.672E-04	0.12
224	7.540E-05	0.18	7.992E-05	0.16	8.456E-05	0.13
225	2.341E-04	0.12	2.719E-04	0.10	2.825E-04	0.09
226	3.184E-05	0.23	4.472E-05	0.20	4.453E-05	0.13
227	2.888E-05	0.25	4.634E-05	0.21	4.437E-05	0.14
228	1.041E-05	0.42	1.894E-05	0.29	1.753E-05	0.19
229	9.614E-06	0.41	1.952E-05	0.31	1.742E-05	0.19
230	4.477E-06	0.57	1.014E-05	0.42	8.705E-06	0.21
231	4.260E-06	0.54	1.054E-05	0.47	8.723E-06	0.25
232	3.948E-06	0.59	1.133E-05	0.41	8.900E-06	0.22
233	2.257E-06	0.72	7.371E-06	0.51	5.486E-06	0.29
234	1.444E-06	0.80	5.404E-06	0.66	3.817E-06	0.30
235	5.184E-07	1.25	1.048E-06	1.01	1.119E-06	0.48
236	3.460E-07	1.86	7.212E-07	1.29	7.930E-07	0.57
237	2.203E-07	1.96	5.508E-07	1.66	6.175E-07	0.65
238	5.320E-09	11.19	2.417E-08	7.13	2.582E-08	2.20

1 fuel bundle

fluxes for Global Unit
region 1

group	flux	percent deviation
1	0.000E+00	0.00
2	0.000E+00	0.00
3	0.000E+00	0.00
4	0.000E+00	0.00
5	0.000E+00	0.00
6	0.000E+00	0.00
7	0.000E+00	0.00
8	0.000E+00	0.00
9	0.000E+00	0.00
10	0.000E+00	0.00
11	0.000E+00	0.00
12	0.000E+00	0.00
13	0.000E+00	0.00
14	0.000E+00	0.00
15	0.000E+00	0.00
16	0.000E+00	0.00
17	0.000E+00	0.00
18	0.000E+00	0.00
19	0.000E+00	0.00
20	0.000E+00	0.00

21	0.000E+00	0.00
22	0.000E+00	0.00
23	0.000E+00	0.00
24	0.000E+00	0.00
25	0.000E+00	0.00
26	0.000E+00	0.00
27	0.000E+00	0.00
28	0.000E+00	0.00
29	0.000E+00	0.00
30	0.000E+00	0.00
31	0.000E+00	0.00
32	0.000E+00	0.00
33	0.000E+00	0.00
34	0.000E+00	0.00
35	0.000E+00	0.00
36	0.000E+00	0.00
37	0.000E+00	0.00
38	0.000E+00	0.00
39	0.000E+00	0.00
40	0.000E+00	0.00
41	0.000E+00	0.00
42	0.000E+00	0.00
43	0.000E+00	0.00
44	0.000E+00	0.00
45	0.000E+00	0.00
46	0.000E+00	0.00
47	0.000E+00	0.00
48	0.000E+00	0.00
49	0.000E+00	0.00
50	0.000E+00	0.00
51	0.000E+00	0.00
52	0.000E+00	0.00
53	0.000E+00	0.00
54	0.000E+00	0.00
55	0.000E+00	0.00
56	0.000E+00	0.00
57	0.000E+00	0.00
58	0.000E+00	0.00
59	0.000E+00	0.00
60	0.000E+00	0.00
61	0.000E+00	0.00
62	0.000E+00	0.00
63	0.000E+00	0.00
64	0.000E+00	0.00
65	0.000E+00	0.00
66	0.000E+00	0.00
67	0.000E+00	0.00
68	0.000E+00	0.00
69	0.000E+00	0.00
70	0.000E+00	0.00
71	0.000E+00	0.00
72	0.000E+00	0.00

73	0.000E+00	0.00
74	0.000E+00	0.00
75	0.000E+00	0.00
76	0.000E+00	0.00
77	0.000E+00	0.00
78	0.000E+00	0.00
79	0.000E+00	0.00
80	0.000E+00	0.00
81	0.000E+00	0.00
82	0.000E+00	0.00
83	0.000E+00	0.00
84	0.000E+00	0.00
85	0.000E+00	0.00
86	0.000E+00	0.00
87	0.000E+00	0.00
88	0.000E+00	0.00
89	0.000E+00	0.00
90	0.000E+00	0.00
91	0.000E+00	0.00
92	0.000E+00	0.00
93	0.000E+00	0.00
94	0.000E+00	0.00
95	0.000E+00	0.00
96	0.000E+00	0.00
97	0.000E+00	0.00
98	0.000E+00	0.00
99	0.000E+00	0.00
100	0.000E+00	0.00
101	0.000E+00	0.00
102	0.000E+00	0.00
103	0.000E+00	0.00
104	0.000E+00	0.00
105	0.000E+00	0.00
106	0.000E+00	0.00
107	0.000E+00	0.00
108	0.000E+00	0.00
109	0.000E+00	0.00
110	0.000E+00	0.00
111	0.000E+00	0.00
112	0.000E+00	0.00
113	0.000E+00	0.00
114	0.000E+00	0.00
115	0.000E+00	0.00
116	0.000E+00	0.00
117	0.000E+00	0.00
118	0.000E+00	0.00
119	0.000E+00	0.00
120	0.000E+00	0.00
121	0.000E+00	0.00
122	0.000E+00	0.00
123	0.000E+00	0.00
124	0.000E+00	0.00

125	0.000E+00	0.00
126	0.000E+00	0.00
127	0.000E+00	0.00
128	0.000E+00	0.00
129	0.000E+00	0.00
130	0.000E+00	0.00
131	0.000E+00	0.00
132	0.000E+00	0.00
133	0.000E+00	0.00
134	0.000E+00	0.00
135	0.000E+00	0.00
136	0.000E+00	0.00
137	0.000E+00	0.00
138	0.000E+00	0.00
139	0.000E+00	0.00
140	0.000E+00	0.00
141	0.000E+00	0.00
142	0.000E+00	0.00
143	0.000E+00	0.00
144	0.000E+00	0.00
145	0.000E+00	0.00
146	0.000E+00	0.00
147	0.000E+00	0.00
148	0.000E+00	0.00
149	0.000E+00	0.00
150	0.000E+00	0.00
151	0.000E+00	0.00
152	0.000E+00	0.00
153	0.000E+00	0.00
154	0.000E+00	0.00
155	0.000E+00	0.00
156	0.000E+00	0.00
157	0.000E+00	0.00
158	0.000E+00	0.00
159	0.000E+00	0.00
160	0.000E+00	0.00
161	0.000E+00	0.00
162	0.000E+00	0.00
163	0.000E+00	0.00
164	0.000E+00	0.00
165	0.000E+00	0.00
166	0.000E+00	0.00
167	0.000E+00	0.00
168	0.000E+00	0.00
169	0.000E+00	0.00
170	0.000E+00	0.00
171	0.000E+00	0.00
172	0.000E+00	0.00
173	0.000E+00	0.00
174	0.000E+00	0.00
175	0.000E+00	0.00
176	0.000E+00	0.00

177	0.000E+00	0.00
178	0.000E+00	0.00
179	0.000E+00	0.00
180	0.000E+00	0.00
181	0.000E+00	0.00
182	0.000E+00	0.00
183	0.000E+00	0.00
184	0.000E+00	0.00
185	0.000E+00	0.00
186	0.000E+00	0.00
187	0.000E+00	0.00
188	0.000E+00	0.00
189	0.000E+00	0.00
190	0.000E+00	0.00
191	0.000E+00	0.00
192	0.000E+00	0.00
193	0.000E+00	0.00
194	0.000E+00	0.00
195	0.000E+00	0.00
196	0.000E+00	0.00
197	0.000E+00	0.00
198	0.000E+00	0.00
199	0.000E+00	0.00
200	0.000E+00	0.00
201	0.000E+00	0.00
202	0.000E+00	0.00
203	0.000E+00	0.00
204	0.000E+00	0.00
205	0.000E+00	0.00
206	0.000E+00	0.00
207	0.000E+00	0.00
208	0.000E+00	0.00
209	0.000E+00	0.00
210	0.000E+00	0.00
211	0.000E+00	0.00
212	0.000E+00	0.00
213	0.000E+00	0.00
214	0.000E+00	0.00
215	0.000E+00	0.00
216	0.000E+00	0.00
217	0.000E+00	0.00
218	0.000E+00	0.00
219	0.000E+00	0.00
220	0.000E+00	0.00
221	0.000E+00	0.00
222	0.000E+00	0.00
223	0.000E+00	0.00
224	0.000E+00	0.00
225	0.000E+00	0.00
226	0.000E+00	0.00
227	0.000E+00	0.00
228	0.000E+00	0.00

```
  229   0.000E+00    0.00
  230   0.000E+00    0.00
  231   0.000E+00    0.00
  232   0.000E+00    0.00
  233   0.000E+00    0.00
  234   0.000E+00    0.00
  235   0.000E+00    0.00
  236   0.000E+00    0.00
  237   0.000E+00    0.00
  238   0.000E+00    0.00
1fuel bundle

                                frequency for generations      24 to
123 each asterisk represents   1.0000 generations
 0.7565 to 0.7593     ****
 0.7593 to 0.7621     ***************
 0.7621 to 0.7650     ***************
 0.7650 to 0.7678     ************************
 0.7678 to 0.7706     ****************************
 0.7706 to 0.7734     *********
 0.7734 to 0.7763     **

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7565 to 0.7593     ****
 0.7593 to 0.7621     **********
 0.7621 to 0.7650     ************
 0.7650 to 0.7678     ****************
 0.7678 to 0.7706     ***********************
 0.7706 to 0.7734     *******
 0.7734 to 0.7763     **

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7565 to 0.7593     ***
 0.7593 to 0.7621     ******
 0.7621 to 0.7650     ***********
 0.7650 to 0.7678     **********
 0.7678 to 0.7706     *************
 0.7706 to 0.7734     *****
 0.7734 to 0.7763     **

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7565 to 0.7593     ***
 0.7593 to 0.7621     ****
 0.7621 to 0.7650     ******
 0.7650 to 0.7678     ***
 0.7678 to 0.7706     ******
 0.7706 to 0.7734     **
 0.7734 to 0.7763     *
```

1
```
********************************************************************************
*****************************************
        ***
***
        ***   fuel bundle
***
        ***
***

********************************************************************************
*****************************************
        ***
***
        ***                                        ******      final results
table      ******                                     ***
        ***
***
        ***        best estimate system k-eff
0.76637 + or - 0.00057                      ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.67058E-02 + or -  1.02237E-04           ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  9.33258E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52761E-01 + or -  1.83823E-04           ***
        ***
***
        ***        number of warning messages
7                                         ***
        ***
***
        ***        number of error messages
0                                         ***
        ***
***
        ***        k-effective satisfies the chi**2 test for normality at
the 95 % level                                    ***
        ***
***
        ***
***

********************************************************************************
*****************************************
```

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**************************************************************************
*****************************************
```

```
**************************************************************************
************************************************************
```

Congratulations! You have successfully traversed the perilous path through Keno-VI in 3.06133 minutes

```
**************************************************************************
************************************************************
1
    OOOOOOOOOOO     PPPPPPPPPPPP     UU          UU     SSSSSSSSSS
   OOOOOOOOOOOOO    PPPPPPPPPPPPP    UU          UU    SSSSSSSSSSSS
   OO          OO   PP          PP   UU          UU    SS         SS
   OO          OO   PP          PP   UU          UU    SS
   OO          OO   PP          PP   UU          UU    SS
   OO          OO   PPPPPPPPPPPPP    UU          UU    SSSSSSSSSSS
   OO          OO   PPPPPPPPPPPP     UU          UU     SSSSSSSSSSS
   OO          OO   PP               UU          UU              SS
   OO          OO   PP               UU          UU              SS
   OO          OO   PP               UU          UU    SS        SS
   OOOOOOOOOOOOO    PP               UUUUUUUUUUUUU    SSSSSSSSSSSS
    OOOOOOOOOOO     PP                UUUUUUUUUUU     SSSSSSSSSS


   DDDDDDDDDDDD       AAAAAAAAA      VV          VV   IIIIIIIIIII
DDDDDDDDDDDD
   DDDDDDDDDDDDD     AAAAAAAAAAA     VV          VV   IIIIIIIIIII
DDDDDDDDDDDDD
   DD          DD   AA          AA   VV          VV        II         DD
DD
   DD          DD   AA          AA   VV          VV        II         DD
DD
   DD          DD   AA          AA   VV          VV        II         DD
DD
   DD          DD   AAAAAAAAAAAAAA   VV          VV        II         DD
DD
   DD          DD   AAAAAAAAAAAAAA    VV        VV         II         DD
DD
   DD          DD   AA          AA      VV     VV          II         DD
DD
   DD          DD   AA          AA       VV   VV           II         DD
DD
   DD          DD   AA          AA        VV VV            II         DD
DD
   DDDDDDDDDDDDD   AA          AA         VVV        IIIIIIIIIII
```

```
DDDDDDDDDDDDD
   DDDDDDDDDDDD    AA         AA          V        IIIIIIIIIIII
DDDDDDDDDDDDD


      0000000       88888888888                //   22222222222
33333333333               //        11          666666666666
     000000000     8888888888888              //   2222222222222
3333333333333             //        111         6666666666666
    00       00    88         88              //    22         22   33
33             //        1111         66
   00          00   88         88             //                22
33            //           11         66
   00          00   88         88           //                 22
33           //           11         66
   00          00    88888888888           //                22
333          //             11        666666666666
   00          00    88888888888          //                22
333          //             11        6666666666666
   00          00   88         88         //              22
33        //               11         66          66
   00          00   88         88       //             22
33       //                11         66          66
    00       00    88         88      //            22             33
33      //                 11         66          66
     000000000     8888888888888     //            2222222222222
3333333333333     //                11111111     6666666666666
      0000000       88888888888     //            2222222222222
33333333333     //                11111111      66666666666


      0000000       666666666666                          11
0000000                     33333333333    5555555555555
     000000000     6666666666666                        111
000000000                   3333333333333   5555555555555
    00       00    66                    :::           1111         00
00          :::       33         33   55
   00          00   66                    :::             11        00
00         :::                  33   55
   00          00   66                    :::             11        00
00         :::                  33   55
   00          00   666666666666                        11        00
00                          333    555555555555
   00          00   6666666666666                       11        00
00                          333    5555555555555
   00          00   66         66         :::             11        00
00         :::                  33              55
   00          00   66         66         :::             11        00
00         :::                  33              55
    00       00    66         66         :::             11         00
```

```
00          :::       33         33   55         55
     000000000     6666666666666                    11111111
000000000                     3333333333333   5555555555555
      0000000       66666666666                    11111111
0000000                       33333333333     55555555555
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAA    LL
EEEEEEEEEEEEE
   SS         SS   CC         CC   AA         AA   LL              EE
   SS              CC              AA         AA   LL              EE
   SS              CC              AA         AA   LL              EE
   SSSSSSSSSSS    CC              AAAAAAAAAAAAA   LL
EEEEEEEEE
    SSSSSSSSSSS   CC              AAAAAAAAAAAAA   LL
EEEEEEEEE
              SS   CC              AA         AA   LL              EE
              SS   CC              AA         AA   LL              EE
   SS         SS   CC         CC   AA         AA   LL              EE
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE

********************************************************************************
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********************************************************************************
**************************************************
        *****
*****
        *****                                          program
verification information                                        *****
        *****
*****
        *****                                     code system:  SCALE
version:  6.1                                       *****
        *****
*****

********************************************************************************
**************************************************
```

```
********************************************************************************
************************************************
        *****
*****
        *****
*****
        *****                program:  opus
*****
        *****
*****
        *****         creation date:  21_jun_2011
*****
        *****
*****
        *****                library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****                jobname:  David
*****
        *****
*****
        *****          machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  06:10:35.06
*****
        *****
*****
        *****
*****

********************************************************************************
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```

```
************************************************
1
                          depletion material no. 1:depletion material no.
1:"curies"
0                 units of measure: curies
0                                        time (d)
   nuclide   0.000E+00 5.000E+00 1.000E+01 1.500E+01 2.000E+01 2.500E+01
3.000E+01 3.300E+01
   --------  --------- --------- --------- --------- --------- ---------
--------- ---------
     ag109   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     am241   3.934E-12 3.937E-12 3.939E-12 3.942E-12 3.944E-12 3.947E-12
3.949E-12 3.951E-12
     am242m  0.000E+00 2.716E-19 5.428E-19 8.146E-19 1.086E-18 1.358E-18
1.630E-18 1.630E-18
     am243   2.309E-13 2.309E-13 2.309E-13 2.309E-13 2.309E-13 2.309E-13
2.309E-13 2.309E-13
     cm242   3.818E-09 6.824E-09 6.697E-09 6.556E-09 6.418E-09 6.283E-09
6.151E-09 6.073E-09
     cm243   5.848E-11 5.846E-11 5.845E-11 5.843E-11 5.841E-11 5.839E-11
5.837E-11 5.836E-11
     cm244   9.403E-11 9.398E-11 9.393E-11 9.388E-11 9.383E-11 9.378E-11
9.373E-11 9.370E-11
     cm245   0.000E+00 4.085E-21 8.134E-21 1.218E-20 1.624E-20 2.029E-20
2.433E-20 2.433E-20
     cs133   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     eu153   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     gd155   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     i129    1.084E-16 1.544E-08 3.193E-08 4.843E-08 6.492E-08 8.142E-08
9.791E-08 9.897E-08
     i130    9.763E-23 9.864E-03 9.876E-03 9.877E-03 9.877E-03 9.877E-03
9.877E-03 1.748E-04
     i131    1.583E-22 4.703E+01 7.900E+01 9.983E+01 1.134E+02 1.221E+02
1.278E+02 1.002E+02
     i132    3.121E-20 1.373E+02 1.841E+02 2.000E+02 2.054E+02 2.072E+02
2.078E+02 1.090E+02
     i133    3.125E-20 3.128E+02 3.187E+02 3.188E+02 3.188E+02 3.188E+02
3.188E+02 2.972E+01
     i135    2.271E-06 2.956E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02
2.956E+02 1.486E-01
     kr85    2.104E-24 1.467E-02 2.997E-02 4.527E-02 6.055E-02 7.581E-02
9.107E-02 9.167E-02
     kr85m   1.022E-20 6.317E+01 6.317E+01 6.317E+01 6.317E+01 6.317E+01
6.317E+01 9.289E-04
     kr88    4.754E-18 1.655E+02 1.655E+02 1.655E+02 1.655E+02 1.655E+02
1.655E+02 3.868E-06
     mo95    0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
```

```
     nd143   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     nd145   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     o16     0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     pm147   6.487E-10 5.482E-02 1.990E-01 4.080E-01 6.638E-01 9.535E-01
1.267E+00 1.444E+00
     pu238   1.941E-11 2.053E-11 2.571E-11 3.974E-11 6.615E-11 1.072E-10
1.643E-10 1.893E-10
     pu239   7.059E-14 4.087E-05 1.167E-04 2.007E-04 2.865E-04 3.727E-04
4.590E-04 4.935E-04
     pu240   2.594E-13 9.493E-12 4.659E-11 1.169E-10 2.217E-10 3.611E-10
5.353E-10 5.354E-10
     pu241   1.191E-10 1.190E-10 1.189E-10 1.189E-10 1.188E-10 1.188E-10
1.188E-10 1.187E-10
     pu242   4.538E-15 5.319E-15 5.323E-15 5.323E-15 5.323E-15 5.323E-15
5.323E-15 5.323E-15
     pu243   0.000E+00 7.569E-15 7.589E-15 7.642E-15 7.642E-15 7.669E-15
7.655E-15 3.241E-19
     rh103   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     ru101   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     sm147   1.606E-20 1.677E-15 1.247E-14 3.923E-14 8.691E-14 1.591E-13
2.583E-13 3.313E-13
     sm149   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     sm150   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     sm151   5.688E+00 5.689E+00 5.691E+00 5.692E+00 5.694E+00 5.695E+00
5.696E+00 5.697E+00
     sm152   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     tc99    8.062E-15 5.007E-06 1.565E-05 2.791E-05 4.064E-05 5.349E-05
6.638E-05 7.220E-05
     u234    1.012E+01 1.012E+01 1.012E+01 1.012E+01 1.012E+01 1.012E+01
1.012E+01 1.012E+01
     u235    4.264E-01 4.264E-01 4.264E-01 4.264E-01 4.264E-01 4.264E-01
4.264E-01 4.264E-01
     u236    6.704E-02 6.704E-02 6.704E-02 6.704E-02 6.704E-02 6.704E-02
6.704E-02 6.704E-02
     u238    2.690E-01 2.690E-01 2.690E-01 2.690E-01 2.690E-01 2.690E-01
2.690E-01 2.690E-01
     xe131   0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00 0.000E+00
     xe133   1.186E-07 1.228E+02 2.184E+02 2.685E+02 2.944E+02 3.078E+02
3.147E+02 2.499E+02
     xe133m  2.827E-22 2.313E+00 3.198E+00 3.387E+00 3.426E+00 3.434E+00
3.436E+00 1.989E+00
     xe135   1.632E-06 3.076E+02 3.077E+02 3.077E+02 3.077E+02 3.077E+02
3.077E+02 4.151E+00
```

```
     xe135m  5.455E-18 3.754E+01 3.754E+01 3.754E+01 3.754E+01 3.754E+01
3.754E+01 1.523E-02
  subtotal   1.657E+01 1.508E+03 1.690E+03 1.777E+03 1.822E+03 1.847E+03
1.860E+03 5.132E+02
     total   1.657E+01 2.404E+04 2.476E+04 2.515E+04 2.541E+04 2.561E+04
2.577E+04 2.368E+03
1                          depletion material no. 1:depletion material no.
1:"curies"
0                  units of measure: curies
                   units of time(1st column):   time (d)
                nuclides
    time         ag109     am241     am242m    am243     cm242
cm243     cm244     cm245     cs133     eu153     gd155     i129
 ----------   --------- --------- --------- --------- --------- ---------
--------- --------- --------- --------- --------- ---------
  0.000E+00   0.000E+00 3.934E-12 0.000E+00 2.309E-13 3.818E-09 5.848E-11
9.403E-11 0.000E+00 0.000E+00 0.000E+00 0.000E+00 1.084E-16
  5.000E+00   0.000E+00 3.937E-12 2.716E-19 2.309E-13 6.824E-09 5.846E-11
9.398E-11 4.085E-21 0.000E+00 0.000E+00 0.000E+00 1.544E-08
  1.000E+01   0.000E+00 3.939E-12 5.428E-19 2.309E-13 6.697E-09 5.845E-11
9.393E-11 8.134E-21 0.000E+00 0.000E+00 0.000E+00 3.193E-08
  1.500E+01   0.000E+00 3.942E-12 8.146E-19 2.309E-13 6.556E-09 5.843E-11
9.388E-11 1.218E-20 0.000E+00 0.000E+00 0.000E+00 4.843E-08
  2.000E+01   0.000E+00 3.944E-12 1.086E-18 2.309E-13 6.418E-09 5.841E-11
9.383E-11 1.624E-20 0.000E+00 0.000E+00 0.000E+00 6.492E-08
  2.500E+01   0.000E+00 3.947E-12 1.358E-18 2.309E-13 6.283E-09 5.839E-11
9.378E-11 2.029E-20 0.000E+00 0.000E+00 0.000E+00 8.142E-08
  3.000E+01   0.000E+00 3.949E-12 1.630E-18 2.309E-13 6.151E-09 5.837E-11
9.373E-11 2.433E-20 0.000E+00 0.000E+00 0.000E+00 9.791E-08
  3.300E+01   0.000E+00 3.951E-12 1.630E-18 2.309E-13 6.073E-09 5.836E-11
9.370E-11 2.433E-20 0.000E+00 0.000E+00 0.000E+00 9.897E-08
1
0                  units of measure: curies
                   units of time(1st column):   time (d)
                nuclides
    time         i130      i131      i132      i133      i135      kr85
kr85m     kr88      mo95      nd143     nd145     o16
 ----------   --------- --------- --------- --------- --------- ---------
--------- --------- --------- --------- --------- ---------
  0.000E+00   9.763E-23 1.583E-22 3.121E-20 3.125E-20 2.271E-06 2.104E-24
1.022E-20 4.754E-18 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  5.000E+00   9.864E-03 4.703E+01 1.373E+02 3.128E+02 2.956E+02 1.467E-02
6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  1.000E+01   9.876E-03 7.900E+01 1.841E+02 3.187E+02 2.956E+02 2.997E-02
6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  1.500E+01   9.877E-03 9.983E+01 2.000E+02 3.188E+02 2.956E+02 4.527E-02
6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  2.000E+01   9.877E-03 1.134E+02 2.054E+02 3.188E+02 2.956E+02 6.055E-02
6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  2.500E+01   9.877E-03 1.221E+02 2.072E+02 3.188E+02 2.956E+02 7.581E-02
6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  3.000E+01   9.877E-03 1.278E+02 2.078E+02 3.188E+02 2.956E+02 9.107E-02
```

```
6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  3.300E+01   1.748E-04 1.002E+02 1.090E+02 2.972E+01 1.486E-01 9.167E-02
9.289E-04 3.868E-06 0.000E+00 0.000E+00 0.000E+00 0.000E+00
1
0                 units of measure: curies
                  units of time(1st column):   time (d)
              nuclides
    time         pm147     pu238     pu239     pu240     pu241
pu242     pu243     rh103     ru101     sm147     sm149     sm150
 ----------   --------- --------- --------- --------- --------- ---------
--------- --------- --------- --------- --------- --------- ---------
  0.000E+00   6.487E-10 1.941E-11 7.059E-14 2.594E-13 1.191E-10 4.538E-15
0.000E+00 0.000E+00 0.000E+00 1.606E-20 0.000E+00 0.000E+00
  5.000E+00   5.482E-02 2.053E-11 4.087E-05 9.493E-12 1.190E-10 5.319E-15
7.569E-15 0.000E+00 0.000E+00 1.677E-15 0.000E+00 0.000E+00
  1.000E+01   1.990E-01 2.571E-11 1.167E-04 4.659E-11 1.189E-10 5.323E-15
7.589E-15 0.000E+00 0.000E+00 1.247E-14 0.000E+00 0.000E+00
  1.500E+01   4.080E-01 3.974E-11 2.007E-04 1.169E-10 1.189E-10 5.323E-15
7.642E-15 0.000E+00 0.000E+00 3.923E-14 0.000E+00 0.000E+00
  2.000E+01   6.638E-01 6.615E-11 2.865E-04 2.217E-10 1.188E-10 5.323E-15
7.642E-15 0.000E+00 0.000E+00 8.691E-14 0.000E+00 0.000E+00
  2.500E+01   9.535E-01 1.072E-10 3.727E-04 3.611E-10 1.188E-10 5.323E-15
7.669E-15 0.000E+00 0.000E+00 1.591E-13 0.000E+00 0.000E+00
  3.000E+01   1.267E+00 1.643E-10 4.590E-04 5.353E-10 1.188E-10 5.323E-15
7.655E-15 0.000E+00 0.000E+00 2.583E-13 0.000E+00 0.000E+00
  3.300E+01   1.444E+00 1.893E-10 4.935E-04 5.354E-10 1.187E-10 5.323E-15
3.241E-19 0.000E+00 0.000E+00 3.313E-13 0.000E+00 0.000E+00
1
0                 units of measure: curies
                  units of time(1st column):   time (d)
              nuclides
    time         sm151     sm152     tc99      u234      u235      u236
u238      xe131     xe133     xe133m    xe135     xe135m
 ----------   --------- --------- --------- --------- --------- ---------
--------- --------- --------- --------- --------- ---------
  0.000E+00   5.688E+00 0.000E+00 8.062E-15 1.012E+01 4.264E-01 6.704E-02
2.690E-01 0.000E+00 1.186E-07 2.827E-22 1.632E-06 5.455E-18
  5.000E+00   5.689E+00 0.000E+00 5.007E-06 1.012E+01 4.264E-01 6.704E-02
2.690E-01 0.000E+00 1.228E+02 2.313E+00 3.076E+02 3.754E+01
  1.000E+01   5.691E+00 0.000E+00 1.565E-05 1.012E+01 4.264E-01 6.704E-02
2.690E-01 0.000E+00 2.184E+02 3.198E+00 3.077E+02 3.754E+01
  1.500E+01   5.692E+00 0.000E+00 2.791E-05 1.012E+01 4.264E-01 6.704E-02
2.690E-01 0.000E+00 2.685E+02 3.387E+00 3.077E+02 3.754E+01
  2.000E+01   5.694E+00 0.000E+00 4.064E-05 1.012E+01 4.264E-01 6.704E-02
2.690E-01 0.000E+00 2.944E+02 3.426E+00 3.077E+02 3.754E+01
  2.500E+01   5.695E+00 0.000E+00 5.349E-05 1.012E+01 4.264E-01 6.704E-02
2.690E-01 0.000E+00 3.078E+02 3.434E+00 3.077E+02 3.754E+01
  3.000E+01   5.696E+00 0.000E+00 6.638E-05 1.012E+01 4.264E-01 6.704E-02
2.690E-01 0.000E+00 3.147E+02 3.436E+00 3.077E+02 3.754E+01
  3.300E+01   5.697E+00 0.000E+00 7.220E-05 1.012E+01 4.264E-01 6.704E-02
2.690E-01 0.000E+00 2.499E+02 1.989E+00 4.151E+00 1.523E-02
1
```

0 units of measure: curies
units of time(1st column): time (d)

time	subtotal	total
0.000E+00	1.657E+01	1.657E+01
5.000E+00	1.508E+03	2.404E+04
1.000E+01	1.690E+03	2.476E+04
1.500E+01	1.777E+03	2.515E+04
2.000E+01	1.822E+03	2.541E+04
2.500E+01	1.847E+03	2.561E+04
3.000E+01	1.860E+03	2.577E+04
3.300E+01	5.132E+02	2.368E+03

1

```
    OOOOOOOOOOO    PPPPPPPPPPPP    UU          UU    SSSSSSSSSS
   OOOOOOOOOOOOO   PPPPPPPPPPPPP   UU          UU   SSSSSSSSSSSS
   OO          OO  PP          PP  UU          UU   SS         SS
   OO          OO  PP          PP  UU          UU   SS
   OO          OO  PP          PP  UU          UU   SS
   OO          OO  PPPPPPPPPPPPP   UU          UU   SSSSSSSSSSS
   OO          OO  PPPPPPPPPPPP    UU          UU    SSSSSSSSSSS
   OO          OO  PP              UU          UU              SS
   OO          OO  PP              UU          UU              SS
   OO          OO  PP              UU          UU   SS         SS
   OOOOOOOOOOOOO   PP              UUUUUUUUUUUUU   SSSSSSSSSSSS
    OOOOOOOOOOO    PP               UUUUUUUUUUU     SSSSSSSSSS


   DDDDDDDDDDDD      AAAAAAAAA     VV          VV  IIIIIIIIIII
DDDDDDDDDDDD
   DDDDDDDDDDDDD    AAAAAAAAAA    VV          VV  IIIIIIIIIII
DDDDDDDDDDDDD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AA         AA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA   VV          VV       II         DD
DD
   DD         DD   AAAAAAAAAAAAA    VV        VV        II         DD
DD
   DD         DD   AA         AA      VV     VV         II         DD
DD
   DD         DD   AA         AA       VV   VV          II         DD
DD
   DD         DD   AA         AA        VV VV           II         DD
DD
   DDDDDDDDDDDDD   AA         AA         VVV       IIIIIIIIIII
DDDDDDDDDDDDD
   DDDDDDDDDDDD    AA         AA          V        IIIIIIIIIII
```

DDDDDDDDDDDD

```
      0000000       88888888888                //   22222222222
33333333333               //        11          666666666666
     000000000     8888888888888              //   2222222222222
3333333333333             //        111         6666666666666
    00       00    88         88             //    22         22   33
33             //        1111         66
   00         00   88         88            //                22
33            //           11         66
   00         00   88         88           //                 22
33           //            11         66
   00         00    88888888888           //                22
333          //             11        666666666666
   00         00    88888888888          //                22
333          //             11        6666666666666
   00         00   88         88        //               22
33        //               11         66         66
   00         00   88         88       //             22
33       //               11         66         66
    00       00    88         88      //            22             33
33      //               11         66         66
     000000000     8888888888888     //           2222222222222
3333333333333     //               11111111     6666666666666
      0000000       88888888888     //           2222222222222
33333333333     //                11111111      66666666666
```

```
      0000000       666666666666                          11
0000000                     33333333333    5555555555555
     000000000     6666666666666                        111
000000000                   3333333333333   5555555555555
    00       00    66                   :::           1111         00
00          :::       33         33   55
   00         00   66                   :::             11        00
00         :::                 33   55
   00         00   66                   :::             11        00
00         :::                 33   55
   00         00   666666666666                         11        00
00                          333    555555555555
   00         00   6666666666666                        11        00
00                          333    5555555555555
   00         00   66         66         :::             11        00
00         :::                   33              55
   00         00   66         66         :::             11        00
00         :::                   33              55
    00       00    66         66         :::             11         00
00          :::       33         33   55         55
     000000000     6666666666666                      11111111
```

```
000000000                    3333333333333   5555555555555
      0000000       66666666666                    11111111
0000000                      33333333333     55555555555
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAA    LL
EEEEEEEEEEEE
   SS         SS   CC          CC   AA          AA   LL              EE
   SS              CC               AA          AA   LL              EE
   SS              CC               AA          AA   LL              EE
   SSSSSSSSSSS    CC               AAAAAAAAAAAAA   LL
EEEEEEEEE
    SSSSSSSSSSS   CC               AAAAAAAAAAAAA   LL
EEEEEEEEE
              SS   CC               AA          AA   LL              EE
              SS   CC               AA          AA   LL              EE
   SS         SS   CC          CC   AA          AA   LL              EE
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA          AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA          AA   LLLLLLLLLLLL
EEEEEEEEEEEE



********************************************************************************
**********************************************

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**********************************************

********************************************************************************
**********************************************
        *****
*****
        *****                                          program
verification information                                      *****
        *****
*****
        *****                                     code system:  SCALE
version:  6.1                                        *****
        *****
*****

********************************************************************************
**********************************************

********************************************************************************
```

```
************************************************
        *****
*****
        *****
*****
        *****               program:  opus
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.33572
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  23_aug_2016
*****
        *****
*****
        *****    time of execution:  06:10:35.12
*****
        *****
*****
        *****
*****

************************************************************************
************************************************

************************************************************************
************************************************

************************************************************************
************************************************
1
```

depletion material no. 1:depletion material no. 1:"grams"

0 units of measure: grams

0 time (d)

nuclide	0.000E+00	5.000E+00	1.000E+01	1.500E+01	2.000E+01	2.500E+01	3.000E+01	3.300E+01
ag108m	2.729E-31	1.364E-10	2.728E-10	4.091E-10	5.453E-10	6.817E-10	8.179E-10	8.179E-10
ag109	5.187E-13	3.683E-06	8.091E-06	1.250E-05	1.691E-05	2.132E-05	2.573E-05	2.644E-05
am241	1.147E-12	1.148E-12	1.148E-12	1.149E-12	1.150E-12	1.150E-12	1.151E-12	1.152E-12
am242m	0.000E+00	2.591E-20	5.178E-20	7.772E-20	1.036E-19	1.296E-19	1.555E-19	1.555E-19
am243	1.156E-12	1.156E-12	1.156E-12	1.156E-12	1.156E-12	1.156E-12	1.156E-12	1.156E-12
cm242	1.152E-12	2.058E-12	2.020E-12	1.977E-12	1.936E-12	1.895E-12	1.855E-12	1.831E-12
cm243	1.156E-12	1.156E-12	1.156E-12	1.155E-12	1.155E-12	1.154E-12	1.154E-12	1.154E-12
cm244	1.161E-12	1.160E-12	1.160E-12	1.159E-12	1.159E-12	1.158E-12	1.157E-12	1.157E-12
cm245	0.000E+00	2.379E-20	4.736E-20	7.094E-20	9.455E-20	1.181E-19	1.416E-19	1.416E-19
cs133	6.329E-13	1.928E-04	8.125E-04	1.681E-03	2.680E-03	3.745E-03	4.845E-03	5.457E-03
eu153	1.135E-01	1.135E-01	1.136E-01	1.136E-01	1.136E-01	1.136E-01	1.137E-01	1.137E-01
gd155	3.151E-02	3.151E-02	3.151E-02	3.151E-02	3.151E-02	3.151E-02	3.151E-02	3.151E-02
i129	6.138E-13	8.742E-05	1.808E-04	2.742E-04	3.676E-04	4.610E-04	5.544E-04	5.604E-04
i130	5.004E-29	5.056E-09	5.062E-09	5.062E-09	5.062E-09	5.062E-09	5.062E-09	8.957E-11
i131	1.274E-27	3.783E-04	6.355E-04	8.030E-04	9.118E-04	9.824E-04	1.028E-03	8.061E-04
i132	3.016E-27	1.327E-05	1.779E-05	1.932E-05	1.984E-05	2.002E-05	2.008E-05	1.053E-05
i133	2.757E-26	2.760E-04	2.812E-04	2.813E-04	2.813E-04	2.813E-04	2.813E-04	2.623E-05
i135	6.424E-13	8.364E-05	8.364E-05	8.364E-05	8.364E-05	8.364E-05	8.364E-05	4.204E-08
kr85	5.379E-27	3.750E-05	7.662E-05	1.157E-04	1.548E-04	1.938E-04	2.328E-04	2.343E-04
kr85m	1.241E-27	7.673E-06	7.673E-06	7.673E-06	7.673E-06	7.673E-06	7.673E-06	1.128E-10
kr88	3.790E-25	1.319E-05	1.319E-05	1.319E-05	1.319E-05	1.319E-05	1.319E-05	3.083E-13
mo95	5.102E-01	5.102E-01	5.102E-01	5.102E-01	5.102E-01	5.103E-01	5.103E-01	5.103E-01

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     nd143   6.805E-13 6.324E-05 3.234E-04 7.646E-04 1.348E-03 2.042E-03
2.822E-03 3.306E-03
     nd145   6.900E-13 6.616E-04 1.375E-03 2.088E-03 2.801E-03 3.514E-03
4.228E-03 4.279E-03
     o16     7.613E-14 7.613E-14 7.613E-14 7.613E-14 7.613E-14 7.613E-14
7.613E-14 7.613E-14
     pu238   1.133E-12 1.198E-12 1.501E-12 2.319E-12 3.861E-12 6.259E-12
9.591E-12 1.105E-11
     pu239   1.137E-12 6.585E-04 1.881E-03 3.233E-03 4.616E-03 6.005E-03
7.394E-03 7.951E-03
     pu240   1.142E-12 4.179E-11 2.051E-10 5.149E-10 9.759E-10 1.590E-09
2.357E-09 2.357E-09
     pu241   1.147E-12 1.146E-12 1.145E-12 1.145E-12 1.144E-12 1.144E-12
1.143E-12 1.143E-12
     pu242   1.152E-12 1.350E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12
1.351E-12 1.351E-12
     pu243   0.000E+00 2.908E-21 2.915E-21 2.935E-21 2.936E-21 2.946E-21
2.940E-21 1.245E-25
     ra222   0.000E+00 3.410E-25 3.460E-24 1.221E-23 2.853E-23 5.343E-23
8.741E-23 1.076E-22
     rh103   4.901E-13 1.660E-05 6.488E-05 1.422E-04 2.460E-04 3.742E-04
5.246E-04 6.188E-04
     ru101   4.806E-13 6.569E-04 1.318E-03 1.978E-03 2.639E-03 3.299E-03
3.960E-03 3.964E-03
     sm147   6.995E-13 7.304E-08 5.434E-07 1.709E-06 3.786E-06 6.931E-06
1.126E-05 1.443E-05
     sm149   7.090E-13 1.060E-04 3.007E-04 5.140E-04 7.312E-04 9.491E-04
1.167E-03 1.254E-03
     sm150   7.138E-13 6.852E-09 1.670E-08 3.013E-08 4.731E-08 6.824E-08
9.296E-08 9.314E-08
     sm151   2.161E-01 2.162E-01 2.162E-01 2.163E-01 2.163E-01 2.164E-01
2.165E-01 2.165E-01
     sm152   7.233E-13 5.161E-05 1.034E-04 1.552E-04 2.069E-04 2.587E-04
3.105E-04 3.106E-04
     tc99    4.711E-13 2.926E-04 9.145E-04 1.631E-03 2.375E-03 3.126E-03
3.879E-03 4.219E-03
     u234    1.625E+03 1.625E+03 1.625E+03 1.625E+03 1.625E+03 1.625E+03
1.625E+03 1.625E+03
     u235    1.972E+05 1.972E+05 1.972E+05 1.972E+05 1.972E+05 1.972E+05
1.972E+05 1.972E+05
     u236    1.036E+03 1.036E+03 1.036E+03 1.036E+03 1.036E+03 1.036E+03
1.036E+03 1.036E+03
     u238    7.999E+05 7.999E+05 7.999E+05 7.999E+05 7.999E+05 7.999E+05
7.999E+05 7.999E+05
     xe133   6.329E-13 6.556E-04 1.166E-03 1.433E-03 1.571E-03 1.643E-03
1.680E-03 1.334E-03
     xe133m  6.303E-28 5.158E-06 7.130E-06 7.552E-06 7.639E-06 7.657E-06
7.660E-06 4.436E-06
     xe135   6.424E-13 1.211E-04 1.211E-04 1.211E-04 1.211E-04 1.211E-04
1.211E-04 1.634E-06
     xe135m  5.986E-26 4.120E-07 4.120E-07 4.120E-07 4.120E-07 4.120E-07
4.120E-07 1.672E-10
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  subtotal   9.998E+05 9.998E+05 9.998E+05 9.998E+05 9.998E+05 9.998E+05
9.998E+05 9.998E+05
     total   1.590E+06 1.590E+06 1.590E+06 1.590E+06 1.590E+06 1.590E+06
1.590E+06 1.590E+06
1                          depletion material no. 1:depletion material no.
1:"grams"
0                  units of measure: grams
                   units of time(1st column):   time (d)
               nuclides
    time         ag108m    ag109     am241     am242m    am243
cm242     cm243     cm244     cm245     cs133     eu153     gd155
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--------- --------- --------- --------- --------- ---------
  0.000E+00   2.729E-31 5.187E-13 1.147E-12 0.000E+00 1.156E-12 1.152E-12
1.156E-12 1.161E-12 0.000E+00 6.329E-13 1.135E-01 3.151E-02
  5.000E+00   1.364E-10 3.683E-06 1.148E-12 2.591E-20 1.156E-12 2.058E-12
1.156E-12 1.160E-12 2.379E-20 1.928E-04 1.135E-01 3.151E-02
  1.000E+01   2.728E-10 8.091E-06 1.148E-12 5.178E-20 1.156E-12 2.020E-12
1.156E-12 1.160E-12 4.736E-20 8.125E-04 1.136E-01 3.151E-02
  1.500E+01   4.091E-10 1.250E-05 1.149E-12 7.772E-20 1.156E-12 1.977E-12
1.155E-12 1.159E-12 7.094E-20 1.681E-03 1.136E-01 3.151E-02
  2.000E+01   5.453E-10 1.691E-05 1.150E-12 1.036E-19 1.156E-12 1.936E-12
1.155E-12 1.159E-12 9.455E-20 2.680E-03 1.136E-01 3.151E-02
  2.500E+01   6.817E-10 2.132E-05 1.150E-12 1.296E-19 1.156E-12 1.895E-12
1.154E-12 1.158E-12 1.181E-19 3.745E-03 1.136E-01 3.151E-02
  3.000E+01   8.179E-10 2.573E-05 1.151E-12 1.555E-19 1.156E-12 1.855E-12
1.154E-12 1.157E-12 1.416E-19 4.845E-03 1.137E-01 3.151E-02
  3.300E+01   8.179E-10 2.644E-05 1.152E-12 1.555E-19 1.156E-12 1.831E-12
1.154E-12 1.157E-12 1.416E-19 5.457E-03 1.137E-01 3.151E-02
1
0                  units of measure: grams
                   units of time(1st column):   time (d)
               nuclides
    time         i129      i130      i131      i132      i133      i135
kr85      kr85m     kr88      mo95      nd143     nd145
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  0.000E+00   6.138E-13 5.004E-29 1.274E-27 3.016E-27 2.757E-26 6.424E-13
5.379E-27 1.241E-27 3.790E-25 5.102E-01 6.805E-13 6.900E-13
  5.000E+00   8.742E-05 5.056E-09 3.783E-04 1.327E-05 2.760E-04 8.364E-05
3.750E-05 7.673E-06 1.319E-05 5.102E-01 6.324E-05 6.616E-04
  1.000E+01   1.808E-04 5.062E-09 6.355E-04 1.779E-05 2.812E-04 8.364E-05
7.662E-05 7.673E-06 1.319E-05 5.102E-01 3.234E-04 1.375E-03
  1.500E+01   2.742E-04 5.062E-09 8.030E-04 1.932E-05 2.813E-04 8.364E-05
1.157E-04 7.673E-06 1.319E-05 5.102E-01 7.646E-04 2.088E-03
  2.000E+01   3.676E-04 5.062E-09 9.118E-04 1.984E-05 2.813E-04 8.364E-05
1.548E-04 7.673E-06 1.319E-05 5.102E-01 1.348E-03 2.801E-03
  2.500E+01   4.610E-04 5.062E-09 9.824E-04 2.002E-05 2.813E-04 8.364E-05
1.938E-04 7.673E-06 1.319E-05 5.103E-01 2.042E-03 3.514E-03
  3.000E+01   5.544E-04 5.062E-09 1.028E-03 2.008E-05 2.813E-04 8.364E-05
2.328E-04 7.673E-06 1.319E-05 5.103E-01 2.822E-03 4.228E-03
  3.300E+01   5.604E-04 8.957E-11 8.061E-04 1.053E-05 2.623E-05 4.204E-08
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2.343E-04 1.128E-10 3.083E-13 5.103E-01 3.306E-03 4.279E-03
1
0 units of measure: grams
units of time(1st column): time (d)
nuclides
time o16 pu238 pu239 pu240 pu241
pu242 pu243 ra222 rh103 ru101 sm147 sm149
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0.000E+00 7.613E-14 1.133E-12 1.137E-12 1.142E-12 1.147E-12 1.152E-12
0.000E+00 0.000E+00 4.901E-13 4.806E-13 6.995E-13 7.090E-13
5.000E+00 7.613E-14 1.198E-12 6.585E-04 4.179E-11 1.146E-12 1.350E-12
2.908E-21 3.410E-25 1.660E-05 6.569E-04 7.304E-08 1.060E-04
1.000E+01 7.613E-14 1.501E-12 1.881E-03 2.051E-10 1.145E-12 1.351E-12
2.915E-21 3.460E-24 6.488E-05 1.318E-03 5.434E-07 3.007E-04
1.500E+01 7.613E-14 2.319E-12 3.233E-03 5.149E-10 1.145E-12 1.351E-12
2.935E-21 1.221E-23 1.422E-04 1.978E-03 1.709E-06 5.140E-04
2.000E+01 7.613E-14 3.861E-12 4.616E-03 9.759E-10 1.144E-12 1.351E-12
2.936E-21 2.853E-23 2.460E-04 2.639E-03 3.786E-06 7.312E-04
2.500E+01 7.613E-14 6.259E-12 6.005E-03 1.590E-09 1.144E-12 1.351E-12
2.946E-21 5.343E-23 3.742E-04 3.299E-03 6.931E-06 9.491E-04
3.000E+01 7.613E-14 9.591E-12 7.394E-03 2.357E-09 1.143E-12 1.351E-12
2.940E-21 8.741E-23 5.246E-04 3.960E-03 1.126E-05 1.167E-03
3.300E+01 7.613E-14 1.105E-11 7.951E-03 2.357E-09 1.143E-12 1.351E-12
1.245E-25 1.076E-22 6.188E-04 3.964E-03 1.443E-05 1.254E-03
1
0 units of measure: grams
units of time(1st column): time (d)
nuclides
time sm150 sm151 sm152 tc99 u234 u235
u236 u238 xe133 xe133m xe135 xe135m
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0.000E+00 7.138E-13 2.161E-01 7.233E-13 4.711E-13 1.625E+03 1.972E+05
1.036E+03 7.999E+05 6.329E-13 6.303E-28 6.424E-13 5.986E-26
5.000E+00 6.852E-09 2.162E-01 5.161E-05 2.926E-04 1.625E+03 1.972E+05
1.036E+03 7.999E+05 6.556E-04 5.158E-06 1.211E-04 4.120E-07
1.000E+01 1.670E-08 2.162E-01 1.034E-04 9.145E-04 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.166E-03 7.130E-06 1.211E-04 4.120E-07
1.500E+01 3.013E-08 2.163E-01 1.552E-04 1.631E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.433E-03 7.552E-06 1.211E-04 4.120E-07
2.000E+01 4.731E-08 2.163E-01 2.069E-04 2.375E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.571E-03 7.639E-06 1.211E-04 4.120E-07
2.500E+01 6.824E-08 2.164E-01 2.587E-04 3.126E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.643E-03 7.657E-06 1.211E-04 4.120E-07
3.000E+01 9.296E-08 2.165E-01 3.105E-04 3.879E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.680E-03 7.660E-06 1.211E-04 4.120E-07
3.300E+01 9.314E-08 2.165E-01 3.106E-04 4.219E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.334E-03 4.436E-06 1.634E-06 1.672E-10
1
0 units of measure: grams
units of time(1st column): time (d)

time	subtotal	total
0.000E+00	9.998E+05	1.590E+06
5.000E+00	9.998E+05	1.590E+06
1.000E+01	9.998E+05	1.590E+06
1.500E+01	9.998E+05	1.590E+06
2.000E+01	9.998E+05	1.590E+06
2.500E+01	9.998E+05	1.590E+06
3.000E+01	9.998E+05	1.590E+06
3.300E+01	9.998E+05	1.590E+06